IPAP18

Innovations in Pharmacy

ADVANCES & PERSPECTIVES

Ediciones Universidad Salamanca

IPAP18.org

Abstracts

24 / 28 September Salamanca

IPAP 18
Innovations in Pharmacy: Advances and Perspectives

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Innovations in Pharmacy: Advances and Perspectives

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IPAP18
Innovations
in Pharmacy
ADVANCES & PERSPECTIVES
IPAP18.org
CONGRESS PROGRAM
24 / 28 September
Salamanca

Congress Schedule

24 Mon
COIFFA Workshop 11:00 Sala de Grados
COIFFA Meeting 16:00 Sala de Grados

25 Tues
COIFFA Assembly 9:00 Salón de Actos
Congress check-in 12:00 -18:00 Hospedería Fonseca

OPENING SESSION: 18:00 Hospedería Fonseca
Nobel Prize Dr. P. Sharp

Chamber Chorus USAL
Welcome Cocktail 20:30 Colegio Fonseca


Phillip Allen Sharp

26 Wed — Morning
SYMPOSIUM: PHARMACY EDUCATION AROUND THE WORLD
9:00 FACULTY OF PHARMACY
Workshop 1: Europe Salón de Actos
Workshop 2: Iberoamérica Aula II
Workshop 3: N.C. América Aula III
11:00 FACULTY OF PHARMACY
Workshop 4: E-Learning Salón de Actos
Workshop 5: Africa Aula II
Workshop 6: Asia Aula III
POSTER SESSION 12:30 FACULTY OF PHARMACY
PLENARY SESSION: 13:00 Salón de Actos
Dr. M. García Blanco


Mariano A. García Blanco

26 Wed — Afternoon
SYMPOSIUM: EDUSFARM
Edusfarm 1: Dean's Conference 9:00-18:00 Colegio Fonseca
Grupo bida farma — BIDAFARMA PRESENTATION 15:30-17:30 AULA I
15:30 FACULTY OF PHARMACY
Edusfarm 2: Vicedean's Conference Sala de Grados
Edusfarm 3a: Oral presentation Salón de Actos
Edusfarm 3b: Oral presentation Aula II
Edusfarm 4: Pharma for NTDs Aula III
17:30 FACULTY OF PHARMACY
Edusfarm 5: Meeting Erasmus Sala de Grados
Edusfarm 6: Individual Med (AEFF) Salón de Actos
Edusfarm 7: Type 2 Diabetes (SEFAC) Aula II
Edusfarm 8: MEDAFAR (P. Care) Aula III
SYMPOSIUM SEFAC 20:30 PARANINFO University of Salamanca

27 Thu — Morning
SYMPOSIUM: SEFAC, The pharmacist you need
10:00 - 18:00 PLAZA DE LOS BANDOS
SYMPOSIUM:RESEARCH AND PHARMACY
9:00 FACULTY OF PHARMACY
Workshop 7: Brain Therapeutics Salón de Actos
Workshop 8: Food and Health Aula II
Workshop 9: Nanotechnology Aula III
11:00 FACULTY OF PHARMACY
Workshop 10: Big Data Haematology Salón de Actos
Workshop 11: Cardiology Aula II
Workshop 12: Superbugs Aula III
POSTER SESSION 12:30 FACULTY OF PHARMACY
PLENARY SESSION: 13:00 Salón de Actos
Dr. M. E. Patarroyo


Manuel Elkin Patarroyo Murillo

27 Thu — Afternoon
SYMPOSIUM: ACADEMIES OF PHARMACY
15:30 PARANINFO USAL
Mylan — MYLAN PRESENTATION 16:00 AULA I
SYMPOSIUM: EDUSFARM
15:30 FACULTY OF PHARMACY
Edusfarm 9a: Oral presentation Salón Actos
Edusfarm 9b: Oral presentation Aula II
Edusfarm 10: Meeting Pharm Care Teachers Aula III
Edusfarm 11: Meeting FInal Project Sala de Grados
17:30 FACULTY OF PHARMACY
Edusfarm 12: Pharma Tech Iberoamerica Salón de Actos
Edusfarm 13: Marketing Aula II
Edusfarm 14: Learning Meth Aula III
Edusfarm 15: Sentinel Pharmacies CONCYL Sala de Grados
COFARES **OPENING AUSAF** 19:00 FACULTY OF PHARMACY

28 Fri
SYMPOSIUM: PHARMACEUTICAL APPROACH
9:00 FACULTY OF PHARMACY
Pharmacy Academies Meeting Sala de Grados
Workshop 13: CONGRAL Salón de Actos
Workshop 14: SEFIG Aula II
Workshop 15: Science Park Salamanca Aula III
11:00 FACULTY OF PHARMACY
Workshop 16: SEFH Salón de Actos
Workshop17: Water Resources Aula II
Workshop 18: Startup Olé accelerator Aula III
POSTER SESSION 12:30 FACULTY OF PHARMACY
PLENARY SESSION: 13:00 Salón de Actos
Dra. B Domínguez-Gil González


Beatriz Domínguez-Gil González

FAREWELL LUNCH
14:00 Castillo del Buen Amor
SALIDA BUS / SHUTTLE DEPART: 14:15 UNIVERSITY CAMPUS

IPAP18
Innovations in Pharmacy
ADVANCES & PERSPECTIVES

#IPAP18
Mylan — Better Health for a Better World
Grupo bida farma

24 Monday · Lunes

11:00 Sala de Grados Workshop COIFFA “Taller Mínimos Curriculares”

16:00 Sala de Grados Meeting COIFFA

25 Tuesday · Martes

9:00 Salón de Actos Assembly COIFFA

12:00 - 18:00 Hospedería Fonseca **CONGRESS CHECK-IN**

18:00 Hospedería Fonseca

OPENING SESSION

Inaugural Lecture:
Transforming Pharmacy through scientific advances.

Dr. Phillip Allen Sharp
Nobel Prize 1993.

Chamber Chorus University of Salamanca

20:30 Colegio Arzobispo Fonseca

Welcome Cocktail

26

Wednesday · Miércoles

SYMPOSIUM: EDUSFARM

9:00 - 18:00 Colegio Arzobispo Fonseca E1. Dean's Conference

SYMPOSIUM: PHARMACY EDUCATION AROUND THE WORLD

9:00 FACULTY OF PHARMACY

Salón de Actos **Workshop 1: Europe.**

Chairperson: Luis Recalde Manrique (Faculty of Pharmacy, University of Granada, Spain).

· The studies of pharmacy in France in 2018: the example of the faculty of Caen. **Michel Boulouard.** *Pharmacie, Université de Caen, Normandie, France.*
· The studies of pharmacy in Poland: the example of the faculty of Krakow. **Renata M F Jachowicz.** *Jagiellonian University, Medical College, Poland.*
· The studies of pharmacy in Portugal: the example of the faculty of Coimbra. **Fernando Ramos.** *Faculty of Pharmacy, University of Coimbra, Portugal*.

Aula II **Workshop 2: IberoamericaPharm. Pharmaceutical Education in Iberoamerica. Scenaries 2030 (challenges and trends).**

Chairperson: Patricia Parra Cervantes and Ramón Soto Vázquez (Facultad de Estudios Superiores, UNAM, México).

· The University on the Horizon 2030. **Alma X. Herrera Márquez**. *Universidad Abierta y a Distancia, UNAM, México.*
· Pharmaceutical Education. . .Where are we going? **Iván Torres Marquina.** *Universidad Privada Antonio Guillermo Urrelo, Perú.*
· Challenges of Pharmaceutical Education. **María Eugenia de Olivera.** *Facultad de Farmacia, Universidad de Córdoba, Argentina.*

Aula III **Workshop 3: AmericaPharm. Pharmaceutical Education in North America and Central America.**

Chairperson: Wanda T. Maldonado-Dávila (School of Pharmacy, University of Puerto Rico, Puerto Rico).

· Pharmacy Education in Canada. **Marc Desgagné.** *Faculté de Pharmacie, Université Laval, Canada.*
· Pharmacy Education in Panamá. **Rosa Buitrago.** *Facultad de Farmacia, Universidad de Panamá, Panamá.*
· Pharmacy Education in the United States of America and Puerto Rico. **Wanda T. Maldonado-Dávila.** *School of Pharmacy, University of Puerto Rico, Puerto Rico.*

10:30 COFFEE BREAK

IPAP18 Innovations in Pharmacy ADVANCES & PERSPECTIVES

26

Wednesday · Miércoles

SYMPOSIUM: PHARMACY EDUCATION AROUND THE WORLD

11:00 FACULTY OF PHARMACY

Salón de Actos **Workshop 4: E-LearningPharm. Working towards better learning in Pharmacy.**

Chairperson: Mª Luisa Ferrándiz and Teresa Mª Garrigues (Facultat de Farmàcia, University of Valencia, Spain).

· Use of technology to deliver team-based learning. **Geeta Hitch.** *Dept Pharmacy Practice, School of Life Sciences, University of Sussex, UK.*
· Technology and Social Media for increasing learning, communication, and critical thinking in our learners. **Ruth E. Nemire.** *American Association of Colleges of Pharmacy (AACP), Associate Executive Vice President, USA.*
· Can we achieve competencies in lab work virtually? **Isabel Andújar Pérez.** *Departamento Ciencias Biomédicas y de la Salud, Universidad Europea de Valencia, Spain.*

Aula II **Workshop 5: AfricaPharm: Pharmacy Education in Africa.**

Chairperson: David Roca Biosca (Fundación El Alto, Castellón, Spain).

· Pharmacy situation in francophone Africa. Opportunities of Higher Education in Pharmacy in Sub Saharan Africa. **David Roca Biosca.** *Fundación El Alto, Castellón, Spain.*
· Pharmacy Education in Ethiopia. Research goals in Pharmaceutical education in Africa. **Ephrem Engidawork.** *School of Pharmacy of Addis Ababa University, Ethiopia.*
· Pharmacy Education in Uganda. Challenges in the leadership of African Pharmaceutical Education. **Richard Odoi Adome.** *School of Health Sciences, Makerere University, Uganda.*

Aula III **Workshop 6: AsiaPharm. Education in Pharmacy around the world: Asia.**

Chairperson: Akira Ikari (Gifu Pharmaceutical University, Gifu, Japan).

· Pharmaceutical education system in Japan. **Akira Ikari.** *Gifu Pharmaceutical University, Gifu, Japan.*
· Pharmacy Practice Model in Japan. **Yasuo Takeda.** *Kagoshima University Hospital, Japan.*
· Exploring innovative pharmaceutical talents cultivation mode in Zhejiang University. **Xiangnan Zhang.** *Zhejiang University, China.*

12:30 FACULTY OF PHARMACY

POSTER SESSION

Posters related to Symposium Pharmacy Education Around the World will be displayed on television screens and, in addition, computer rooms will be enabled, where it will be possible to consult the posters more peacefully.

26

Wednesday · Miércoles

13:00 FACULTY OF PHARMACY

Salón de Actos **PLENARY SESSION**

The Love-Hate relationship between host proteins and viral RNAs.

Mariano A. García Blanco
Biochemistry and Molecular Biology University of Texas Medical Branch Galveston TX, USA.

14:00 WORK LUNCH

SYMPOSIUM: EDUSFARM

15:30 FACULTY OF PHARMACY

Grupo bida farma

BIDAFARMA PRESENTATION
AULA I

Sala de Grados **E2. Vicedean's Conference.**

Chairperson: Ana Martín Suárez (University of Salamanca, Spain).

Salón de Actos **E3a. Final Project Oral Communications.**

Chairperson: Raquel Álvarez Lozano (University of Salamanca, Spain).

· Molecular mechanisms of neuronal death in amyotrophic lateral sclerosis with C9orf72 gene mutation. **Andrea García López.** *University of Castilla La Mancha, Spain.*
· Role of pleiotrophin and midkine in LPS-induced astrocytosis: implications in neuroinflammation. **Carlos de la Torre-Ortiz**. *University of San Pablo CEU, Spain.*
· Design of a new scaffold of soy protein combined with mesenchymal stem cells for chronic wound healing. **Kevin Las Heras Zapata.** *University of the Basque Country, UPV/EHU, Spain.*
· Nanoencapsulated curcumin as a potential therapy for age related neurodegenerative diseases. **Telma Bezerra Soares.** *University of Porto, Portugal.*
· *Saccharomyces cerevisiae* as a model for the study of Alzheimer's disease. **Marta Valentí Sanguino.** *Complutense University of Madrid, Spain.*

Aula II **E3b. Final Project Oral Communications.**

Chairperson: Marta Prieto Vicente (University of Salamanca).

· Toxicity of fluconazole in selected aquatic species. **Cristina Pablos Ocaña**. *University of Alcalá, Spain.*
· Development of an ocular insert with Progesterone for the treatment of Retinosis Pigmentaria. **Iris María Domenech Monseil.** *University Cardenal Herrera-CEU, Valencia, Spain.*
· Photophysical study of new fluorescence probes. **M. Carmen González García.** *University of Granada, Spain.*
· Attention-Deficit/Hyperactivity Disorder. **María Mercedes Polo Giménez.** *University of Sevilla, Spain.*
· In silico study of potential antidiabetic activity of phenolic compounds from *Psidium guajava*. **Francisco Girón Rodríguez.** *Catholic University San Antonio of Murcia.*

26 Wednesday · Miércoles

Aula III **E4. Special Session. Pharma for NTDs.**

Chairperson: Juan José de los Santos Sanz-Bustillo (Mundo Sano Foundation, Spain).

· Novel Advances in Pharma for NTDs: The case of Chemo Group and Mundo Sano Foundation.

17:00 COFFEE BREAK

Posters Pharmacy TFG students will be displayed on television screens and, in addition, computer rooms will be enabled, where it will be possible to consult the posters more peacefull.

17:30 FACULTY OF PHARMACY

Sala de Grados **E5. Meeting Erasmus Coordinators.**

Chairperson: Carmen Rubio Armendáriz (University of La Laguna, Spain).

Salón de Actos **E6. Quality aspects for individualized compounded medications in different US and EU settings.**

Chairperson: Rafael Puerto Cano and Luis Marcos Nogales, (Spanish Society of Individualized Drugs, Spain).

· United States Pharmacopoeia (USP). Reference Standards and its implementation in Pharmaceutical compounding both in US and internationally. **Marisol López.** *University of Puerto Rico, School of Pharmacy. Faculty American College of Apot, Puerto Rico.*
· Quality for compounding activities in Community Pharmacy in Spain and other EU countries. **Rafael Puerto Cano**. *LaSEMI – President (Spanish Society of Individualized Drugs), Spain.*
· Hospitalized patient versus discharged patient. Relevant aspects in individualized. **Aquilino Corral Aragón.** *Community Pharmacist. Compounding expert, Spain.*

Aula II **E7. Pharmaceutical Care in Type 2 Diabetes in Community Pharmacy, SEFAC.**

Chairperson: Ana Mª Molinero Crespo (SEFAC (Spanish Society of Familiar and Community Pharmacy, Spain).

Aula III **E8. MEDAFAR: Communication between health professionals.**

Chairperson: Ana Dago (Fundación Pharmaceutical Care Spain, Spain).

20:30 Paraninfo University of Salamanca. Historical Building.

SYMPOSIUM SEFAC. The Pharmaceutical Professional Services in the framework of the Sanitary System.

Chairperson: Jesús C. Gómez Martínez SEFAC,
(Spanish Society of Familiar and Community Pharmacy, Spain).

27 Thursday · Jueves

10:00 – 18:30 Plaza de los Bandos

SYMPOSIUM SEFAC: THE PHARMACIST YOU NEED
Tent of pharmaceutical professional services.

SYMPOSIUM: PHARMACY RESEARCH & PHARMACY

9:00 FACULTY OF PHARMACY

Salón de Actos **Workshop 7: Understanding our Brain to improve Therapeutics.**

Chairperson: Juan Pedro Bolaños (Institute of Functional Biology and Genomics, Salamanca, Spain).

· Crosstalk between Brain Cells. **Juan Pedro Bolaños.** *Institute of Functional Biology and Genomics, Salamanca, Spain.*
· Neural Stem Cells. **Isabel Fariñas.** *University of Valencia, Spain.*
· Cannabinoids and Brain Function. **Giovanni Marsicano.** *Université Bordeaux, France.*

Aula II **Workshop 8: Food and health in the omics era.**

Chairperson: Celestino Santos Buelga (University of Salamanca, Spain).

· Nutritional genomics. The way to personalised nutrition. **Alberto Dávalos Herrera.** *Instituto Madrileño de Estudios Avanzados (IMDEA) Madrid, Spain.*
· Metabolomics. Defining biomarkers of consumption and effect. **Fulvio Mattivi.** *Center Agriculture Food Environment, University of Trento, Italy.*
· Microbiomics. What happens in the gut matters! **María Carmen Collado Amores.** *Instituto de Agroquímica y Tecnología de Alimentos IATA-CSIC, Valencia, Spain.*

Aula III **Workshop 9: Perspectives of Nanoscience and Nanotechnology in Medicine and Pharmacy.**

Chairperson: María Jesús Almendral Parra (University of Salamanca, Spain).

· Nanobiosensors in diagnostics. **Arben Merkoçi.** *Instituto Catalán de Nanotecnología, Spain.*
· Identifying molecular signatures of tumor dormancy as a basis for the rational design of precision nanomedicines. **Ronit Satchi-Fainaro.** *Faculty of Medicine, Tel Aviv University, Israel.*
· Designing Hybrid Nanoparticles for Therapy and Diagnosis. **Jesús M. de la Fuente.** *Institute of Nanoscience of Aragon, University of Zaragoza, Spain.*

10:30 COFFEE BREAK

11:00 FACULTY OF PHARMACY

Salón de Actos **Workshop 10: Haematological Malignancies Big Data.**

Chairperson: Jesús Mª Hernández Rivas (University of Salamanca, Spain).

· Secondary use of health data in the era of the GDPR: an ethical and legal approach. **Federico de Montalvo.** *ICADE, Madrid, Spain.*
· The relevance of the public-private partnership in health. **John Butler Bayer**. *Germany.*
· Big Data for Better Outcomes (BD4BO) in Health. **Jesús Mª Hernández Rivas.** *University of Salamanca, Spain.*

21

Thursday · Jueves

Aula II **Workshop 11: Advanced Pharmaceutical Solutions in Cardiology.**

Chairperson: Ignacio Fernández Lozano (Hospital Puerta de Hierro, Madrid, Spain).

· Advances and challenges in Cardiovascular treatment. **Ignacio Fernández Lozano.** *Hospital Puerta de Hierro, Madrid, Spain.*
· 2018: State of the art in Cardiology Pharmaceutical Solutions. **Luis Rodríquez Padial.** *Complejo Hospitalario de Toledo, Spain.*
· Reduced major cardiovascular events by using IPCSK9. Outcomes from the FOURIER study. **Peter Sever.** *International Centre for Circulatory Health, National Heart and Lung Institute. Imperial College London, London, United Kingdom.*

Aula III **Workshop 12: Superbugs: the global epidemic.**

Chairperson: María Jesús Lamas Díaz
Agencia Española de Medicamentos y Productos Sanitarios (AEMPS).

· Spain against resistance: PRAN advances. **María Jesús Lamas Díaz**. *Agencia Española de Medicamentos y Productos Sanitarios (AEMPS).*
· PREPARE-VET. **Bruno González Zorn.** *Facultad de Veterinaria de la UCM.*
· Proyecto SWISpain. **Víctor Jiménez Cid**. *Universidad Complutense de Madrid, Spain.*

12:30 FACULTY OF PHARMACY

POSTER SESSION

Posters related to Symposium Research and Pharmacy will be displayed on television screens and, in addition, computer rooms will be enabled, where it will be possible to consult the posters more peacefully.

13:00 FACULTY OF PHARMACY

Salón de Actos **PLENARY SESSION**

The New Vaccines.

Manuel Elkin Patarroyo

Fundación Instituto de Inmunología de Colombia
FIDIC. Bogotá, Colombia.

14:00 WORK LUNCH

21

Thursday · Jueves

SYMPOSIUM: ACADEMIES OF PHARMACY

16:00 Paraninfo University of Salamanca

Mylan MYLAN PRESENTATION
16:00 AULA I

15:30 FACULTY OF PHARMACY

Salón de Actos E9a. Final Project Oral Communications.

Chairperson: Esther Caballero Salvador (University of Salamanca, Spain).

· In vitro study of Rilpivirine antifibrotic effect through STAT1 signalling pathway. **David Verdú Coloma**. *University of Valencia, Spain.*
· Intracellular delivery of nucleic acids using a new type of cell penetrating peptides. **Irene Adán.** *Barrientos University of Santiago de Compostela, Spain.*
· Characterization of nivolumab use in non-small cell lung cancer in a named patient program in Portugal. **Patrícia Gaspar Gomes.** *University of Lisboa, Portugal.*
· Bevacizumab treatment in metastatic colorrectal cancer patients: genes studies as biomarkes of drug efficacy. **Laura Beltrán Sangüesa.** *European University of Madrid, Spain.*
· New role of splicing and nonsense-mediated decay (NMD) alterations in acetaminophen-induced acute liver damage. **María Garate Rascón.** *University of Navarra, Spain.*

Aula II E9b. Final Project Oral Communications.

Chairperson: Raúl Rivas González (University of Salamanca, Spain).

· Leishmanicidal and trypanocidal activity of new natural products. **Karen Álvarez Tosco.** *University of La Laguna, Tenerife, Spain.*
· Molecular epidemiology of *Pseudomonas aeruginosa* through Double-locus sequence typing technique. **Mireya Fernández Sánchez.** *Miguel Hernández University of Elche, Spain.*
· Study of the gastrointestinal microbiota in 3 months-old children from the NELA cohort study: A) Microbial cultures. *Escherichia coli*: prevalence and phylotypes. B) Gas chromatography – mass spectrometry as culture-independent technique. **Miguel Gancedo Rodrigo.** *University of Murcia, Spain.*
· Study of the protective capacity of the chimeric protein Fh3Tq against infection in experimental model of *Fasciola hepatica*. **Alexander Martín Tabasco.** *University of Salamanca, Spain.*

Aula III E10. Meeting Pharmaceutical Care Teachers.

Chairperson: María Álvarez de Sotomayor (University of Sevilla, Spain).

Aula IV E11. Meeting Final Project Coordinator.

Chairperson: Raquel Álvarez Lozano (University of Salamanca, Spain).

17:00 COFFEE BREAK

Posters Pharmacy TFG students will be displayed on television screens and, in addition, computer rooms will be enabled, where it will be possible to consult the posters more peacefull.

17:30 FACULTY OF PHARMACY

Salón de Actos E12. Research on Pharmaceutical Technology: Iberoamerica.

Chairperson: Ana Isabel Torres-Suárez (Universidad Complutense de Madrid, Spain).

· Pharmaceutical development of herbal medicinal products. **Manuel Córdoba Díaz.** *Universidad Complutense de Madrid, Spain.*
· Targeted nanoparticles for cancer therapy. **Josimar de Oliveira Eloy.** *Universidade Federal do Ceará, Fortaleza-CE, Brazil.*
· Lyotropic liquid crystalline dispersions as topical and transdermal drug delivery systems. **Carlos Tomás Quirino Barreda.** *Universidad Autónoma de México-Xochimilco, México.*

Aula II E13. Innovation in the commercialization of new medicines: the 4 pillars from the Marketing Authorization to Market Access.

Chairperson: José Manuel Rodríguez Barrios (Economics, Pricing and Market Access Strategy Director Europe, Daiichi Sankyo Europe) and Raquel Carnero Gómez (University of Salamanca, Spain).

· First of the 4 pillars: Innovation in Marketing Authorizations. **Marcos Timón.** *AEMPS – Alternate member at the Committe for Advanced Therapies / Member of the BWP, Spain.*
· Second pillar from Marketing Authorization to Market Access: evidence generation from HEOR. **Paloma González.** *Strategic account & Business Development Lead – Hologic, Inc., Spain.*
· Pricing and Market Access Strategy from Pharma industry: the third pillar. **Mª José Sancho González**. *QP and Regulatory Affairs Director – Mundipharma, Spain.*
· The fourth pillar from Marketing Authorization to Market Access: the hospital approach and the pharmacotherapeutics guide system. **Arístides de León.** *Responsible for pharmacotherapeutic management and secretary of the Clinical Trials Commission of the Hospital de la Candelaria de Tenerife, Spain.*

Aula III E14. Strategies for the implantation of active learning methods in pharmaceutical education.

Chairperson: Geraldo Alécio de Oliveira (Grupo Educacional Athenas – Brazil).

Sala de Grados E15. Experiences from the Sentinel Surveillance Network of Pharmacies in Castilla y León.

Chairperson: Carlos Treceño Lobato (Presidente del Consejo de Farmacéuticos de Castilla y León y responsable de la Red de Farmacias Centinela, Spain).

19:00 FACULTY OF PHARMACY

OPENING AUSAF

COFARES

IPAP18 Innovations in Pharmacy ADVANCES & PERSPECTIVES

28

Friday · Viernes

SYMPOSIUM: PHARMACEUTICAL APPROACH

9:00 FACULTY OF PHARMACY

Salón de Actos **Workshop 13: Experiences in the development of pharmaceutical professional services from the Community Pharmacy (CONGRAL).**

Chairperson: Miguel Ángel Gastelurrutia, (Presidente COF Guipúzcoa, Spain).

· Pharmacy Practice and Pharmacy curricula in Spain. **Marta Gil Ortega.** *University San Pablo CEU, Spain.*
· Pharmaceutical Professional Services in Spain. **José Luis Nájera García.** *President of the Official College of Pharmacists of Palencia, Spain.*
· Pharmaceutical Professional Services in Portugal. **Hélder Mota Filipe.** *Presidente del Consejo de Cooperación de la Orden de Farmacéuticos de Portugal.*
· Teaching Pharmaceutical Care in the University. **Miguel Ángel Gastelurrutia.** *President COF, Gipúzcoa, Spain. And* **Eduardo Mariño.** *University of Barcelona, Spain.*

Aula II **Workshop 14: Advances in Pharmaceutical Technology, SEFIG (Sociedad Española de Farmacia Industrial y Galénica).**

Chairperson: Francisco Otero Espinar (SEFIG, Sociedad Española de Farmacia Industrial y Galénica, Spain).

· Present and future pharmaceutical technologies for the delivery of active substances. **Gilles Ponchel.** *Université Paris Sud. Faculté de Pharmacie, France.*
· Advances in the formulation of biologicals using pharmaceutical nanotechnology. **Mª José Alonso.** *University of Santiago de Compostela, Spain.*
· Design space and critical points in solid pharmaceutical forms. **Isidoro Caraballo.** *Universidad de Sevilla, Spain.*

Aula III **Workshop 15: Salamanca Science Park, Boosting Innovation.**

Chairperson: Teresa Jiménez Cabaco (University of Salamanca, Science Park).

· Tissue compensator for improving the radiation dose when treating superficial tumors through 3D printing. **Antonio J. Alonso**. *My Little Factory.*
· Legal protection and defense of intangible assets. **David Franco / Eleazar García.** *TEGÖ.*
· Discover and develop molecules for the treatment of CNS conditions. **Miguel Ángel Ávila.** *Neurofix Pharma.*

10:30 COFFEE BREAK

11:00 FACULTY OF PHARMACY

Salón de Actos **Workshop 16: Commitment to Hospital Pharmacist Trainning, Spanish Society of Hospital Pharmacy (SEFH).**

Chairperson: María José Otero, (Hospital Pharmacy Service of Salamanca, Spain).

28 Friday · Viernes

· Specialist Training as the way for Excelence in Hospital Pharmacy. **Ana Lozano Blazquez.** *SEFH Vice president. National Commission Hospital Pharmacy Member, Spain.*
· Innovation in continuous training for specialist pharmacist and technician in Hospital. **Ana María Cordero Cruz .** *SEFH Deputy Director Training, Spain.*
· What does the resident pharmacist from training? What does SEFH do to improve training of resident pharmacist? **Manuel Murillo Izquierdo.** *SEFH Resident Pharmacist Vocal, Spain.*

Aula II **Workshop 17: Mineromedicinal waters Microbiology in Latin American and Europe: Microbiota and its Biotechnological Pharmaceutical, and Industrial applications.**

Chairperson: Félix Daniel Andueza Leal (Universidad Central del Ecuador).

· Microbial mats in mineromedicinal water of Spain. **Carmina Rodríguez Fernández.** *Universidad Complutense de Madrid, Spain.*
· Chemical study of mineromedicinal water from Spain. **Esperanza Torija.** *Universidad Complutense de Madrid, Spain.*
· Microbial biodiversity and environmental resistomas in mineromedicinal waters from Latin America. **Felix Daniel Andueza Leal.** *Universidad Central del Ecuador, Ecuador.*

Aula III **Workshop 18: Startup Olé Accelerator, boosting entrepreneurial mindset.**

Chairperson: Emilio Corchado (University of Salamanca, Spain).

· Innovation and Entrepreneurship in Pharma. **Antonio León.** *Centro de estudios Superiores de la Industria Farmacéutica (CESIF).* **José Benjumea.** *Thermo Fisher Scientific.* **Beatriz de Luis.** *BDL SEARCH.* **Francisco Otero Espinar.** *Sociedad Española de Farmacia Industrial y Galénica (SEFIG).*

12:30 FACULTY OF PHARMACY

POSTER SESSION

Posters related to Symposium Pharmaceutical Approach will be displayed on television screens and, in addition, computer rooms will be enabled, where it will be possible to consult the posters more peacefully.

13:00 FACULTY OF PHARMACY

Salón de Actos **PLENARY SESSION**

Organ Transplantation: Current Challenges and Solutions.

Beatriz Domínguez-Gil González

Organización Nacional de Trasplantes, Spain.

Castillo del Buen Amor **14:30 FAREWELL LUNCH**

Salida Autobús/ Shuttle Depart: 14:15 University Campus

Faculty of Pharmacy

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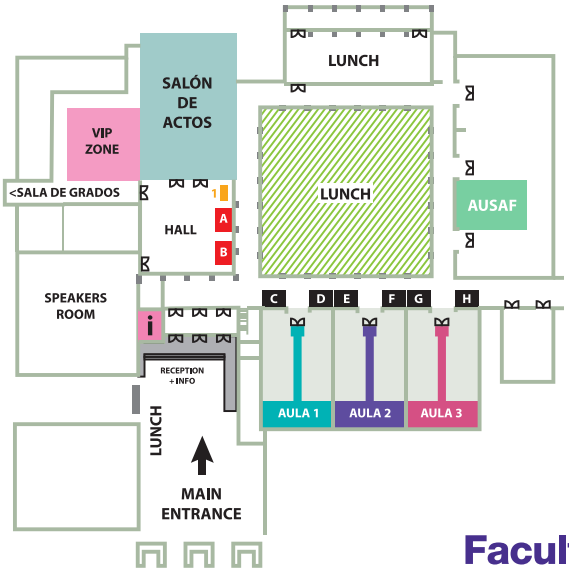

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- H SANTANDER

Faculty of Pharmacy

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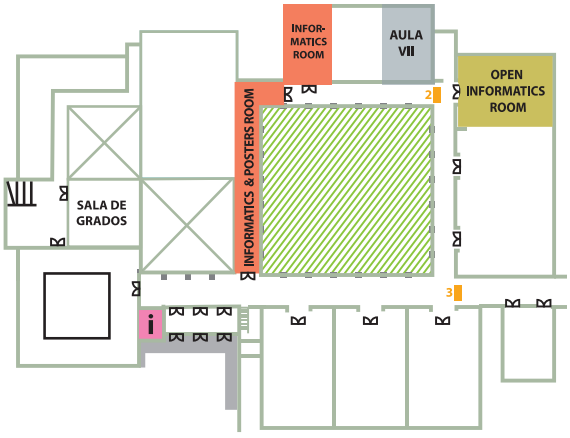

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OPENING SESSION

Transforming pharmacy through scientific advances

Phillip ALLEN SHARP

Professor Koch Institute for Integrative Cancer Research,
Massachusetts Institute of Technology (MIT), Cambridge, MA, USA

Abstract:

The early science of chemistry and microbiology were the source of most drugs until the revolution of genetic engineering in the mid 1970s. Then biotechnology made available novel protein agents such as interferons, blood factors and monoclonal antibodies that have changed the modern pharmacy. Over the past year, a new pharmacy of oligonucleotides has emerged from the science of gene expression such as RNA splicing and RNA interference. The ability to design therapeutic agents from genomic sequences will transform treatment for many diseases. The science that created this advance and its future promise will be discussed.

Phillip Allen Sharp is an American geneticist and molecular biologist who co-discovered RNA splicing. He shared the 1993 Nobel Prize in Physiology or Medicine with Richard J. Roberts for "the discovery that genes in eukaryotes are not contiguous strings but contain introns, and that the splicing of messenger RNA to delete those introns can occur in different ways, yielding different proteins from the same DNA sequence. He works in Institute Professor Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology (MIT), Cambridge, MA, US.

PLENARY SESSIONS

The love-hate relationship between host proteins and viral RNAs

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Abstract:

Flaviviruses, such as dengue, yellow fever and Zika viruses, use many tools to counter the immune responses of their hosts. Among the most potent of these tools is a non-coding RNA called the subgenomic flaviviral RNA (sfRNA), which is produced from the viral genome by host exonucleases. The sfRNA interacts with host RNA binding proteins to cripple the innate immune system of the human host and the mosquito vector. We will present examples that elucidate the mechanisms by which this non-coding RNA interferes with human and mosquito immune mechanisms. In one example, we discovered how the interaction between sfRNA and human RNA binding proteins altered viral fitness and epidemic potential. We conducted in vitro studies and identified a determinant of fitness in a foreign dominant (PR-2B) DENV-2 clade, which emerged during the 1994 epidemic in Puerto Rico and replaced an endemic (PR-1) DENV-2 clade. The PR-2B DENV-2 produced increased levels of subgenomic RNA (sfRNA) relative to genomic RNA during replication. Furthermore, the PR-2B sfRNA shows enhanced sequence-dependent binding and inhibition of deubiquitylation of tripartite motif 25 (TRIM25), which is needed to activate its E3 ligase activity critical for sustained and amplified.

Keywords & topics

Dengue, yellow fever, Zika viruses, non-coding RNA.

The New Vaccines

Manuel Elkin PATARROYO

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Abstract:

Physicochemical rules must be followed for the development of fully-protective, chemically-synthesized vaccines. We have identified most of these principles or rules for the prototype disease (malaria) for developing a panel of functionally-relevant, specifically modified, high activity binding peptides (mHABPs) attaching to host cells, thereby inducing sterile protective immunity in the experimental Aotus monkey model. These principles include a polypropyline II – left handed-like (PPIIL) 26.5 ± 3.5 A° distance between aminoacids fitting into Pockets 1 to 9 of Class II molecules' peptide binding region (PBR), an appropriate charge and volume of residues fitting into these molecules' Pockets 1, 4, 6 and 9, as well as specific rotamer orientation of residues contacting the T-cell receptor that must be preceded by specific β turns in the N-terminal regions as well as positively charged residues in positions p10 or p11. These principles or rules have led to developing long-lasting, protection-inducing multi-epitope, multistage, minimal subunit-based, chemically-synthesized vaccines or effective immune protection-inducing, synthetic protein structures.

Organ Transplantation: Current Challenges and Solutions

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Abstract:

Transplantation has become one of the miracles of modern medicine. The World Health Organization estimates that more than 120,000 patients benefit from organ transplantation annually across the world. Although the activity is impressive, it barely covers 10% of the global transplantation needs of patients. As a result of organ shortage, many patients die or endure a poor quality of life while waiting for an organ. Organ shortage is therefore the main limitation to the expansion of transplantation therapies.

Since the creation of the Spanish Organización Nacional de Trasplantes (ONT) back in 1989 and the implementation of the so-called Spanish Model on Organ Donation and Transplantation, Spain has been a worldwide leader in organ donation and transplantation activities. The key for success of the Spanish system is an appropriate management of the process of deceased donation — since the identification of donation opportunities to the successful transplantation of organs in patients in need. Donor coordinators with the most appropriate profile (intensive care physicians) are designated in every hospital with a potential for organ donation.

National and regional health authorities guarantee adequate guidance and continuous training of the donor coordination network. There is also a constant evaluation of performance in deceased donation through a Quality Assurance Programme. A specific relationship with the mass media has replaced any public campaign in support for organ donation. Hospitals are reimbursed to cover all resources required for donation, procurement and transplantation activities. The Spanish model on Organ Donation and Transplantation has been partially or completely reproduced by other countries with successful results.

The Spanish system has also adapted to a scenario where mortality relevant to organ donation is decreasing, neurocritical care improves and important changes have occurred in the care of patients at the end of life. Novel strategies to increase donation opportunities include intensive care to enable organ donation, the use of organs from expanded and non-standard risk donors, and donation after circulatory death.

The progress towards self-sufficiency in transplantation does not only entail increasing the availability of organs, but also decreasing the needs through preventive strategies that reduce the occurrence of with chronic –or acute– diseases treatable through transplantation. A recent example of public health policies impacting upon the need of transplantation is that of Direct-Acting Antivirals for the treatment of hepatitis C virus infection. Action in terms of reducing the incidence of acute – and chronic rejection – or inducing tolerance in transplanted patients can also contribute to reduce the need for re-transplantation.

The creation of human organs by 3D printing or by chimerism whereby animals can "incubate" human organs is a current area of active research. Although the future in clinics of these initiatives is still to de delineated, not only they could help to confront the shortage of organs for transplantation, but also prevent the rejection of organs that are created with recipient`s own cells.

Keywords & topics

Organ donation and procurement; Transplantation; Intensive Care; Donation after Circulatory Death; Cell therapy

WORKSHOPS

Education in Pharmacy around the world: Europe

ORGANIZING COMMITTEE

Luis RECALDE MANRIQUE

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Abstract:

The similarities and differences between pharmacy studies in the different European countries will be revealed through four countries.

Each speaker will value the tendencies and characteristics of their title depending on the main needs of their country.

Some questions such as: should we raise new common objectives in Europe for the training of our students? will be discussed.

Conferences

The studies of pharmacy in France in 2018: the example of the faculty of Caen (Normandy, France)
Michel BOULOUARD
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The studies of pharmacy in Poland: the example of the faculty of Krakow
Renata M F JACHOWICZ
Jagiellonian University. Medical College.
mfjachow@cyf-kr.edu.pl

The studies of pharmacy in Portugal : the example of the faculty of Coimbra
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Keywords & Topics

Pharmacy Degree Europe Perspectives

Pharmaceutical Education in Iberoamerica. Scenaries 2030 (challenges and trends)

ORGANIZING COMMITTEE

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Abstract:

It is time to participate in defining the type of Pharmaceutical Education we require for the future, to know what kind of university we will have to build by the year 2030, so the questions are: What should the university do, and pharmacy faculties to train its students in the coming years? What do we have to do to insert ourselves critically in the global and take advantage of advances in science and technology for the health of individuals? To answer these questions, the universities will have to carry out academic and longterm reforms, accompanied by the development of new educational models, with policies that articulate and respond in a clear and determined way to the priorities of Health in Latin America. The ability to establish trends on the profiles required to solve health problems in Ibero-America considering topics such as: epidemiological schemes, market, production, patient care, loss of patents, less blockbusters, visit regulations, concern by the expense, alternative distributions, self-regulation, segmentations and mergers of pharmaceutical companies, as well as the harmonization of the sanitary regulation to mention some that force to pose future scenarios.

Conferences

The University on the Horizon 2030

Alma X. HERRERA MÁRQUEZ

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Pharmaceutical Education… Where are we going?

Iván TORRES MARQUINA

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Challenges of Pharmaceutical Educaction

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Keywords & Topics

Prospective, future scenaries, pharmaceutical education trends, Future university, iberoamerican university

Pharmacy Education in North America and Central America

ORGANIZING COMMITTEE

Wanda T. MALDONADO-DÁVILA

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Abstract:

Pharmacy as a profession exhibits certain core elements that are shared among different countries, however, differences in the scope of practice reflect differences in the curricular components between countries. Faculty from pharmacy programs in Canada, Panamá and Puerto Rico, will present how pharmacy educations is conceptualized and offered in their countries. Professional programs as well as graduate programs will be emphasized, as well as their contextualization to the pharmacy profession. Common elements as well as differences in perspectives will be highlighted. Canada represents an example of pharmacy education in North America, Panamá represents an example from Central America, and Puerto Rico represents a program that is within the context of the United States of America. The speakers will present how their programs address education in the areas of basic sciences, pharmaceutical sciences, pharmaceutical technology, behavioral and administrative sciences, and clinical practice experiences within their curricula. The presenters will also address the accreditation mechanisms in place for the academic programs in their respective countries, and the process and requirements needed to grant licensure to the graduates to practice the profession.

Conferences

Pharmacy Education in Canada
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Pharmacy Education in Panamá
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Pharmacy Education in the United States of America and Puerto Rico
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Keywords & Topics

Pharmacy Education, North America, Central America, Canada, Panamá, Puerto Rico, United States of America.

"e-Learning Pharm". Working towards better learning in Pharmacy

ORGANIZING COMMITTEE

Mª Luisa FERRÁNDIZ and Teresa Mª GARRIGUES

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Driven by digital technology, our society is changing with exponential rate. This change has an impact on both Health care needs and Higher Education Institutions (Universities, Schools, and Colleges). Pharmacy as a profession is a clear exponent of this transformation. As members of the Health Team, pharmacists need to manage complex information, think creatively, use resources (including digital ones) smartly and communicate effectively. There is a certain mismatch between these needs and the skills students actually attain. On the other hand, Faculties are mainly oriented towards knowledge. The academia often finds difficult to include new learning-teaching activities in high demanding curricula without compromising the scientific basis and proving efficiency and quality. Nevertheless, students are not fully prepared to critically work out the information/knowledge., nor completely develop the range of transversal skills (problem solving, communication, etc.) they need for resilience in a changing world.

Our proposal is reviewing different technology driven teaching-learning activities to facilitating both aims: improving quality and engaging students in their responsibility for learning.

Conferences

Use of technology to deliver team based learning
Geeta HITCH
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Technology and Social Media for increasing learning, communication, and critical thinking in our learners
Ruth E. NEMIRE
American Association of Colleges of Pharmacy (AACP).
Associate Executive Vice President (USA).
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Can we achieve competencies in lab work virtually?
Isabel GARCÍA ARNANDIS
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Keywords & Topics

Technology, learning-teaching process, Pharmacy, digital society, competences.

Pharmacy Education in Africa

ORGANIZING COMMITTEE

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Abstract:

With the XXI Century well entered and the challenges that we currently have in Global Health, the role of the Pharmacist is defined as a key among the generation of opportunities in a geographical context with a very young population and the creation of environments conducive to community growth.

The sustainable development goals set certain guidelines and the University must support and lead this implementation. We all must involve in generating those skills and attitudes that allow a greater number of Pharmacy Schools and studying the current situation with its strengths and weaknesses to continue improving the situation of our students and our contexts.

Conferences

Pharmacy situation in francophone Africa. Opportunities of Higher Education in Pharmacy is Sub Saharan Africa.
David ROCA BIOSCA
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Pharmacy Education in Ethiopia. Research goals in Pharmaceutical education in Africa.
Ephrem ENGIDAWORK
School of Pharmacy of Addis Ababa University. Ethiopia.
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Pharmacy Education in Uganda. Challenges in the leadership of African Pharmaceutical Education.
Richard ODOI ADOME
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"Education in Pharmacy around the world": Asia

ORGANIZING COMMITTEE

Akira IKARI

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Abstract:

Pharmacists must have ability to detect and resolve drug-related problems to effectively provide pharmaceutical care. Various tools are available to aid in the education process, but the contents are not shared. The aim of this workshop is to discuss and exchange ideas and information of strategies in pharmacy education in the countries of Asia including Japan and China.

Conferences

Pharmaceutical education system in Japan

Akira IKARI

Gifu Pharmaceutical University, Gifu, Japan
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Abstract:

Pharmacists must have ability to detect and resolve drug-related problems to effectively provide pharmaceutical care. In Japan, undergraduate pharmacist programmes were changed from four-year system to a six-year system in 2006. The student must undergo the common achievement tests (Computer-based Testing, CBT and Objective Structured Clinical Examination, OSCE) implemented prior to practical training. Only students who have passed the common achievement tests can move on to a pharmacy practice training in hospital and community pharmacies, where they acquire the skills and knowledge required for a pharmacist.

The 'Model Core Curriculum for Pharmacy Education' has been revised since 2011 and the revised curricula were firstly applied to students admitted in 2015. The curriculum specifies specific behavioral objectives (SBOs) associated with the acquisition of the basic knowledge and skills needed for home health care, inpatient care, and communication with other medical professionals including physicians and nurses. In addition, it contains SBOs associated with the development of pharmaceutical researchers and engineers. In our university, the special curriculum consists of two courses. One is called as the "Clinical Pharmacy Course". After graduating from the course and obtaining a license as a pharmacist, graduates start their carriers mainly in hospital, drug stores, and clinical pharmacy industries. Another is called as the "Drug Discovery and Development Course" which develop researchers to work in pharmaceutical, chemical, and food industries. I will talk about pharmacy and pharmaceutical sciences education in our University and Japan.

Pharmacy Practice Model in Japan

*Yasuo TAKEDA

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Abstract:

With the remarkable progress in medical study, a pharmacist's role has been also remarkably changed, along with social needs. In the new deployment regarding to the pharmaceutical sciences and practices, the primary role of pharmacists has been centered from 'dispensing chemicals' to the 'patient's safety'. Recently both hospital- and community-pharmacists have mainly focused on pharmaceutical care through monitoring the effects and side effects of medication therapy. Then they help doctors to make prescription for next step of medication therapy. To promote these activities, pharmacists should work with other medical practitioners as a member of multidisciplinary health care team in not only hospital ward but also home care.

In Japan, it is necessary to establish a new health care system. The new system will is expected to collaborate with medical care and nursing care in each community, for upcoming super-aged society. To promote this community-based health care system, pharmacists need to perform pharmacy practices with preparedness to have all the responsibility in all things regarding to medication. Also in not only a ward but emergency care and ambulatory care, it is required for that a pharmacist develops high quality pharmacy practices. As for in-home care, especially, a community pharmacist are expected becoming a health care advisor for patients and community-residents to consult and guide their self-medication and health care.

At this symposium, while describing pharmacy practice model and practice program in Japan, the strategy of the expanding work by the pharmacists towards nearly upcoming a super-aged society will be introduced.

Exploring innovative pharmaceutical talents cultivation mode in Zhejiang University

Xiangnan ZHANG

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Abstract:

College of Pharmaceutical Sciences (CPS) of Zhejiang University has a long academic heritage. It originated from Pharmacy Department of Zhejiang Provincial College of Medicine founded in 1913 and Pharmacy Department of National Zhejiang University set up in 1944, becoming one of the earliest educational organizations for modern pharmacy in China. After the merging of four universities in 1998, CPS was established at Zhejiang University in 1999. Guided by the college motto of 'seeking truth and being creative' and the mission of 'creating the best medicine for human health', CPS has achieved conspicuous development and now ranks among the best top 5 among more than 700 colleges of pharmaceutical sciences in China. CPS now has 3 specialties for undergraduate studies (pharmacy, pharmaceutics, and traditional Chinese pharmacy), is entitled to confer master's degrees in 7 programs (pharmacology, pharmaceutical analysis, medicinal chemistry, pharmacognosy, pharmaceutics, microbiology and biochemistry, and traditional Chinese pharmacy), and doctoral degrees in 6 programs, which has formed a comprehensive advanced pharmacy education and scientific research system. Under its administration there are 2 departments, 5 research institutes, 1 experimental centre for pharmaceutical sciences teaching, and 1 post-doctoral station. In this present talk, I will give the audience a brief overview of the current status and future prospects of pharmaceutical education in China. Then I would like to introduce the history, organization, education programs, academic research and our attempts in exploring innovative pharmaceutical talents cultivation mode in CPS.

Keywords & topics

Problem-based learning; Pharmaceutical care; Hospital practice program.

Understanding our Brain to Improve Therapeutics

ORGANIZING COMMITTEE

Juan Pedro BOLAÑOS

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Abstract:

Our brain is the least known organ of our body, possibly due to the complexity of the poly-cellular nature of its structure and dynamic physical and neurochemical networking. However, the recent advances in potent genetic tools are helping us to understand the cell-specific functions of our brain cell types at managing metabolism, cell renewal and signalling processes. This workshop aims to summarize recent unexpected findings that reveal some details of this highly complex area of research. Identification of the specific steps controlling metabolism, stem cells renewal and signalling processes through endocannabinoid receptors will not only help us to understand ourselves, but also to find novel therapeutic targets against neurological problems. The aim of nanopharmacy is to improve drug pharmacokinetics, pharmacodynamics, non-specific toxicity, immunogenicity and the biorecognition of systems in order to attain maximum efficacy and minimum undesirable side effects. To achieve this aim, drug formulation, thr route of administration and specific targeting are the major parameters considered.

Conferences

Crosstalk between Brain Cells
Juan Pedro BOLAÑOS
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Neural Stem Cells
Isabel FARIÑAS
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Cannabinoids and Brain Function
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Keywords & topics

Neurosciences, Metabolism, Intercellular Communication, Neural Stem Cells, Neurorepair, Cannabinoids, Behaviour, Therapeutics, Neurological diseases.

Food and health in the omics era

ORGANIZING COMMITTEE

Celestino SANTOS BUELGA

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Abstract:

Food and health relationships have been classically interpreted in the context of life maintenance, as ensured by nutrients. However, foods also contain a wealth of secondary bioactive non-nutrient components that can also contribute to the prevention and even treatment of different chronic illnesses. Indeed a large number of epidemiological studies have shown the existence of correlations between dietary patterns and the incidence of distinct diseases, such as type 2 diabetes, cardiovascular diseases, certain cancers or neurodegenerative disorders. Nevertheless, the knowledge about the precise constituents and the mechanisms involved in their putative beneficial effects is still limited. In this workshop the contribution of recently introduced novel high throughput omics approaches to the understanding of the food and health relationships will be reviewed by three experts in their fields.

The large inter-individual variability in the response of humans to diet is influenced, among other factors, by their genetic makeup. Nutritional Genomics aims at understanding the complex interactions between food components and genes looking at their impact on gene expression (Nutrigenomics) as well as at the influence of genetic variation on the response to diet (Nutrigenetics). In the end, Nutritional Genomics will definitively contribute to the implementation of more refined dietary recommendations targeting specific groups of people with similar phenotypes and genetic risk factors and will help to the development of personalized nutrition.

Metabolomics takes advantage of the availability of advanced highly sensitive analytical techniques to explore the pool of metabolites present in foods or in body fluids following food consumption. This should help defining biomarkers for the intake of individual or groups of compounds or their effects, so that adequate relations with the incidence of particular diseases can be established.

In recent times, the gut microbiota has been given a crucial role in human health. Interactions between food constituents and the human microbiota may take place in a dual way. On the one hand, compounds can be transformed by microorganisms leading to a range of metabolites that may have a role as nutrients or bioactives. On the other hand, food components or their metabolites could impact on the composition and/or function of the microbiota, which may contribute to the maintenance of healthy bacteria populations and (or) to restore altered microbiota (dysbiosis) usually associated with the onset and development of chronic intestinal, metabolic and

immune disorders. Microbiomics focuses on understanding the complex interactions between food constituents and the human microbiota following a multidisciplinary approach that takes into account the complexity of the human microbiome and its metabolic function and the variability among different population groups.

Conferences

Nutritional genomics. The way to personalised nutrition

Alberto DÁVALOS HERRERA
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Metabolomics. Defining biomarkers of consumption and effect.

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Microbiomics. What happens in the gut matters!!!

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Keywords & topics

Food, health, omics, phytochemicals, chronic dieseases, nutrients.

Perspectives of Nanoscience and Nanotechnology in Medicine and Pharmacy

ORGANIZING COMMITTEE

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Abstract:

Nanotechnology has now reached the status of being one of the key areas in investigation attracting researchers in the twenty-first century in their endeavours to make use of the unique characteristics of atomic and molecular assemblages constructed at nanoscale. The ability to manipulate the physical and chemical properties of nanoparticles offers researchers the possibility of designing and using nanomaterials rationally in diverse applications.

Through their own merits, Nanoscience and Nanotechnology have become one of the latest bastions of revolutionary events in Science and Technology. The still young field of Nanoscience has seen considerable advances. Thus, nanoparticles of different nature are used in a variety of disciplines, from Medicine to Physics, Biology or Chemistry, whose development has been boosted by the increasingly in-depth knowledge of nanomaterials. Today a broad range of synthesis procedures has been described, aimed at the preparation of nanoparticles with a tight size distribution that have been used as functional building blocks in the development of superstructures with novel properties and applications.

The possibility of applying nanomaterials to the diagnosis, treatment, and prevention of diseases makes nanomedicine one of the most attractive areas of nanotechnology. The application of nanomaterials in molecular imaging, drug delivery, and therapeutic interventions promises to have a positive impact in this area owing to the unique properties of nanoparticles, which will allow them to overcome cellular and physiological barriers.

In this context, one particular field that has gained advantage due to the nanotechnology revolution is pharmacy. A new distinctive discipline has since evolved, namely nanopharmacy. Nanopharmacy involves the preparation and delivery of ultra-small pharmaceuticals or therapeutic substances in the molecular and nanometer (nm) size range (preferably 1 to 100 nm) to the desired site of action in the human body, without affecting healthy organs and tissues. The importance of this science lies in the fact that almost 95% of the actual discovered drugs present poor pharmacokinetics and bioavailability properties.

The aim of nanopharmacy is to improve drug pharmacokinetics, pharmacodynamics, non-specific toxicity, immunogenicity and the biorecognition of systems in order to attain maximum efficacy and minimum undesirable side effects. To achieve this aim, drug formulation, thr route of administration and specific targeting are the major parameters considered.

Conferences

Nanobiosensors in diagnostics
Arben MERKOÇI
Instituto Catalán de Nanotecnología, Spain.
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Identifying molecular signatures of tumor dormancy as a basis for the rational design of precision nanomedicines
Ronit SATCHI-FAINARO
Faculty of Medicine, Tel Aviv University, Israel.
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Designing Hybrid Nanoparticles for Therapy and Diagnosis
Jesús M. de la FUENTE
Institute of Nanoscience of Aragon, University of Zaragoza, Spain.
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Keywords & topics

Nanomedicine; Nanopharmacy; Nanoparticles; Nanomaterials; Diagnosis; Therapy; Drug Delivery; Biofunctionalization; Nanotoxicology; Regulation.

Haematological Malignancies Big Data

ORGANIZING COMMITTEE

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Abstract:

The application of Big Data to foster the results in health. HARMONY as an example of data sharing in health. HARMONY is a Big Data project aimed to define new outcomes for the best management of hematological cancer.

Conferences

Secondary use of health data in the era of the GDPR: an ethical and legal approach
Federico de MONTALVO
ICADE, Madrid, Spain

The relevance of the public-private partnership in health. The IMI experience.
John BUTLER
Bayer, Germany.
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Big Data for Better Outcomes (BD4BO) in Health
Jesús Mª HERNÁNDEZ RIVAS
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Keywords & topics

Big Data, Health, Oncology, Outcomes, Hematological malignancies, Data sharing.

Advanced Pharmaceutical Solutions in Cardiology

ORGANIZING COMMITTEE

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Abstract:

Results of several major trials has been released on the past recent years to significantly reduce major cardiovascular events with an extraordinary impact in both pharmacological cardiologist's therapeutic arsenal and public health economics.

FOURIER, CANTOS, COMPASS, PARADIGM-HF… are some of them and we will review how these landmark trials has changed the way cardiomyopathy patients are and will be treated today and in an early future.

Conferences

Advances and challenges in Cardiovascular treatment
Ignacio FERNÁNDEZ LOZANO
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2018: State of the art in Cardiology Pharmaceutical Solutions
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Reduced major cardiovascular events by using IPCSK9. Outcomes from the FOURIER study
Peter SEVER
International Centre for Circulatory Health, National Heart and Lung Institute, Imperial College London, London, United Kingdom.

Keywords & topics

Ischemic Cardiomyopathy, Diabetes and Cardiomyopathy, Adverse or Cardiovascular Events and LDL-C, Secondary CV Prevention, Inflammatory, thrombosis prevention.

Superbugs: the global epidemic

ORGANIZING COMMITTEE

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Abstract:

Antibiotics resistance is occurring everywhere in the world, compromising our ability to treat infectious diseases, and with a very high epidemiological, microbiological and clinical impact.

Patients with infections caused by drug-resistant bacteria are generally at increased risk of worse clinical outcomes and death, and consume more health-care resources than patients infected with the same bacteria that are not resistant.

Nowadays, a wide range of initiatives and activities, aimed specifically at addressing the challenge of antimicrobial resistance, have been launched by governments and private entities around the world. World Health Organisation (WHO) has adopted a global action plan on antimicrobial resistance; likewise, European Union (EU) has adopted an action plan against the rising threats from antimicrobial resistance, aimed to tackle antimicrobial resistance. The plan contains 12 actions and identifies 7 areas where measures are most necessary.

According to the data available from the Spanish surveillance systems, the AMR situation in our country poses a major public health threat; Spain is among EU countries showing a high antibiotic consumption in both human and animal health.

So these are the reasons why Spain is one of the 28 EU countries that have an action plan on AMR, which fully reflects our determined commitment to collaboration on such an important challenge. The Spanish National Action Plan on AMR was launched in 2014 and will be further developed in a second stage that will be presented next December.

The Spanish plan's strengths mainly lie in collaboration and support coming from all of those involved in AMR problem. This is a One Health plan that includes the efforts by doctors, vets, farmers, researchers, universities, authorities all over the country. Everyone support this plan, which is also connected to international working groups on AMR, from EU-based ones to World Health Organization-related.

Conferences

Spain against resistance: PRAN advances

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Keywords & topics

Resistance, Antibiotics, Strategy, Surveillance, Control, national plan, superbugs.

Experiences in the development of pharmaceutical professional services from the Community Pharmacy (CONGRAL)

ORGANIZING COMMITTEE

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Presidente CONGRAL
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Abstract:

The General Pharmaceutical Council of Spain promotes the roundtable "Experiences in the development of professional pharmaceutical services from the Community Pharmacy" aimed to project in the framework of the IPAP'18 Congress the advancement of Pharmaceutical care in the Iberian Peninsula.

Portugal and Spain are jointly working on the promotion of a patient-centred Community Pharmacy, with a set of professional healthcare services that complement and make more effective the work on medications and Public Health developed from the corresponding networks of community pharmacies.

The lectures included in the roundtable will expose such experiences as well as discussing the new orientation of university education in order to provide competent pharmaceutical professionals to provide a better service to the National Health System and to the patients.

Conferences

Pharmacy Practice and Pharmacy curricula in Spain
Marta GIL ORTEGA
Universidad San Pablo CEU

Pharmaceutical professional services in Spain
José Luis NÁJERA GARCÍA
President of the Official College of Pharmacists of Palencia

Pharmaceutical professional services in Portugal
Ana Paula MARTINS.
President da Ordem dos Farmacêuticos de Portugal

Teaching Pharmaceutical Care in the University
Miguel Angel GASTELURRUTIA / Eduardo MARIÑO
President of Guipúzcoa COF / University of Barcelona

Advances in Pharmaceutical Technology, SEFIG (Sociedad Española de Farmacia Industrial y Galénica)

ORGANIZING COMMITTEE

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The pharmaceutical sciences represented an advanced and highly dynamic field. The incorporation of new technologies, the continuous research to design more specific or targeted drug delivery system, or the increase in the effort to develop the biological evidence-based drugs have brought important advances in the field of biopharmacy and pharmaceutical technology.

Spanish Society of Pharmaceutics and Pharmaceutical Technology, SEFIG is a scientific society that brings together researchers, specialists and teachers working in the field of Pharmaceutical Technology, Biopharmacy and Pharmacokinetics in Spain. One of the missions of the society is to contribute to the professional development, teaching, and research through the exchange of knowledge, knowledge, and methods and promote the communication and dissemination of the last advances in the field of Pharmaceutics, Pharmaceutical Technology and related sciences.

In accordance with these objectives, SEFIG has organized the following session to analyze some of the latest advances in the field of drug development. With this aim, we have invited three speakers who are renowned in the area of the design and manufacture of advanced drug delivery systems that will discuss the latest advances in the development of drugs and their release systems.

Conferences

Present and future pharmaceutical technologies for the delivery of active substances
Gilles PONCHEL
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Advances in the formulation of biologicals using pharmaceutical nanotechnology
Mª José ALONSO
Universidad de Santiago de Compostela. Facultad de Farmacia.
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Design space and critical points in solid pharmaceutical forms
Isidoro CARABALLO
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Salamanca Science Park, boosting innovation

ORGANIZING COMMITTEE

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Abstract:

The Science Park of Salamanca (SPS) is an initiative of the University of Salamanca (USAL) whose mission is to house new research and development structures that attempt to take better advantage of the knowledge generated within the academic and entrepreneurial contexts, promoting research and the transformation of its results into technological and industrial innovation within the framework of an Open Innovation Ecosystem. With this underpinning, in July 2005 USAL initiated the creation of the Science Park Foundation as a strategy to strengthen the interaction between the University context and Industry, based on a connection between the University, different Companies and the Public Administration. The commitment of USAL to this project is clear and the University is working intensely to consolidate it as a research and innovation ecosystem that will complement the endeavours of the University itself to build a Third Generation Park with the following characteristics:

- It will favour the integration and development of collaborative projects among the companies housed at the Park and the institutions surrounding it.
- Salamanca has a density of research institutions and Higher Knowledge institutions that is above the national mean. The SPS takes advantage of this economic potential to promote the development of the zone.

Conferences

Tissue compensator for improving the radiation dose when treating superficial tumors through 3D printing

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Benefits of comsumption of donkey's milk

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Discover and develop molecules for the treatment of CNS conditions

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Commitment to Hospital Pharmacist Trainning, SEFH

ORGANIZING COMMITTEE

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Abstract:

In an era of rapidly change in healthcare and an innovations as drugs, technology and procedures, the scientific societies make a commitment to improves the competences of pharmacists, in this case Spanish Society of Hospital Pharmacy (SEFH) to hospital pharmacist (HP).

Spain represents an example of specialization in hospital pharmacy. In this session, the first speaker will present the model, the evolution in the number of HP, the access way, the national program and an innovative competence evaluation system. It will be presented the excellent results of the model in Spain and as to apply to other countries.

In keeping with mission of the SEFH, the purpose of continuous education, the second speaker will be revealed through of formaSEFH (Continuous Professional Development) an innovative model to improve the education for staff pharmacist and technician, a process of active participation activities to help the professional. Finally, in this session will participate a resident pharmacist and it´s a luck to know the point of view of the resident, not only the training activities, but other inciatives of the SEFH such as grants, investigation proyects and the program International Centres of Excellence in Hospital Pharmacy.

Conferences

Specialist Training as the way for Excelence in Hospital Pharmacy

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Innovation in continuous training for specialist pharmacist and technician in Hospital

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What does the resident pharmacist from training?
What does SEFH do to improve training of resident pharmacist?

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Mineromedicinal waters Microbiology in Latin American and Europe: Microbiota and its Biotechnological Pharmaceutical, and Industrial applications

ORGANIZING COMMITTEE

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Mineral-medicinal waters have been used in the world for therapeutic purposes in spas for centuries. At present, this form of treatment has gained many followers, constituting a flourishing industry, where thousands of people are attended throughout the year. In most of the springs of mineral-medicinal waters existing in the world, the composition of the microbial community present is unknown. The study of the characteristic and microbiota of each spring has a sanitary interest, since a microbial contamination can represent a risk for the health of the agustists and can also indicate the degree of protection of the springs. On the other hand, in recent decades the international scientific community has given great importance to the studies of microorganisms in different habitats, including aquatic extreme environment, since, understanding their structure and functioning, we can achieve a better understanding of the processes of adaptation and evolution of life on earth that have led to the development of a great biodiversity, as well as the possibilities of existence of life on other planets. Some of these microorganisms isolated in aquatic extreme habitats produce metabolites useful for their application in different fields of science and industry, hence the importance of holding a round table or workshop, which deals with research on bacteria present in these environments and its possible Biotechnological, Pharmaceutical, and industrial applications. The different studies carried out by the Real Academy of Pharmacy in mineral water springs in Spain, in relation to its microbiota and possible applications, will be announced. Similarly, the studies carried out in Colombia, Ecuador, Peru, and Venezuela that have opened new horizons in the possible applications in bioremediation processes, alternate energy generation and the bioprospecting of new microbial metabolites, such as polysaccharides, antibiotics, drugs, and surfactants

Conferences

Microbial mats in mineromedicinal water of Spain

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Chemical study of mineromedicinal water from Spain

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Microbial biodiversity and environmental resistomas in mineromedicinal waters from Latin America

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Keywords & topics

Mineromedicinal water Microbiology, Spring water, Spa, Thermal Water, Biotechnology, Pharmaceutical, Industrial

Startup Olé Accelerator, boosting entrepreneurial mindset

ORGANIZING COMMITTEE

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Abstract:

Startup Olé Accelerator (startupole.eu) is an ecosystem-enabling organisation that belongs to University of Salamanca. Its goal is to boost the entrepreneurial mindset of university community, from supporting spin-off (research projects that become viable businesses) to providing students with the right knowledge to begin a successful career as entrepreneurs. Startup Olé also supports startups in their quest for funding sources and talent. Amongst its activities, it is worth mentioning Startup Olé, an annual tech entrepreneurial event supported by European Commission-Startup Europe, Marca España and Central American Integration System (SICA), that gathers startups, innovative SMEs, investors, corporates, public administrations, universities and media, and that has become a benchmark for the international tech entrepreneurial ecosystem. Startup Olé also runs pre-acceleration programmes for corporates such as Iberdrola and public administrations like Junta de Castilla y León. From an international perspective, Startup Olé has coordinated the H2020 project WELCOME, and currently is part of MY-GATEWAY and SEP2.0, all of them EU-funded and developed as ecosystem-enabling projects.

Conference

Innovation and Entrepreneurship in Pharma

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Molecular mechanisms of neuronal death in amyotrophic lateral sclerosis with C9orf72 gene mutation

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Abstract:

Amyotrophic lateral sclerosis is a neurodegenerative disease in which spinal cord and cerebral cortex motoneurons die, resulting in progressive muscle atrophy until dead occur by means of respiratory muscle weakness. The exact cell-apoptosis mechanism is still unknown. Several genes have been identified to play a role in this process, being C9orf72 one of the main. Its mutation generates an expansion of GGGGCC hexanucleotide repeat which produce toxic dipeptides that aggregate in motoneurons, predominantly GA subtype. These aggregates relocate TDP-43 from nucleus to cell cytoplasm, altering its function and the autophagy process, finally leading to cellular stress and motoneuron death. To study these molecular mechanisms, GA will be expressed in motoneurons cultures and TDP-43 localization will be determined by inmunocytochemistry. Cellular stress, both reticular and mitochondrial, will be evaluated by Western Blot and by measure of mitocondrial transmembrane potencial and ROS.

Role of pleiotrophin and midkine in LPS-induced astrocytosis: implications in neuroinflammation

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Abstract:

Pleiotrophin (PTN) and Midkine (MK) are two growth factors that modulate neuroinflammation. It was previously shown that transgenic PTN over-expression in the mouse brain prevents LPS-induced astrocytosis but exacerbates amphetamine-induced astrocytosis in the striatum**.** In addition**,** the modest astrocytic response caused by a low dose of LPS (0.5 mg/kg) is blocked in the striatum of MK-/- mice whereas amphetamine-induced astrocytosis is enhanced. The data suggest complex regulatory roles of these cytokines in the astrocytic response depending on the stimulus. To further clarify these roles of PTN and MK, we have now tested the effects of an intermediate dose of LPS (7.5 mg/kg) in glial responses in PTN-/- and MK-/- mice. We found that LPS-induced astrocytosis is prevented in prefrontal cortex and striatum of both PTN-/- and MK-/- mice. The data suggest that regulation of astroglial responses to LPS administration are highly dependent on the levels of expression of PTN and MK. In addition, since it was previously shown that PTN potentiates LPS-induced activation of BV2 microglial cells, we tested the activation of FYN kinase, a substrate of the PTN receptor RPTPβ/ζ, and the subsequent ERK1/2 phosphorylation on LPS and PTN-treated BV2 cells. LPS effects on BV2 cells were not affected by the addition of PTN, suggesting that PTN does not recruit the FYN-MAP kinase signalling pathway in order to modulate LPS effects on microglial cells.

Financial support and/or acknowledgments

This work has been supported by grants SAF2014-56671-R from Ministerio de Economía y Competitividad of Spain, PNSD001I2015 from National Plan on Drug abuse, Ministerio de Sanidad, Servicios Sociales e Igualdad of Spain.

Design of a new scaffold of soy protein combined with mesenchymal stem cells for chronic wound healing

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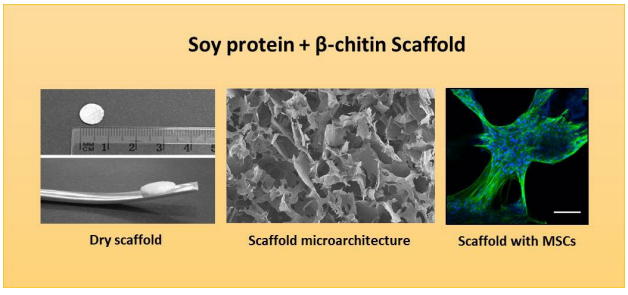
Abstract:

Chronic wounds are those in which the normal process of healing has failed despite standard wound care practices. In recent years, new therapies with biomaterials and mesenchymal stem cells (MSC) have emerged as a promising alternative for management of chronic wounds. Key features of these therapies are composition of biomaterial and effect presented by MSCs on tissue regeneration.

This end of degree project is part of a research project carried out by the NanoBioCel group in collaboration with the Biomat group of the UPV/EHU. In this approach, the use of soy protein combined with chitin allowed the design of a polymeric scaffold that eases the union of MSCs to the microarchitecture of the biomaterial, thereby favouring their paracrine immunomodulatory effect close to the wound.

Results obtained in the present study show high water absorption and swelling capacity of this biomaterial, which provides moisture-retention within the wound bed. In addition, this scaffold shows good biocompatibility with human cell lines and adequate stability in aqueous medium. Finally, human MSCs derived from adipose tissue show an increase in the production of indoleamine 2,3-dioxygenase (IDO) when incorporated into the scaffold, thus increasing an anti-inflammatory effect that may be harnessed for wound tissue regeneration.

Graphical abstract (optional)



Nanoencapsulated curcumin as a potential therapy for age related neurodegenerative diseases

Telma BEZERRA-SOARES[*1,2,3], João. P. CAPELA[3,4], M. Elisabete. C.D. REAL OLIVEIRA[1], Alberto DIAS[5,6], Maria L. BASTOS[3], Félix CARVALHO and Marlene LÚCIO[1]

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Abstract:

Age related neurodegenerative diseases (ARND) are one of the CNS most debilitating and challenging diseases. Lipid nanocarriers have emerged as efficient delivery systems with the capability to cross the blood brain barrier. Also, when associated to natural compounds, have demonstrated to be an interesting alternative to ARND therapies. Within natural compound sources, the *Curcuma* genus have acquired great importance mainly due to the presence of curcumin, a compound with anti-inflammatory and antioxidant properties, recognized as valuable for the treatment/prophylaxis of ARND. A biophysical analysis based on spectroscopic and x-ray diffraction studies has gathered predictors of curcumin pharmacokinetic profile indicating low bioavailability and solubility, bioaccumulation, high affinity to human serum albumin, as well as a tendency to induce membrane biophysical changes. Therefore, to improve curcumin therapeutic benefit, we developed stealth nanocarriers (NC) of dioctadecyldimethylammonium bromide (DODAB) and 1-oleoyl-*rac*-glycerol (MO) (1:2) for Curcumin delivery.

These nanocarriers have shown 94.5% of curcumin release over 50 h. Furthermore, the nanocarriers were PEGylated and this stealth procedure prevented interactions with plasma proteins. Moreover, by fluorescence decay of a lipophilic probe (DPH-PA) under the action of a peroxyl radical generator the antioxidant activity of curcumin encapsulated was confirmed.

To study *in vitro* safety of NC we have analyzed the concentration-toxicity curves of curcumin, empty NC and curcumin loaded NC in human SH-SY5Y cells using two cytotoxicity assays: dimethylthiazol diphenyltetrazolium (MTT) reduction and neutral red (NR) uptake. NC loaded with curcumin have proved to be significantly less toxic to neuronal cells than the unloaded compound.

Financial support

This work was supported by the Portuguese Foundation for Science and Technology (FCT) in the framework of the Strategic Funding UID/FIS/04650/2013. Marlene Lúcio acknowledges the exploratory project funded by FCT with the reference IF/00498/2012.

Saccharomyces cerevisiae as a model for the study of Alzheimer's disease

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Abstract:

Currently Alzheimer's disease is the most common neurodegenerative disorder. It is characterised by the development in the central nervous system of extracellular neuritic senile plaques (formed by β-amyloid peptide aggregates) and intracellular neurofibrillary tangles (formed by hyperphosphorilated tau protein), between which a relationship must exist. In order to gain a better insight into this disease, it is necessary to come up with new research tools and the creation of models using the yeast Saccharomyces cerevisiae may be one of them, thanks to overexpression, deletion, mutation and heterologous expression of proteins involved in it. These models are especially useful due to the fact that they are eukaryotic and easily manageable in vivo systems. In this work, we summarize the main yeast models created to study the β-amyloid cascade and tau protein, paying especial attention to the contributions made by each of them. We also discuss the main advantages/disadvantages of this new approach and its possible future applications.

Acknowledgements

I am grateful to María Molina, Professor of Microbiology at the UCM, for supervising this work.

Toxicity of fluconazole in selected aquatic species

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Abstract:

Azoles are common-use antifungal drugs to treat a great number of fungal infections. In addition to this application, nowadays these compounds are being using in agriculture as pesticides to protect crops. These compounds will end in the fresh water, entering in this aquatic ecosystem, and as a result of it, aquatic organisms will be affected. Because of this fact, the ecotoxicity risk assessments are very important, and the tests we have performed in this study are the first step to these ecotoxicity risk assessments. We investigated the sensitivity of the freshwater crustacean *Gammarus Pulex* towards one typical azole fungicide, Fluconazole, performing an acute toxicity test of immobilisation. In the same way, we investigated the sensitivity of free-floating aquatic plants from the duckweed family called *Lemna sp* toward the same substance -Fluconazole- but in this case we performed a growth inhibition test.

Lemna sp has ended up being very sensitive to Fluconazole, it has been affected from the lowest concentration; on the other hand, *Gammarus pulex* is less sensitive and it is not affected by the substance until the highest concentration used in the experiment, and this concentration was not the EC50, so we have theorized with this concentration using statistical approach, so it is needed to make further experiments.

Financial support and/or acknowledgments

The author is grateful to prof. Jaroslav Legath for scientific help and supervision and to UAH for the Erasmus grant.

Development of an ocular insert with Progesterone for the treatment of Retinosis Pigmentaria

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Abstract:

INTRODUCTION AND OBJECTIVES

Retinosis pigmentaria (RP) is a hederitary disease that causes progressive loss of the photoreceptors developing blindness. Currently there is no treatment to cure this disease, but there are studies that propose that progesterone (PG) could slow down the course of this pathology. Most ocular diseases are treated by the application of ophthalmic dosage forms such as gels or eye drops, which translates into a large amount of dosage per day. To reduce this problem, the formulation of eye inserts with PG has been proposed as a possible treatment to slow the course of this disease.

METHODOLOGY

Polymeric ocular matrix were elaborated with PG, and from this the external morphology was determinated. The weight, pH and thickness of each of them was also analyzed. The selected matrix containing polyvinylalcohol and methylcellulose as polymers and propyleneglycol as a film-forming agent and this was used to analyze the concentration of PG, the hydroscopicity and the permeation of PG in rabbit corneas and scleras.

RESULTS

The hydroscopicity tests showed that the inserts captured water, this is important to avoid disintegration once in the eye. The statistical results showed that there was a significant difference between the amount of PG that crosses the cornea with respect to the sclera. From minute 60, the esclera permeation was better than at cornea.

CONCLUSIONS

We can affirm that it is possible to incorporate PG in ocular inserts. The administration of these is better in sclera than in cornea.

Financial support and/or acknowledgments

CEU Cardenal Herrera university, Valencia.

Photophysical study of new fluorescence probes

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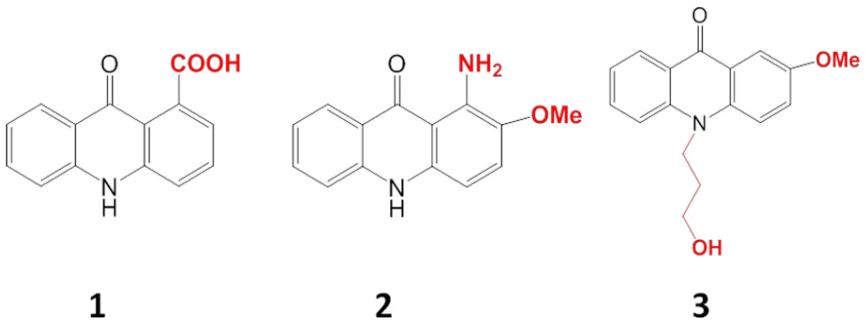
Abstract:

Acridones are heteroaromatic compounds with long fluorescence lifetimes (>10 ns) and good quantum yields (>0.5), exhibiting emission wavelengths in the blue region, 400-500 nm. They have been employed in several applications such as DNA sequencing, monitoring of enzymatic systems, detection of biomolecules, intracellular sensing (Ca^{2+}, Cu^{2+}, H^{+}…), and as antitumoral drugs [1]. Their photophysical and spectroscopic properties dependence with pH, polarity and viscosity make them good candidates as fluorescent sensors for the diagnosis of diseases, such as cancer, that creates intracellular metabolic disorders [2].

In this study, we explore the dependence of pH on the fluorescent properties of 3 new acridone derivatives (Scheme 1). Absorption, emission spectra and fluorescence lifetimes have been obtained in aqueous solutions.

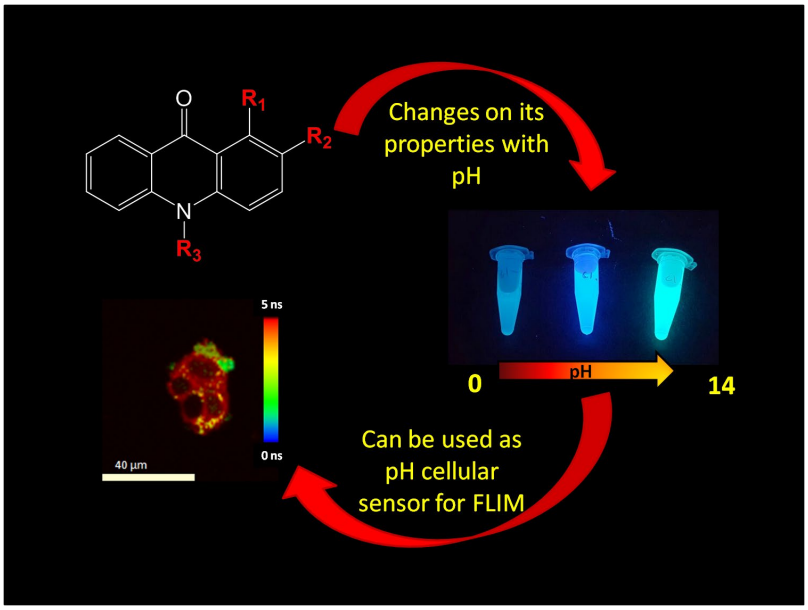


Scheme 1. Chemical structure of the acridone probes studied in this work.

This study provides important information for their application as fluorescent sensors of intracellular parameters, especially in techniques such as FLIM (Fluorescence Lifetimes Imaging Microscopy) in which both, intensity and lifetimes, are recorded at the same time to build up a fluorescence image. Besides, time-resolved detection allows for time-filtering of short-lived signal ("time-gate") such as interferences and cellular autofluorescence, contributing in a better signal to noise ratio [3].

[1] Smith, J.A. et.al.*; J.Fluoresc*, 2004, **14**, 151-171
[2] Orte, A. et al.; *ACS Nano*, 2013, **7**, 6387-6395
[3] Ruedas-Rama, M.J. et al.; *Springer International Publishing, Cham*, 2015, **15**, 191-223

Graphical abstract



Financial support and/or acknowledgments

The results were funded by grants CTQ2014-56370-R and CTQ2017-85658-R from the Spanish Ministry of Economy and Competitiveness and the European Regional Development Fund (ERDF).

Attention-Deficit/Hyperactivity Disorder

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Abstract:

Attention-Deficit/Hyperactivity Disorder (ADHD) is a chronic disorder that usually begins in childhood and sometimes it endures into adulthood. Therefore it can affect children, teenagers and adults.

It has a complicated diagnosis and then, it has different tests that must be done by a doctor or mental health professional.

Many studies have been carried out to discover what causes ADHD, and investigations conclude that several causes can take part in the onset of this disorder.

Sex, age, stage of development and social environment can play an important role for children and teenagers in the evolution of the disorder.

ADHD has different clinical presentation and according to this, the patient is indicating a non-pharmacological treatment, drug therapy or the combination of both.

The main objective of this study is to analyse in the "Area de Gestión Sanitaria Sur de Sevilla" (AGSSS) patients currently treated for ADHD with Methylphenidate, Lisdexamfetamine, Atomoxetine and Guanfacine.

It has been compiled all the information about clinical history of patients who are prescribed these four drugs in our Area, assessing the degree of adequacy of treatments. Therefore we need the algorithm for ADHD proposed by CADIME 2017.

In view of the results we conclude that there is a lack of monitoring of patients and drugs are taken for a long period of time.

In silico study of potential antidiabetic activity of phenolic compounds from Psidium guajava

Francisco GIRÓN-RODRÍGUEZ*, Elixabet DÍAZ-DE-CEIRO, Alfonso PÉREZ-GARRIDO, Helena DEN-HAAN, Jorge PEÑA-GARCÍA, José Antonio GABALDÓN-HERNÁNDEZ, Vito VERARDO, Antonio SEGURA-CARRETERO and Horacio PÉREZ-SÁNCHEZ

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Abstract:

Over the last decade, Psidium guajava L. (guava) leaves have demonstrated their effect against Diabetes mellitus (DM). This activity, as others, has been related to their content in phenolic compounds. In many instances, the whole extract has been used to carry out in vitro and in vivo studies. However, there is a lack of literature concerning the effect of the individual phenolic compounds present in the leaves. For this reason, the aim of the present work was the in silico evaluation of each phenolic compound to predict their effect towards the principal targets involved in DM disease. The identification of an ethanol extract (80% ethanol) revealed the presence of 73 compounds. The in silico study, based on DIA-DB hernia (ligand similarity based virtual screening (LBVS) and structure based virtual screening (SBVS): Docking), revealed that, among phenolic compounds assayed, naringenin, quercetin, quercitrin, isoquercitrin, guajaverin, ellagic acid, catechin and geraniin showed the highest antidiabetic potential. On the other hand, naringenin and catechin exhibited the highest number of interactions with target proteins and displayed similarities with a broad of known antidiabetic drugs. In conclusion, guava leaves contain several compounds that act in the mechanism involved in DM and DIA-DB hernia showed being an useful tool for the screening of molecules with antidiabetic potential.

Financial support and/or acknowledgments

This work has been funded by a grant from the Spanish Ministry of Economy and Competitiveness (CTQ 2017-87974R)

Novel Advances in Pharma for NTDs: The case of Chemo Group and Mundo Sano Foundation

ORGANIZING COMMITTEE

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Abstract:

Mundo Sano Foundation (MS) channels the corporate social responsibility of the family owned pharmaceutical company: Chemo Group. Born in Argentina in 1993, MS starts its work on Neglected Tropical Diseases (NTDs) focusing on Chagas disease, one of the 17 NTDs named by the World Health Organization (WHO) in 2010, currently the list has been increased to include 20 diseases. Fruit of this collaboration, Chemo group developed in 2012 the drug of choice for Chagas disease, benznidazol. This decision was taken by the pharmaceutical group due to the world stock´s breakage of benznidazol which occurred in 2011, and thanks to MS intermediation. Nowadays and due to this drug development, Chemo group has obtained a Food and Drug Administration (FDA) Priority Review Voucher (PRV) in the United States of America (USA), which Chemo group has committed to invest 50% of the PRV total amount to NTD programs.

The amount of migrant population coming from Latin America to Spain since the last decades of the 20th century, has converted Spain in the second non endemic country, after USA, with the highest amount of population affected by Chagas disease in the world. According to different estimations, there may be between 50,000 and 100,000 people living with Chagas disease in Spain at the moment. In 2010, MS started its program in Spain with the compromise to fight Chagas disease with a global vision.

The amount of migrant population coming from Latin America to Spain since the last decades of the 20th century, has converted Spain in the second non endemic country, after USA, with the highest amount of population affected by Chagas disease in the world. According to different estimations, there may be between 50,000 and 100,000 people living with Chagas disease in Spain at the moment. In 2010, MS started its program in Spain with the compromise to fight Chagas disease with a global vision.

Keywords & topics

Neglected Tropical Diseases (NTDs); Corporate Social Responsibility (CSR); Priority Review Voucher (PRV); Food and Drug Administration (FDA); Chagas disease; benznidazol; Soil Transmited Helmints (STH); Ivermectine; Albendazol; coformulation.

From mobility programs to internationalization at home

ORGANIZING COMMITTEE

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Abstract:

The seminar will address a range of current topics in internationalization as they relate to higher education institutions in Pharmacy, presenting the benefits of an international perspective for all stakeholders, not only the actual participants in a given mobility program. Topics will include:

- Strategic international partnerships between Pharmacy Schools: planning, implementing and evaluating within each institutional context. Creating opportunities for students to study and staff to teach or train in international higher education institutions (HEIs). International credit mobility.
- Creating and implementing a successful strategic internationalization plan at your Pharmacy Faculty: key stakeholders, diagnosis, communication plan, monitoring tools and evaluating outcomes.
- Development of international competencies for all (pharmacy students and staff). Mobility and internationalization of the pharmacy curriculum. How can international students contribute to internationalization at home in a Pharmacy Faculty? How do global issues intersect with local ones?
- Facilitating "cultural learning". Development of intercultural competence. Benefits of enhanced multicultural educational experiences of international students in Pharmacy Schools.
- Enhancing the student experience: are our Pharmacy Faculties providing the best possible experience for our international students? Aspects affecting the experience of international students upon arrival and throughout their studies. Best practices to enhance quality for the entire student body.
- Pharmacy Summer schools.
- Establishing, developing and expanding international alumni relations programmes.

Participants will be invited to share relevant case studies and hands-on exercises.

Keywords & topics

Mobility programs, Internationalization at home, Strategic international partnerships, Facilitating "cultural learning".

Quality aspects for individualized compounded medications in different US and EU settings

ORGANIZING COMMITTEE

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Abstract:

Pharmacy compounding or the preparation of individualized medications is becoming more relevant now than ever when it comes to satisfying the unique needs of patients who otherwise would not have access to the required medication, due to the lack of tailor made drug products, shortages of the market, some treatment requirements, etc.

The United States Pharmacopoeia (USP) is a independent, scientific, non-profit organization whose objective is to develop public standards in order to establish the identity, concentration, quality and purity of medicines, setting the bar for scientific rigor.

Compounding pharmacists have basic references and accurate guidelines in the USP Reference Standards that help ensure the quality of the compounding preparations. It establishes the correct procedures, methods and practices for the formulations as well as Drug Monographs for compounding formulations for which there is no commercially available drug product.

In this conference, the guidelines and USP chapters that are of paramount importance for establishing good practices in compounding, as well as its importance and practical approach in community Pharmacy are disussed.

In Spain, GMPs in compounding were a turning point thanks to which the concept of Quality in the elaboration of individualized compounded medications was definitively installed since 2001.

This implies the need to include in university study plans the legal, administrative and assistance aspects that surround the compounding practices beyond the mere training in pharmaceutical technology.

In Europe, compounded medications are legislated, but coexist in very different scenarios. In countries such as Spain, they have always been widely used and nowadays their importance is recognized, while in other countries their presence is becoming smaller.

It is particularly important for those patients that require a continuty in treatment based on the administration of compounded medications after being discharged from the hospital.

The need to maintain the criteria at hospital and outpatient level with the consequent communication between pharmacists of both settings is evident. It is necessary to carry out an analysis of the circumstances, both technical and legal, that encompass the continuation and accomplishement of the patient's treatments. Besides, communication with physicians is essential, along with the training they receive on the prescription of compounded medications. These aspects are to be highlighted because of its importance and its little presence in their education curriculum.

Conferences

United States Pharmacopoeia (USP) Reference Standards and its implementation in Pharmaceutical Compounding both in US and internationally.

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Quality for compounding activities in Community Pharmacy in Spain and other EU countries.

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Hospitalized patient versus discharged patient. Relevant aspects in individualized

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Keywords & topics

Pharmacy compounding; Compounded medications; Pharmaceutical formulations; Individualized medications; Quality; Reference Standards; USP

Pharmaceutical Care in Type 2 Diabetes in Community Pharmacy

ORGANIZING COMMITTEE

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Abstract:

The epidemiological study di@betes (2010) shows that there are 13% of diabetics in Spain, 6% of whom are undiagnosed.

The approach to the diabetic patient must be taken in an integral manner, involving the patient whith the rest of the healthcare professionals.

From the community pharmacy, diabetes patient care can be provided in differents leves:

1. Healthy people: education and promotion of healthy lifestyle habits to reduce risk factors such as ovweweight and obesity and therefore decrese Type 2 Diabetes.
2. Undiagnosed diabetics by detecting individuals at risk for diabetes or possible diabetics who will be referred to the doctor for diagnosis.
3. Diagnosed diabetics.
   - Guaranteeing the patient's treatement and follow-up.
   - Promoting adherence to pharmacological treatment.
   - Collaborating with physicians and other healthcare professionals, working with consensual guidelines and protocols.
   - Performing diabetes traning.
   - Reducing morbidity and mortality due to micro and macrovascular complications related to the disease.
   - Identifying and assessing risk factors.
   - Performing pharmacotherapeutic follow-up and pharmacovigilance.

Keywords & topics

Diabetes, Pharmaceutical Care, Community Pharmacy, Community Pharmacist.

MEDAFAR: Comunicación entre profesionales sanitarios

ORGANIZING COMMITTEE

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Abstract:

The lack of communication between doctors and pharmacists is one of the barriers to the implementation of Pharmaceutical Care. For this reason, The Pharmaceutical Care Esp Foundation, with Semergen and Esteve have developed MEDAFAR, a bidirectional telematic communication system between doctors and pharmacists that allows the transmission of information to improve health outcomes. In this workshop, MEDAFAR will be presented and real cases will be worked on. The classification of referrals consists of 38 validated rubrics that define situations related to pharmacotherapy that require referral between doctor and pharmacistgilance**.**

Conference

Ana DAGO
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Keywords & topics

Diabetes, Pharmaceutical Care, Community Pharmacy, Community Pharmacist.

In vitro study of Rilpivirine antifibrotic effect through STAT1 signalling pathway

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Abstract:

Introduction and aims: Chronic liver disease (CLD) is a leading cause of interruption of the antiretroviral treatment (ARV) employed in human immunodeficiency virus (HIV) patients. This study aims to asses possible antifibrotic effect associated with Rilpivirine (RPV), a non-nucleoside reverse transcriptase inhibitor (NNRTI) through its role in the inactivation of hepatic stellate cells (HSCs) and the involvement of the Janus Kinase signal transducers and activators of transcription 1 (STAT1) and 3 (STAT3) in this process. **Methods:** Hep3B/G2 and LX-2 cell lines, employed as models of hepatocytes and HSCs respectively, were treated with RPV, in the presence and absence of transforming growth factor β (TGF-β) as a profibrogenic stimulus. MTT assay, optical and fluorescence microscopies, or flow cytometry were employed to analyse cell viability, morphology and nuclear cell count, and induction of apoptosis. Gene expression of fibrosis markers (*COL1A1*, *ACT-2 PDGFB* and *SERPINE1*), was analysed by qRT-PCR whereas the protein expression (COL1A1, pSTAT1 and pSTAT3) was assessed by Western blot. Inhibition of pSTAT1 was achieved both pharmacologically (fludarabine) and genetically (siRNA). **Results:** RPV reduces viability and proliferation of LX-2 cells, an effect not observed in Hep3B cells. Moreover, both in non-activated and activated (TGF-β-treated) LX-2 cells RPV triggers apoptosis in a concentration-dependent manner. This action occurs through pSTAT1 as both the pharmacological and the genetic inhibition of pSTAT1 abolished the effect. pSTAT signalling is also responsible of the decrease in the expression of fibrotic markers in these cells. **Conclusions:** The RPV-induced proapoptotic effect in HSCs is dependent on pSTAT1 while STAT3 activation remains unaltered.

Key Words

Rilpivirine, Fibrosis, HSCs, Apoptosis, STAT1.

Financial support and/or acknowledgments

This work was supported by the Instituto de Salud Carlos III, Ministerio de Economía y Competitividad (research grant PI14/00312 and CIBER CB06/04/0071); the Conselleria d'Educació, Formació i Ocupació, Generalitat Valenciana (research grant PROMETEOII/2014/035).

Intracellular delivery of nucleic acids using a new type of cell penetrating peptides

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Iria LOUZAO and Javier MONTENEGRO

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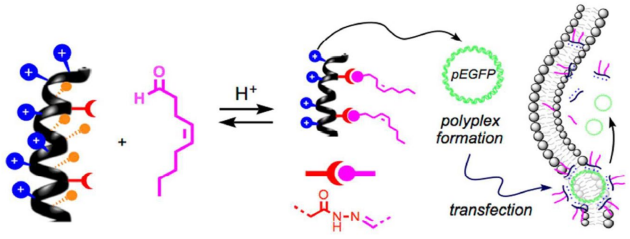
Abstract:

Gene therapy has attracted the interest of the scientific community, due to its potential to treat genetic diseases: it is able to inactivate overexpressed genes or to replace malfunctioning ones. In addition, this therapy can be used to cure other conditions, such as cancer. However, its strong potential is hindered by the delivery problem: designing vehicles that allow the efficient transportation of therapeutic nucleic acids to its target tissue is a considerable challenge, since many physiological barriers must be overcome in an efficient way, and without causing cytotoxicity.

A new type of cell penetrating peptide-based vectors for the intracellular delivery of plasmids and short interfering RNAs (siRNAs) is presented in this work. These vectors have an amphiphilic secondary structure, are positively charged, and are chemically modified by coupling long chain aliphatic aldehydes through a hydrazone bond. They have been synthesized and characterized in the laboratory; and *in vitro* assays have been performed in order to study their transfection efficiency and cytotoxicity. Furthermore, the influence of different factors on transfection efficiency has been studied, such as the position of the aldehyde pendants and the nature of the nucleotide cargo.



I. Louzao, R. García-Fandiño, J. Montenegro, *J. Mater. Chem. B* **2017**, *5*, 4426-4434.

Financial support and/or acknowledgments

This work was partially supported by the Spanish Agencia Estatal de Investigación (AEI) [CTQ2014-59646-R, SAF2017-89890-R], Xunta de Galicia (ED431G/09, ED431C 2017/25 and 2016-AD031) and the ERDF. J. M. received a Ramón y Cajal (RYC-2013-13784), an ERC Starting Investigator Grant (DYNAP-677786) and a Young Investigator Grant from the Human Frontier Science Research Program (RGY0066/2017).

Characterization of nivolumab use in non-small cell lung cancer in a named patient program in Portugal

Patrícia GOMES*[1], Margarida FALCÃO[2], Fátima FALCÃO[2,3], Helena FARINHA[2,3], José Manuel CORREIA[4], Cristina MATOS[4] and Fernando NOGUEIRA[4]

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Background: Nivolumab has shown efficacy and safety in clinical trials for non-small cell lung cancer (NSCLC) treatment, but there are few data on its use in clinical practice. This study characterizes the use of nivolumab in a named patient program (NPP) in a Portuguese hospital and compares the obtained results with recently published data.

Methods: Descriptive, observational, retrospective study including all NSCLC patients approved for the NPP that started therapy with nivolumab. Nivolumab's safety was assessed based on the frequency and severity of potential treatment-related adverse events and its effectiveness was measured by overall survival, progression-free survival, event-free survival and post-therapy survival time. Data was collected from clinical records between 28/03/2017 and 21/06/2017. Ethics Committee approved the study.

Results: 8 patients were included in the study, 6 were male and the median age was 65.5 years. All patients had adenocarcinoma and 62.5% of them were diagnosed at stage IV. In most patients (62.5%) nivolumab was given as second-line treatment. Median time from diagnosis to treatment initiation was 15.1 months. Average treatment duration was 5.3 months. 7 patients had potential treatment-related adverse events with only 1 discontinuing treatment. Median overall survival was 9.0 months. Median progression-free survival was 8.4 months. Median event-free survival was 7.0 months. Post-therapy survival time was 3.0 months.

Conclusion: There was a high percentage of patients with potential treatment-related adverse events. The median overall survival was lower and the median progression-free survival and median event-free survival were higher than the ones observed in the consulted studies.

Bevacizumab treatment in metastatic colorrectal cancer patients: genes studies as biomarkes of drug efficacy

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Abstract:

Colorectal cancer (CRC) is one of the most common cause of cancer-related death worldwide. One of the drugs used to complement the first-line treatment is Bevacizumab, which is a monoclonal antibody whose target is VEGF gene. This drug inhibits the angiogenesis process. However, Bevacizumab has a low well-response rate due to the development of new therapy resistance. According to previous studies, it has been proved the relationship between the response of the treatment and the expression of some genes. For that reason, the main purpose of this project is to increase the knowledge of the Bevacizumab efficacy on metastatic CRC patients.

In this project, mRNA expression of 89 genes related to angiogenesis was studied in 60 metastatic CRC patients treated with Bevacizumab. According to the response of the patients to the drugs, two biological groups were created: good response and bad response. The preliminary result of 15 samples shows different expression in 10 genes between both biological groups. Among these 10 genes, even though the expression of BAI1 is highlights for a possible relationship with a good response to Bevacizumab, ANGPT2, EDN1, IL6 and PDGFA have a possible relationship with a poor response. Furthermore, the expression of PTGS1, HGF and PLAU is also related with poor prognostic as well as bad response to Bevacizumab therapy but the mechanism is not clear yet.

As a result of this project, possible genes are suggested as some possible biomarkers of the efficacy of Bevacizumab in metastatic colorectal cancer.

Financial support and/or acknowledgments

My acknowlegments to the investigation group”Genetic variability” of the European University of Madrid.

New role of splicing and nonsense-mediated decay (NMD) alterations in acetaminophen-induced acute liver damage

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Abstract:

Background & Aims: Acetaminophen (APAP) overdose is one of the main causes of acute liver damage. SLU7 splicing factor was shown decreased in chronic liver damage and this is associated with altered expression and splicing of *SRSF3,* a splicing factor essential for mature hepatocytes. The present work intends to deepen into the molecular mechanisms implicated in APAP-induced liver damage, in order to identify new therapeutic targets. To this end, we developed an acute model of APAP toxicity and studied the changes in *SLU7* and *SRSF3* expression and function.

Methods: Human HepaRG cell line was treated with APAP. Supernatant transaminases were measured as markers of damage. Expression of *SLU7*, *SRSF3* and antioxidant genes in HepaRG and mouse liver after APAP treatment was evaluated by qPCR and Western blot. NMD activity was measured by Dr. Kulozik assay. *SRSF3 ISO2* mRNA was downregulated using a specific siRNA.

Results: APAP treatment diminished *SLU7* expression both in HepaRG cells and mouse liver. This was parallel to the induction of liver damage and changes in *SRSF3* splicing, with an increase of *SRSF3 ISO2*, normally degraded by NMD. However, *ISO2* was accumulated as a result of NMD inhibition by APAP and a truncated SRSF3 protein was detected. Downregulation of *ISO2* seemed to modulate antioxidant response.

Conclusions: This is the first demonstration of APAP as a modulator of alternative splicing and NMD system, being capable of changing *SLU7* and *SRSF3* expression. The induction of an aberrant SRSF3 truncated protein may participate in the modulation of the antioxidant response.

Financial support and/or acknowledgments

I thank all the Program of Hepatology group from CIMA and especially my supervisors R.Urtasun (PhD) and C.Berasain (PhD and Full Professor of Biochemistry).

Leishmanicidal and trypanocidal activity of new natural products

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Abstract:

Leishmaniasis and Chagas disease are two diseases caused by parasitic protozoa, which affect millions of people worldwide. Their clinical manifestations range from asymptomatic to disabling alterations that can lead to death. However, the currently available treatment remains the same as 50 years ago, which presents significant problems of toxicity and efficacy, in addition to the difficulty of access for the majority of the affected population. For this reason, the World Health Organization considers them within the current list of neglected tropical diseases and the development of innovative drugs to fight them remains as a challenge.

In this study, the *in vitro* activity of the extracts obtained from the supernatant of *Streptomyces sanyensis* was tested, against *Leishmania amazonensis* and *Trypanosoma cruzi*, in order to find new molecules with possible leishmanicidal and trypanocidal *in vitro* activity, with lower toxicity and greater efficacy than the available treatments.

The method used was based on the quantitative colorimetric reaction of the resazurin indicator (alamarBlue® Cell Viability Reagent). The cytotoxicity test was also based on the use of alamarBlue®, in this case using macrophage cultures.

In this study, crude extract and sub-fractions shows activity against *Leishmania amazonensis* and, also, *Trypanosoma cruzi*.

On the other way, the compounds present in the different fractions produce structural and functional changes of vital importance in the parasites studied.

Financial support and/or acknowledgments

Our thanks to the Universidad de La Laguna and Universidad de Salamanca for the financial support provided.

Molecular epidemiology of *Pseudomonas aeruginosa* through Double-locus sequence typing technique (Oral Presentation)

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Abstract:

Background: *Pseudomonas aeruginosa* is one of the main microorganisms isolated in cross infections. The prevalence of multi-resistant (MDR) or extremely resistant (XDR) strains has risen globally in the last decades. Epidemiologic surveillance is a tool to prevent the appearance of these resistances due to the existence of a defined MDR/XDR profile locally in hospitals. The present study was developed after an outbreak of multi-resistant *P. aeruginosa* clone in the Nephrology Service of *Hospital General Universitario de Alicante*.

Objective: To assess the utility of double-locus sequence typing (DLST) to characterise *P. aeruginosa* hospital outbreaks.

Materials and methods: Genetic characterization study of *P. aeruginosa* strains. Cases were 24 strains associated to the Nephrology Service outbreak which happened from February to August 2017. Controls were 22 strains of *P. aeruginosa* chosen randomly during August 2017 and came from hospitalised patients in other Services that did not have known connection with the outbreak. The protocol followed was: (1) bacterial DNA extraction, (2) amplification of *ms172* and *ms217* genes, (3) visualisation of fragments through gel electrophoresis, (4) DNA purification and (5) Sanger sequencing. Also, a phylogenetic tree was built, and antibiotic susceptibility testing was carried out.

Results: A 100% typing was obtained. All cases strains were classified as the same DLST type (52-44). Regarding control clones, there was great variety and a new allele was discovered for each gene: allele 124 for *ms172* and allele 202 for *ms217*.

Conclusions: This study confirms that DLST technique is useful, fast, simple and less expensive than others for the detection of *P. aeruginosa* hospital outbreaks.

Study of the gastrointestinal microbiota in 3 months-old children from the NELA cohort study: A) Microbial cultures. *Escherichia coli*: prevalence and phylotypes. B) Gas chromatography – mass spectrometry as culture-independent technique

Miguel GANCEDO-RODRIGO[1]*, Silvia PARDO-LACÁRCEL[1], Eva MORALES[2], Pedro L. VALERO-GUILLÉN[2], Geno YAGÜE[1] and L. GARCÍA-MARCOS[2]

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Abstract:

The human microbiota is defined as the set of microorganisms that inhabit different parts of the human body. The taxonomic and functional composition of the microbiota can be influenced by different factors resulting in changes from birth to adulthood. The study of the microbiota is of great interest at the time of establishing possible relationships between the microbial composition of the individual and the development of future diseases. Therefore, in this work, based on the multidisciplinary NELA (Nutrition in Early Life and Asthma) project from the "Instituto Murciano de Investigación Biosanitaria", a study in feces of children at 3 months of age has been carried out through culture-dependent and culture-independent techniques with the aim of analyzing the bacterial diversity of the gastrointestinal tract. The microbial cultures reflected a great diversity in the 3 months-old children microbiota, being *Escherichia coli* one of the most prevalent isolated microorganisms and, within it, the B2 phylotype the most frequent in the samples studied. Gas chromatography-mass spectrometry of 3-hydroxylated fatty acids gave a global view of the Gram-negative bacteria that colonize the gut at early ages: bacteria from the phyla *Bacteroidetes*, *Proteobacteria-Fusobacteria* and *Firmicutes* were detected, showing differences between the samples, which, finally, were classified in three groups, depending on the proportion of these three bacterial groups. These data will be related, in several steps of the project, with other biological and environmental parameters to elucidate their possible predictive value in the development of asthma in some of the subjects investigated.

Study of the protective capacity of the chimeric protein Fh3Tq against infection in experimental model of *Fasciola hepatica*

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Abstract:

Fasciolosis is a zoonosis caused by trematodes of the genus *Fasciola*, that mainly affects grazing ruminants. The drug of choice is triclabendazole, but the emergence of resistance in recent decades leads to the search for new control strategies. The development of a vaccine provides a profitable and sustainable alternative for the control of fasciolosis. In previous studies, a battery of peptides with B and T epitopes designed by bioinformatic methods were evaluated. Three of them, T14, T15 and T16, showed a high protective capacity formulated in the adjuvant adaptation ADAD vaccination system. It was proposed to bind these three peptides in a single molecule, giving rise to a recombinant chimeric protein that was called Fh3Tq. BALB/c mice were immunized with Fh3Tq or T14+T15+T16, using the ADAD vaccination system, and infected with metacercariae of *F. hepatica*. The magnitude of the hepatic injuries and the reduction in the number of flukes were evaluated, and the immunoglobulins were quantified to study the existence of an immune modulation. The group immunized with the peptide subunits T14, T15 and T16 showed the greatest reduction in liver score and number of flukes, followed by the group immunized with the chimeric protein Fh3Tq. Immunization in the two groups caused high levels of IgGTotal and generated a mixed Th1/Th2 response. However, the group immunized with Fh3Tq didn't achieve a higher survival rate than the group immunized with the peptides mixture T, that got the best protection results.

Research on Pharmaceutical Technology in Ibero-America

ORGANIZING COMMITTEE

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Abstract:

The objective of this workshop is to present some of the most important lines of research in pharmaceutical technology in which universities of different countries of Ibero-America currently work. There will be a review of both own research and others conducted in collaboration between universities. The three selected conferences cover both innovative aspects of pharmaceutical technology, as well as other highly relevant worldwide:

- the design and development of new controlled release systems for topical and transdermal administration of drugs,
- the possibilities offered by different types of nanoparticles as targeting systems of antitumor drugs, increasing their effectiveness and decreasing their toxicity
- the research and development of safe and effective phytomedicines as a strategy to promote the economic, social, health and scientific development of regions with an abundance of vegetables with medicinal properties.

Conferences

Pharmaceutical development of herbal medicinal products
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Targeted nanoparticles for cancer therapy
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Lyotropic liquid crystalline dispersions as topical and transdermal drug delivery systems
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Keywords & topics

Pharmaceutical development, Drug delivery systems, Drug targeting, Nanomedicine, Lyotropic liquid crystalline dispersions, Herbal medicinal products, Universitary cooperation in research on Pharmaceutical technology.

Innovation in the commercialization of new medicines: the 4 pillars from the Marketing Authorization to Market Access

ORGANIZING COMMITTEE

Raquel CARNERO GÓMEZ

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This is a Workshop in which the speakers are representative of the four pillars: evaluation and authorization of the medicinal product, represented by the The Spanish Agency of Medicines and Medical Devices (AEMPS) with the Spanish representative from the Committee of Advanced Therapies (CAT), the Hospital Drug Product Access through the Pharmacotherapeutic Guidelines with a representative of the Spanish Society of Hospital Pharmacy (SEFH), the Market Access from the pharmaceutical industry, with a Responsible of a Department of Pharmacoeconomics in BMS and the Regulatory Affairs with a Qualified Person and RA Director from Mundipharma.

The moderator of the table is one of the leaders in the world of Pharma Market Access, Health Economics and Outcomes Reseach/Pricing and Reimbursement, with extended teaching experience:

José Manuel RODRÍGUEZ BARRIOS. *Health Economics, Pricing and Market Access Strategy Europe Director, Daiichi Sankyo Europe.*
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Conferences

First of the 4 pillars: Innovation in Marketing Authorizations.

Sol RUIZ ANTÚNEZ
Head of Sector of Biotechnology and Advanced Therapies at the Spanish Medicines Agency- CAT member and and a co-opted member of the CHMP (Committee for Human Medicinal Products) at European Medicines Agency.
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Second pillar from Marketing Authorization to Market Access: evidence generation from HEOR.

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Pricing and Market Access Strategy from Pharma industry: the third pillar.

Mª José SANCHO GONZÁLEZ

QP and Regulatory Affairs Director – Mundipharma.

The fourth pillar from Marketing Authorization to Market Access: the hospital approach and the pharmacotherapeutics guide system.

Mª Dolores FRAGA FUENTES

Coordinator at GRUPO GENESIS from SEFH).

Strategies for the implantation of active learning methods in pharmaceutical education

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Abstract:

Pharmacy education is changing, and this change is being driven by a call for curricular innovation as well as an increase of new pharmacy programs. As competition among schools increases, faculty members will be expected to accept the challenges that this new generation of pharmacy education presents. The knowledge base in the field of healthcare continues to grow, but it is impossible to increase semester length or class time proportionally. Thus, moving forward, faculty members must recognize that active-learning strategies may be a valid way to address the increasing knowledge base by facilitating the training of pharmacy graduates who can find, process, analyze, and apply new information with their patients and their colleagues. Consequently, reorientation of pharmacy education has become necessary. As such, active learning strategies have been introduced into classrooms to increase problem-solving and critical thinking skills of students. Active learning involves substantive changes in the ways students and teachers work together, shifting the focus of classroom instruction from teaching to learning. In such classrooms, students are engaged in learning activities such as gathering data, defining issues, stating problems, generating and testing hypotheses, drawing conclusions, and reporting and defending their work. Active learning can enhance students motivation to learn by reinforcing the relationship of the material to real life. Examples of active learning instructional strategies include evaluating case studies, class discussions, project-based learning, problem-based learning, problematization, simulation (role playing, simulated patient, and virtual patient), time-based learning, game-based learning, and building concept maps.

Similarly, transforming a 'traditional' educational practice into competency-based pharmacy education will involve re-thinking of the roles of teachers, the roles of students, and re-designing of assessment tasks and many educational activities. Moreover, a pharmacy department or faculty is usually organized along disciplines ranging from medicinal chemistry, via biopharmacy to pharmacotherapeutics and social pharmacy. It is, therefore, necessary to create a curriculum management structure and a human resources allocation model, which may interfere or conflict with existing hierarchies and research interests.

This taller will address examples of active learning instructional strategies and the essential steps in designing a competency-based pharmacy curriculum and gives tips for a successful organization, development, and implementation of such curricula.

In Brazil 2017, the National Guidelines for Undergraduate Education in Pharmacy recommend professionals training to consist of a generalist, humanist education, which develops critical thinking skills with respect to health care, competency-based curriculum. In addition, the recommendations target theoretical and practical training in patient care. To help the teachers, the Brazilian Association of Pharmaceutical and Biochemical Education (Abenfarbio 2013) published a book aiming to guide and encourage the application of active learning methodologies in pharmaceutical education.

Keywords & topics

Pharmacy education, active learning, competency-based pharmacy curriculum

Experiences from the Sentinel Surveillance Network of Pharmacies in Castilla y León

Carlos TRECEÑO LOBATO

Presidente del Consejo de Farmacéuticos de Castilla y León
y responsable de la Red de Farmacias Centinela

The Sentinel Surveillance Network of Pharmacies in Castilla y León is a program launched by the Council of Professional Associations of Pharmacists of Castilla y León (CONCYL) in 2015 through a Collaboration Agreement between the Consejería de Sanidad of Castilla y León and CONCYL.

The objective of the network is the detection, notification and prevention of safety problems related to the use of medications, such as adverse reactions or medication errors. In addition, this network is being used for the development of research projects that contribute to a safer use of medicines; as the studies carried out real-life ambulatory settings on the safety of oral anticoagulant treatment and on the safety of statin treatment in patients treated with CYP3A4 inhibitors, of which very important results have been obtained.

The data recorded so far highlights the network of Sentinel Surveillance Network of Pharmacies in Castilla y León and corroborates the importance of the pharmacovigilance tasks of the community pharmacist in order to contribute to the well-being of the patient and the improvement of public health.

Consejo de Colegios Profesionales
de Farmacéuticos de Castilla y León

Keywords & topics

Pharmacy, Pharmacovigilance, Public health.

POSTER SESSION SYMPOSIUM PHARMACY EDUCATION AROUND THE WORLD

Pharmacy, Science and Profession at the Faculty of Pharmacy of the University of Granada

Ana CONEJO*, Francisco OCAÑA, Manuel SÁNCHEZ, María José RUEDAS, Ana DEL MORAL, Rafael GIMÉNEZ and José Luis ARIAS

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Abstract:

The adaptation of the teaching to the European Higher Education Area has meant a new pedagogical approach and a renewal in teaching. The real innovation involves a closer dialogue with the society and the professional world. We must be attentive to a changing society and a profession that is adapting to the new times.

One of the main shortcomings of a curriculum is the isolation of teachers from the profession. Except for the associate professor, the most usual situation implies that the teaching and research staff (PDI) is well trained academically and in research, but they usually do not have professional experience.

In our Faculty a strategy has been implemented to correct this gap and enrich the training. Throughout each academic year there is an extensive program of extra-academic activities which contribute to completing the training in areas and aspects not addressed. These activities contemplate different profiles:

1. Professionals of prestige who bring us closer to current trends.
2. Researchers, nationals and foreigners, invited by the center's research groups.
3. Speakers from other categories invited at the proposal of the students (experts in social networks, coaching...)
4. Workshops in the Practical Pharmacy Classroom.

In order to encourage student participation, the so-called TFG points have been implemented; this means that for being allowed to defend the degree final project (TFG) the student must have attended to 16 of these proposed activities during the last two years.

This proposal brings the student closer to research, to the professional world and to the social reality and forms a flexible teaching that can adapt to the demands of a changing world.

Detection of weaknesses and improvement actions performed by the Quality Internal Guarantee Committee of the Degree in Pharmacy of the University of Granada

José Manuel PAREDES, Miguel ROMERO, Beatriz CLARES, Mª José MUÑOZ, Ricardo NAVARRETE, Manuel SÁNCHEZ, Ana DEL MORAL* and Olga CRUZ-LÓPEZ

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Abstract:

Introduction: The Quality Internal Guarantee Committee (CGIC from the Spanish acronym) is responsible for the integration of the Quality Guarantee System in the daily work of the Degree of Pharmacy of the University of Granada (UGR). Its main objective is to guarantee the academic and administrative continued improvement of the Degree through the participation of all the collectives involved (Students, Lecturers, Administration and Services Staff). The tools used are questionnaires of satisfaction elaborated by the UGR, reports of responsible for mobility and externships and quality indicators and estimation tables.

Aim: The objective of this study was to analyze different indicators of internal guarantee of the Degree of Pharmacy at the University of Granada.

Methodology: The CGIC has performed a survey of opinion to students to know their pre-University academic preparation, duplicity of topics between different subjects, laboratory sessions contents, use of tutorials and the knowledge of the CGIC's existence among students.

Results and conclusions: The following conclusions have been highlighted from the analysis of the results obtained for the 2017-2018 course:

- 62% of students from the first course think that they have an adequate preparation to study the Degree in Pharmacy.
- 48% found duplicity between subjects.
- 79% consider adequate the contents explained in the lab sessions.
- 71% use the tutoring only occasionally.
- 8% know the existence of the CGIC.

From the analysis carried out, the CGIC will propose some improvement actions that should lead to the avoidance of duplicities between subjects and inform students about the CGIC's work.

An activity to promote entrepreneurship: innovation fast track in the University of Navarra

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The Innovation Fast Track (IFT) is a practical training program in the creation of new innovative companies organized by the Entrepreneurship Unit of the University of Navarra. The aim of this program is to motivate the entrepreneurial activity of students by establishing interdisciplinary work groups formed by students from different Faculties of the University, both undergraduate and postgraduate. The objective is to encourage teamwork, the analytical, imaginative and creative abilities of students and the solution of problems from different points of view.

The students received training from experts, in the five phases of the development of an innovative entrepreneurship project: ideation, business model canvas, marketing, business plan and communication.

Thanks to this program students of the Master E-MENU, PhD in Biomedicine, Degree in Economics, Leadership and Governance and of the Master's Degree in Drug Research, Development and Innovation of the University of Navarra have been able to present the winning project "FLASH", a new underground transport system based on polypropylene capsules, pushed at very high speed by a system of low pressure pumps that deliver the package in very short times. As a reward, students have obtained a travel to Tel Aviv, one of the main centers of innovation in the world to complete the entrepreneurial experience offered by the program.

Keywords

Interdisciplinary, Entrepreneurship, Innovation, teamwork, motivation.

New learning methodologies increases the comprenhension of the students in Pharmaceutical Technology

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Abstract:

Pharmaceutical Technology is a compulsory subject in Spanish Pharmacy Degree. One of its characteristics is that it gathers concepts from different areas of knowledge such as physiology, physics, chemistry and engineering processes. This feature makes it of special difficulty for the students since they need to integrate previous knowledge in order to understand and manage the characteristics of the formulations designed for the different routes of administration. Although a special failure rate in comparison with other compulsory subjects in Pharmacy Degree has not been observed, the marks of the students are usually lower, suggesting a lack of deep understanding because a failure in the integration of all the concepts underlying in Pharmaceutical Technology. To improve student's comprehension of the subject, we applied learning through project work at laboratory sessions together with the possibility of taking voluntary periodic online evaluations during the course.

We implemented these methodologies during the academic year 2017-2018 (152 students). We compared their participation in the final exams, their rate of success and their final marks with those obtained from the students in the previous academic year. Our results did not show an impact on the rate of students passing the subject. However there was a significant increase in the quality of the knowledge showed by the students during all evaluation tasks, which resulted in significantly higher final marks. From these data we can outline that the methodologies used increased the understanding of the students commited with the subject, helping them to integrate the required contents, being therefore, better prepared to face the final exam.

Financial support and/or acknowledgments

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Gamification in the classroom: Mobile phones and on-line quizzes

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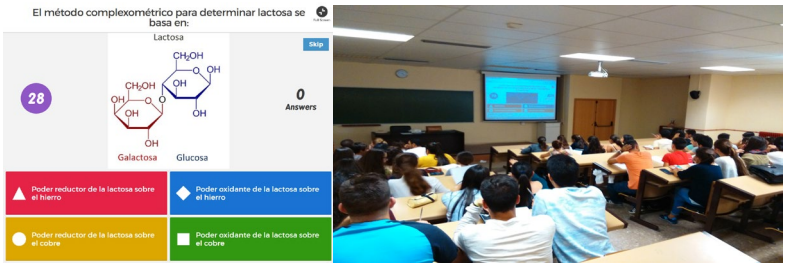
Abstract:

With digital native students coming to our classrooms in the recent courses, it is becoming evident that new methodologies are required to maintain the students' interest, engaging them in long-lasting learning activities. In this context, the application of gaming elements, supported by ICT technologies, to the Higher Education methodologies gave rise to gamification in the classroom: Different alternatives to implement gaming elements into the learning process, including educational computer games. According to many studies, gamification has an undoubtedly positive impact in the students' motivation what should result in improved academic yield.

In this context, some professors from the departments of Physical Chemistry and Pharmaceutical and Organic Chemistry of the Faculty of Pharmacy of the University of Granada are using gamification elements as a part of the teaching methodology. In particular, we have used a specific eLearning platform, called Kahoot!, which is a free online platform that permits to create quizzes, surveys, and other gaming-based activities, to be run in real time or at the students' own pace, through a dedicated mobile app. The professors can create their own Kahoot tests, which are kept in their Kahoot! accounts, so they can be played again in further academic years. The program gathers the scores of the tests in spreadsheet files, which simplifies and helps the analysis of results. After the use of this platform, the students were surveyed about different issues, and in general, the users were highly satisfied with this gamification methodology.



Re-thinking and re-shapping the pharmacy curriculum

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Abstract:

Introduction: Following the recent development of quality assurance systems, namely those in the European space, the Portuguese state a policy of periodical re-acreditation of study cycles in Higher education. With the approach of the 2016/2017 evaluation period, the School of Health Sciences saw an opportunity to re-think and re-shape the pharmacy curriculum. Methods: Following the Model for Curriculum Development, the preliminary data was obtained from SWOT analysis, interviews with students and faculty and quality assessment surveys submitted by the students. Furthermore, an analysis of the attributes of the "ideal graduate" and the foundational content relationship with professional practice was conducted, according to current legislation, national and international guidelines on Pharmacy Education. Results: A new curriculum was proposed, to respond to the gaps, redundancies and opportunities identified. This new curriculum involved the change from quarter to semester, changes in designation of the modules/disciplines and the strengthening of "Simulations/ Práticas Simuladas", which were highly valued by the SWOT analysis, and reflect the identity of the degree. Changes in instructional methods and evaluation were also addressed. The proposal was then validated by two internal committees regarding pedagogical and scientific issues. Discussion/Conclusion: The new curriculum was assessed by an external advisory committee of national and international experts. Some changes were proposed by the external committee and the new curricula was finally validated and will be fully implemented in the academic year 2018/2019.

A new regulation for the Final Project of Studies in Pharmacy degree and Optics and Optometry degree of the University of Seville. Analysis of its implementation

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Abstract:

The regulation of the Final Project of Studies in Spain is the RD 1393/2007, of October 29 and, in the University of Seville, the agreement 4.1 / GC 20-7-17. This has led to a new regulation at Pharmacy degree and Optics and Optometry degree of Seville that was approved on May 9, 2018.

In this Final Project ("TFE": "TFG" and "TFM") the student performs, with the direction of the Tutor, a project, memory, study or experimental work about an assigned subject that must develop the knowledge, skills and competences acquired in the degree.

In Seville, the novelties that are applied for the first time in July 2018 are:

1. The "TFEs" are valued by courts formed by two professors, with representation from different teaching areas.
2. The student is the author of the "TFE" and will be the owner of the intellectual property rights.
3. The "TFE" must be signed by the student with an explicit statement in which the originality of the work is assumed. No sources have been used without being duly cited.

Using the methodology of surveys addressed to the members of the academic committee of the "TFE", we present in this communication a critical analysis on the main objections and strengths of this first year with the new Regulation in order to adapt its implementation in Pharmacy degree and Optics and Optometry degree at the University of Seville.

Electronic portfolio in a scientific methodology course at the Faculty of Pharmacy of the University of Salamanca

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Abstract:

Methodological courses on competences for elaboration of scientific texts and the use of information and communication technologies (ICT) are very valuable in Pharmacy curricula. In the Faculty of Pharmacy of the University of Salamanca there are 3 ECTS credits course in the first year focused on this transversal knowledge. Evaluation of this course includes the development of a subject about History of the Pharmacy in scientific text, slide collection and poster format. Individual learning monitoring process could be tedious with time and effort wasted. Electronic portfolio asks the students to select evidences and make reflections to show their learning outcomes. This study analysed the use of electronic portfolio in first year of the degree in Pharmacy in the context of a course of scientific methodology. Evidence of meaningful learning was assessed from evidence selection and student narratives: description of activities, identification of objectives, use of course recursion, ICT contribution, reasoning, qualification skills, and reflective practice on learning process. More than a half of the 176 participant students of both sexes showed high level of use of ICT. More than 60% presented valuable evidences for their learning and identified the learning objectives More than 40% of the narratives had qualification of the activities or reflections on their leaning process. Moreover, a 75% of the students were able to describe easily the activities and a 25% present high level in this skill. We concluded that portfolio contributed to the student's learning outcome and stimulated reflection.

Acknowledgments

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Service Learning in the pharmacy degree of San Jorge University

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Abstract:

Among the pedagogies of the experience, the Service Learning (ApS) stands out, combining community service with academic instruction, to favor the acquisition of knowledge and skills as well as social and civic responsibility in the student. Since its implementation, in the degree of Pharmacy of San Jorge University, numerous ApS projects have been carried out, framed in three main lines: collaboration with patient associations; Health promotion and visibility of forgotten diseases.

In collaboration with patient associations, actions have been carried out for the preparation of technical material and professional services by students. Among them, the design of technical dossiers in several formats, multimedia teaching matherials for the correct application of drugs, drug guides and awareness campaigns and fundraising for patient associations (lupus, multiple sclerosis, cystic fibrosis, association of bone marrow donors). In the field of community pharmacy, the initiative "Teaching applied to patients and populations" stands out, where students provide pharmacotherapy follow-up to patients in community pharmacies supervised by community pharmacists. As ApS activities for the visibility of diseases linked to poverty, awareness campaigns have been designed in collaboration with NGOs (Doctors Without Borders, MOMIN, Mundi Doctors). Finally, to promote communication skills, different social groups and future health professionals have carried out various integrative activities with schoolchildren (elementary school, ESO) and people with intellectual disabilities.

Drug Addiction: justification of the offer as optional subject of the Pharmacy degree

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Abstract:

The "Drug Addiction" subject of the Pharmacy degree at the University of La Laguna (ULL) contributes to the comprehensive training of the Pharmaceutical professional by bringing it closer to the healthcare needs of the community and the health system. The theoretical and practical contents of this optional subject of 6 credits offer to the student skills related to nature and composition of traditional and emerging substances of abuse as well as their properties, action mechanisms, toxicity, analytical methods, consumers profile and the therapeutics' tools and care levels available for the treatment and monitoring of poisonings and the route to detoxification. The participation of pharmacists in multidisciplinary teams of national toxicology institutes, public health services of different public administrations, national plan on drugs, methadone maintenance programs, smoking cessation campaigns, among others, is a reality. In addition, the Professional Pharmacy Services (PPS) of the pharmacy office also bet on the design of pharmaceutical care protocols for the consumer user of substances of abuse focused on the dispensation, pharmaceutical indication and pharmacotherapy monitoring of the treatments. Thus, the General Council of Official Associations of Pharmacists designed and implemented the Pharmaceutical Indication in Smoking Cessation in its "Strategic Plan of Implementation of Pharmaceutical Care" and now bets on the approach of excessive alcohol consumption. This optional subject, which has an average of 60 students per year, is undoubtedly an option for students in the pharmacy degree, although they should enrich this basic training with specialized postgraduate training and continuing education.

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Gamification in large groups: application in Clinical Pharmacy and Pharmaceutical Care

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Abstract:

Objective: introduction of the methodology of gamification in the subject Clinical Pharmacy and Pharmaceutical Care, fourth year, Pharmacy Degree, University of Barcelona.

Methodology: Type of gamification: we have opted for the adaptation typology; participants: students enrolled in the mentioned subject who voluntarily wish to participate; team formation: first day of class, four people that will be maintained for the entire course and for all games; development: 3 activities by teams at the beginning, during and at the end of the course throughout the theoretical classes and 1 individual activity after the completion of a laboratory practice; obtaining scores: each game performed contributes a score to the team; reward: to stimulate the students in their involvement with the activities; student satisfaction: a satisfaction survey will be taken to know the opinion of the students about advantages and disadvantages, strengths and weaknesses and proposals for improvement.

Results: 108 students (30%) forming 27 teams participated in the following activities: *Pasapalabra*, carried out by teams at the beginning and at the end of the subject, to be able to assess the level of previous knowledge and compare them with those acquired after the teaching of the subject; *Kahoot*, individual, after the completion of a laboratory practice and thus to be able to monitor the learning obtained; *Quizizz* and *Relation of columns*, by teams, after different theoretical classes, pretending in this way to improve the motivation, interest and attention of the students in masterclasses as well as monitor the learning of some specific topics.

Pharmaceutical Care: a four-year teaching experience in constant evolution

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Abstract:

Since Pharmaceutical Care was defined in the 90s, pharmaceutical practice has shifted towards patients care. At the University of Seville, Pharmaceutical Care was introduced as subject in Master programs and included in Pharmacy Degree Curriculum in 2009 and firstly taught as compulsory subject in 2013 to 5th year students.

A Likert questionnaire was performed to assess if the contents of Pharmaceutical Care subject were aligned properly with the real pharmacy practice. Questionnaire was launched at the end of the Supervised Placement period at community pharmacies. The results were compared with those obtained in 2015. An open question was included in order detect improving areas.

The majority of the students found useful the subject. Nevertheless, the percentage of positive answer decreased from 90.3% to 76.3%. Dispensing and minor symptoms treatment protocols were often applied during placements in two thirds of the asked students. This value remained similar during the years. The main difference in answers concerns to pharmacotherapy follow-up. In 2015, only 15.6% of the student carried out this activity and 26.5 % could observe during their placements. In 2018, those values augmented to 26.8% (students who could carry out the follow-up) and to 44.6% at observer level. 90.4% (2015) and 80.4% (2018) of the students thought that the activities could be implemented if there were any economic retribution.

Some suggestions registered in the open questions: the need of more practical activities and a book containing solved cases and problems. In addition, there are some enthusiastic opinions encouraging the role of pharmacist as health care professional.

Financial support and/or acknowledgments

There is no financial support.

Students' opinion on the II Conference on Toxicology and Society: Food Safety and Drugs of Abuse (Toxicology Forum and Olympiad)

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The II Conference on Toxicology and Society: Food Safety and Drugs of Abuse (Toxicology Forum and Olympiad) was held on March 23, 2018 at the Faculty of Pharmacy of the University of Sevilla, thanks to a Teaching Innovation Project of the University of Seville. The aim was to establish a framework for discussion on topics of great interest on Toxicology, such as Food Safety and Drugs of Abuse, among students of different subjects and degrees (Degrees in Pharmacy, Biochemistry and Criminology, and Double Degree in Pharmacy and Optics and Optometrics). Within 10 hours, different sessions were organized: invited oral presentations, round table about Food Safety, short oral presentations by the students, and a poster session. Afterwards, as a novelty, the "Toxicology Olympiad" took place, in which the students participated by teams in different games, with questions related to the syllabus taught in classes. The three finalists were awarded. Regarding the overall evaluation of the Conference, almost 70% of the students considered them to be quite or of great interest, showing greater satisfaction with the invited oral presentations, among the morning sessions. In general, the Toxicology Olympiad was the most attractive activity for the participating students. The Conference seems to have fulfilled the expectations of the majority of attendees, so that more than 80% would recommend attending future conferences to other colleagues. Success in attendance and participation (more than 170 people were enrolled), variety of topics addressed, and interaction among students allowed the enrichment of all of them.

Financial support and/or acknowledgments

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Teaching Innovation designed for the Degree in Pharmacy, Universidad San Jorge

Elisa LANGA[1]*, Edgar ABARCA[1], Desirée ACEBES[2], Diego BALLESTERO[1], Jesús BERGUES[1], Fiona CREAN[2], Beatriz GINER[1], Diana GINER[2], David FLORES[1], Cristina GARCÍA[1], Manuel GÓMEZ[1], Carlota GÓMEZ[1], Ruth GONZÁLEZ[1], Laura LOMBA[1], Víctor LÓPEZ[1], Nashwa NASHAAT[2], Rosa PINO[1], Mª Pilar RIBATE[1], Ana SÁEZ-BENITO[1], Loreto SÁEZ-BENITO[1], Eva TERRADO[1], Nuria BERENGUER[1], Marta URIEL[1] and Monika WOZNIAK[2].

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The palpable lack of students' holistic view of the degree content subjects has prompted us to develop a teaching innovation strategic plan for the Pharmacy Curriculum in Universidad San Jorge.

For this it has become a trend to pursue innovation teaching projects longitudinally, horizontally, and across degree programs, such as with Nursing, Physiotherapy, Journalism and Education.

The main goal that unites these projects is to provide services to the society while our students acquire the expected skills (Service Learning Projects, SLP). Some examples are listed below:

- Get your Cell-fie: students from Pharmacy and Education go to primary and secondary schools to teach children how to prepare the stains and extract their own cells to be observed under the microscope.
- Removing barriers: students from Pharmacy subjects teach to mentally handicapped people the importance of taking medicines properly and without damaging the environment.
- Teaching applied to patients and populations: our most experienced students provide pharmacotherapeutical advice combined with pharmacogenetic studies to some patients' associations.

Another successful project we regularly carry out is Pharmaceutical Scene Investigation (PSI), in which our students solve a crime through several approaches, including a flipped classroom approach. And last but not least is Eurogenes, in which students have to solve a clinical case related to farmacogenetics and farmacogenomics in an atmosphere that simulates reality.

Regarding The Modern Language Institute, because English is the vehicular language, not only in the projects but also in many of the subjects we teach (Content and Language Integrated Learning, CLIL), members of the institute are contributors to our projects.

Authors want to thank Universidad San Jorge, Universidad Francisco de Vitoria and IPAP18 for the financial support to carry out and disseminate these teaching innovation projects.

Training activity of Moodle-based PRADO2 platform in the Faculty of Pharmacy of Granada (Spain)

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Abstract:

In 2014, University of Granada (UGR) relaunched a new version of its moodle-based teaching platform, named PRADO2 (Spanish acronym of "resources platform for supporting teaching"), intended to unify all the online teaching modalities used at UGR. Moodle is a freeware open-code learning management system (LMS) for online teaching/learning that was first released in 2001. It is an open-code software distributed by a GNU license which makes possible an easy adaptation to each requirement of different Universities.

In this context, as members of the Multidisciplinary Teaching Team in the Faculty of Pharmacy, we carried out an activity aimed to introduce to our colleagues the new online teaching platform (PRADO2) supported by UGR. Our colleagues usually had experience in previous obsolete online platforms (SWAD) or even no experience. Our approach was not just technical, but also based on the specific needs of our Faculty.

The activity consisted in a two-hours course in which we shared our experience about PRADO2, starting with the basics (login, activating subjects, checking and updating lists of students and so on) following with other advanced points (uploading documents and other files, tasks, control of attendance, administration, calendar, evaluation and marking, etc.). Besides the training in the use of the learning platform, the activity was useful to identify the members of the teaching group that had advance experience with this online tool, promoting our network of collaboration between colleagues. The experience was encouraging because the activity managed to resolve some misunderstanding and problems about the use of PRADO2.

Financial support and/or acknowledgments

The authors are grateful to University of Granada for the funding provided for the VIII Program for the strengthening and support to beginner professors of this university (2017-18) to the formative program "Multidisciplinary teaching team of the Faculty of Pharmacy (University of Granada)".

Work-shops a new academic activity in the degree of Pharmacy of the University of Barcelona

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Abstract:

The inclusion of professional guidelines for undergraduate students into the degrees has been one of the most outstanding challenges envisaged by the implementation of the European Higher Education Area in the Universities. With this target in mind, the Faculty of Pharmacy and Food Sciences of the University of Barcelona has done remarkable efforts in bringing the pharmaceutical industry to the academy in order to get the maximum contact between undergraduates and the professional world.

We present here the results of the activity regarding two main areas, in order to assess the activity from different perspectives and finally bringing together the approaches to improve the activity for the coming editions. First, the opinion of the organizers, speakers and representatives from the companies was considered in order to determine if the initial objectives have been accomplished. Secondly, the data resulting from the questionnaire fill in by the students related to the fulfilment of their prospects, their learning, etc. was surveyed.

The assessment of the program was very positive. Note the comments related to the importance of having sessions in English and the discussions that took place at the end of the sessions or at the break time between the speaker and the audience. The speakers were please to collect the CVs of some of the students.

Financial support and/or acknowledgments

The integrants of the work are members of the two consolidated UB Groups of teaching innovation MICOMFAR. (http://mid.ub.edu/webpmid/content/micomfar) and GIDTF2013 (http://mid.ub.edu/webpmid/content/gidtf2013).

A teaching strategy to improve students' perception of the importance of organic chemistry in pharmacy studies

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Abstract:

To help students to appreciate the importance of the Organic Chemistry in their studies, a new teaching strategy has been developed in our group. At the beginning of the course, a drug is assigned to each student by random, on which they will have to apply the knowledge acquired in the academic program of the subject.

It is important to emphasize that each student has a different drug to perform personalized work. This objective is considered of great interest, since in it, students must apply the theoretical concepts to aspects related to pharmacy and everyday life.

The program of this activity is divided in six steps. For example, the first step is to know the structure, IUPAC formulation, activity and pharmacological treatments or other industrial applications.

The basic principles of structure and bonding, conformational analysis, resonance, acid-base, stereoisomerism to review the space arrangement of the molecule (being able to use molecular models to visualize them) and the reactivity of the studied molecule; are some of the topics covered in the remaining steps.

57 students have participated in this experience and the learning results will be known in the evaluation tests on July. Data analysis and results will be presented on due course.

Acknowledgments:

M.G. thanks to Consejería de Educación de la Junta de Castilla for a predoctoral fellowship . Proyecto de Innovación y Mejora Docente de la USAL ID2017/192.

Introducing Research in Pharmacology Course To Students of the National University of Chimborazo, Ecuador

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Abstract:

Students at the National University of Chimborazo were short of research methodology and knowledge. Moreover, the lack of motivation on the students promotes a change in our teaching practices. The University is located in the Andean region of Ecuador, where traditional medicine plays an important role in the population. The province presents popular medical practices that are usually employed and are needed for scientific study [1]. Therefore, we have introduced active learning with research activities based on traditional herbal medicine, that promotes the participation of all the students and helps their understanding of what is research and how they can apply it easily with their pharmacology knowledge. As a result, we could be able to involve the students in the proper design and practice of a research study, involving the ancestral knowledge of their family and neighbours, as well as we were able to present the results into a scientific congress in Ecuador, where all the student attended it, increasing their motivation into pharmacology and research.

Financial support and/or acknowledgments

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References

1. Fátima Morales, Susana Padilla, Félix Falconí. Medicinal Plants Used In Traditional Herbal Medicine In The Province Of Chimborazo, Ecuador. *Afr J Tradit Complement Altern Med.*, 14 (1), 10-15, **2017**.

Climate Change and Impacts on Human Health. Subject Proposal

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Abstract:

The objective of this cross-curricular subject is for pharmacy students to take awareness and study a key fact on the planet: Climate change.

The atmosphere and the oceans are heating up due to the emission of greenhouse gases such as CO2 and CH4. A warmer atmosphere and the increasing loss of summer ice in the Arctic oceans modify wind trajectories that move the water vapor produced in the sea surface altering current patterns. Hence the name ''climate change" is not only an increase in global temperature but also a redistribution of the climatic zones of the planet.

Life adapts to the surrounding envinronmental conditions. Thus, climate changes are fostering microbial population of bacteria and viruses to invade new habitats where there is no resistance by means of new carriers. Droughts and floods generate health problems, especially from water shortage of wells in the first case, or deposition of dragged pollutants on soils in the second.

A cross-curricular subject of 6 ECTS credits with 60 hours of face-to-face teaching is presented, whose contents are distributed in 18 topics including generic aspects of planet's own dynamics and the impact of climate change on human health.

A proposal of specific competences and broader generic skills is made, together with the learning outcomes as the main goal of the course.

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Dr. D. José María Ordóñez Iriarte

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An Objective Structured Clinical Examination to assess fifth year pharmacy internship performance

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Abstract:

The assessment of clinical competence is fundamental to ensure that graduate pharmacists can exercise their duties in patient care.

There is a need to improve methods used to assess pharmacy students' clinical skills. Objective Structured Clinical Examination (OSCE) is a method of assessing students´ clinical knowledge, professional judgment, interpersonal and professional communication, and problem-solving skills. In this method, a number of stations, each of which contains specific clinical scenario, are used. Through these stations, students must complete specific clinical tasks that require students to perform specific pharmacist activities involving trained actors playing the part of patients or doctors.

OSCE is a valid and reliable assessment method, but it does have its limitations (faculty members' lack of time, human resources and managing the complexity of such exam).

OSCE has been hailed as the "gold standard" of clinical assessments for medical and pharmaceutical students, worldwide. In Spain, the School of Pharmacy and Nutrition (University of Navarra) has taken a pioneering role during the 2017-2018 academic year, by applying this assessment instrument.

In June 2017, a pilot OSCE was conducted with eighteen fifth year pharmacy students, in order to evaluate the reliability of this type of examination. Students' opinions were collected, from a focus group discussion. Students viewed the OSCE as a valid, realistic, and fair assessment method. They reported high levels of satisfaction, and noted that the OSCE was a positive assessment experience.

This year (May 2018), 7-station OSCE, as compulsory internship assessment of fifth year pharmacy students has been successfully implemented.

II Workshop of Pharmaceutical care of Parkinson`s disease patients

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Abstract:

The principal aims of this workshop, proposed by Pharmacy School teachers, relies on the complementation of the knowledge acquired by the students in the classes. In this sense, this theoretical and practical workshop, carried out in a Simulated Pharmacy, teach to our student new health approaches for the Parkinson Disease (PD). For these purposes, different specialist in health science and patients coming from the Association of Relatives and PD Patients of Albacete have participated.

The workshop was organized following a previously described methodology (1). A careful attention was given to the role-playing session. In the first session, the participants received information about two clinical cases of PD in which they worked thought the workshop looking for information. In the last session, students faced a virtual situation with four real patients, interpreted by a members of the association named above.

Evaluation of acquired knowledge were carried out with a specific checklist integrating knowledge about the disease, communication abilities and treatment. The results showed that the students clearly itself with empathy, catching the interest, and properly used the non-verbal communication. However, they did not apply previous acquired knowledge or specific information about adverse reactions and interactions of drugs.

In sum, the workshop help to our students to reach a better understanding of the PD, and improve their knowledge about other health approaches. Besides, the Simulated Pharmacy was a useful tool preparing our students to the management of real situations.

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Financial support and/or acknowledgments

We would like to express our heartfelt gratitude to the Association of Relatives and PD Patients of Albacete, and the specialist and students who participated in the workshop.

The use of computer based tests (CBT) and psychometric analysis in Doctor of Pharmacy Programs to assess exam reliability and consistency

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Abstract:

The use of computer based tests (CBT) and psychometric analysis in Doctor of Pharmacy Programs to assess exam reliability and consistency.

Introduction. Computerized based tests (CBT) are becoming an essential tool for Doctor of Pharmacy Programs (DOPs), in order to quantify and qualify exams and items performance to better assess the development of required abilities by the students.

Objectives: 1) Assess CBT psychometric data to determine University of Puerto Rico DOP exams and items reliability and consistency. 2) Examine the relationship between exam reliability and consistency, and course progression.

Methods. This longitudinal study analysed psychometric data from a sample of 141 CBT and 5,655 items across 20 courses over a period of three consecutive academic years (2016-2018). Psychometrics were collected from the electronic assessment-management system used by faculty and students for CBT and reporting. Descriptive statistics and Pearson correlation analysis were performed to examine reliability and consistency of CBT over time on course progression.

Results. Data showed that 95 out of 141 CBT (67%) achieved an internal consistency reliability index (KR-20) over 0.60. Items correlation against overall exams showed that 2,942 out of 5,655 items (52%) achieved at least 0.20. Items difficulty median was 0.84. Regression analysis for the 141 CBT showed no significant relationship ($r=.077$, $p=0.36$, $\alpha=0.05$) on KR-20 scores over time. However, about 70% of individual courses did see an improvement in KR-20 scores over time, although not statistically significant.

Conclusion. This study shows that DOP exams reliability and consistency scores frequently surpassed desired KR-20 scores of 0.60 and item correlations of 0.20. Future efforts will continue to build upon CBT implementation to further improve DOP assessments.

Financial support and/or acknowledgments

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Aligning Education and Practice

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Abstract:

Background: Outdated teaching and professionals' unfitness for practice may be seen as a product of lack of alignment between education and practice. Aiming at overcoming this problem, the Portuguese Pharmaceutical Society (PPS) developed the Education & Practice Platform (EPP) to meet the common interests of academia and practitioners.

Methods: Development was initiated by identifying members, leadership, and the short and long-term aims of EPP, following settting EPP's mission, vision and values. A baseline workshop with all involved parties was organized to share concerns, interests and identify common goals.

Results: EPP includes one member from each of the nine pharmacy faculties and one member from the six PPS Specialty Colleges. EPP's vision is to align education and practice with the PPS' statutes, ensuring competencies validation defined for each practice area, whilst following international organisations guidance. EPP's mission is to evaluate the quality and adequacy of education from professional integration's perspective; to foster quality development in teaching practices considering autonomy in freedom to teach and learn. Values were defined as "strengthening the link between academia and the profession"; adequacy to societal demands; adequacy of teaching to new professional areas and recognition of existing human capital.

The EPP adapted FIPed WDGs, mapped the baseline situation, whilst reaching out to partners to motivate meeting the unmet WDGs. During our workshop, a common training framework for undergraduate internships was identified as a key-priority.

Conclusion: The EPP is a worldwide case study and although it is precocious to judge its impact on practice, results are encouraging.

Application of new technologies to the laboratory practical sessions in Physical Chemistry Department

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Abstract:

Practical sessions of different subjects of the Physical Chemistry Department have been traditionally carried out with the collaboration of students ("student teaching assistants"), supervised by a professor. In recent years it has been observed that this methodology is no longer the most appropriate, since some information is lost by the "student teaching assistants" and therefore students are not motivated any more. Thus, it is intended that together with the explanation of the teacher, students visualize the lab practical sessions, through presentations and / or videos, replacing all this to the "student teaching assistant".

The main objective of this work is the elimination of the "student teaching assistants" in all the subjects of the Physical Chemistry Department. Together with this general objective, this project achieves other objectives, since the material employed contributes to innovative laboratory practical sessions assisted by new information and communication technologies (ICT) applied to teaching. This provides students with very helpful and valuable tools to carry out the laboratory practical sessions and to assimilate concepts in an attractive way. Furthermore, this strategy forces students to take a more active attitude and at the same time favors the self-learning, which contributes to potentiate the adaptation of the current university teachings to the European Higher Education Area.

Recording sessions will be made and photographs of the practices will be taken. In addition, the necessary slides, including practical examples, will be prepared. Subsequently, the corresponding presentations and / or videos of the laboratory practical sessions.

As results, a greater involvement of the students in the laboratory work has been obtained, and it has been verified that the direct contact between the teacher and the students has led to a greater commitment and understanding of the laboratory practical sessions.

Plastinated parasites: a new teaching tool for practical lessons in Pharmacy degree

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Abstract:

The technique of plastination is usually presented as the most recent and important option for conservation of biological material, preventing the disadvantages of traditional preservers such as formaldehyde (toxicity, retraction of structures, colour changes, carcinogenicity, smell, feeling damp, maintenance requirement, wearing gloves for manipulation, storage, expiry…). Although plastination has been commonly employed in human and veterinary anatomy, it has rarely been used for parasites' conservation to date.

Several parasitic specimens were plastinated to obtain samples for Parasitology practical lessons in Pharmacy degree: Artrhopods (*Oestrus ovis*), Nematodes (*Parascaris equorum and Ascaris suum*), *Macracanthorynchus hirudinaceus,* and Plathelminthes (*Fasciola hepatica*, *Dicrocoelium dendriticum and Taenia* sp.). The level of knowledge and a satisfaction score employing plastinated specimens versus traditionally preserved parasites (formaldehyde) were evaluated through closed morphological and multiple choice questions (Likert-type scale), respectively. A pre-test of 30 theoretical questions to assure the homogeneity of study groups was carried out.

The use of plastinated or formaldehyde-fixed parasites during practical lessons was not significantly associated ($p > 0.05$) with the knowledge score test. On the other hand, the satisfaction of students using plastinated parasites was significantly higher ($p<0.05$) than the one of whom employ conventional samples in terms of the learning comprehension, management of parasites and the overall acceptance of plastinated specimens.

Our results indicate that plastination could replace the traditional methodology of parasite conservation. The incorporation of plastinated specimens as educational material will allow us to use dry, odorless, non-irritating, non-carcinogenic and non-toxic material, ensuring a quality and safely education.

Satisfaction degree of the mobility Erasmus students in the Faculty of Pharmacy of the University of Seville

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Abstract:

The International Relations Team (IRT) of the Faculty of Pharmacy of the University of Seville is very concern about the well-being of our outgoing and incoming Erasmus students. In this sense, a questionnaire about the work carried out by the IRT was sent to the students in order to gather their opinions and comments to enhance the Erasmus experience. Both the incoming and the outgoing students valued their stay and adaptation to the Faculty of Pharmacy or to the Universities abroad very positively. The most of them admitted that the information received by the IRT before and during their Erasmus period was appropriate. They also stated that the communication by e-mail and/or WhatsApp with the IRT was fluent and very useful, remarking the short response time. In addition, both student groups generated a very positive opinion about the IRT. Finally, a blank space was left to the students, who sent a lot of interesting and useful comments, opinions and advices. The IRT will take into account the information collected in order to ensure a satisfactory experience for all the Erasmus students at the Faculty of Pharmacy of the University of Sevilla.

Financial support and/or acknowledgments

The IRT wishes to thank all the voluntaries who participate in the mobility program of the Faculty of Pharmacy of the University of Sevilla. The IRT also wants to acknowledge the excellent work and dedication of the workers of the International Centre of the University of Seville.

I+D+i in Pharmacy, Universidad San Jorge

Laura LOMBA[1]*, Edgar ABARCA[1], Diego BALLESTERO[1], Jesús BERGUES[1], Beatriz GINER[1], David FLORES[1], Cristina GARCÍA[1], Carlota GÓMEZ[1], Manuel GÓMEZ[1], Elisa LANGA[1], Francisco LES[1], Víctor LÓPEZ[1], Rosa PINO[1], Mª Pilar RIBATE[1], Ana SÁEZ-BENITO[1], Loreto SÁEZ-BENITO[1], Eva TERRADO[1], Nuria BERENGUER[1] and Marta URIEL[1]

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Teachers of the degree in Pharmacy (USJ) belong to five different research groups, Greenlife, PVBA, SeFapp, GATHERS and GAIAS, all of them recognized by the Aragon County Government (DGA).

The main topics we are interested in are pharmaceutical care, pharmacogenetics, pharmacokinetics, pharmacoeconomics, new natural drugs, phytotherapy, advanced and sustainable processes applied to pharmaceutical technology, *in silico* studies, health and climate change, and ecotoxicological drug, LCA (Life Cycle Analysis) and CO2 footprint evaluation of drug manufacture, packaging and transport.

More than two national projects and four European ones (LIFE, POCTEFA, MEDCHANGE, etc) have been funded since 2009.

Our research is constantly in touch with business companies, thus, since 2011, we have led three Business Chairs with ENATE (to obtain natural drugs from the winery industry by-products using green technologies), PRANAROM (to bestow traditional essential oil applications on scientific rigour together with searching for new biomedical applications of essential oils) and NOVALTIA (to perform studies about green pharmaceutical packaging and CO2 footprint evaluation).

PACMI is our best example of research transfer project. Thanks to an intercomparative network composed by different pharmaceutical compounders, pharmacy offices can compare their personalized medicines among them to improve their own formulations.

Research is an important part of USJ Pharmacy curriculum; because of that, we design all Final Degree Projects to be part of the current research projects.

For those students with scientist vocation, the Faculty of Health Science (USJ) offers two doctorate programmes, one in Health Science and other in Environmental Science.

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How to develop a mooc step by step in the context of higher education. The TOX-OER project experience

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Abstract:

In the field of Toxicology, a massive open online course (MOOC) called TOX-OER (Learning Toxicology through Open Educational Resources) has been developed, implemented under the Erasmus+ program. This project, led by the University of Salamanca, has been carried out by a consortium of professionals of very different expertises (Toxicology, Chemistry, New Technologies, Pedagogy, etc.) belonging to 7 countries. Its development has involved the use of pedagogical, technical and scientific resources. For this reason, and after its completion, it was proposed to write a book (Spanish-English edition) to share a personal vision that could serve as a guide for others.

The book entitled "Challenges in Open Educational Resources: The case of TOX-OER MOOC" begins with a global vision of Toxicology as an emerging science and the need to promote knowledge through online learning. The pedagogical bases of this type of courses are explained, the term of Open Educational Resources, the use of Creative Commons licenses, and the basic requirements to develop a MOOC. It also details how Moodle was the platform chosen in this project. For the pedagogical scripts, a guide of the available tools, on the variety of resources and activities that can be implemented is included. In the visualization of a MOOC it is exposed from the simple edition of a video, to the use of the YouTube channel. Another issue addressed is the recognition of learning acquired via MOOC. Finally, the bases of Quality Control in this type of courses are considered. This book is available at: https://toxoer.com/intellectual-outputs/

Financial support and/or acknowledgments

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Didactic strategy for students to prepare a protocol to conduct a drug stability study

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Abstract:

A workshop was developed as a didactic strategy for the study of the subject "regulatory issues in the field of drug stability" with Pharmacy students of the course Pharmaceutical Physicochemistry II. The objective was to allow a significant learning of the subject, based on personal experiences.

The knowledge and application of the current regulations for the development of drug stability studies is a fundamental aspect of the pharmacist`s work in the pharmaceutical industry in Costa Rica.

This activity proposed a new way of approaching the issue, involving the student in the construction of a more meaningful knowledge of the management and application of these norms and was developed along the semester in five stages:

1. Plan the strategy
2. Coordination between the teachers of the different laboratory groups
3. Knowledge of the basic concepts of stability by students
4. Application of the teaching strategy in two sessions
5. Evaluation of the strategy by students, through the Google Forms platform.

The work teams reviewed the Central American Technical Regulations (RTCA) and developed the stability protocol for the assigned drugs. Subsequently, they presented their proposals at the indicated time.

Conclusion: The strategy used was very successful for the development of the issue of regulatory aspects of drug stability, since it aroused the interest of the majority of students and also validates the need to conduct coordination meetings between teachers.

Financial support and/or acknowledgments:

Our thanks to the Department of University Teaching of the University of Costa Rica for the support provided for the design of the teaching strategy.

A Pharmacy Degree Program towards Professional Pharmacy Services implementation

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Abstract:

Professional Pharmacy Services (PPS) implementation constitutes a real challenge for pharmacists. A specific training in PPS for pharmacy students is considered a key facilitator to achieve this change in pharmacy practice. Pharmacy curriculum at the University of San Jorge has an important focus on the acquisition of skills for the design, evaluation and implementation of PPS.

Objective: To describe the design of a Pharmacy Degree Program and the integration of this learning into the pharmacy curriculum at the University of San Jorge.

Design: An 18 European Credit Transfer and Accumulation System (ECTS) pharmaceutical care program and a total of 900 hours of clinical placement at both hospital and community pharmacy services are delivered across the 5-year pharmacy degree program to all the students enrolled. Professionals from the community and hospital settings have been recruited as professional tutors for the practical sessions at the university and for the clinical placements. Innovative teaching strategies are implemented to provide students with appropriate communication, clinical and service-provision skills: Problem Based Learning (PBL), Content and Language Integrated Learning (CLIL), Communication and Information Technologies (TIC), Objective Structured Clinical Examination (OSCE) and Service-Learning Projects in simulated and real settings. Besides, an integration of contents with Clinical Pharmacy as well as multidisciplinary collaborative activities with other subjects are carried out to enable a holistic learning. Students with special interests in research on PPS have the opportunity of developing their Degree Final Project on the ongoing faculty projects and collaborating in them once they are graduated in Pharmacy.
Conclusion: The pharmacy program design

Financial support and/or acknowledgments

We acknowledge the support of the Degree in Pharmacy. University of San Jorge.

The teaching training of the external tutors: the experience of the Faculty of Pharmacy of the University of Costa Rica

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Abstract:

Introduction: The teaching training of the external tutors to the Faculty is important, since they provide a guide in the verification of competences. To develop their work well, the Faculty has organized a course in teaching training for them.

Methodology: The teaching training course consists of seven sessions that address: the contents of learning, the educational intentions or objectives, the strategies and didactic techniques and the evaluation. In the first session, the Honey and Alonso Learning Styles Questionnaire (CHAEA) and the Teaching Styles Questionnaire (CEE) of Pedro Martínez Geijo, are applied to analyze these aspects in the tutors.

Results: 32 external tutors were trained in the first edition of the course. 75.0% are women and the remaining 25.0% are men. 25% have postgraduate training and 58.1% have more than 3 years of collaborating as tutors. In relation to learning styles, 90.6% of tutors have a tendency of moderate, high or very high towards the theoretical learning style, followed by reflective style (81.3%). In relation to teaching styles, 100% of the tutors have a tendency of moderate, high or very high towards the functional teaching style, followed by the structured style (96.9%)

Conclusions: Each teacher has a personal way and own characteristics to teach. The results show that the tutors that participated tend to give more importance to the procedural and practical contents than to the theorists (Functional), followed by those who give importance to the planning and to the coherence and structure of the contents (Structured).

Financial support and/or acknowledgments

Faculty of Pharmacy of the University of Costa Rica and external hospital tutors who participated

Participation feedback practices to improve the academic performance

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Abstract:

The *GIDTF* has identified that the subject of *Farmacia Galénica I* (*FGI*) presents a lower performance than other subjects in the field of Pharmaceutical Technology. Having analysed the possible reasons for these results, it is found that the evaluation has an accrediting character but perhaps its formative potential is not used. That is why a project with the support of the entire FGI teaching team and the collaboration of the *GIDAT* was initiated in the 2017-2018 academic year, aimed at improving the evaluation devices used by the subject. The initiative combines three types of actions that can make it possible to reinforce the students' learning during the continuous evaluation process: 1) Writing of test questions by *FGI* students. 2) Diagnostic self-evaluation prior to theory and problem exams. 3) Feedback that incorporates the reflection on the errors made in the partial exams. The initiative was well received by the students: A total of 883 test questions were collected, which, once reviewed by the teachers, served as the basis for questions to create questionnaires on each topic of the program as a diagnostic and formative self-evaluation. The results of the first exam show an increase in the % of students who passed it compared to the previous year. Students consider that the proposed self-assessment instrument is very useful or indispensable but can be improved. It is concluded that feedback is an effective tool to know how students perceive teaching actions and has provided relevant information to reorient them.

Financial support and/or acknowledgments

This work is part of the Project 2017PID-UB/03 of the University of Barcelona entitled *Pràctiques de feedback participat per a la millora del rendiment a l'assignatura Farmàcia Galènica I*. We thank the fellows José Manuel BORREGO-BURÓN and Daniel GARCÍA-MARTÍN for their collaboration in this project.

Internationalization strategy of the Faculty of Pharmacy of the University of Granada

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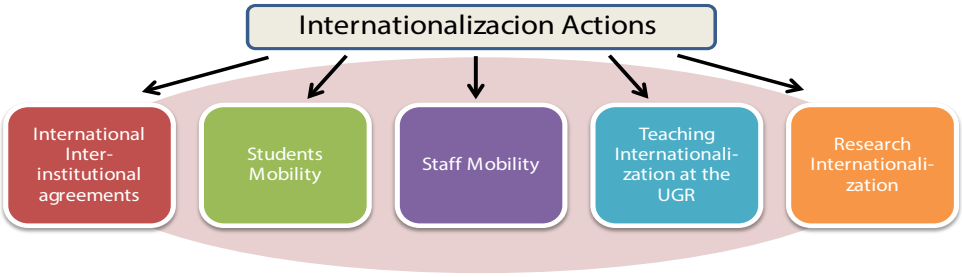
Abstract:

In January 2017 the University of Granada approved its Internationalization Strategy with the aims of its international activity in the context of its responsibility in the search of solutions for the world social challenges. The Faculty of Pharmacy, in concordance with the University, has also defined its Internationalization Strategy, in order to stablish an itinerary and specific guidelines about its internalization policy. It is an evidence of the solid commitment that the Dean Team have with these strategy in all the fields in which its members are involved.

The concept of Internalization goes beyond the signing of bilateral agreements that allow the mobility of students and staff, and must involve to all the University levels, from the teaching and the research to the transfer, dissemination and visibility of their results. Nevertheless, it is a confirmed and clear fact that the mobility has a strong impact in the personal and academic training of the students, and in the possibilities of labour inclusion. This is the reason why the Faculty of Pharmacy of the University of Granada has a serious commitment to encourage, facilitate and promote the international mobility of its students by means of different actions of this Internationalization Strategy. Next figure shows these main actions:



Updates in pharmacy studies at granada university: preparing professionals for the future

Manuel SÁNCHEZ*, María José RUEDAS, Ana DEL MORAL, Rafael GIMÉNEZ, Ana CONEJO, José Luis ARIAS and Francisco OCAÑA

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Abstract:

In the present work, the evolution of the curriculum of the Bachelor to Graduate in Pharmacy by the University of Granada is presented. The Bachelor of Pharmacy has had frequent changes in curricula and various singularities in universities, both in the number of credits with which the degree was configured as in the content itself. In the University of Granada the curriculum of 1973 consisted of 330 credits, while in others universities almost did not reach 300. The first major modification of the career was imposed by Directive 85/432 / CEE, and in the following ten years two changes in the curricula were carried out. The modification of 1973 allowed greater recognition of the degree in Pharmacy in the Spanish hospital world, through its extensive studies of Biochemistry, Clinical Analysis, Microbiology and Parasitology. Thanks to this training, the pharmacist also continued, with full scientific rights, in all areas of environmental health. In 1983 the Law of University Reform was approved, and the new curriculum seems universal with areas of knowledge, departments and credits. The curriculum of the 1990s presented substantial innovations, focused on a remarkable dose of pharmaceutical pre-specialization. Thus, aspects such as Pharmacology, Pharmacotherapy, Clinical Pharmacy, Biopharmacy, Management and Pharmaceutical Planning, Toxicology, Anatomy, Immunology, Hydrology, in addition to Internship Practices, were promoted or introduced. Currently, Order CIN / 2137/2008, of July 3rd, which establishes the requirements for the verification of the official university studies that qualify for the exercise of the profession of pharmacist, creates the "Degree" of Pharmacy. The total number of credits of the degree is 300, distributed over five years. The configuration of the career in two cycles disappears and within the 300 credits are included 30 for a supervised internship and an end-of-career project.

Use of audiovisual means in Pharmacy studies at UAH to provide expert nutritional advice

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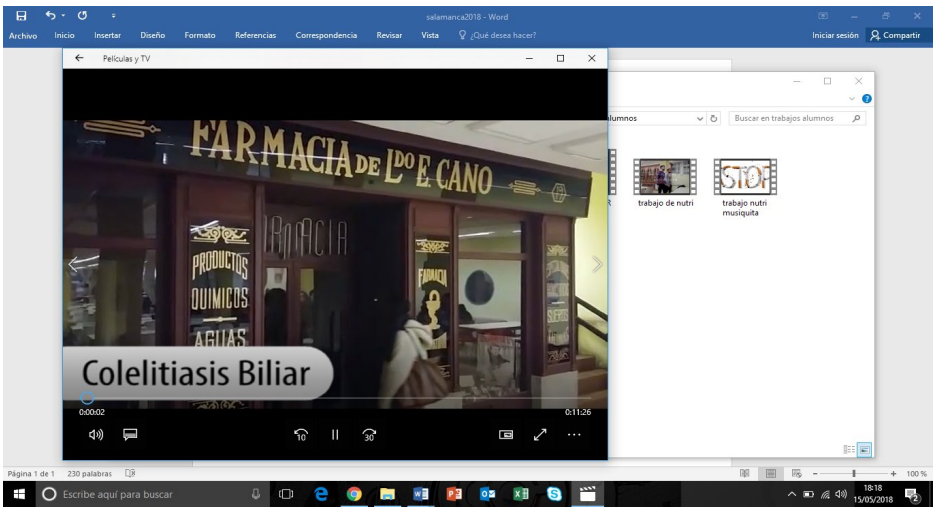
Abstract:

The comprehensive training of students of the Pharmacy degree requires the use of new technologies that facilitate their teaching-learning process adapting to the new needs of society and the clinical profile expected from the pharmacist. Therefore, this work summarizes the experience of students registered in the UAH Pharmacy degree course Clinical Nutrition and Diet Therapy. During academic years 2016-17 and 2017-18, they have used broadcast media as methodology to provide nutritional advice in an effective way. The topics covered have been mixed from drug-food interactions or nutritional support to nutritional counseling in different prevalent pathologies in Spain. The results obtained have shown the acquisition by students of useful competences for their professional practice as health educators able to give a more balanced advice to the patient while developing a critical thinking in a real life context. Their knowledge as well as their capacity to empower the patient to be responsible for its own health will result in an improved adherence to the prescribed nutritional and / or pharmacological treatment. The students have declared a high degree of satisfaction due to greater motivation, interest, cooperation, interactivity, etc.



Elaboration of an approval procedure for the Community Pharmacies as receptor centers for Supervised Training Placements

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Curricular external internships have become a key and complementary element to the academic training and an integral part of students' academic curriculum, facilitating the subsequent job placement. The Supervised Training Placements can be carried out in two modalities: i) in Community Pharmacy during six months or ii) in a Hospital Pharmacy Service + Community Pharmacy during three months in both cases. In order to improve the selection process, elaboration of a procedure for approves the participation of the Community Pharmacies as receptor centers for Supervised Training Placements was carried out. Mixed Commission of Faculty of Pharmacy elaborated an initial evaluation questionnaire that gathered necessary information for participation process of receiving centers. Questionnaire contained information related to the established requirements and the assistance services that receptor centers offer. Community Pharmacies will provide to the Faculty the necessary information to carry out the evaluation system through the questionnaire. Mixed Commission and the Official Pharmacists Associations will charge of managing required documentation of each receptor center, ensuring confidentiality of data and reports issued in the procedure. Approval participation will be maintained for four years; afterwards, process will be repeated to confirm its renewal. Receptor centers are obliged to communicate to the Faculty any change which could affect the practices, so that approval process will be repeated. Elaboration of an approval procedure for the Community Pharmacies as receptor centers for Supervised Training Placements can result a novel strategy to increase quality of the participating centers.

Financial support and/or acknowledgments

III Plan Propio de Docencia, University of Seville.

Design of an OSCE to evaluate the acquisition of competences in the subject of pharmaceutical care. Practical example in the topic of medication adherence

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Introduction: The Objective Structured Clinical Examination (OSCE) is a type of examination that combines several methods of evaluation through a real-world approach to evaluate clinical skill, attitudes and behaviours. It has been successfully used in other health sciences, therefore, it should be ideal to evaluate Pharmaceutical Care (PC), a healthcare-oriented subject.

Objective: To design an OSCE as evaluation method for the PC subject, using the topic of medication adherence as example.

Method: The OSCE design was carried out by a Coordinating Committee, consisting of 8experts specialized in PC and teaching, through different stages: 1) Competences: Definition, disaggregation and weighting; 2) Specifications table: relating the evaluated areas with the competency components; 3) Stations: proposed cases and evaluative instruments; 4) Medication adherence: evaluation of the topic using the OSCE designed.

Results: An OSCE has been designed for the PC subject based on 8competences: healthcare pharmacy (10%), clinical skills (15%), technical skills (15%), patient management and services (30%), communication and collaboration (15%), professional development (5%), preventive and educational activities (5%), training, teaching and research (5%). 5 stations were designed to evaluate 5 PC topics and 6 competences using the following evaluative instruments: standardized patients, structured oral examination, computer simulation, clinical images and short questions. The selected cases for the topic of medication adherence were: detection of adherence, evaluation of adherence, management of non- adherent, registration and documentation.

Conclusions: The OSCE designed aims to be an adequate and innovative method to evaluate competences in skills for the PC subject. The example used in medication adherence indicates that this test is appropriate and viable.

A comparative analysis of the different studies of pharmacy in spain

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Abstract:

A comparative study of the subjects offered by the different faculties of Pharmacy (public and private centres) has been carried out. A comparison of the different ECTS-credits for each subject has been performed, as well as the coverage ratio of each one. As an example, it have been evidenced that there exist some mandatory subjects that are offered by all centres whereas some subjects are only offered by a little number of faculties.

Our study evidenced a lack of homogeneity concerning the contents of the different studies in terms of the general structure of the syllabus and broad divergences between both optional and mandatory subjects.

An analysis of the different studies by groups of knowledge (Chemistry, Physics and Mathematics, Biology, Pharmacy and Technology, Medicine and Pharmacology and Legislation) evidenced deeper differences, not only considering the duration (ECTS) but also in the distribution of the contents.

Internships of the Degree of Pharmacy at the University of the Basque Country (UPV/EHU): Study on the satisfaction of stakeholders

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Abstract:

Since the European Higher Education Area (EHEA) was launched in March 2010, three classes of graduates obtained their Degree in Pharmacy at the University of the Basque Country, this is, the classes of 2014/15, 2015/16 and 2016/17. According to the degree study programme, students carry out their 6-month internship (Practicum) at the fifth year (from January to June) either in a Community Pharmacy or in a Hospital Pharmacy Service.

During the above-mentioned three academic courses, and in order to guarantee a continuous improvement of the quality of the internships offered, the institutional Teaching Evaluation Service has been conducting Satisfaction Surveys to various stakeholder groups including students, lecturers and instructors at internship centres. These Surveys are composed of several questions that can be grouped in three main topics: the management and organization by the university, the internship centres, and the overall evaluation of the teaching and learning process.

Briefly, altogether 176 surveys from students, 100 from lecturers and 106 from instructors were gathered. That means a quite high response rate, higher than 50%, considering that surveys are voluntary and answered online, once the practicum is finished. In general, survey results showed that the three stakeholder groups are quite or very satisfied not only with the organization and the daily practice at the internship, but also with the learning results reached by the students. It must be noted that 65% of students consider that the internship can lead directly or indirectly to an employment contract in the same or another related company.

Financial support and/or acknowledgments

Authors thank the Vice-Rectorate for Quality and Teaching Innovation from the University of the Basque Country (UPV/EHU) for having funded this work (Programa EHUNDU-A 2017).

Assessment of the degree of implementation process of pharmaceutical care in Colombia

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Abstract:

BACKGROUND. In Colombia, since 2005 begin a new era of regulatory developments designed to strengthen the technical capacity of the pharmaceutical services to better exercise its role within the system health. TARGET. Assess the degree of implementation of the process of pharmaceutical care in Colombia. METHODS. An online survey format was designed, validated and applied, distributed by email to 259 pharmaceutical services, 125 responded to the survey. RESULTS. 48% of the pharmaceutical services has implemented the process of pharmaceutical care. In 47% of the services the process is carried exclusively by the pharmacist, 23% is executed by the regent of pharmacy under the supervision of the pharmacist, while in 30% is executed either by regents of pharmacy without the supervision of the pharmaceutical. In 72% of the pharmaceutical services the activity is exclusive, while the remaining 28% share whit other activities. In 53% of the pharmaceutical services, pharmaceutical care process is conducted in an exclusive, independent patient privacy area. 50% offering pharmaceutical care process exclusively to outpatients, 25% to hospitalized patients, and 25% offer service to both types of patients. 50% of pharmaceutical services develop all the activities established in the management model of pharmacy service for the pharmaceutical care process. CONCLUSIONS. The pharmaceutical care is implemented approximately 50%. In the pharmaceutical services where it has been implemented, are developed with the relevant human talent and subject to the management model of the pharmaceutical service. The pharmaceutical care is mainly focused on outpatients, in institutions of low and medium complexity.

Financial support and/or acknowledgments

This research was funded by the national open and distance university of Colombia. The authors thank the directors of the pharmaceutical services of the country for their support and contribution in the management of the information for the realization of this work.

The Pharmacy Practice Classroom project in Pharmacy Degree of the University of Seville

Concepción PÉREZ GUERRERO, Mª Carmen MONEDERO PERALES, Antonio RAMOS CARRILLO, Javier ESCAMILLA JIMENEZ, Mª José PERAL RUBIO, José Manuel VEGA PÉREZ and María ALVAREZ DE SOTOMAYOR*

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Abstract:

Simulation Laboratories are commonly used in the teaching of Health Sciences Degrees. The Pharmacy Practice Classroom (PPC) was projected in July 2017 with the aim of increasing professional practice skills of Pharmacy students. The project included 5 phases:

Phase 1. Meetings with pharmacists in order to design the project and stablish the necessities of the PPC. Brainstorming to identify the main activities that will take place in the classroom.

Phase 2. Search of support for the project. The project was mainly sponsored by two companies: Bidafarma (Pharmaceutical Distributor) and Tecnyfarma (Pharmacy Furniture). Roche Diagnostics and Acofarma also contributed.

Phase 3. Plan of teaching activities, including name of the subject, length of the activity (3 hours/session), number of students attending (18 students /group), number of groups needed (20 groups) and teaching methodology and departments involved.

1. Pharmaceutical Care and Medicines and Pharmaceutical Practice (5th year). Pharmacology and Pharmaceutical Technology
   a. Dispensing of medicines with or without prescription. Role Play.
   b. Minor symptoms and treatment selection. Role Play.
   c. Pharmaceutical Care to polymedicated patient with cardiovascular risk. Clinical practice.
   d. Personalized Dosage Systems. Practice Case.
2. Pharmacology and Pharmacotherapy (4th year)
   a. Medication Review of Diabetic Patient. Clinical Practice
   b. Medication Review of Hypertensive Patient. Clinical Practice

Phase 4. Teaching activities. The activities will start on September 2018

Phase 5. Evaluation. Questionnaires to assess the interest, expectations and opinion of the students, teachers and pharmacists.

Financial support and/or acknowledgments.

The PPC was supported by Bidafarma, Acofarma, Tecnyfarma and Roche Diagnostics and 3rd University of Seville Teaching Plan.

Innovations in Pharmacology teaching: "semivirtual" mice, a tool for learning the evaluation of analgesic activity

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Abstract:

The aim of this project was to design a tool, as alternative to the use of animals, to learn the analgesic activity assessment in Pharmacology practices.

Method and results. Previously, teaching team carried out the complete assay to record a set of videos about the course of the practice. For this proposal, analgesic activity was assessed by hot plate test using mice randomized in three groups. Individual videos for each animal at every assay time were edited. The practical session starts in the laboratory where the teacher shows the students the equipment for measuring analgesic activity (hot plate and others) and instructs them on the basis. Then it is explained how the hot plate experiment was performed; a) the animals were placed on the hot plate (55±0.1 °C) and the time until jumping was recorded; b) after, each group received saline solution (control), morphine or drug problem; c) the jump time was again evaluated at 10, 20, 30, 60 and 90 min after administration. Each student has to visualize the movies for each animal in order to measure the jump times at every time. After that, the results are plotted, analyzed and discussed during practical session. Finally, the students´ opinion about this alternative tool is requested. So far, most of them fully agree with this innovation.

Conclusion. This tool is an innovation very useful in Pharmacology teaching as evidenced by the good feedback received from both students and teachers.

Graphical abstract

Financial support and/or acknowledgments

This project was supported by the USAL (ID2014/0171). The authors thank Digital Production and Innovation Service (USAL) for recording and editing videos.

Assessment of Parasitology knowledge consolidation in Pharmacy university students

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Abstract:

Forty-eight students of Pharmacy degree at Murcia's University were evaluated of Parasitology subject for a second time 15 days after the official exam, with a similar level of difficulty test. They were asked to value their own study effort categorising it from 1-5 according to zero, low, medium, high or very high intensity of study, respectively.

First exam mean mark was 7.08, with a 93% of passes rate and almost 90% of students stating a high or very high intensity of study. Second exam mean mark was 4.47, with only a 39% of passes rate and more than 90% of students declaring not having studied. Statistically significant positive correlation was found between each student's marks in both exams (correlation coefficient=0.69, $p<0.0001$). Pass/failure rates as well as marks were significantly associated with level of study ($p=0.005$) in the first exam in contrast to the second one. Analysis of marks evolution in students who did not studied for the second exam showed that, as it was expected, a 76% of them obtained a lower mark category, whereas only a 21% conserved the same merit, good or pass scores, and a 3% maintained the fail. No one improved mark category and only one student raised punctuation although within the same mark level.

Notwithstanding the first exam successful results, the high proportion of students with subsequent lower punctuation suggests limited knowledge consolidation, despite the short time between both evaluations.

Organizing a scientific mini-conference as a group tutoring activity of the Master research project

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Abstract:

The Master in Research and Development of Medicines of the University of Santiago includes a major research project of 24 ECTS.

The students are distributed in the research groups of Pharmacology or Pharmaceutical Technology where they work planning and carrying out a pharmaceutical research during the second semester, from February to July.

The subject "final research project" has been assigned 35 hours of personalized tutorials, which aim to guide the student in carrying out the research work, as well as solve the problems and doubts of the student.

During the last three academic years, 2015-2016, 2016-2017 and 2017-2018, an activity has been carried out in the format of a scientific conference, which includes an opening ceremony, a plenary lecture, oral communications by students and a poster session. A best poster award session is also included. All students and many professors of the Master attend the conference.

The observations and questions that arise after the oral presentations of the students are particularly interesting, which has allowed us to classify this activity as group tutoring.

Both teachers and students have felt that participation in the conferences facilitates the interaction between them, helps students to focus and explain their research work and favours the appearance of new ideas. The students really feel like young researchers.

Graphical abstract (optional)

Financial support and/or acknowledgments

Authors thank Jorge Espinosa for the poster design and "Eloqüencia" company for its selfless participation

Education of Kampo medicine (traditional Japanese medicine) in GPU

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Abstract:

Japanese Ministry of Education, Culture, Sports, Science and Technology imposes "Core Curriculum for Pharmaceutical Education" to whole 75 schools of pharmacy in the country. Based on the curriculum, faculties majoring in herbal medicines are liable to teach two sections of 'C5–Natural Resources' and 'E2–Pharmacotherapy'. The former section includes original plant sources and medical parts of crude drugs, chemical constituents and biological activities, and application to therapeutic drugs and/or functional foods, *etc*.; the latter comprises Kampo medicine (traditional Japanese medicine). Each school can achieve similar educational objectives assignable to the 'C5' except what grade you study them in or how many academic credits you can get for them. On the other hand, even though the educational objectives are common, there are significant differences in the class-works related to the 'E2' among almost all the schools. Here, we should mention that Kampo has become unmatchable to the traditional Chinese medicine by the influence of positivism in the 18th century. Then, at the end of samurai dynasty westernization excluded any traditional styles of medicine. It was in the middle of the 20th century that Kampo was finally reassessed as an alternative therapy. Thus, teaching methods of Kampo have not yet been established systematically. In the current congress, we would like to introduce our challenge for an advanced education of Kampo medicine and its related classes in Gifu Pharmaceutical University (GPU).

Financial support and/or acknowledgments

All members cooperating to this presentation declare that they have no conflict of interest.

Virtual minicongress of pharmacology as a learning and collaborative tool

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José Ángel GARCIA-PEDRAZA, María Luisa MARTÍN and Asunción MORÁN

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Abstract:

The use of new teaching methodologies in Pharmacology has become a priority for the Pharmacology Professors of the Pharmacy Degree in the University of Salamanca in order to adapt our studies to the European Higher Education Area (EHEA) and to train better pharmaceutical professionals.

The main goal of the learning activity proposed (Minicongress) was to stimulate autonomous learning and encourage teamwork to reduce passive forms of teaching and motivate the students towards an active training, in order to acquire basic and transversal competences included in the Spanish framework of qualifications for Higher Education.

Methodologically, the activity was performed in two phases. Firstly, the learning tool was presented to the students enrolled in the subject of Pharmacology II (4th year of the Degree in Pharmacy) as a volunteer activity; and a second phase for student recruitment, assignment of roles, establishment of Organizing and Scientific Committees and requirements for the abstract and poster submission. All scheduled activities were posted on Studium platform (https://moodle2.usal.es/course/view.php?id=11125).

A total of 21 students registered, with 6 posters presented in public and evaluated by the students of Pharmacology II. The acceptance of the activity was excellent. In the satisfactory survey the students evaluated the Minicongress in between 4-5 (being 5 the highest score). They remarked that the activity was useful to achieve the objectives proposed. The learning results and final calcifications show a better assessment for the students participating in the Minicongress than for the non-participant students.

Financial support and/or acknowledgments

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How to train pharmaceutical care services. Opinion of a teaching video to learn about medication adherence

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Introduction: Pharmaceutical Care(PC) can't only be taught by theoretical frameworks, due to healthcare interventions. New teaching tools are required for both, teachers and students.

Aim: To produce a video about adherence as supplement teaching tool for PC subject and to know the students' opinion about it.

Method:

Making of (03/17–11/17): a)Documentation and composition of the case study presented as simulated patient; b)Review and agreement by an 8members focus group in adherence; c)Stage preparation, 2actors training, video recording and editing.

Assessment (11/17–04/18): a)Theoretical lesson about adherence and display of the video; b)Use of an *ad hoc* survey with 18 items, marked 1(completely disagreed)-10(completely agreed); c)Frequency analysis for each marking distributed in 2 categories(<8;≥8).

Results:

Making of: 10minutes video of a study case based on a hypertensive patient with combined non-adherence in community pharmacy. Divided in 5acts: 1) Service offering; 2)Evaluation of adherence; 3-4)Management on intentional and unintentional non-adherence; 5)Controlling health problems and follow-up. Pharmacist's skills were enhanced.

Assessment: 90questionnaires were completed by students of Bachelor of Pharmacy, 19 by the master of PC and 17community pharmacists. From the 18items, more than 75% of the students(n=94) rated 11items ≥8. The worst ranked item was "simulation of reality", rated ≥8 by 47,6%(n=66) people, and the best one was "appropriate complementary tool for classic teaching", with 95,2%(n=120) marking ≥8.

Conclusions: A teaching video is an adequate tool as a complement for teaching about adherence. It was positively assessed as an addition to regular classes; simulation of reality should be improved in the future.

Evaluation of the practical teaching of Pharmaceutical Technology II of the Degree in Pharmacy of the University of Murcia

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Abstract:

Pharmaceutical Technology II is a subject with 12 credits ECTS (European Credit Transfer System) teached in the fourth year of the Degree in Pharmacy at the University of Murcia. This subject, which is the basis of one of the most genuine aspects of the Pharmacy, consists of 42 h of laboratory practices distributed throughout the course, so the evaluation of practical teaching is of vital importance to assess the student's learning.

We have conducted an anonymous survey among the students of this subject (course 2017/2018, n=33) in which they had to answer to 4 questions related to practical teaching: Score was fixed between 1 and 5: 1 (very little necessary), 2 (little necessary), 3 (indifferent), 4 (necessary) and 5 (very necessary). GraphPad Prism 6.01 was used for the statistical study,

Our results show that students notice that performing lab practices is very necessary (4.788 ± 0.095). They also demand the acquisition of new and latest lab equipment (4.364 ± 0.143). Regarding the practice development, they estimate necessary to have the notes for the practice before it starts (3.545 ± 0.145) and, finally, the students do not consider necessary to access the Real Spanish Pharmacopoeia during the practice development and during its subsequent study.

Pharmaceutical Technology II teachers detect the need to improve the quality of lab practices, in relation to infrastructure and materials available to the student, and also are aware that they must promote the use of the Royal Spanish Pharmacopoeia or other pharmacopoeias of recognized prestige among students.

Financial support and/or acknowledgments

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Strengths and weaknesses in the internationalization in the Faculty of Pharmacy and Food Sciences

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Abstract:

The Faculty of Pharmacy and Food Sciences offers the students of its three degrees, Pharmacy, Human Nutrition and Dietetics, and Food Sciences and Technology the possibility of internships in foreigner universities. One of the main commitments of the Faculty is to meet the growing demand of the students to spend a period abroad. In this framework the coordinator, along with the other academics and administrative staff, considers the stay in other universities part of the improvement in the comprehensive academic formation of the students. Therefore, a considerable effort is constantly done in order to prepare an internationalization program that satisfy the students and fulfil the academic necessities to prepare professionals. Herein we present the outcomes and impacts of the international mobility program in the 2015-2016 and 2016-2017 academic years. Three main aspects are considered: a) the students that go abroad within the ERASMUS+ or other programs; b) the foreign students that come to the Faculty to stay for a short-period and c) the management of the internationalization call in the 2016-2017 and 2017-2018 academic. This study has allowed recognizing some issues that could be addressed to improve the program. Unfortunately, some spots although identified could not be solved at the moment and are proposals for improvement in the future and in some cases are far from their resolution.

To sum up, the comprehensive study presented herein allows, after initial reflections, the identification of the improvement issues and the implementation of the proposals in order that the Faculty of Pharmacy offers an outstanding internationalization program to undergraduates of the three degrees.

From University to working life: Graduates in Pharmacy

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Abstract:

In a socio-economic context like the current one, it is more necessary than ever to evaluate the labor insertion process of the graduates by their corresponding university centers. Precisely the labor insertion processes make it possible to gather key information to improve the training of students and that can contribute, with their talent and effort, benefits to society. The educational program of the Degree in Pharmacy, presents a referential frame of the behavior and the professional trajectory of its graduates; the interpretation of the results of this study will serve to continue contributing experiences that allow renewing the educational project of the Faculty and, at the same time, strengthening the institutional information systems oriented towards decision-making. The presented work collects the results of the labor insertion survey directed to graduates in Pharmacy from the 2011-2017 classes. 231 graduates were surveyed and the results showed that: i) 47% of the respondents are practicing as a pharmacist in community pharmacy offices, ii) 20% of the graduates are currently doing postgraduate studies , iii) 21% of the graduates are making the FIR, iv) 10% of the respondents are carrying out research tasks in private research centers or in public universities, while v) 5% of the respondents are doing other activities. It is interesting to note the low percentage of graduates who are not practicing, approximately 2% of the total graduates from the different classes.

Collaborative teaching and learning approaches with the use of the Kahoot and Google Drive tools in Pharmacy teaching

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Abstract:

From 2014 to 2018 our education research group has taught a series of courses related to teacher training and innovation within the University of Salamanca and Faculty of Pharmacy (EducaFarma) training frameworks. The aim of these courses was to promote the use of Information and Communication Technologies (ICTs) methodologies and resources within the teaching-learning process at the School of Pharmacy. New computer tools and ITCs will help on the acquisition of the skills and competencies required for the continuous update in teaching, learning and research methodologies in the Pharmacy studies. During these courses, we addressed the use of the Google Drive platform, the Kahoot web tool and mobile devices (iPad). The courses were aimed at both teachers and students and a total of 142 trainees attended the 12 courses taught. The objective of the work presented here was to get insight into their degree of satisfaction with the courses. To this end, after each course, attendees were presented with a satisfaction survey with questions such as: Is the Kahoot web tool useful for face-to-face assessment?, How dependent on the connectivity within the classroom is the use of mobile devices? and so on. Attendees were very satisfied (86%), satisfied (11%) or indifferent (3%) to the courses. Therefore, we consider that this type of training courses should continue to be implemented as a necessary support for the teaching-learning process within the School of Pharmacy educational duties.

Financial support and/or acknowledgments

Audio broadcasting de aula en la docencia de clases magistrales, seminarios, tutoriales y conferencias. Integración con Studium, Diarium y la plataforma NIMBUS-USALgoogle de la USAL. *University of Salamanca* (ID2015/0260).

Socrative, Kahoot y USALgoogle: herramientas webs aplicables en el proceso de enseñanza/aprendizaje en las diferentes enseñanzas de la Parasitolgía. *University of Salamanca* (ID2016/157).

Antihypertensives knowledge – Assessment in higher education students through digital game-based learning

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Hypertension has been described as the most prevalent risk factor for cardiovascular diseases, which are the main cause of death worldwide. In Portugal, in 2015, its prevalence was of 36%. This pathology's therapeutic success depends upon a good knowledge about the therapeutic alternatives available. There is, therefore, imperative to insure that the learning process is efficient. In order to improve it, in a more appealing and effective way, there has been an increase in the employ of digital tools. This study aimed to assess the impact of a mobile application in knowledge's acquisition and/or consolidation about antihypertensives, in higher education Pharmacy students. The study took place in Superior Health School of Porto, Portugal, with a sample of 141 students. Data was collected by applying two questionnaires. The first was applied in the beginning of the study and the second after the usage of the mobile application. Four groups of study were defined, that varied in accordance with the application's usage frequency: group A (2/week); group B (4/week); group C (every day), group D (control group). The study revealed an evident evolution from the first to the second questionnaire, in all course years (p<0.001) and study groups (p<0.001). There was an evolution of 31.34% in group A, 45.18% in group B and 49.37% in group C. It can be concluded that mobile applications, namely digital games educationally directed, can be useful tools in higher education students.

Keywords: Hypertension; Antihypertensives; Digital game-based learning; e-learning

Implication of Pharmacy degree students in Secondary Education cooperative learning

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Abstract:

Students of Pharmacognosy, a compulsory subject of the 3rd year of Pharmacy Degree at the University of Valencia, have implemented educational activities (flipped classroom/gamification) in the teaching of Biology subject in the Secondary Education Schools, to facilitate knowledge sharing to the students (4º ESO) and motivate them to continue their university studies in Science. Cooperative learning and gamification may be teaching tools to increase student engagement in Science, avoiding the progressive reduction of enrolment of students in Higher Education. Undergraduate students prepared a cooperative work session consisting of an exposition of the most representative medicinal plants and their active constituents followed by a practice session, in three different High Schools. Tobacco leaf was the biological raw material used for the extraction and characterization of alkaloids, being the identification of the main alkaloid made by thin layer chromatography with a nicotine standard. To motivate the pupils, a free game-based learning platform (Kahoot!) was applied performing five questions about the practice in the laboratory, getting to immediately feedback about the collaborative learning. The activity allows degree students to work both general outcomes (autonomy, communication of information and concepts to a youngster audience), and specific ones (capacity for teamwork and interpersonal relationships) to efficiently manage their knowledge acquired through its leading role in the process of learning. Pharmacy students encouraged high school students to continue Sciences studies, and the satisfaction survey indicated this activity was positive and useful to begin the study on the field of medicinal plants.

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Final Degree Project and multidisciplinary projects based on professional situations in pharmacy

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Abstract:

Final Degree Project (FDP) is an activity that students carry out at the end of their training process, being the opportune moment for them to demonstrate their professional qualification. The present paper proposes a new methodology for an execution dynamic of the FDP based on different professional possibilities. The proposal includes a working methodology of a teaching group that is involved and participates in the proposal, elaboration, direction and evaluation of the FDP. Our teaching group is multidisciplinary, formed by specialists in different subjects of all the courses of the Pharmacy Degree. The methodology used, by both the teaching group and the students, was Problem-Based Learning (PBL). The methodology proposed for carrying out of the FDPs allows the integration of specific competencies from very different areas, which provides an enriching and unusual global perspective in the FDP. This proposal methodology, can be largely implementable in any Degree, strengthens the coordination of teaching groups, the originality and creativity of the FDP, the active role of students and teachers, and a direct relationship with professional opportunities. In this work, two scenarios are presented corresponding to two professional situations in the field of research and the pharmaceutical industry, such as the development of an intradermal influenza vaccine and the development of an antitumor agent based on nanotechnologies. Both scenarios have been developed as FDPs in the Faculty of Pharmacy at the University of the Basque Country. The students are very satisfied with the work done and the evaluation obtained has been excellent.

Financial support and/or acknowledgments

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Design and implant of new practices for the FRLs VII and VIII

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Abstract:

Teaching priority areas of chemical-biological sciences as well as its development is closely related to research in bio-pharmacy, cell biology as well as bioinformatics that will be constituted as a strategic tool of social welfare in the immediate future. It is intended that its application will enhance the implementation of new technologies of information and communication used in education, as appropriate, contribute to the quality of training of students in higher education and for progress towards a knowledge society which will result in improving processes teaching and learning, especially in those interested in the areas of Pharmacy and Cell and Molecular Biology. For this reason, we developed a research project to design, validate and implant practices of Pharmacy and Cellular and Molecular Biology for the Formative Research Laboratories (FRLs) VII and VIII, for the students of Q.F.B. and Biology of the FES- Zaragoza UNAM. Also, improvements made to these subjects can be extended to other subjects in of Q.F.B. and Biology, which has 900 students. To do this, they designed 3 new Pharmacy and Cellular and Molecular Biology practices and a protocol was drawn up to implementation in the FRLs VII and VIII. Likewise, to evaluate the impact, of the implementation of the practices in the teaching of the area of Pharmacy and Cellular and Molecular Biology in the FRLs has been developed and application an instrument expressly, to know the opinion of the students and the professors about the implantation of the practices.

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Chemical and chemical-toxicological forensic analysis: a professional Master course

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Abstract:

Since A.Y. 2012-2013, the professional Master course in *Chemical and Chemical-Toxicological Forensic Analysis* has been active at the University of Bologna (director: Prof. S. Girotti), under the supervision of a Scientific Council and a Proponent Committee.

The Master is open to graduates in chemical- pharmaceutical sciences to become experts in forensic chemistry and analysis, to support investigations and judicial rulings or to assist suitors in civil litigations. This highly-marketable professional profile is not yet fully acknowledged in Italy but is needed in many legal cases. The professional trained by the Master will interface with the judiciary offices, public security forces, advisors and companies. In these frameworks, scientifically sound data must be produced, described to non-experts and turned into legally valid documents. Master students receive training in the areas of forensic and analytical chemistry and chemical toxicology. The analysis of xenobiotics and contaminants for environmental protection, food and workplace safety and pharmaceutical purposes are also addressed. The areas of legal intervention are mainly those of security, criminal law, insurance and patent litigation. A large part of teaching activity is directed to laboratory and field practice. At the end of the Master, the trained professionals will obtain a solid professional experience thanks to advanced practical internship programs also abroad.

Until now, more than 100 students completed the Master. Moreover, some teaching courses include didactic materials developed within the framework of the *TOX-OER* Erasmus+ project, a massive open online course (MOOC) for the learning of toxicology, developed in collaboration with international experts (www.tox-oer.com).

Internationalisation at Universidad San Jorge-Pharmacy Degree

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Abstract:

Internationalisation is a transversal strategy. At Universidad San Jorge we share the ambition to become an international university in which global diversity is perceived as a valuable resource. We actively promote mobility for our students and staff, offering a welcoming and friendly atmosphere for incoming international students and an increasing number of credits taught in English.

The Pharmacy Degree was initiated in 2008 and the number of mobility agreements has increased up to ninety six in ten years. Within the European framework, our bilateral agreements are the following: KU Leuven (Belgium), University of Ljubljana (Slovenia), University of Helsinki (Finland), Université Bordeaux I (France), Université Paul Sabatier - Toulouse III (France), Università degli Studi di Camerino (Italy), Università degli Studi del Piemonte Orientale 'Amedeo Avogadro' (Italy), Università degli Studi di Pisa (Italy), Università degli Studi di Roma 'La Sapienza' (Italy), Università degli Studi di Urbino 'Carlo Bo (Italy), Università degli Studi di Firenze (Italy), Università degli Studi di Roma 'Tor Vergata' (Italy), Universidade do Porto (Portugal), Instituto Politécnico de Bragança (Portugal), University of Veterinary and Pharmaceutical Sciences Brno (Czech Republic), Universitatea de Medicina si Farmacie 'Iuliu Hatieganu' din Cluj-Napoca (Rumania) and Liverpool John Moores University (UK)

Taking into account that during the academic year 2017-2018 approximately 11 % of our students were under a mobility programme (incoming or outgoing) and that the rate of graduated students enjoying an outgoing stay is 40 %, we can consider that the Pharmacy Degree at Universidad San Jorge is committed with a high quality international education.

Financial support and/or acknowledgments

Universidad San Jorge and IPAP18 are thanked for financial support.

Integration of The Pharmacists' Patient Care Process to the Pharmacy Curriculum

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Abstract:

Describe how the Pharmacists' Patient Care Process is conceptualized and incorporated within academic experiences offered throughout the Doctor of Pharmacy curriculum.

Various strategies were used to incorporate the pharmacists' patient care process into the curriculum. The concept of comprehensive medication management was previously contextualized to pharmaceutical care, which is an integral component of the curriculum. Upon the release of the consensus statement for the Pharmacists' Patient Care Process, the theoretical foundations of pharmaceutical care, comprehensive medication management and the pharmacists' patient care process were addressed by the faculty. This provided the basis for the development of a plan for the integration of the patient care process throughout the academic experiences. The patient care process is conceptualized in didactic courses as well as in practice experiences in a longitudinal manner. The integrative seminars, which are offered each semester from the first to the third professional years, are the unifying center of the curriculum, and play a key role in this integration.

The integration of the patient care process transitions from didactic courses to introductory and advanced pharmacy practice experiences. The patient care process is contextualized to the provision of patient-centered care in the ambulatory and the acute care setting. The concept is also contextualized to the principles of pharmaceutical care and medication management services.

This longitudinal integration within the curriculum provides the students a consistent and common framework for the conceptualization of the pharmacists' patient care process as the basis for the delivery of pharmacist provided patient care.

TOX-OER MOOC: learning toxicokinetics and liver as target organ of xenobiotics

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Abstract:

TOX-OER (Learning Toxicology through Open Educational Resources) is an Erasmus+ Action KA2 Project, involving seven European countries, which aims to develop an international Massive Open Online Course (MOOC) on Toxicology. Its purpose is to enhance digital integration in learning, teaching, training and youth work at various levels by developing scientific, pedagogical, informative and formative materials. TOX-OER MOOC platform is already available online (https://toxoer.com/), being the MOOC in English and all partner-country languages in a continuing construction process.

The MOOC is organized into seven modules: General Concepts; Pharmaco-Toxicokinetics; Main Groups of Xenobiotics; Environmental Pollutants; Target Organ Toxicity and Biomarkers; Environmental Toxicology; and Patents and Patent Application. They constitute a total of 31 ECTS and include an introduction to the module, video lessons, intermediate evaluation or active online learning activities, text based learning resources, a final evaluation test and bibliography.

The Pharmaco-Toxicokinetics module (6 ECTS) includes 4 topics: ADMET, Membrane and Transport Mechanisms; Membrane Transporters and BBB; Absorption, Distribution, Excretion; and Xenobiotic Metabolism. The module dedicated to liver toxicity (2 ECTS) described hepatic physiology/structure, and their tight relationship with hepatotoxic mechanisms, namely those related to intrinsic and idiosyncratic (allergic and non-allergic) xenobiotic-induced hepatotoxicity as well as direct and indirect mechanisms of toxicity. A section related to clinical manifestation of hepatotoxicity and biomarkers of liver damage is also included.

The presentation will demonstrate the interest of this pedagogical tool for the Toxicology Education process, not only in the classroom but also in any computer of the world.

Financial support and/or acknowledgments

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POSTER SESSION SYMPOSIUM PHARMACY & RESEARCH

Ex-vivo diffusion studies of Progesterone in rabbit cornea and sclera

Adrián ALAMBIAGA CARAVACA, María SEBASTIÁN MORELLÓ, María Aracely CALATAYUD PASCUAL, Cristina BALAGUER FERNÁNDEZ and Alicia LÓPEZ CASTELLANO

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Abstract:

Introduction: Retinitis pigmentosa (RP) is the most frequent hereditary degeneration of visual photoreceptors that produces blindness in advanced stages. There is not an effective treatment, but some authors described that progesterone (PG) could be used in RP[1].

Aim: Formulate eye drops and gel that contain PG and study the absorption of PG from this formulation through rabbit cornea and sclera.

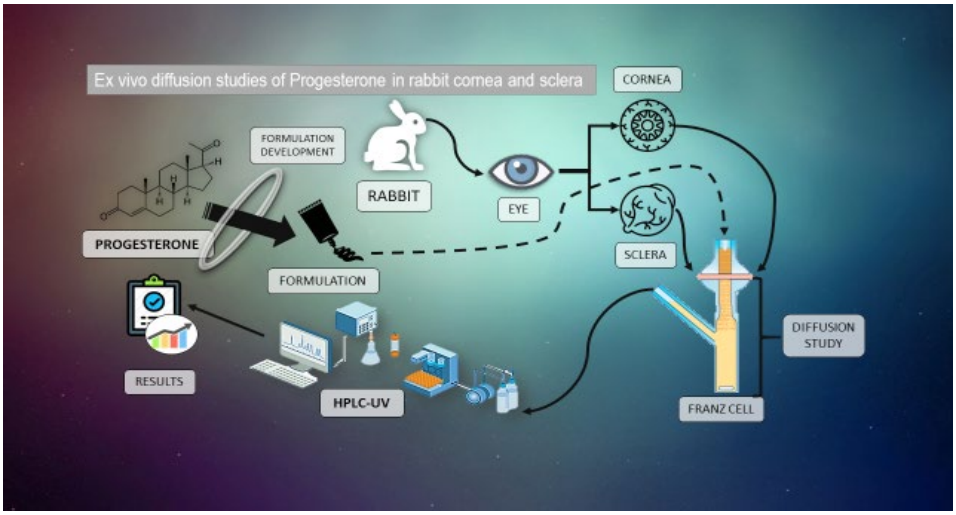
Material and method: An eye drops and a gel with progesterone were developed. The PG use in this formulation was PG-water soluble (contain methyl-β-cyclodextrin complex). Furthermore the gel was prepared with polyvinylpyrrolidone, methylcellulose, glycerine, propyleneglycole and water. The diffusion studies of these formulations were performed with Franz cells using rabbit cornea and sclera as membranes. PG in the samples obtained during this experiments was quantify by HPLC-UV.

Results and discussion: After testing the two formulations, a higher permeation was observed through the sclera. This may be due to less complexity of this membrane. In addition, better results were observed with the gel than with eye drops. These results were also interesting because the gel could stay longer in contact with the eye surface in *in-vivo* conditions.

Conclusion: With these preliminary studies we can say that it could be possible to administer PG directly in the eye for the treatment of local diseases. However, more studies are necessary to optimize the pharmaceutical forms and the dosage for the different diseases.

Bibliography: 1) Sánchez-Vallejo V. et al. Neuroprotective actions of progesterone an in vivo model of retinitis pigmentosa. Pharmacol Res. 2015; 99:276-88.

Graphical abstract:



Financial support and/or acknowledgments:

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Preparation of Nanochitin from Crawfish (*Procambarus clarkii*) by-products

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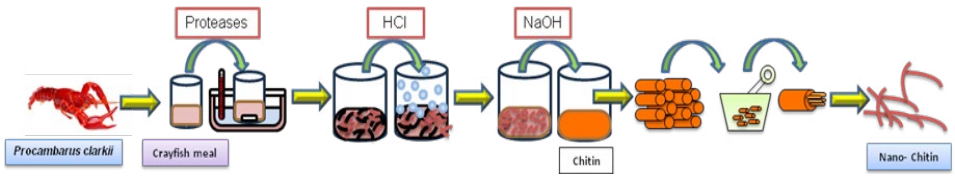
Abstract:

Nanochitin fibers (NChC) were prepared from crawfish chitin (*Procambarus clakii*) by-products. Raw chitin has been obtained by two different processes: **Process A** consists of a first deproteinization with a protease treatments, followed by a demineralization *in situ* by lactic acid fermentation (**1**) and a second deproteinization by alkaline treatment; **Process B** consists of acid demineralization step, followed by an enzymatic treatment with proteases and a final alkaline treatment. The concentration of raw crab chitin obtained from Process-A and -B determined as N-acetyl-glucosamine is 85 ± 1.8% and 83 ± 2.3%, being a chitin of good quality, similar to that commercially available for food and medical uses. Subsequently, the preparation of chitin nanofibers were carried out disintegrating the chitin aggregates by a milling process. After a treatment cycle with a wet-type grinder, the chitin suspension formed a gel; disintegration was achieved due to a high surface-to-volume ratio. Obtaining highly uniform chitin fibers with a width of approximately 10 nm which still maintained their original chemical and crystalline structures (**2,3**). The obtained product can be used for industrial applications in pharmacy, cosmetic, agriculture and wastewater treatments.

Graphical abstract



References

1. Bautista et al., (2001). Process Biochemistry, 37: 229-234.
2. Abe K.., et al., (2007). *Biomacromolecules. 8*: 3276–3278.
3. Ifuku S., (2014). Molecules, 19: 18367-18380.

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Study of Saccharomyces cerevisiae L-ASNase 1 Expression in *Pichia pastoris Glycoswitch* strain - potential use in the treatment of acute lymphoblastic leukemia (LLA)

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Abstract:

Introduction

The L-asparaginase (ASNase) as the biopharmaceutical inhibitor of the abnormal cells proliferation. The asparagine, in turn, is an essential element for the growth of leukemic cells, but not for the normal cells. Thus, the deficiency of this amino acid in the blood serum can lead to tumor cell death by apoptosis.

Objectives

- The expression of L-ASNase 1 in the *glicoswitch* strain of *P. pastoris*
- Evaluate glycosylation and what effect on specific activity of ASP1
- Purify the enzyme ASP1 and evaluate its kinetics and time of efficiency, under certain conditions of pH and temperature.
- Test antitumor activity against *in vitro* leukemia cell lines

Methods

The expression of the enzyme Sc_ASNase1, we will use the parental strain SuperMan5 (his-) of *Pichia pastoris*. Later, we will determine the activity and purification of the enzyme L-ASNase 1 using the method of Frohwein, as well as modifications in the structure of this enzyme will be evaluated. As a last step, we carry out the toxicity tests in leukemic cell lines.

Expected Results

As results of this work, we expect to obtain an alternative source in the expression of the enzyme L-asparaginase 1 in the strain *Glicoswitch* and that the effects of humanized glycosylation on this yeast increase its stability and decrease the immunogenicity for a potential therapeutic use against acute lymphoblastic leukemia ALL.

Financial support and/or acknowledgments

This work is supported by CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), Brazil.

Preliminary Imatinib Population pharmacokinetic model in patients with chronic myeloid leukemia

Alvaro CORRAL ALAEJOS[1], Dolores SANTOS BUELGA[2], Beatriz CASTAÑO RODRÍGUEZ[1], Silvia JIMÉNEZ CABRERA[1], Fermín SÁNCHEZ GUIJO[1], Aranzazu ZARZUELO CASTAÑEDA[2], M.ª José OTERO LÓPEZ[1], M.ª José GARCÍA SÁNCHEZ[2]

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Abstract:

Imatinib is the first line therapy of chronic myeloid leukemia. The high interindividual pharmacokinetic variability suggest the usefulness of therapeutic drug monitoring as a tool to optimize imatinib therapy. The aim of this study was to develop a preliminary population pharmacokinetic model from 28 patients (21-78 years) in treatment with imatinib of the university hospital of Salamanca and 48 samples (steady-state through concentrations) were determined by HPLC-UV.

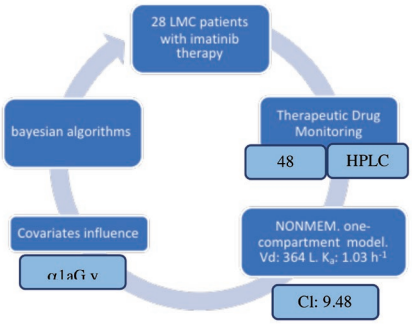
Clearance was the parameter estimated, according to a one-compartment pharmacokinetic model, while volume of distribution (364 L) and absorption constant (1.03 h^{-1}) were keeping constant.

NONMEM® v.7.4 mixed effect modelling software was used to estimate influence on clearance of demographics (age, weight, height, sex) and clinics (hemoglobin concentration, white blood cell count, liver function, platelets and blood proteins) covariates.

From the basic model, clearance was estimated on 9.48 L/h (estimation error < 5 %), with interindividual and residual variabilities of 22.8 % and 13.1 % respectively (both estimation error < 30 %).

The correlation analysis revealed a decrease of clearance when increasing the concentration of a1 acid glycoprotein and a tendency to increase of clearance when increasing hemoglobin levels.

This preliminary model, despite the limited number of data, it could be useful to optimize imatinib therapy in our population using Bayesian algorithms.



Parameterising PDK1-Induced Perturbations on the Dose-Response Profile of Human Glioblastoma

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[1] *Grupo de Investigação Aplicada em Farmácia (GIAF), Departamento de Farmácia, Escola Superior de Tecnologia da Saúde de Coimbra|Coimbra Health School do Instituto Politécnico de Coimbra, Portugal*
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Abstract:

Twenty first century drug discovery & development welcomes a shift in its scientific background. Despite the innovative developments during the last decades, this process is still inefficient. The main objectives for 2020 on this matter are clearly focused in improving the whole process. In order to achieve this goal, several strategies have been pursued, namely the novel concept of Systems Pharmacology.

The present study aims to evaluate the perturbations induced by the PDK1 inhibitor, G51 (C25H25N5O4), on the proliferation and viability of a human glioblastoma cell line (U-87 MG), applying the concept of Systems Pharmacology to drug development. This can be critical for the treatment of Glioblastoma Multiforme (GBM), which remains therapeutically challenging.

Financial support and/or acknowledgments

Not applied.

Enrofloxacin transferosomes as alternative leishmaniasis nanotherapy

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Abstract:

Leishmaniasis is increasing its importance as cause of morbidity and mortality worldwide. The first-line treatment, antimonate meglumine, has a large number of adverse effects, high costs and is developing resistance. New alternatives are mandatory. Fluoroquinolones, has been reported active on topoisomerases II of *Leishmania*; they has lower cost, fewer adverse effects. To determine the leishmanicidal effect of fluoroquinolones, a fluorecence method was optimized and applied to reproduction phase cultures of *Leishmania mexicana* and *Leishmania braziliensis* using antimonate meglumine as a positive control. The tests were conducted in different concentration ranges depending on drug water solubility: enrofloxacin and levofloxacin from 20.000 µM to 19, 5 µM; ciprofloxacin from 50.000 µM to 39, 1 µM; moxifloxacin from 400.000 µM to 781 µM; and antimonate meglumine from 616.425 µM to 1.203 µM. Enrofloxacin had greater leishmanicidal activity than the other fluoroquinolones, all of them were more active than meglumine antimonite.

Enrofloxacin is ionized in a wide range of pH, which could decrease its absorption through the biological membranes; this limitation could be solved loading it in liposomal systems such as the transferosomes. Ultradeformable nanovesicles produced by thin layer hidration and ultrasonication, were characterized in terms of size, polydispersity index, zeta potential, entrapment percentage, dissolution profile and physical stability. The transferosomes of enrofloxacin showed greater leishmanicidal activity than enrofloxacin in solution over promastigotes of *Leishmania mexicana*.

Graphical abstract

Financial support and/or acknowledgments

This work was financed with funds from project # 21 of the General Directorate of Research and Postgraduate Studies, Universidad Central del Ecuador and with funds from the Academic of Recherche et d Enseignement Supérieur (ARES) of Belgium.

Preparation of Fungal-Nano chitin crystals: Aplication to Mushroom (*Agaricus bisporus*) by-products

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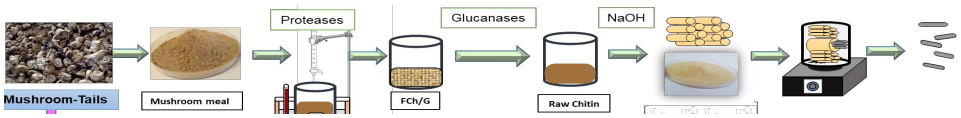
Abstract:

Chitin is a crystalline polysaccharide of high molecular weight, found in crustacean shells, insect cuticles and in yeast, green algae and cell walls of fungi. It occurs as a highly-organized micro- and nano-fibril structure [1]. Transformation of micro-fibrils in nano-crystals can be achieved dissolving the amorphous regions followed by acidic breaking [2,3]. Functionalized fungal-chitin nanocristals (FChNC) can be used in the medical-pharmaceutical and food industry do to it antifungal activity [4].

In this work we report on FChNC preparation using fungal chitin (*Agaricus bisporus*) as raw material, obtained by a sequential process based on the use of proteases, glucanases [5]. The concentration of raw fungal chitin obtained by this process, determined as N-acetyl-glucosamine, is 83 ±1.8%, being a chitin of good quality, similar to that commercially available for food and medical uses. Preparation of fungal nano-chitin fibres (FNChF) was obtained disintegrating chitin aggregates in a wet-type grinder, generating chitin gel-suspension. Disintegration was achieved due to a high surface-to-volume ratio. Obtained uniform chitin fibers with a width of approximately 10 nm which still maintained their original chemical and crystalline structures [6]. These fibrils form highly crystalline regions and disordered (amorphous) regions that can be turned in nanocrystals via top-down methods such as acid hydrolyses by dissolving the amorphous regions [2,3]. Functionalization of FNChC allows it uses in different composites with medico-pharmaceutical and food uses.

Graphical abstract



References

[1] Salaberria A.M., et al., (2015). Eur. Polym. J. 68:503–515.
[**2**] Salaberria A.M., et al., (2015). React. Funct. Polym. 89:31–39.
[**3**] Paillet, M. and Dufresne, A., (2001). Macromolecules 34:6527–6530.
[4] Lopez, O., et al., (2014). LWT Food Sci. Technol. 57:106–115.
[**5**] Cremades et al., (2012).
[6] Ifuku S., (2014). Molecules. 19:18367-18380

Financial support and/or acknowledgments

- Spanish Ministry of Science and Innovation (project RTC-2015-4039-2), FEDER funds of the European Union.
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Determination of Escherichia coli O157: H7 in slaughtered beef in Quito-Ecuador

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Abstract:

The present work determines the presence of Escherichia coli O157:H7 in in slaughtered beef samples from the Abbatoir Metropolitan Company of Quito (EMRAQ-EP).

According with information of EMRAQ-EP, the yield of production is around 450 beefs slaughtered daily. The samples were taken randomly for a week, in agreement with the Ecuadorian technical normative NTE INEN 776:2012 for meat and meat products. The collection of the samples were carried out from three specific sites of the canal: **cuadril,** chest and side tissue from the Ecuador highland and coastal regions' beefs.

For determining the *Escherichia coli O157:H7* was employed the AOAC 996.09 official method, which consists in the immuno-precipitation of lateral flux in one step for the microorganism detection, allowing it to obtain fast results after the sample addition in the device; each device contains a system of reagents that forms a complex antigen-antibody-chromogen, that is visually perceived if the microorganism is present in the sample.

The experimental development was performed in the Food-Microbiology Laboratory of the Chemical Science College. This research allowed to find out that 3 % of the samples have *Escherichia coli O157:H7* presence. Those results were compared with the Ecuadorian technical normative NTE INEN 1338:2012, showing that the samples do not fulfill with the quality and innocuity requiriments.

Rapid estimation of the shelf life of acetylsalicylic acid by non-isothermal treatments using differential scanning calorimetry

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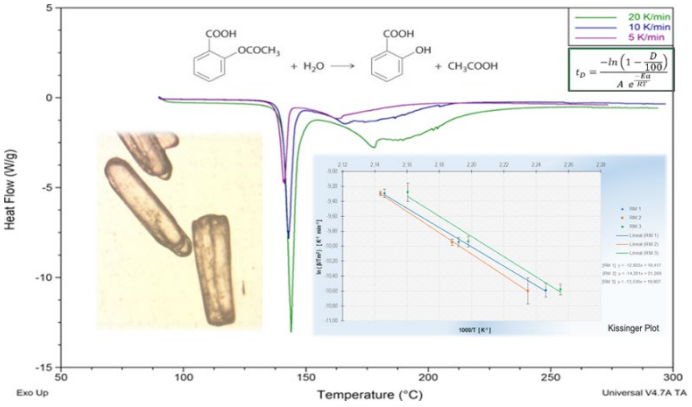
Abstract:

The traditional methods for determining the stability of drugs are isothermal and require a lot of time and material resources for their execution; for this reason, it is proposed to quickly estimate the shelf life through methods that consider the kinetics of the solid state. The non-isothermal treatment of acetylsalicylic acid (ASA) samples, coming from different batches, by differential scanning calorimetry allowed the application of Kissinger method to calculate the activation energy and the pre-exponential factor of the degradation process; these values were contrasted with those obtained from ASA / salicylic acid binary mixtures, of similar composition to the raw material. There was not significant difference between these kinetic parameters and therefore, they were grouped and characterized by an isokinetic point. The residual shelf life estimated for the raw material constituted by crystals with lower specific surface area and more homogeneous particle size distribution was the highest. The non-isothermal method used was not only a rapid tool for the estimation of shelf life but also sensitive in detecting differences of activation energy, possibly related to variations in the productive process or the storage.

Graphical abstract



Financial support and/or acknowledgments

This work was financed with funds from the Seed Project of the Central University of Ecuador and with funds from the Academic of Recherche et d Enseignement Supérieur (ARES) of Belgium.

"Assessment of biochemical changes in the reward pathway elicited by drugs of abuse"

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[2] Institute of Biomedical Research of Salamanca (IBSAL), Spain. [3] Department of Biochemistry and Molecular Biology. Faculty of Medicine. Universidad de Salamanca, Spain
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Abstract:

Drugs of abuse are considered a serious public health problem due to their addictive properties and the recreational use of new compounds, either obtained from natural products or of synthetic origin, with potential to develop tolerance and dependence is rapidly rising up. Drugs of abuse elicit their actions by stimulating the reward pathway and by increasing mesencephalic dopamine release, but there is a lack of knowledge regarding their side effects, putative targets and signalling pathways, as well as their long-term consequences.

Zebrafish (*Danio rerio*) is an advantageous tool to evaluate the *in vivo* effects of pharmacological agents. Zebrafish neurotransmitter systems share similar molecular, pharmacological and biochemical profiles with their human homologues, so that the obtained results can be easily extrapolated to higher vertebrates. To analyze the biochemical effects of drugs of abuse, zebrafish embryos were exposed to morphine and cocaine from 5 hpf (hours post-fertilization) to 6 dpf (days post-fertilization). We have analysed the changes in dopamine content by ELISA. Besides, we have also performed Western Blotting to determine the changes in protein levels of several transcription factors, namely Fos family members and CREB. Our results indicate that the expression of these immediate early genes is modified by the drug used and by the length of the treatment. This finding may reflect the differences in the modulation of the reward pathway between acute and chronic exposure to addictive agents.

Financial support and/or acknowledgments

This work is supported by a Grant from the Spanish Ministry of Economy and Competitiveness (MINECO AGL2015-68330-C2-2-R).

Sacha Inchi oil as cognitive enhancer

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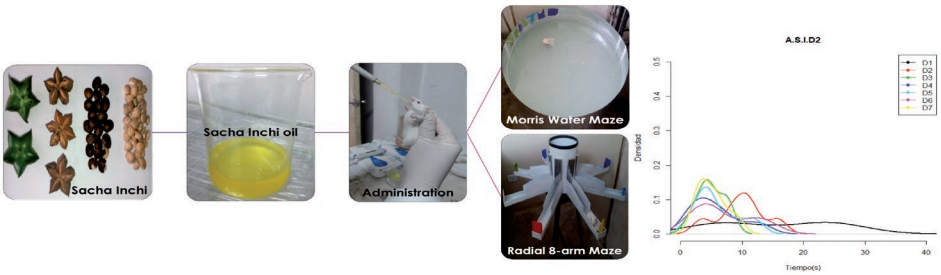
Abstract:

Neurodegenerative diseases increase as population ages. The socio-sanitary resources of the country destined to clinical and classic therapeutic approaches are not enough, making mandatory to develop specific, less toxic and more economic strategies to face them. The purpose of this research was to determine the activity of *Plukenetia volubilis* fixed oil, rich in fatty acid Omega-3 and 6, as a cognitive enhancer through in vivo studies with rodent models of the species *Mus Musculus*. The animals were divided into four groups; the negative control: water, positive control: Ginkgo Biloba and two groups for different doses of Sacha Inchi oil. The oral administration during 42 days included a learning stage for both the Morris Water Maze and the Radial 8-arm Maze. The nonparametric Gaussian kernel estimators showed a tendency to enhance the cognitive power of Sacha Inchi oil in a dose of 974.16 mg/Kg. There were no statistically significant differences in the weight of the individuals during the study. The Radial 8-arm Maze is a behavioral test more sensitive to external distractors than Morris Water Maze. It is recommended to extend the present study using this method with higher doses of Sacha Inchi oil, for prolonged administration times, with a test time of no more than three days, including groups of early young and aged mice.

Keywords:

COGNITIVE ENHANCER, *Plukenetia volubilis*, SACHA INCHI OIL, MORRIS WATER MAZE, RADIAL 8-ARM MAZE.

Graphical abstract



Financial support and/or acknowledgments

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Use of nanomedicine in preclinical wound healing studies

Beatriz MORENO-LOBATO, Natalia PICADO ROMÁN*, Jorge BOTE CHACÓN and Francisco Miguel SÁNCHEZ-MARGALLO

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Abstract:

The nanomedicine is the science and technology responsible of diagnosing, treating and preventing disease and traumatic injury, of relieving pain, and of preserving and improving health, using molecular tools and molecular knowledge of the body. Nanomedicine has been proposed for the development of new systems for the controlled release of drugs. For the administration of drugs a large variety of nanostructures bas been existed, such as nanoparticles, nanocapsules, nanovesicles, polymer conjugates, etc.

Nanoparticles are currently an area of intense scientific research, due to a wide variety of potential applications in biomedical fields. Nanoparticles are used to deliver genes or drugs to facilitate their arrival at the place of action and produce the desired effect.

The treatment of skin wounds represents an important research area. During the last years, nanoparticles have emerged as important platforms to treat skin wounds. Due to their specific characteristics, nanoparticles are ideal vehicles to improve the effect of drugs (antibiotics, growth factors, etc.) aimed at wound healing.

In our experience, several preclinical research studies have been conducted for different pharmaceutical companies in the national and international field for the study of cutaneous ulcer healing. These studies were performed by topical administration to the wound with the use of nanoparticles or nanovesicles of different pharmacological products, highlighting the growth factors.

The use of nanoparticles for the treatment of skin ulcers, significantly improves the times of wound reduction in the different studies, demonstrating the in vivo effectiveness of topical nanoparticle administration.

Financial support and/or acknowledgments

Jesús Usón Minimally Invasive Surgery Centre (JUMISC).

Phenylpropanoids as anti-Dengue molecules

Belén RODRÍGUEZ[1]*, Jennifer de la VEGA[1], Jose Luis LÓPEZ-PÉREZ[1], Arturo SAN FELICIANO[1], Yaneth M. BRAND[2], Liliana BETANCUR[2] and E. del OLMO[1]

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Abstract:

Dengue is a disabling disease transmitted by the Dengue virus (DENV), which develops severe forms, sometimes, becoming lethal. The most affected population by the DENV worldwide lives mainly in tropical and subtropical regions; since its main vector, the *Aedes aegypti*, and its congeners proliferate in these climates. In addition, because of global warming, its zone of dispersion is becoming increasingly wide.

Despite the global impact of DENV, there are no approved antiviral drugs for treatment in humans, and studies directed towards the search for a tetravalent vaccine have shown efficacy of less than 70%. Control of the vector mosquito has been another of the alternatives explored to prevent or control the disease, however, vector resistance to insecticides has proven to be a challenge for its eradication. Likewise, the appearance of a new serotype of DENV (DENV-5), demonstrates the high mutation rate of these viruses (which makes the challenge of avoiding the emergence of resistant strains even greater), also limiting the prophylactic efficacy of a possible vaccine.

The treatment, prevention and control of this pathology is one of the priorities of the World Health Organization (WHO). Impulsing the search and development of new molecules with antiviral properties, acting on host cells targets. The cyclolignans and derivatives belong to the group of phenylpropanoids, some of them have shown to have shown activities against HHV and against HIV. The aim of the work is to obtain different derivatives with podophyllotoxin and test its anti-dengue activity *in vitro*.

Financial support and/or acknowledgments

The authors thanks MINECO-RETOS: AGL2016-79813-C2-2-R and COLCIENCIAS: 111574455595 for the support of this research.

Pathogens in ticks removed from persons in Castilla y León in 2017

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Abstract:

Introduction: Ticks are hematophagous arthropods that occasionally feed on people, at which time they can inoculate a wide variety of pathogenic agents. Identify tick species that are fixed on people and their characterization will allow us to guide the prevention measures. **Objetive**: Determine the presence of pathogens in ticks removed from persons in Castilla y León in 2017.This will allow us to establish their infection rate with these pathogens. **Materials and methods**: a total of 1248 ticks removed from persons in the health centers of Castilla y León were morphologically identified after which they were analyzed individually by PCR for *Rickettsia*, *Anaplasma* and *Borrelia*. Ticks belonging to 5 genere: *Ixodes, Dermacentor, Rhipicephalus, Hyalomma* and *Haemaphysalis.* Positive samples were cleaned and sequenced. **Results**: Rickettsial DNA was detected in 180 (14,4%) ticks belonging to *I. ricinus, D. marginatus, D. reticulatus, R. bursa, R. turanicus, R. sanguineus, H. marginatum, H. lusitanicum* and *H. punctata*.

A total of 2 ticks (*I. ricinus* and *R. bursa*) were tested positive for *Borrelia* (0,16%) and no one was positive for *Anaplasma*. **Conclusions**: During 2017 have been studied 1248 ticks belonging to 5 genere and 9 species. The positive figures are very heterogeneous depending on the pathogen and the species of the tick. Negative for *Anaplasma*, very low for *Borrelia* (0,16%) and moderately high for *Rickettsia* (14,4%). There are large differences in the distribution of ticks both by provinces and by months of the year.

Financial support and/or acknowledgments:

Conserjería de Sanidad, Junta de Castilla y León; ISCIII:RICET RD16/0027/0018; IPI16/01784; DST16/00207

Development of a liposome formulation for topical administration of quercetin

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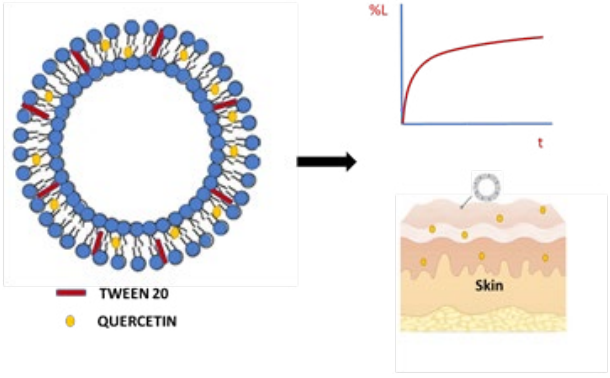
Abstract:

Quercetin is a flavonoid with excellent antioxidant and anti-inflammatory activity. It has been proposed in dermal delivery for the treatment of wounds, the prevention of aging and protection against UVA rays. However, its low aqueous solubility and inestability difficult its formulation. Hence, the objective of this work was to develop a quercetine flexible liposomal formulation, for its topical administration.

Quercetin liposomes of egg-phosphatidylcholine with two different concentrations of Tween 20 were prepared with the conventional thin film hydration method followed by sonication during 15 min at 30 ºC and extrusion through a 100 nm polycarbonate filter. The quercetin liposomes were characterized regarding drug loading, particle size and zeta potential, antioxidant properties and drug release.

The particle size of the prepared liposomes was estimated by dynamic light scattering. It decreased from 184 to 120 nm (PdI 0.3 and 0.27, respectively) when increasing the Tween 20 concentration. The encapsulation efficiency was similar for both formulations (79.9 ±1.1% and 78±0.66 %). The antioxidant properties of quercetin were maintained for liposomes as assessed by the DPPH assay. The *in vitro* release of quercetin from liposomes in pH 5.5 phosphate buffer, showed a prolonged release kinetics during 24 h with respect to the profile obtained for quercetin solution. The characteristics of the developed nanovehicles made them suitable for dermal administration of quercetin. However, further studies of drug skin permeation when incorporated to nanocarriers should be performed.



Drug activation energy as a new approach for amorphous drug formulation assessment during hot melt extrusion (HME) compounding

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Abstract:

BACKGROUND: Hot melt extrusion (HME) has demonstrated to be an adequate compounding method for poorly-soluble pharmaceutical drugs, as it increases its solubility by fixing its amorphous solid-state. In this study, we aimed at linking the melt activation energy(Ea) of celecoxib during HME compounding to its resultant amorphous solid state. The drug was compounded with crystallization inducers (surfactant-TPGS) and inhibitors (polymer-PVP) to assess the energetic competition between the polymer trying to inhibit drug/drug interaction and the surfactant facilitating drug/drug interactions and hence crystal growth.

METHODS: Celecoxib/PVP/TPGS was compounded using a HAAKE MinilabII HME compounder (co-rotating screws, 150^{o}C and 25 min^{-1}). Ten samples were compounded with varying proportions. The activation energy(Ea) was determined from temperature dependent viscosity curves of each sample. NMR, FT-IR and Raman spectroscopy was used to characterize the amorphous state of the compounded drug.

RESULTS: Ea resulted to be impacted mainly by the crystallization inducer, showing an inversely proportional relationship to the amount of TPGS present in the formulation, independent of the amount of PVP or celecoxib. Samples with the highest Ea had the lowest amount of TPGS. These samples showed much less chemical displacement when characterized with NMR. Samples with less amount of TPGS in general showed crystalline spectral behavior.

CONCLUSION: Crystallization inducer TPGS had the most significant impact in the Ea compared to PVP/celecoxib, not captured by traditional HME characterization techniques. Ea is a quantitative approach to assess during HME compounding to predict the amorphous state of the compounded drug (or lack there of), thus it should be explored more.

Financial support and/or acknowledgments

Infrastructure support was provided in part by the National Institute on Minority Health and Health Disparities RCMI Grant: 8G12MD007600.

Optimization of the alcoholic fermentation of organic solid waste, by means of temperature control and the addition of Zn as a cofactor or limiting reagent of the coenzyme alcohol dehydrogenase

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Abstract:

The present study was conducted at the Central University of Ecuador, in order to give new use and productive value to the urban organic solid waste from Quito´s Metropolitan District, thus contributing to the change of the matrix energetic and productive of Ecuador, for which the alcoholic fermentation of said residues was optimized, by means of the temperature control obtaining an optimum point of work for brewing yeasts of high fermentation at 20 °C corroborated with the increase in the kinetics of the process as in the composition of Bio-ethanol; The addition of Zn as a cofactor or limiting reagent of the coenzyme alcohol dehydrogenase was also analysed, obtaining in the same way an increase in the speed or kinetics of the process and in addition an increase to the composition of the Bio-ethanol, contributing to generate more bio-products in less time.

Effects of *in vitro* bioavalaibility on Lipase and Alpha-glucosidase inhibitory effect of broccoli sprouts

Mª Teresa LÓPEZ-CHILLÓN,[a] Javier MARHUENDA[a], Nieves BAENAS[c], Diego A. MORENO[c], Pilar ZAFRILLA[a] and Débora VILLAÑO[a]*

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Abstract:

Background & aims Broccoli sprouts (*Brassica oleracea* L. var. *italica*) (BS), are rich in glucosinolates (GLS). Sulforaphane (SFN), the hydrolysis product of the main GLS found in broccoli sprouts glucoraphanin, has been widely studied because of its biological activity and beneficial health effects. The consumption of cruciferous plants (*Brassicaceae* family) has been associated with beneficial metabolic effects. In addition to the above-mentioned bioactivities, it has been reported that broccoli sprouts also display significant anti-diabetic activity and sulforaphane contribute to improvement of inflammation of the liver or adipose tissues and insulin resistance as well as to prevention of lifestyle diseases. **Methods**: To represent the digestion as realistic as possible, any extraction from fresh broccoli sprouts was developed, simulating gastrointestinal environment. The alpha-glucosidase inhibitory activity assay used was a modification of a previously reported procedure (Chan et al., 2010). Lipase activity was determined as previously described by Moreno et al. (2003), adapted to a microscale for 96-well micro plates. Finally, *in vitro* digestion was carried out following the method described by González-Sarrías, et al. (2015). **Results**: alpha-glucosidase inhibition of broccoli sprouts before *in vitro* digestion was 7.88 % ± 0.66 and after in *vitro* digestion decreased until 3.60 % ± 1.20. Inhibition of the enzymatic activity of intestinal lipase of broccoli sprouts before *in vitro* digestion was 16% ± 0.8 and after *in vitro* digestion decreased until 10.70 % ± 2.36. **Conclusions**: Judging by *in vitro* assays, broccoli sprouts could have diabetic activity and prevent obesity.

Influence of solvents and methods of extraction in the determination of the antioxidant activity of the species "*Disterigma alaternoides (Kunth) Nied.*" Native plant of ecuador

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Abstract:

This research was developed to verify the influence of solvents and extraction methods in the antioxidant activity of the *Disterigma alaternoides (Kunth) Nied* species, the plant was subjected to a drying process and subsequently crushing to obtain the ethanol extract. Then, 50 grams of the fruit were subjected to different extraction processes using maceration, decoction and percolation methods, the solvents were (methanol-HCl 1%. 6:1) (ethanol- Citric acid 0.03% P/V in water). The total phenol activity was determined by the colorimetric method of Folin-Ciocalteu and antioxidant activity in vitro by the method of 1-picrilhydrazile 2,2 diphenyl radical (DPPH) in a concentration of 250 ug/ml of each extract. With the results of the concentration of total phenols was determined the antioxidant activity, it was of 97.73%, even greater than vitamin C 93.14%, that was used as reference standard. Finally, the obtained data were analyzed through of a statistical program Stat-graphics following a Multivariate Factorial Completely Randomized design with 2 factors and with 3 levels for each factor. Proving that the used solvents influence in the antioxidant activity of the *Disterigma alaternoides (Kunth) Nied* species, otherwise it shows that the used extraction methods haven´t significant effect on antioxidant activity.

Financial support and/or acknowledgments

Central University of Ecuador.

Knowledge management: A tool for intersectoral communication in antiretroviral treatment

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Abstract:

Introduction: In Within Knowledge Management, we have three priority aspects such as organizational culture, information technologies and intellectual capital. **Objective**: To disseminate information regarding interventions, antiretroviral treatments, results of qualitative-quantitative projects, seminars, congresses, forums, symposia, workshops, meetings, practices, interventions and experiences developed. **Materials and methods:** Participation of different representatives of governmental and non-governmental organizations, universities, hospitals, intervention groups, opinion leaders, people living with HIV (PLWHA), mutual help groups (GAM), peer counselors (PC), health professionals, students, etc. whose quantitative research results were disseminated on the platform in order to show the population and scientific community various strategies to respond to the direct or indirect HIV / AIDS epidemic, lessons learned, experiences and any activity that tends to acquire a new knowledge or enhance the one that already exists. **Results:** Thematic forums were held on the end of the HIV Epidemic and its implementation in Public Health, changing the course of the Epidemic in affected countries: leadership and responsibility, laboratory tests and antiretroviral treatment, scientific advances in the treatment of Tuberculosis and HIV, HIV integration and health services. **Conclusions:** the systematization of information allows disseminating and democratizing access to HIV knowledge; from different approaches such as health, education, social, political, economic; In addition, these results can be used by political decision-makers to propose and use intervention strategies with timely results, multidisciplinary research with a gender and intercultural approach to the population, and also complements the implementation of scientific projects that will help in the decision-making process. decisions and continuous improvement in the care of patients in health services.

Financial support and/or acknowledgments:

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National Institute of Health. Peru.
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Evaluation of glomerular filtration rate equations to best describe amikacin elimination

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Abstract:

Background: Amikacin (AMK) is a classical aminoglycoside drug mainly renally excreted, with glomerular filtration influencing its elimination and dosing in clinical practice.

Objective: To evaluate the abilities of different glomerular filtration rate (GFR) equations to describe AMK elimination.

Material and methods: Retrospective observational study (2 years) of patients hospitalized who received AMK. Variables collected: age, sex, weight, height, serum creatinine, urea, haematocrit and AMK plasma concentrations. GFR was calculated with Cockcroft-Gault (adjusted (CGA), ideal (CGI) and total (CGT) body weight), modified MDRD (MDRD-4 and MDRD-6), CKD-EPI, BIS1 and HUGE equations. The analysis was performed following a non-linear mixed effect modeling approach (NONMEM 7.3 software). Minimum objective function value (MOFV) together with goodness-of-fit plots and simulation-based diagnostics were used for model evaluation.

Results: 217 patients (61 [18-93] years) and 655 measured AMK plasma concentrations were included. One compartment model with first order elimination, interindividual variability on clearance (CL) and volume of distribution and combined residual error model was selected as a base structural model. All parameters were estimated with an adequate precision and the inter- and intra-individual variability were lower than 30%. All the GFR equations evaluated showed proper description of the data. The linear relationship between CL and CGT showed a statistically significant improvement on the fit. The best equation to describe typical clearance of AMK was: CL (L/h)= 0.816 + (3.87 x [CGT (mL/min)/101.59 (mL/min)]).

Conclusion: All the GFR equations have provided adequate fits being the CGT with linear relationship the best prognostic factor of the AMK elimination (CL).

Bacterial microbiota and its profile of antimicrobial resistance in Ecuador mineral-medicinal waters

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Abstract:

In Ecuador, the springs of mineral-medicinal waters are related to the presence of volcanoes, they have been used since remote times in an empirical way as medicines by the different ethnic groups. However, in Ecuador it is unknown what is the biodiversity and composition of the microbiota and biological properties. The objective of the present work was to study the bacterial microbiota and its profiles of resistance to antibiotics in the mineral-medicinal waters of 4 springs water located in the provinces of Imbabura, Pichincha, and Tungurahua. Water samples from both the emergency zone, as the pools used by bathers were collected. The study of heterotrophic bacteria was performed using culture plates Petrifilm™ and R2A. Identification of bacterial colonies was performed per the tests suggested by MacFaddin (2003) and Barrow and Feltham (2003), supplemented with system tests Microgen™ bacterial identification. The antibiotic susceptibility profiles were performed using the method of Kirby Bauer agar diffusion. The results indicate the presence of bacterial genera: *Acidovorax, Actinobacillus, Actinomyces, Aeromonas, Alcaligenes, Bacillus, Brevundimonas, Budvicia, Citrobacter, Edwardsiella, Escherichia, Ewingella, Flavobacterium, Kurthia, Micrococcus, Pasteurella, Proteus, Pseudomonas, Psychrobacter, Staphylococcus, Vibrio, Yersenia y Yokonella*. All isolates showed resistance to at least one antibiotic. The genus of bacteria resistant to more than one antibiotic were *Aeromonas, Alcaligenes, Brevundimonas, Kurthia, Pseudomonas y Psychrobacter*. The results obtained indicate that each spring of mineral-medicinal water studied has a scarce, diverse, and specific bacterial microbiota, with different antimicrobial resistance patterns, prevailing multiresistant strains. It is necessary to carry out bacterial characterization studies

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Application of QbD approach to the development of a cytopherometric analysis of human red blood cells: comparison with traditional development methodology

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Abstract: The objective of this work is to show the added value of QbD principles application to the development and validation of analytical methods versus the traditional ICH Q2 (R1) guideline alone.

Data from original development of a method for electrophoretic mobility determination in red blood cells (1991) have been reprocessed according to QbD principles in 4 sequential steps:

1) **Method development**: Analytical Target Profile (ATP), Critical Method Parameters (CMP) and Critical Method Attributes (CMA) anf their acceptance criteria were established.
2) **Risk assessment**: factors affecting the analytical behaviour were analyzed using a Priorization Matrix and Failure Mode and Effects Analysis (FMEA).
3) **Method robustness**: Design of Experiments (DoE) tools were used to determine Method Operable Design Region (MODR) where the CMA acceptance criteria are met, and Control Space which defines the best conditions for analytical determinations.
4) **Method ruggedness**: Measurement System Analysis (MSA) techniques were used to quantify equipment, analysts and samples contribution to total method variability.

Results obtained following QbD show an enhancement in the knowledge and control of the cytopherometric method originally developed in 1991, giving more flexibility on CMP management and appropriate tools to control the principal sources of analytical variability.

X Factors	ORIGINAL	FOLLOWING QbD	
	Working conditions	MODR (Design SPace)	Control Space
Suspension media pH	5.65	5.00 - 5.75	5.65
Media ionic strength	0.1 M	0.1 – 0.2	0.1 M
Electrophoretic chamber temperature	25 – 30ºC	25 – 31ºC	25ºC
Electrical current intensity	10 mA	10 – 15 mA	10 mA
Sample storage temperature	4ºC	N/A	4ºC
Red blood cells (RBC) washing	No	N/A	No
Use of fresh RBC	Yes	N/A	Yes

Acknowledgments: to Inkemia IUCT group for technical support on data processing.

Newly synthetized xanthonic derivatives as P-glycoprotein Modulators – *in silico* and *in vitro* studies

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P-glycoprotein (P-gp) is an ATP-dependent efflux pump that, apart from its involvement in the development of multidrug resistance of neoplastic cells to cancer therapy, was also found to be constitutively expressed in normal human epithelial tissues. Given its broad substrate specificity, its cellular polarized expression in many excretory and barrier tissues, and its great efflux capacity, it plays an important role in the protection of susceptible organs, by significantly reducing the absorption and distribution of harmful xenobiotics, decreasing their intracellular accumulation and, consequently, their toxicity.

The present study is a follow-up study of hit optimization and aimed to investigate six newly synthetized xanthonic derivatives, a group known to interact with P-gp, as potential P-gp modulators (inhibitors and inducers/activators of drug efflux). *In silico*, using a P-gp model the structure-based virtual screening of a library of new xanthones, in search for new potential P-gp modulators was accomplished. Docking simulations between the validated P-gp model and the tested compounds were undertaken, and these compounds were also mapped onto previously described P-gp induction and activation pharmacophores. The compounds able to interact with P-gp were tested for their cytotoxicity and for their capacity to modify the toxicity of harmful P-gp substrates, like paraquat (PQ), in Caco-2 cells.

The newly synthetized xanthonic derivatives demonstrated to interact with P-gp, both *in silico* and *in vitro*. Noteworthy, the compounds that increased P-gp expression/activity significantly reduced PQ-mediated cytotoxicity, demonstrating to be a promising new source of antidotes against the cytotoxicity of P-gp substrates, such as PQ.

Usage of antimicrobial agents in a low/middle income country; a pilot study at the Kejetia Market in the Ashanti Region of Ghana

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Abstract:

Background: Irrational use of antimicrobial agents is a potential driver of antimicrobial resistance (AMR) facing all low and middle income countries. Ghana Government has recently launched its first national policy and action plan to combat AMR. Despite some research on AMR in Ghana, very little information exists on usage of antimicrobials for self-medication by the indigenous populations of market place communities in Ghana.

Method: A pilot study was thus carried out at Kejetia Market in the Ashanti Region of Ghana, to determine the knowledge surrounding use of antimicrobials and AMR by the indigenous population over a two day period. A questionnaire was developed with various sections on demographic details of the respondents, antimicrobial sourcing and usage, and disposal of unused antimicrobials.

Results: Participants sourced their often incomplete courses of antimicrobials from local pharmacies and Over The Counter Medicine Sellers outlets (OTCMS). Over 72% confirmed to taking antimicrobials during the last 12 months. Over 38% had self-medicated using amoxicillin, 33% using metronidazole and over 30% had used tetracycline, penicillin, cloxacillin or doxycycline. The most common conditions for self-medication were gastrointestinal and urogenital conditions. Unused antimicrobials were used for future conditions/illness for self, family and friends. Some participants also preferred to use herbal or traditional remedies in combination with the antimicrobials.

Conclusions: This study highlights use of antimicrobials for conditions about which the participants have little or no knowledge, and which can easily be sourced as incomplete courses. Participants are unaware of potential additional complications with combined use traditional remedies and antimicrobials.

Financial support

This research was supported by the Harry Kroto Research Fellowship awarded to Geeta Hitch by University of Sussex.

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We would also like to thank the team of assistants from Departments of Pharmacy Practice, Clinical Microbiology, School of Public Health, Pharmacology, of the College of Health Sciences , Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Acute Kidney injury-to-Chronic Kidney Disease: a novel animal model

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Abstract:

Acute Kidney injury (AKI) represents a clinical problem due to its increasing prevalence and associations with further morbidities. Different studies demonstrate that patients that suffer AKI have a higher risk of developing CKD in relation to the severity and frequency of their episodes. The mechanisms of AKI to CKD transition remain unclear so animal models are of upmost importance. We hypothesised that three renal insults would be able to achieve this transition.

Male Wistar rats were subjected to 3 renal interventions. To induce AKI, animals were treated intraperitoneally with 5 mg/kg of Cisplatin (CDDP5), while control groups received saline solution. When renal function had recovered (D8), a 60-minute unilateral ischemia-reperfusion (I/R60) was performed on the left kidney. Sham rats were subjected to a simulated surgery. Two weeks later, rats were administered with 3 mg/kg of Cisplatin (CDDP3) intraperitoneally, while controls received saline. Blood and urine were collected at: D0 (basal); D4 (AKI development); D8 (normalized renal function after AKI); D9 (1 day after ischemia); D15 and every week thereafter. Renal function was analysed by plasma creatinine, glomerular filtration rate, blood urea and proteinuria using colorimetric methods. At D56 all animals were sacrificed, and kidney samples were stained with Trichrome of Masson (TM) to analyse the degree of fibrosis.

Our data show that after AKI, renal function in the triple injury group (CDDP5-I/R60-CDDP3) was recovered and significant differences were not observed when compared to the other groups. TM staining revealed significant fibrosis in both kidneys only in the triple injury group.

Financial support and/or acknowledgments

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Development of ivermectin and ivermectin tablets monograph for the International Pharmacopoeia

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Abstract:

During the process of developing a monograph for the International Pharmacopoeia (IntPh), a transparent process and a broad public consultation must be warranted so that the texts that are approved are made public accurately.

After each meeting of the WHO-Expert Committee on Pharmaceutical Preparations and subject to the availability of resources, the Secretariat of the Committee seeks to publish monographs that have been adopted for inclusion in the IntPh.

The monographs that appear in the IntPh are an important element of the quality of medicines (including safety and efficacy) that appear on the WHO List of Essential Medicines.

Ivermectin, a semi-synthetic macrolide agent is used in public health campaigns, and the quality of the medicines distributed depends on the existence in the Pharmacopoeia of validated methods and appropriate quality standards. The WHO-Expert Committee on Specifications for Pharmaceutical Preparations considers a priority to include in the IntPh active pharmaceutical ingredients and finished pharmaceutical products for high prevalence tropical diseases in low income populations such as helminthiasis, human filariasis, onchocerciasis, etc.

Based on the scientific literature search and related standards that appears in other pharmacopoeias, methods of analysis and quality specifications have been proposed that must be checked / verified or experimentally modified to present the laboratory reports for consideration by the Committee of Experts for possible approval and inclusion in the International Pharmacopoeia. The work seeks to demonstrate that the proposed methods are suitable for acceptance of inclusion in the International Pharmacopoeia as monographs. Therefore, the results of these 2 new-monographs are presented herein.

Financial support and/or acknowledgments

This work is partially supported by World Health Organization funds. Standards and API were donated by manufacturer. Practical work was developed at University of Panama (School of Pharmacy), in collaboration with Absorption Systems, Medipan and, Instituto Especializado de Análisis, Panamá.

"In vitro" evaluation of the anti-helminthic potential of extracts from five Colombian plant

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Abstract:

Strongyloidiasis is caused by nematodes of the genus *Strongyloides* widely distributed in tropical and subtropical areas. There are about 52 species in the genus, but only *S. stercoralis* and *S. fuelleborni* infect humans. It is estimated up to 100 million people are infected worldwide. Currently, ivermectin is the best therapeutic option for the treatment of strongyloidiasis. Due to the need of new antiparasitic agents, the objective of this work was the evaluation of the anthelmintic activity of several plants with ethnobotanical backgrounds, that were identified in the UTMC herbarium of Magdalena University, in Colombia. Alcoholic extracts were obtained from leaves of specimens of *Piper peltatum*, *Baccharis inamoena*, *Neurolaena lobata*, *Clibadium arboreum* and *Castanedia santamartensis* by maceration and concentration by rotaevaporation at reduced presure. The *"in vitro"* activity was evaluated on third stage larvae (L3) of *S. venezuelensis* through direct count by optical microscopy, and by the colorimetric technique based on the metabolic reduction of 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT), standardized in the laboratory of Center for Research on Tropical Diseases of the University of Salamanca (CIETUS). The assays were performed in triplicate incubated at 28 °C, using ivermectin as reference drug. Inhibitory Concentration 50 (IC50) was calculated for each of the extracts by the method of least squares. After 72 hours of incubation, the following IC50 values of: 23.9; 62.5; 134.8; 144.3 and > 200 µg/mL were obtained for the extracts of *C. arboreum*, *N. lobata; B. inamoena*, *P. peltatum* and *C. santamartensis* respectively.

Acknowledgments

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Covariate sex affects sunitinib plasma pharmacokinetics and its drug-drug interaction with ibuprofen

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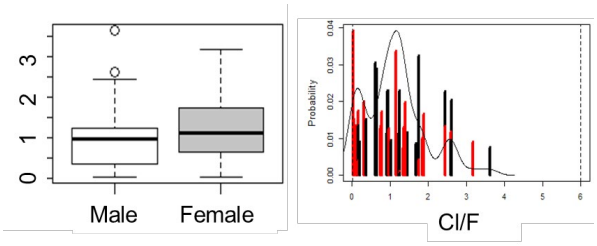
Abstract:

Background: Sunitinib is an antitumor, antiangiogenic, tyrosine kinase inhibitor authorized to treat advanced renal cell carcinoma (RCC), metastatic RCC (mRCC), pancreatic neuroendocrine tumors (PNET) and scenarios of imatinib intolerance in gastrointestinal stromal tumors (GIST). Preclinical studies suggest sex-divergent pharmacokinetics and drug-drug interactions with drugs for palliative care of pain and inflammation in cancer treatment. Methods: Male and female mice (Blab/c) were administered a single sunitinib dose (60 mg/kg, controls, n=40 each group) or ibuprofen (30 mg/kg, 30 min earlier) followed with sunitinib (male and female study groups, n=40 each). Sunitinib plasma concentration data were analyzed using a bayesian, non-parametric approach with the NPAG engine, Pmetrics® to validate possible sex-divergent plasma disposition and drug interactions after a preliminary non-compartmental analysis (NCA). Results: Non-stratified data showed greater Cl/F ($p<0.040$) in female mice and ibuprofen coadministration increased V/F ($p<0,002$). Comparison between male and female control groups showed no differences; ibuprofen coadministration to male mice decreased Cl/F ($p<0.025$) and Ka ($p<0.025$) *versus* control male group; but no differences were found in female mice in Cl/F ($p<0.091$) and Ka ($p<0.117$). When coadministration groups were compared, Ka increased in female mice ($p<0.045$). Discussion: The results partially agree with those found after NCA. The fact that male mice present lower Cl/F and Ka after ibuprofen coadministration may have translational clinical relevance: male and female patients taking sunitinib and ibuprofen may show different outcomes and toxicity. Evaluation of gender differences regarding sunitinib pharmacokinetics may improve their personalized targeted treatment.

Graphical abstract



Effect of covariate sex on Cl/F (L/h/Kg) (left) with distribution of individual values probabilities (right). Black = male, Red = female. p<0.040.

New tool to predict the progression of end stage renal disease

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Abstract:

One of the most important clinical questions in the field of nephrology is the lack of diagnostic tools for monitoring the evolution of chronic kidney disease (CKD) in patients in advanced stages, in order to determine the initiation of dialysis. As recently described by Palant et al. (Am J Physiol Renal Physiol 311: F305-F309, 2016), patients with CKD may have nonlinear serum creatinine concentration (SC) trajectories, and they propose a method to calculate SC variability, based on non-linear trajectories of SC (SCNL=SC nonlinearity), finding a strong correlation between SCNL and rate of CDK progression. We analyse the predictive capacity of SCNL to predict the progression to end stage renal disease (ESRD) and dialysis in patients with CKD. We revised medical records of 267 patients with CKD in stages IV or V, classified as rapid progressors to ESRD if their GFR is decreased more than 5ml/min/1.73m2/year, to extract SC measurement and glomerular filtration rate (GFR) estimated by CDK-EPI during 2015-2017. We calculated SCNL, SC slope, and GFR slope as described by Palant et al (2016).

SCNL was significantly higher in patients classified as rapid progressors than in slow progressors and showed a positive correlation with SC slope. After excluding patients with a negative slope for SC, the correlation between SCNL and progression to ESRD was even stronger.

Summarizing, SCNL is a good predictor of rapid progression to ESRD and could be clinically relevant when deciding the right moment to initiate dialysis treatment.

Financial support and/or acknowledgments

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Analysis of the phenolic compounds of different pepper varieties. Effect of cooking

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Abstract:

Background and objective

The objective was analyze the concentration of flavonols of different pepper varieties of different sizes and colors, (red, green and yellow and large and small size), and observe the effect of different cooking techniques (boiled, grilled, steam and microwave).

Materials and methods

The determination of the compounds was carried out by high performance liquid chromatography (HPLC) at 360 nm. Before HPLC analysis, samples were filtered through a 0.45 m filter (type Millex HV13, Millipore Corp, Bedford, MA).

Results

The contents in total phenolic compounds of the samples of small fresh pepper have values significantly higher than the large ones, except the yellow peppers, which do not show significant differences. The concentration of total phenolic compounds is higher in small red peppers and larger green peppers have a higher amount of phenolic compounds.

The phenolic compounds that present higher values in fresh pepper samples are the quercetin derivatives: quercetin glucoside and quercetin rhamnoside, except in the case of mini green peppers that, on the contrary, have higher values of luteonin.

The samples of red peppers have values of phenolic compounds significantly higher than green peppers because the concentration of bioactive compounds with antioxidant capacity increases with the degree of fruit ripening.

Conclusions

Higher losses are observed in the peppers cooked on the grill, followed by boiling in aqueous medium, steam and finally the microwave. These results are justified by the temperatures reached and / or the degree of leaching produced by the contact with the cooking water.

Strain-dependent changes in the Hypothalamic-Pituitary-Adrenocortical axis after naloxone-induced conditioned place aversion in mice

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Abstract:

The intense associative memories that develop between drug-paired contextual cues and the drug withdrawal associated aversive feeling have been suggested to contribute to the high rate of relapse. Our study was aimed to elucidate the implication of hypothalamic-pituitary-adrenocortical (HPA) axis activity in the expression and extinction of aversive memory in two inbred mouse strains, Swiss and C57BL/6(B6) mice. The animals were rendered dependent on morphine by i.p. injection of increasing doses of morphine (10-60 mg/kg). Negative state associated with naloxone (1 mg/kg s.c.)-precipitated morphine withdrawal was examined by using conditioned place aversion (CPA) paradigm. Our results showed an increase statistically significant in corticosterone plasma levels after CPA-expression in morphine-treated Swiss mice versus the saline+naloxone group or B6 mice treated with morphine+naloxone. However, no changes in corticosterone plasma levels were observed after CPA expression in B6 mice. Extinct morphine-withdrawn Swiss mice showed a significant decrease in corticosterone plasma levels versus the same strain treated with saline and B6 mice treated with morphine. There were no changes in the corticosterone levels in B6 mice after naloxone withdrawal. The differences observed between Swiss and B6 mice suggest that, since stress has a prominent role in cue-associated memories, the treatment of addictive disorders should take into account an individual predisposition to associate the aversive learning with the context.

Financial support and/or acknowledgments

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Cytotoxic activity of (E)-methyl 2-(7-chloroquinolin-4-ylthio)-3-(4-hydroxyphenyl) acrylate

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Abstract:

In this research, the synthesis of new compounds using the experimental approach of molecular variation and evaluation suggested a possible, antineoplastic activity. Synthesizing a series of benzoates describes substituted (E)-methyl 2-(7-chloroquinolin-4-ylthio)-3-(4-hydroxyphenyl) acrylate (2–15), based on a method of synthesizing three linear steps, where the key step involved the reaction of modified Steglich esterification, hydrochloride using 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDCI) as the activating agent. Molecules were evaluated for their cytotoxic activity against two human cancer cell lines (Jurkat E6.1 and HL60) and primary culture of human lymphocytes. Most of the synthesized compounds, except for analogs 2–6, 8, and 10–12, displayed cytotoxicity against cancer cell lines without affecting normal cells. The potency of the compounds was 15>> 1, and 14 > 7, 9, and 13. Flow cytometry analysis demonstrated an increase in apoptotic cell death after 24 h. The compounds may affect tumor cell autophagy and consequently increase cell apoptosis.

Phytochemical Screening and Antioxidant Activity of Green Tea (*Camellia sinensis*) Infusions Commercialized in Portugal

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Natural antioxidant products, like green tea (*Camellia sinensis*) have gained popularity worldwide and new products claiming antioxidant activity are frequent in the dietary supplement industry. However, information regarding the antioxidant properties of these products, in the labels, is usually scarce. In addition, the antioxidant properties of commercial teas were not investigated in detail. Therefore, the present study aims to investigate the phytochemical and antioxidant activity of *C. sinensis* infusions. For that purpose, six samples (A-F) from different commercial brands available in the Portuguese market were tested for *in vitro* antioxidant activity by free radical scavenging activity assay using 2,2-diphenyl-l-picrylhydrazyl (DPPH) and metal iron chelating capacity. The screening was performed for phenolic compounds, polyphenols, flavonoids, tannins, diterpenes, triterpenes, alkaloids, saponins and cardiotonic heterosides. The phytochemical screening showed positive results for phenolic compounds, polyphenols, flavonoids and diterpenes in all the samples, whereas triterpenes, alkaloids, and saponins were absent. In the DPPH assay, IC50 values range from 12.0-556.6 µg/ml, in all the infusions tested. The sample F (bags with green tea, turmeric, ginger and lemon verbena) showed the lower IC50 value (12.0±1.5). This is probably related with the synergic effect of the plants and the different bioactive compounds present, with antioxidant activity. For the Fe^{2+} chelating activity, only the sample B (dry leaves of green tea) showed an IC50 value of 58.0±17.1. The different brands and mixture of plants included in the samples may influence chemical composition in green tea infusions and therefore their antioxidant capacity.

Hepatocyte-like cells maintain metabolic competence after bioenergetic adaptation

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Abstract:

The liver plays a key role in xenobiotic biotransformation and metabolic homeostasis. Great advances have been made in the generation of hepatocyte alternative models. However, in most hepatic *in vitro* systems, cells are maintained under non-physiologic conditions. This work focused on the evaluation of human neonatal mesenchymal stem cells-derived hepatocyte-like cells (HLCs) response to insulin, glucagon and fasting in key pathways of energy metabolism, unravelling their potential as an *in vitro* competent model. As such, upon hepatic differentiation HLCs were maintained in differentiation medium or adapted to maintenance medium (MM), containing lower concentrations of dexamethasone (100 nM) and insulin (1 nM). We were able to adapt and maintain functional HLCs in MM up to two weeks in culture. Phase I and II metabolism, glycogen storage and the presence of the hepatic transporters, OATP-C and MRP2 and the hepatic markers CK-18, ALB, HNF-4α was observed throughout this period. Most importantly, in response to insulin, glucagon and fasting, HLCs expressed genes regarding glycolysis and lipogenesis (*Pdk4*), gluconeogenesis (*Pepck* and *G6pase*), fatty acid oxidation (*Ppara*), bile acid metabolism (*Fxr* and *Cyp7a1*) and mitochondrial function and biogenesis (*Pgc-1a*) with similar trends to that observed in a physiologic context. Overall, we obtained functional and metabolic responsive HLCs of human origin that maintained its characteristics up to two weeks in culture. Additionally, cells were capable of adapting their metabolism to insulin, glucagon and fasting, setting up the roads for developing *in vitro* liver models as valuable tools for disease modelling, drug discovery and toxicology studies.

Financial support and/or acknowledgments

This work was supported by FCT (TUBITAK/003/2014, UID/DTP/04138/2013, PD/BD/114280/2016 to S.P.C. and IF/00846/2015 to J.P.M.).

Antiamoebic activity of *Argemone mexicana* against trophozoites of *Entamoeba histolytica*

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Abstract:

Infections caused by parasites in humans represent one of the main public health concerns. Amoebiasis, a parasitic infection caused by *Entamoeba histolytica* (*E. histolytica*), is considered endemic in Mexico, where *Argemone mexicana* (*A. mexicana*) has been used in traditional medicine to treat intestinal parasitic diseases. The objective of this work was to evaluate the potential biological activity of *A. mexicana* on *E. histolytica*. For this purpose, a methanolic extract was prepared from *A. mexicana* leaves, and a differential fractionation was carried out with solvents of different polarities. The inhibitory capacities of the extract and its fractions were evaluated in vitro using HM1-IMSS, a strain of *Entamoeba histolytica*. *A. mexicana* extract was found to have a growth-inhibiting activity for *E. histolytica*, showing an IC50 = 78.39 µg/mL. The extract was characterized phytochemically and the methanolic extract fractions were analyzed by liquid chromatography (HPLC) and mass spectrometry (MS). Berberine and jatrorrhizine were present in the active fractions, and these compounds may be responsible for the antiparasitic activity. The identification of amoebicidal activity of *A. mexicana* on *E. histolytica* gives support to the traditional use. Further studies with berberine and jatrorrhizine will be carried out to understand the mechanism involved.

Financial support and/or acknowledgments

We thank the financial support of the National Council of Science and Technology (CONACYT) through project CB176853 and the subsidy received for Joel H. Elizondo Luevano. Registration No. 418935. Authors thank M.C. Sergio García and Dr. Roberto Mercado for their invaluable technical assistance.

Preparation, characterization and cell culture evaluation of docetaxel-loaded liposomes functionalized with cetuximab

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Abstract:

Drug nanocarriers, including liposomes, are advantageous, having better drug efficacy with fewer side effects. Liposomes can be targeted with antibodies against overexpressed receptors on tumor cells for selective drug delivery. Thus, in this work we developed liposomes composed of phosphatidylcholine/cholesterol/diste roylphosphatidylethanolamine-maleimide for loading of docetaxel, prepared using the thin lipid film hydration method. The liposomes were functionalized with the monoclonal antibody cetuximab through thioter linkage between thiolated antibody and maleimide-containing liposomes, for EGFR targeting. The characterization of formulations included particle size, polydispersion index and zeta potential evaluation through dynamic light scattering. The encapsulation efficiency of docetaxel was measured by the previously validated high pressure liquid chromatography method. The functionalization efficiency was measured using the bicinchoninic acid assay (BCA) and the integrity of cetuximab was assayed by SDS-PAGE electrophoresis. The uptake of 3,3′-dioctadecyloxacarbocyanine perchlorate (Dio)-containing liposomes and immunoliposomes was evaluated by confocal microscopy. The results showed that liposomes presented particle size, PdI and zeta potential corresponding to 67.47 ± 4.32 nm, 0.287 ± 0.006 and -16,6± 0.6 mV, respectively, while for immunoliposomes these values corresponded to 128,8 ± 2,35 nm, 0,279±0,002 and -7,51 ± 0,50, respectively. Docetaxel encapsulation efficiency corresponded to 99,95% and 93,5 ± 2,3%, respectively. The functionalization efficiency was 53,29% and the antibody maintained the integrity of its primary structure after the functionalization reaction. Finally, confocal microscopy showed that the immunoliposome uptake was higher compared to liposome uptake, in the EGFR positive DU 145 prostate cancer cell line. In conclusion, the docetaxel-loaded immunoliposome is promising for future *in vivo* evaluation.

Financial support and/or acknowledgments

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Anxiolytic and antidepressant-like effects of dichloromethane and butanol fractions obtained from roots of *Valeriana pilosa* Ruiz & Pav. in mice

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Abstract:

Mental disorders such as depression and anxiety affect millions of people around the world. Alternative treatments for these disorders can be obtained from natural sources. Species of the genus *Valeriana* have been used traditionally as mild sedatives and anxiolytics. These pharmacological activities are mainly attributed to iridoids, known as valepotriates, sesquiterpenes and flavonoids. In previous studies, the ethanol extract from roots of *Valeriana pilosa* displayed antidepressant and anxiolytic-like effects in mice.

In this work, dichloromethane and butanol fractions obtained from partitioning of the ethanol extract of roots of *Valeriana pilosa* were used to evaluate its antidepressant and anxiolytic-like effects in ICR mice (150, 300 mg/Kg v.o.) using elevated plus maze and forced swimming tests. Clonazepam (0.3 mg/kg; v.o) and imipramine (35 mg/Kg; v.o) were used as reference agents.

Both fractions of *V. pilosa* showed significant effects. There was an increasing of the time spent (20% more vs control) in the open arms in the elevated plus maze test and a reduction of the immobility time similar to reference control (imipramine) in the behavioural despair test. These results may provide support for the use of *V. pilosa* as anxiolytic and antidepressant. Further studies are needed to confirm these activities and to identify the bioactive metabolites.

Acknowledgments

This study was funded in part by Sistema de Investigación de la Universidad Nacional de Colombia (SIUN) (code 40983). We would like to thank to the research Group "GIFFUN" and the Department of Pharmacy Universidad Nacional de Colombia, Faculty of Sciences. We also want to thank to the Department of Pharmacy Bioterium, Universidad Nacional de Colombia-Bogotá.

Pharmaceutical approach to search for drug target molecules of inherited hypomagnesemia

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Abstract:

The concentration of magnesium ion (Mg^{2+}) in the blood is regulated in the narrow range between 0.7 - 1.1 mmol/L. Mg^{2+} acts as a cofactor for more than 300 enzymes in the mammalian cells and has an important role in maintaining physiological functions. Chronic Mg^{2+} deficiency may cause hypertension, heart disease, stroke, diabetes, and so on. Body Mg2+ content is strictly controlled by intestinal absorption and renal reabsorption mechanisms. In the intestine, Mg^{2+} is absorbed mediated by transient receptor potential melastatin 6 (TRPM6) and cyclin M4. In the kidney, Mg^{2+} is transported through claudin-16 (CLDN16), which is expressed in the tight junction of the thick ascending limb of Henle's loop. Congenital mutations in CLDN16 have been identified in genetic diseases such as familial hypomagnesemia. The patients show not only hypomagnesemia but also hypercalciuria, urinary calculus, and kidney calcification, resulting in renal dysfunction. Mg^{2+} deficiency may be also involved in the chronic kidney disease. So far, we reported that the phosphoserine level of CLDN16 in hypertensive rats is lower than that in normotensive rats and urinary magnesium excretion increases in hypertensive rats. Dephosphorylated CLDN16 is mainly distributed in the cytosol, but the regulatory mechanism has not been clarified. In the present study, we searched for binding protein that regulates the distribution of CLDN16 and found that E3 ubiquitin ligase PDZ domain-containing RING finger protein 3 (PDZRN3) could bind to CLDN16. An inhibitor of PDZRN3 may be a novel drug for the treatment of hypomagnesemia and hypertensive nephropathy.

Financial support and/or acknowledgments

This work was supported in part by JSPS KAKENHI Grant Number 15H04657 (A.I.), and the grants from the Salt Science Research Foundation (1627).

Acetylation of starch extracted from rejected fruits of *musa x paradisiaca l.* To obtain a pharmaceutical disintegrant

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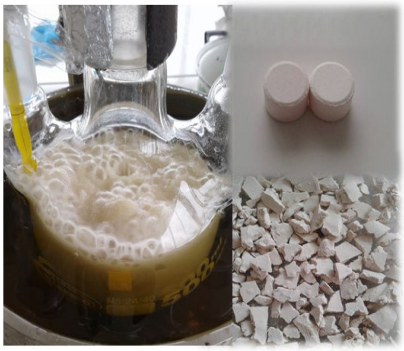
Abstract:

There are several alternative sources for obtaining native starch as a pharmaceutical excipient; one of them is banana fruits (*Musa x paradisiaca L.*) rejected during selection process, which are not properly used. Native starch has disadvantages as pharmaceutical excipient, specifically in its disintegrating properties. This work describes the extraction and modification of banana starch for acetylation to improve its characteristics. We obtained a modified banana starch with a degree of substitution of 0,88. Swellability and water absorption rate was two times higher than native banana starch. To compare the disintegrant properties of modified banana starch versus modified (commercial) corn starch, 200 mg ibuprofen tablets were formulated with both types of starch at 5% and 10%. The best formulation was the one containing 10% of starch. The dissolution profiles of the ibuprofen tablets were similar, concluding that the modified banana starch can be used as a pharmaceutical disintegrant.

Graphical abstract



Financial support and/or acknowledgments

This research partially supported by laboratories of Chemical Sciences of the Central University. Special thanks to Liliana Naranjo for technical help with the work.

Prevalence of pharmacogenomic variants affecting the efficacy of clopidogrel therapy in the HCHS/SOL cohort

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Abstract:

Background: Dual-antiplatelet therapy (DAPT) with aspirin plus P2Y12 receptor antagonist is the standard of care following acute coronary syndrome (ACS). Although clopidogrel is the most utilized P2Y12 receptor antagonist, up to 10% of ACS patients taking it will experience recurrent MI within one year. Poor response to DAPT may be attributed to heritable variability in clopidogrel responsiveness. However, most evidence comes from white, non-Hispanics in North America/Europe. We describe the frequency of pharmacogene variants associated with variable responsiveness (*CYP2C19, B4GALT2, ABCB1, PON1, CES1*, and *P2RY12*) in the US Hispanic population.

Methods: We extracted 9 pharmacogene variants (Table 1) in 12,633 US Hispanics/Latinos from Hispanic Community Health Study/Study of Latinos (HCHS/SOL), the largest US Hispanic/Latino cohort study to date recruited from metropolitan areas. Minor allele frequencies (MAFs) of these variants were compared between Caribbean and Mainland Hispanic subpopulations within the cohort as well as to frequencies reported for continental groups from the 1000 Genomes project using z-test for independent proportions.

Results: MAFs for 7 out of 9 pharmacogene variants differed significantly between the two cohort subgroups. Prevalence of both *ABCB1c.3435* and *CYP2C19*2* were higher in the Caribbean Hispanic population ($p < 0.000$ for each). Compared to 1000 Genomes European continental group, MAFs of the *ABCB1*, *CES1*, and *PON1* pharmacogenes had a higher prevalence in the HCHS/SOL cohort, whereas variants of *B4GALT2* and some *CYP2C19* (*2 and *17) had lower prevalence.

Conclusion: Differences in prevalence of these pharmacogenes are an important part of understanding how US Hispanic populations may respond to DAPT.

Graphical Abstract:

Table 1: Extracted Pharmacogene Variants			
GENE	SNP	Synonym	Sub
ABCB1	rs1045642	c.3435	A>G
B4GALT2	rs1061781	c909	C>T
CES1	rs8192950	CES1	T>G
CYP2C19	rs12248560	CYP2C19*17	C>T
CYP2C19	rs4244285	CYP2C19*2	G>A
CYP2C19	rs4986893	CYP2C19*3	G>A
CYP2C19	rs28399504	CYP2C19*4	A>G
P2RY12	rs2046934	Haplotype 2	G>A
PON1	rs662	Q192R	T>C
Sub = amino acid substitution			

The Hispanic Community Health Study/Study of Latinos is a collaborative study supported by contracts from the National Heart, Lung, and Blood Institute (NHLBI) to the University of North Carolina (HHSN268201300001I / N01-HC-65233), University of Miami (HHSN268201300004I / N01-HC-65234), Albert Einstein College of Medicine (HHSN268201300002I / N01-HC-65235), University of Illinois at Chicago – HHSN268201300003I / N01-HC-65236 Northwestern Univ), and San Diego State University (HHSN268201300005I / N01-HC-65237). The following Institutes/Centers/Offices have contributed to the HCHS/SOL through a transfer of funds to the NHLBI: National Institute on Minority Health and Health Disparities, National Institute on Deafness and Other Communication Disorders, National Institute of Dental and Craniofacial Research, National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Neurological Disorders and Stroke, NIH Institution-Office of Dietary Supplements. This project was also partially supported by The National Institute of Health Award Numbers: HCTRECD R25MD007607 and HiREC S21MD001830 from the National Institute on Minority Health and Health Disparities.

Development of co-processed Paracetamol with Hydroxypropylmethyl cellulose (HPMC) and Maltodextrin by wet granulation process

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Abstract:

The purpose of this work is to improve some of the important physicochemical properties to an active pharmaceutical ingredient (API) as the solubility in water of Paracetamol. To improve the physicochemical properties of API, two pharmaceutical excipients, HPMC and Maltodextrin were used, which help to improve the solubility and this also help the manufacturing process of a Pharmaceutical product. Different granules were manufactured applying a design of experiments matrix where the wet granulation was used, combining Paracetamol with the excipients to obtain a uniform particle size and subsequently assess the properties of interest. The solubility was evaluated using a method (Mexican Pharmacopoeia - FEUM) based on UV / VIS, building the calibration curve only for the API in order to evaluate the granules and calculate the percentage of solubility of these. Favourable results were obtained for two of the seven manufactured granules, the granules mix F;G :25 g of Paracetamol, 1.5;1.75 g of HPMC, and 23.5 g; 23.25 of Maltodextrin has a solubility of 104.17% and 101. 48% the G demonstrating that the process by wet granulation is able to improve its solubility. This type of coprocessed granules also fulfills the function to mask the bitter taste of Paracetamol in an oral pharmaceutical form, as in the case of a syrup. The flavour was assessed by a panel with 20 people, the taste of the syrups that were made with the granules with better solubility was compared with the syrups containing only the API. It is shown that the F granules has improvements in the solubility of Paracetamol and can mask the unpleasant (bitter) taste of the active ingredient.

Financial support and/or acknowledgments

Laboratory of excipients No. 112 in the Universidad Autónoma Metropolitana Campus Xochimilco, Collaboration of Makymat S.A. of CV

Physicochemical study of a pediatric suspension of Albendazole (400 mg/10 mL)

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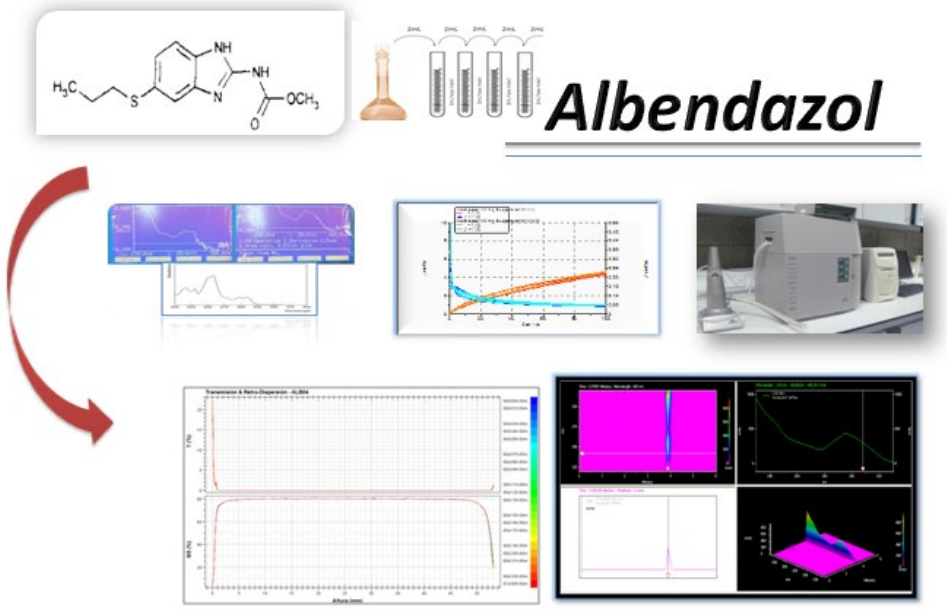
Abstract:

The design of the oral suspension of albendazole 400mg / 10mL was initiated with the analysis of the raw material of albendazole. Checking the chromatographic purity and the solubility of it, showing that it was suitable for use in the preparation of medicines.

An experimental design of the D-optimal mixture, quadratic model, was carried out with the SoftwareDesing Expert 8.0.6. The independent variables were: sodium carboxymethylcellulose (0.2-0.8%), Veegum K (0.5-1.5%), glycerin (5-20%) and water (72.3-88.3%) ; (total of mixture to vary 94.30%); and as dependent variables: sedimentation volume, pH and density. Sixteen formulations were tested, obtaining viscous suspensions. The dependent variables did not show differences that allowed establishing a mathematical model to explain the results and select the optimal formulation. However, the technological characterization made it possible to determine formulations 4, 9 and 10 as those with the best results. The physicochemical characterization was carried out by: particle size, Z potential, rheology and short-term stability.

The method of high resolution liquid chromatography (HPLC), previously validated, was used to control the quality of the preparation, which was linear, precise, specific but not exact. In addition, a microbial count analysis was developed on the raw materials and the suspension obtained, which showed that the selected formulation and the raw materials evaluated meet the microbiological requirements established for non-sterile medicines and this quality remains in the formulation during the 30 days of test.

Graphical abstract



Acknowledgments

We appreciate the support provided by the Department of Pharmacy and Pharmaceutical and Physicochemical Technology of the Faculty of Pharmacy of the University of Barcelona for the tests carried out to carry out this study.

Protective role of selenium against mercury toxicity to the Spanish tuna consumer: Health Benefit Values (HBV_{Se})

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Tuna is a rich source of selenium, an essential element that could reduce the toxicity associated with the main bioaccumulated pollutant and biomagnified by tuna, mercury. However, a Se excess could also produce adverse effects on consumer health and even synergistic effects with Hg. Considering the high tuna consumption by Spanish population, in different presentations available, the Se and Hg contents were determined by ICP-MS spectrometry. To estimate the relation of Se regarding Hg levels, the Se Health Benefit Values (HBV_{Se}) were calculated.

In fresh and processed tuna, mean concentrations were 1.24 and 1.17 ppm for Se, and 0.765 and 0.306 ppm for Hg, respectively. The results of the HBV_{Se}, agree with other previous studies, showing positive values: 14.53 and 14.65 in fresh and processed tuna, respectively. Since this criterion considers, conservatively, that all the content of Hg sequesters the same moles of Se, the positive values of this study mean that tuna contribute to improve the Se status in the consumer, and the scale of the positive values proportionately reflects the excess of selenium available to maintain the activity of the selenoenzymes.

According to Agencia Española de Consumo, Seguridad Alimentaria y Nutrición (AECOSAN) on tuna consumption in Spain, the Estimated Daily Intake (EDI) of Se, via tuna, would cover a substantial part of the Adequate Intake (AI) proposed by the EFSA. In conclusion, tuna could be considered a relevant source of Se in the Spanish diet and the positive HBV_{Se} showed a protective surplus of Se against Hg toxicity.

Prevention of contrast-induced nephropathy with quercetin. Evaluation of the associated risk factors

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Abstract:

Previous studies conducted in our laboratory showed that quercetin improved renal function in patients undergoing cardiac catheterization, who received iodinated contrast media. Specifically, it was observed lower incidence of contrast-induced nephropathy (CIN) in patients who were given quercetin (p.o., 500 mg/three times a day, -24, 24 and 48 h of contrast administration, group CM+Q), compared to a group of patients who did not take quercetin but received contrast media (CM group). Patients of both groups showed very similar anthropometric characteristics and risk factors.

The objective of this study was to evaluate the protective capacity of quercetin against kidney damage associated with each one of the risk factors (hypertension, diabetes mellitus, dyslipidemia, smoking and volume of contrast media greater than 350 mL). For this, the calculation of the relative risk (RR) to suffer CIN with each one of these risk factors was made.

The results showed very similar values in both groups although slightly lower in the CM+Q group. In the case of the contrast media volume, the RR value observed was much lower in patients receiving quercetin (CM+Q 0.80 vs CM 1.83).

In conclusion, this data suggests that quercetin may reduce the CIN produced by the administration of high CM volume, and does not seem to protect against kidney damage associated with other risk factors. Although more studies are needed, it could be suggested that the use of quercetin would allow to manage larger volumes of CM, in diagnostic or surgical interventions, without increasing the risk of CIN.

Financial support and/or acknowledgments

Hernández-Sánchez MT is a recipient of a predoctoral fellowship from the Junta de Castilla y León (Spain) and the European Social Fund from the European Commission.

Characterization of cholesteryl oleate-loaded cationic solid lipid nanoparticles for the targeted delivery of nucleic acids

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Abstract:

Nanoparticles have received considerable attention as vectors for gene delivery. However, the clinical translation of nanoparticles is limited due to poor delivery, immunogenicity, toxicity, high processing costs, and production scaling problems. In recent years, cationic solid lipid nanoparticles (SLNs) have gained considerable attention owing to their advantages over viral and other nanoparticle delivery systems. The use of the cell membrane component cholesterol in lipoplex formulations has attracted interest for successful transfection, thus opening new avenues for the synthesis of novel carriers using cholesterol or its derivatives, which could greatly enhance the delivery and activity of nucleic acids. Here, we describe the development and characterization of a stable and scalable formulation of SLNs containing cholesteryl oleate. In addition to studying the physicochemical properties of the SLNs, the effect of cholesteryl oleate on the cytotoxicity, plasmid DNA and RNA transfection efficiency, and gene inhibition capacity of the lipoplexes was also studied. We identified a formula optimized in terms of structure, morphology, and nucleic acid binding efficiency without cytotoxicity, as well as superior transfection efficiency for inducing potent biological activity.

Financial support and/or acknowledgments

This work was supported by grants from the Spanish Ministry of Economy and Competitiveness and the Andalusian Government to C.S. and to C.H.M. Support from the European Region Development Fund (ERDF [FEDER]) is also acknowledged. M.S.-P. was supported by a fellowship from the Spanish Ministry of Education (FPU Program).

Optimization of the alcoholic fermentation of organic solid waste through the maceration process

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Abstract:

The present study was conducted at Central University of Ecuador, in order to give new use and productive value to the urban organic waste from Quito Metropolitan District, thus contributing to the change of the matrix energetic and productive of Ecuador, for which the alcoholic fermentation of that solid residues wasted was optimized, by controlling the maceration in the fermentation process, obtaining an increase in the fermentation speed or kinetics of the process of 30.77% and in Regarding the generation of bio-ethanol, an increase of 58.06%, which would allow us to generate more product for different uses, either for energy purposes in biofuels or for other commercial and industrial purposes; in addition to reducing the retention times for the generation of those products.

Pluronic F127 polymeric micelles as drug carriers for controlled release

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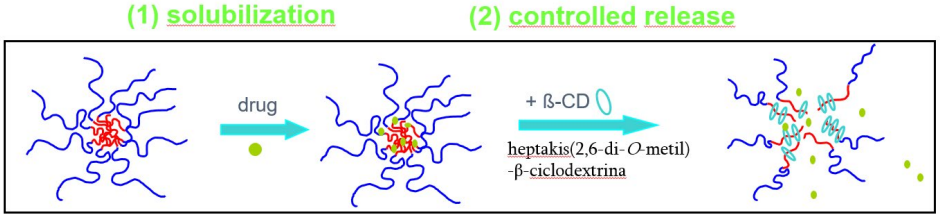
Abstract:

Polymeric micelles are very attractive candidates to help formulate poorly water soluble drugs, improving their solubility, stability, circulation time and ultimately bioavailability. Pluronics, triblock copolymers of poly(ethylene oxide)-poly(propylene oxide) poly(ethylene oxide) have been widely used for this purpose; they offer a number of advantages, amongst which, low toxicity, selectivity, commercial availability, low cost and variability of architecture. There is little rationale behind the formulations, due to a blatant shortage of structural data on the nanoscopic core-shell structures formed by the drug/polymer complexes. Determining the partitioning of the drug into the micelles and the locus of solubilisation is however paramount as it is directly related to drug loading capacity and release profile. The research aims at achieving a detailed characterisation of these key-parameters as a function of drug chemical structure and charge, using a combination of Small-angle neutron scattering and physico-chemical techniques, including spectroscopy, in order to finally provide the basis of a formulation rationale. In addition, we propose to impart responsiveness to the system by using ß-cyclodextrins to trigger and control the release of the drug, using a recognition mechanism between the central PPO block and ß-cyclodextrins. This process offers a very novel type of trigger, and also leads to a competitive complexation mechanism between the 3 species (drug, polymer, ß-cyclodextrin), which are fascinating to explore from a fundamental point of view.

Graphical abstract



Coumarin derivatives as monoamine oxidase B inhibitors with antiparkinsonian like properties

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Abstract:

Parkinson disease (PD) is the second most common neurodegenerative disorder causing progressive disability. Monoamine oxidase B (MAO-B) inhibitors are used in monotherapy or concomitantly with levodopa for treatment of PD. Some coumarin compounds have shown selective inhibition of MAO-B. In this study, monoamino oxidase inhibitory activity and the possible antiparkinsonian effects of coumarin derivates were evaluated. Two coumarin derivates (CD1 and CD2) were synthesized and monoamino oxidase inhibitory activity were evaluated in an *in vitro* assay on A and B isoforms of monoamine oxidase. Additionally, the model of 2-phenylethylamine (PEA) was used to support possible *in vivo* inhibition of MAO-B. The reserpine model was used to evaluate the reversal of the hypokinesia in mice. The results showed that both coumarin compounds presented selective inhibitory activity towards MAO-B (IC_{50} values: DC1=5.46 ± 0.36 µM and CD2 =41.63 ± 2.79 µM). Coumarin derivates presented *in vivo* inhibition of MAO-B because potentiated the stereotypies produced by PEA. Furthermore, CD1 (100 and 200 mg//kg) and CD2 (100 mg/kg) produced a significant increase in the locomotor activity of reserpinized mice compared to the control group. In conclusion, the two-coumarin derivates presented selective inhibitory activity on monoamino oxidase B and anti-parkinsonian effects in a model of PD. Therefore, they could be potential antiparkinsonian agents.

Financial support and/or acknowledgments

This work was conducted with funding from Universidad Nacional de Colombia, Bogotá (VRI/DIB, Project: 15259).

Physicochemical, mechanical and antimicrobial evaluation of an antibiotic-anesthetic film for burn wound treatment

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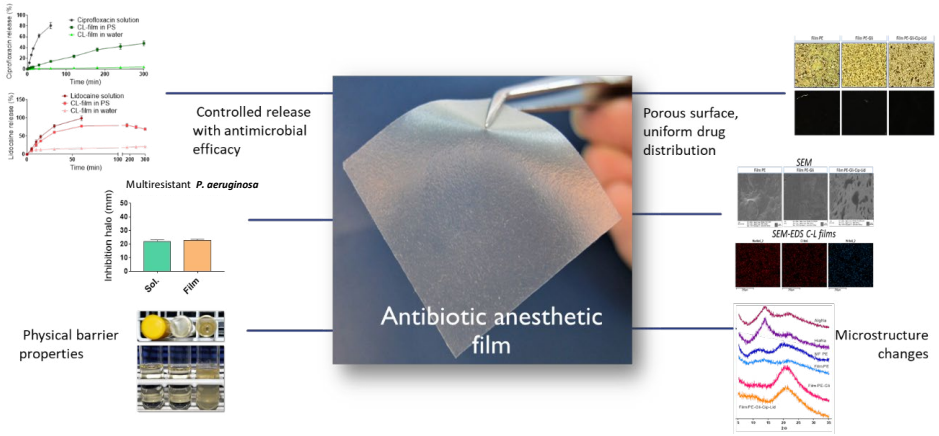
Abstract:

The goal of this work was to characterize films for the treatment of burn wounds. Films containing hyaluronan, sodium alginate, glycerin, lidocaine and ciprofloxacin (CL-films) were obtained by solvent casting method. The average thickness was 181 ± 5 µm and the swelling index was 2. Powder X-ray diffraction patterns showed changes in the microstructure of CL-films, assigned to intermolecular interactions between the components, which were confirmed by FTIR spectroscopy. Thermogravimetric analysis indicated a water content of 20 % which was unaffected by the presence of glycerin. Glycerin improved stretch-ability and smoothness of the films, showing elongation at break (59±7 %), tensile strength (23.7±0.5 mPa) and Young´s module (37±3 mPa) values that are appropriate for topical administration. The morphology and mechanical properties were examined by SEM/EDS and optical and polarized light microscopy. The CL-films exhibited a porous but homogeneous surface, with uniform drug distribution. The absence of drug birefringent crystals was confirmed. They also showed good physical barrier properties as observed in microbial penetration tests. Drug release in Franz cells towards water and saline solutions showed that the release of ciprofloxacin and lidocaine occurs thorough an ionic interchange mechanism. Ciprofloxacin release rate was slower than that of lidocaine suggesting a higher affinity constant with polyelectrolyte´s acidic groups. Antimicrobial activity was assayed by agar diffusion methods against *Staphylococcus aureus* and *Pseudomonas aeruginosa*, including ciprofloxacin-resistant strains. CL-films exhibited similar antimicrobial efficacy than ciprofloxacin solutions at the same concentration, suggesting that the modulated release does not interfere with efficacy, even against the multi-resistant strains.

Graphical abstract



Financial support and/or acknowledgments

This work was supported by Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET, PIP 2013-2015), Fondo para la Investigación Científica y Tecnológica (FonCyT, PICT 0173 and PICT 3331) and Universidad Nacional de Córdoba (SECYT-UNC).

Application of a pH transmembrane gradient to optimize the entrapment efficiency and drug loading of sildenafil citrate liposomes

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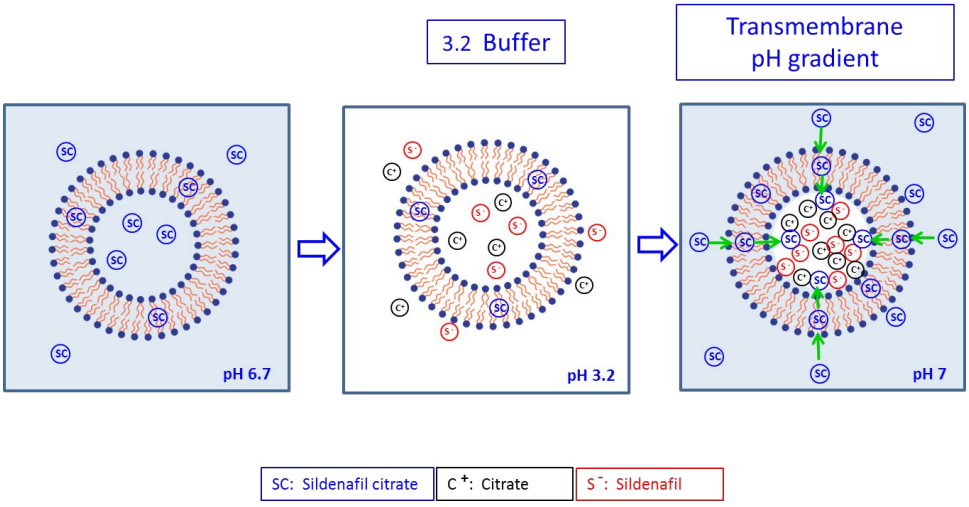
Abstract:

Sildenafil was first approved in 1998 for erectile dysfunction, but since then additional uses has found. Pulmonary hypertension is among therapeutic indications of this drug by oral or intravenous administration. In this case, pulmonary drug delivery is an efficient strategy for passive drug targeting, with the advantages of direct access to the target, together with reduction of side effects associated to systemic exposure. Liposomes have demonstrated their safety for pulmonary administration in animals and humans, but one of the greatest challenges in liposomal preparation is to achieve efficient and stable drug entrapment. Ammonium sulphate pH gradient and ionophore-mediated loading have been applied to improve drug entrapment efficiency of liposomes (EE %). In this study citrate buffering and pH gradient were applied for remote loading of sildenafil, aimed to optimize the EE %. Liposomes from egg phosphatidylcholine and cholesterol, containing or not D-alpha-tocopheryl polyethylene glycol 1000 succinate, were prepared by direct sonication of components. Ultracentrifugation at 6ºC was performed to separate the liposomes from the unentrapped drug to finally estimate the EE %. Buffering and application of a transmembrane pH gradient produced a significant change of EE % values, which increased from 17.68±4.25% for unbuffered lipid vesicles to values above 80% for pH gradient liposomes. In summary, the solvent-free procedure, the composition of liposomes and the drug loading achieved for optimized liposomes (above 40 µg/g lipid) made these lipid vesicles suitable nanocarriers for pulmonary delivery of sildenafil.

Key words

Liposomes; Sildenafil; Remote loading; Transmembrane pH gradient; Solvent-free procedures.

Graphical abstract



Implication of BDNF pathways in the Gyrus Dentate after morphine-withdrawal extinction

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Abstract:

Brain-derived neurotrophic factor (BDNF) regulates neuron synaptic plasticity and plays a vital role in learning and memory in multiple brain areas.Hippocampus is especially important for the processing of contextual information, being necessary for both fear acquisition and extinction. Therefore, we used male mice and performed conditioned place aversion (CPA) paradigmto study the role of the precursor of BDNF (proBDNF)and BDNF mature form on plasticity-related processes that occur within the dentate gyrus (DG)after the CPA extinction. The animals were rendered dependent on morphine by intraperitoneal injection of increasing doses of morphine (10-60 mg/kg). Negative state associated with naloxone (1 mg/kg s.c.)-precipitated morphine withdrawal was examined by using CPA. After CPA extinction the animals were decapitated and the extracellular-regulated kinase (ERK), CREB, proBDNF and BDNF expression were detected in DG by immunoblotting. Mice subjected to conditioned morphine withdrawal robustly expressed CPA, which was extinguished between 5-10 days after CPA expression. The CPA extinction was accompanied by significantly decreased levels of BDNF mature form and pERK expression in DG without any changes in proBDNF form or CREB expression. Altogether, these results indicate that other pathways, such as PKA or CaMK-IV, but not CREBcould be implicated in the modulation of BDNF after morphine withdrawal extinction.

Financial support and/or acknowledgments

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Pharmacognostic evaluation of *Suaeda divaricata* Moq. (Chenopodiaceae), a medicinal species of Patagonia Argentina

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Abstract:

Suaeda divaricata, "vidriera", "jume crespo", inhabits on the coast of the district San Jorge Gulf. It is described for stomach pain, insect bites, dermatitis. We show antioxidant activity and chemical results obtained from the leaves collected in the spring of 2017, in Comodoro Rivadavia (reference in the Herbario Regional Patagónico, HRP 7457). Dried and ground leaves were extracted with water by infusion or with water by decoction. The extracts were recovered by centrifugation, concentrated under reduced pressure and lyophilized. Both were analyzed to determine chemical constituent groups, and by planar and instrumental chromatographic profiles (RP-HPLC-DAD). In addition, the antioxidant capacity was quantified using the DPPH method, determining the SC50. The extraction yields were important, 48 and 50% for infusion and decoction, respectively. In both extracts, flavonoids, carbohydrates and tannins were highlighted. TLC showed chlorogenic and isochlorogenic acids, kaempferol 3-*O*-rhamnoglucoside and 7-*O*-glycoside, rutin, vitexin 2"-*O*-rhamnoside and saponarin; the decoction also showed kaempferol 3-*O*-gentiobioside. The phenolic acids and the main flavonoids were corroborated by HPLC and UV spectra. The antioxidant capacity was very important, with a SC50 of 11 and 15 µg/ml for the infusion and decoction, respectively. Flavonoids, chlorogenic acid and carbohydrates present is related, at least in part, to the antioxidant activity also demonstrated. These metabolites give it the ability to survive in a habitat characterized by water scarcity, strong winds, intense UV radiation, salinity and soil contamination by hydrocarbons. The indicated constituents are extractable with water, allowing the design of a simple, relatively economical and environmentally suitable obtaining protocol.

Financial support and/or acknowledgments

This works has financial support to research projects PICTO GSJ 36871 - ANPCYT Argentina and PI UNPSJB. MSN has a CIN scholarship and DPQ has a CONICET CIT GSJ doctoral fellowship.

The different microvesicles released in urine could provide information on the physiopathology of drug-induced acute kidney injury by cisplatin and gentamicin

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Abstract:

Exosomes are small membranous vesicles 30-150 nm in diameter released by many cell types to different biological fluids, including plasma and urine. At first, it was thought that the exosomes simply served as "garbage bags" for cells to eliminate unwanted components. But thanks to recent findings, we know that they play a relevant role in a wide variety of functions. Their composition, which consists of molecular constituents from their original cells, which includes proteins, lipids, mRNA and microRNA (miRNA), make them promising biomarkers of certain pathologies, and thus they are a potential diagnostic tool. For this reason, study these microvesicles in drug (cisplatin, gentamicin)-induced acute kidney injury (AKI). We isolated these nanoparticles, from the urine of male Wistar rats treated with both drugs at toxic doses, and one of our main conclusions is that depending on the nephrotoxic drug used the size of the microvesicles released into the urine is different from those of the control group, and thus, a potential biomarker might be other nanoparticles that have not yet been identified o defined in the literature and that could provide more information about the physipathology of AKI.

Financial support and/or acknowledgments

Instituto de Salud Carlos III: DTS/00166 and Retics REDINREN RD16/0009/0025, co-funded by FEDER

Study of the molecular evolution of neurotrophins and of the Trk receptor tyrosine kinases

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Abstract:

Neurotrophins are growth factors required for survival, differentiation, growth and maintenance of different cell populations. These growth factors elicit a broad range of functions in the central and peripheral nervous system during the embryonic development and also during the adult life. Their biological effects are mediated by the activation of their corresponding receptors, which belong to the tropomyosin-related kinase (Trk) family of receptor tyrosine kinases. An impairment in neurotrophic signalling is related to several neurodegenerative disorders, rare diseases as congenital insensitivity to pain and anhidrosis (CIPA), other inflammatory diseases and cancer. Therefore, Trk receptors and neurotrophins stand for potential targets to develop new pharmacological agents that can be used in the clinical practice. Most of the experimental work is performed in model organisms, however in many cases these models are not fully predictive of the pharmacological responses in humans. In this work we aim to analyse the molecular evolution of Trk receptors, Trk A (NTRK1) and Trk B (NTRK2), and their ligands namely the nerve growth factor (NGF) and the brain derived neurotrophic factor (BDNF). We have also determined the degree of homology among vertebrates, which is closely related to the conservation of function. We propose that the neurotrophin family is evolutionarily conserved in vertebrates, so it could be possible to select a model organism to test the effect of small molecules targeting Trk receptors.

Financial support and/or acknowledgments

This work is supported by a Grant from the Spanish Ministry of Economy and Competitiveness (MINECO AGL2015-68330-C2-2-R).

Platelet antiaggregant properties of ethyl cafeate isolated from *Solanum tuberosum* periderm

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Abstract:

Although coronary artery disease remains as the leading cause of death worldwide, antiplatelet drugs have managed to decrease their risks, especially myocardial infarct. Previous work showed that *Solanum tuberosum* periderm extract elicit antihypertensive effect in rats and antiplatelet properties in human plasm. Since ethyl cafeate is among the metabolites isolated from this specie, this study assessed the effect that this compound exerts in platelet aggregation. Cumulative concentrations (10-100 µg/mL) of ethyl cafeate were used applying Born methodology in human platelets stimulated with collagen (10 µM), arachidonic acid (150 µg/mL), epinephrine (300 µM) and adenosyn diphosphate (ADP, 10 µM). Acetylsalicylic acid (5.5 uM) was used as reference agent. Ethyl cafeate inhibits platelet aggregation of all of these agents (IC50: 0.29 – 0.30 mmol). These results shown that caffeic acid is at least one of the active principles from *S. tuberosum* with antiaggregant properties and that their mechanisms of action could be placed at intracellular level.

Financial support and/or acknowledgments

This work was conducted with funding from COLCIENCIAS (706/2014) and Universidad Nacional de Colombia, Bogotá (VRI/DIB, Projects: 28383, 37271).

Validation of a titration method to determine chondroitin sulfate loaded to solid lipid nanoparticles in an experimental factorial design

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Abstract:

Previous efforts at the Faculty of Pharmacy and Food Sciences of the University of Barcelona, have achieved to obtain cationic solid lipid nanoparticles (cSLN), with an average size of less than 200 nm, by the hot microemulsion method. It is of scientific interest to evaluate the capacity of SLN transporting chondroitin sulfate (CHON), which is a potential therapeutical agent in Osteoarthritis (OA), and studies recommend the development of topical systems with nanotechnology as a new perspective for future treatment of OA.

An experimental factorial design, to optimize the production of SLN of CHON, was employed. The variables were defined as Concentration (mg/ml), Stirring rate (rpm) and Reaction time (min). Different properties were tested, including entrapment efficiency of CHON, zeta potential and particle size. The optimal factors were attained by Minitab® program, using design of experiment (DOE) and pareto chart. A titration method was validated to test entrapment efficiency of CHON. A calibration curve was obtained from 0.10 to 1.20 mg mL–1 ($r > 0.9994$). Within-day % RSD was 0.7 and between-day % RSD was 1.11. Specificity/ selectivity experiments revealed the absence of important interference from excipients, mean recovery from spiked samples for CHON was 93.6 %.

In conclusion, the titration method is a simple, rapid and reliable method for the determination of chondroitin sulfate loaded to SLN. The DOE revealed that reaction time does not have a significant impact in the evaluated responses. However, concentration (0.4 mg/ml) and stirring rate (20 000 rpm) were determinant to maximize entrapment efficiency of CHON in SLN and to get the optimum size and zeta potential of SLN.

Financial support:

Ministry of Science, Technology and Telecommunications of Costa Rica (MICITT)

Urinary NAG and NGAL could be a useful tool in transplant complications

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Abstract:

Kidney transplantation (KT) is the best choice for patients that suffer end stage renal disease. The function follow-up of the transplanted kidney is based on plasma creatinine (very late marker of kidney damage) or on graft biopsy (invasive technique). Therefore, there is great interest in identifying new urinary markers capable of early diagnosis of post-transplant complications. For this purpose, we analysed the early urinary biomarkers NAG (N-acetyl glucosaminidase), NGAL (Neutrophil Gelatinase associated Lipocalin) and KIM-1 (Kidney Injury Molecule-1) in urine samples from 70 kidney transplant patients. The samples were taken at post-transplant days +1, +3, +5, +7, and the day of renal stabilisation. The biomarker levels were related to different complications after KT: acute rejection, acute tubular necrosis (ATN), delayed graft function, cold ischemia time, nephrotoxicity, and the renal function on the day of stabilisation.

During the first week after KT, renal function improves as measured by creatinine levels. However, evolution of urinary biomarkers NAG, NGAL and KIM-1 after KT indicate possible tubular damage or other pathology of the kidney. High values of NGAL at post-transplant day 7 predict statistically significant probability of suffering ATN. High values of NAG in the first week post-transplant predict more renal function stabilisation time. KIM-1 did not show any relationship with the events described above.

The use of the urinary biomarkers NAG and NGAL can help us to act in a preemptive way to avoid the complications of KT. This could improve the global results of renal transplantation.

Financial support and/or acknowledgments

This work was supported by Consejería de Sanidad y Bienestar Social (Junta de Castilla y León, Spain), grant number BIO/SA69/14; and by Fundación Samuel Solórzano (University of Salamanca, Spain), grant number FS/17-2015

Hernández-Sánchez MT is a recipient of a predoctoral fellowship from the Junta de Castilla y León (Spain) and the European Social Fund from the European Commission.

Medicinal plants in the community of Madrid: A survey of their consumption

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Abstract:

According to the WHO, last two decades have seen a significant increase in the consumption of mecidinal plants by the general population. Due to the increase in the variety and use of phytotherapy drug formulations, the objective of this work is to analyze the current pharmacological uses of the most commonly used medicinal plants in the Community of Madrid. To this end, a cross-sectional descriptive study on consumption of medicinal plants in the Community of Madrid has been carried out through the preparation of an ad hoc survey, which was previously validated and carried out through different paper-based and social networks (on line) with the population of the Community of Madrid. The survey was aimed at both men and women between the ages of 18 and ≥ 65.

A total of 450 surveys were conducted. The results obtained from its analysis indicate that the population of greater consumption is that of ages 18 to 45 years; being the most consumed those related to digestive problems, followed by those of sedative/relaxing action. The pharmacy is the preferred place for respondents to purchase medicinal herbal products followed by the herbalist and supermarkets. About half of the population surveyed think that medicinal plants may have side effects. Finally, data on interactions are provided.

Evaluation of embryopathoxic effects of *Lantana camara* extracts in rodents

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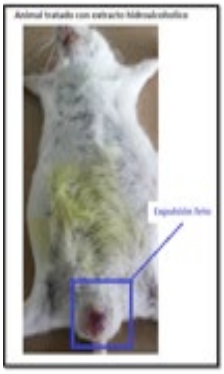
Abstract:

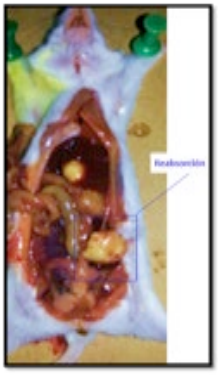
Lantana camara belongs to the Verbenaceae family, and it's a branched shrub that contains a variety of metabolites including triterpenes, sesquiterpenes, and alkaloids among others. This plant is known in Colombia and the world as a reported invasive plant with abortifacient activity. Therefore, the need to evaluate the embryo-fetal toxicity with its administration surged from the traditional usage of this plant. The presence of terpenes, flavonoids and furanonaptoquinones at hydroalcoholic 70:30 extracts was verified. Embryo-fetal toxicity associated with the administration of infusions and hydroalcoholic extracts was found. Resulting in an increased embryo-fetal toxicity in the hydro-alcoholic extract, compared to the infusions.

Graphical abstract (optional)

Reproductive organ with implants process and affections



Fetal expulsion



Fetal resorption

Financial support and/or acknowledgments

Made with personal budget in the facilities of the Pharmacy Department of the National University of Colombia.

Endotoxin Elimination from Pharmaceutical Preparations

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Abstract:

Endotoxins, also called lipopolysaccharides (LPS), are contaminants found in commercially available medicaments. The presence of small amounts of endotoxin in pharmaceutical preparations can cause pathophysiological effects in patients such as endotoxin shock, tissue injury, and even death. Due to these reactions, it is essential to remove endotoxins from drugs, injectables, and other biological and pharmaceutical products. The purpose of this article is set to give an overview of the methods used for endotoxin removal from pharmaceutical preparations.

A number of approaches are typically utilized to reduce endotoxin contamination of pharmaceutical preparations, including the use of an oxidation agent such as KMnO4. The removal can also be carried out by adsorption to special activated carbon, ion-exchange chromatography, affinity adsorbents, such as immobilized L-histidine, poly-L-lysine, poly(γ-methyl L-glutamate), and polymyxin B, gel filtration chromatography, ultrafiltration, sucrose gradient centrifugation, and Triton X-114 phase separation. Membrane-based chromatography has been successfully employed for preparative separations predominantly for proteins. In recent years, the interest in the use of two-phase aqueous micellar systems for the purification of biological molecules, such as proteins and viruses has been growing. In these systems an aqueous surfactant solution, under the appropriate solution conditions, spontaneously separates into two predominantly aqueous, yet immiscible, liquid phases, one of which having a greater concentration of micelles than the other.

Efficient and cost-effective removal of endotoxins from pharmaceutical and biotechnological preparations is challenging. Despite development of novel methods, such as the two-phase aqueous micellar systems, in recent years, more research is needed in this field.

Hepatoprotective activity of *Croton hypoleucus* ethanolic extract in thioacetamide induced-damage model in rats

Thania A. URRUTIA[1], Mirandeli BAUTISTA[1]*, Claudia VELAZQUEZ[1], Minarda DE LA O[1], Araceli CASTAÑEDA, Elena G. OLVERA and Alejandro CHEHUE

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Abstract:

Croton hypoleucus named "Palo blanco" has been identified in natural areas in Mexico. In the complementary traditional medicine, it has been used to treat several diseases as respiratory illnesses, gastric pain and inflammatory processes. In previously studies of our group it has been found that bark and leaves of hexanic extract has antimicrobial activity. In the present research the effect of aerial parts of ethanolic extract of Croton hypoleucus (Ch) were studied in a postnecrotic liver damage induced in rats by thioacetamide. **Material & Methods**: Rats, pretreated with a single dose of Croton hypoleucus ethanol extract (300 mg/kg) every 24 h for four days, were intraperitoneally injected with a single dose of TA (400 mg/Kg) at fourth day of treatment. Samples of blood were obtained at 24 h following TA intoxication and parameters related to liver damage like GPT, GOT, ALP, BILI-C, GGT and LDH were carried out in blood using well established protocols and methods. **Results**: The results showed that the pre-treatment with Ch significantly reduced liver damage. Croton hypoleucus decreased liver injury by 60, 75 and 38%, for GPT, GOT and ALP, respectively (biochemical markers of liver damage), also 73, 99 and 68% for BILI-C, GGT and LDH respectively at 24 h the peak of maximum regeneration. **Conclusion:** The data obtained indicate that the aerial parts ethanolic extract of *Croton hypoleucus* has hepatoprotective activity. However, compounds related with the hepatoprotective effect needs to be identified.

Financial support and/or acknowledgments

Thanks to CONACYT for giving studentship to Thania A. Urrutia for PhD studies.

Nootropic effect of Ecuadorian linseed oil and powder (*Linum usitatissimum*) on Mus Musculus mice

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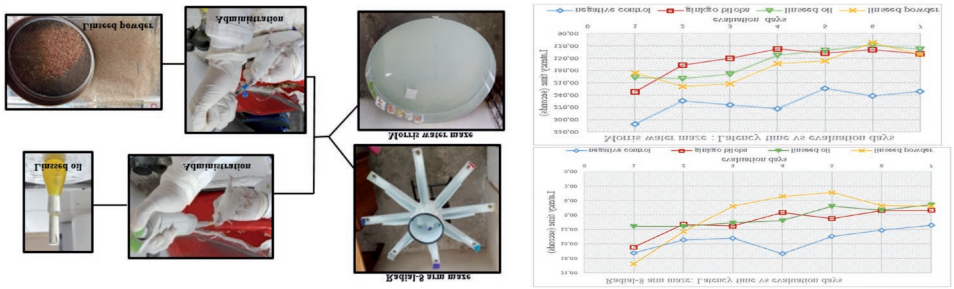
Abstract:

The attention and memory process are main elements for learning, this are very fluid in childhood and youth, but as the years pass decreases, producing different diseases, including neurodegenerative diseases. Based on this, the present investigation was developed with the purpose of determining if the linseed powder and oil cultivated in Ecuador (*Linum usitatissimum*), has the same nootropic effect in mice (*Mus musculus*) as the extract of ginkgo biloba that has been used as positive control. For this, four groups of six mice were used. Group 1 (negative control) distilled water, Group 2 (positive control) ginkgo biloba, Group 3: linseed oil, and Group 4: linseed powder. Subsequently, to evaluate its effect, the four groups were undergoing Morris water maze test and Radial 8-arm maze. Finally the SEDEX statistical program was used, executing a factorial analysis A x B with completely random blocks design (D.B.C.R), In Morris water maze which allows us to make inferences regarding reference memory, the following result was obtained: linseed powder proved to be more effective than linseed oil and ginkgo biloba; However, in the radial 8-arm maze, which allows making inferences about reference memory and working memory, there was no significant difference between powder, linseed oil and ginkgo biloba, in the first case. But as for working memory, there was no significant difference between powder and linseed oil, both being better than ginkgo biloba.

KEY WORDS: *Linum usitatissimum*, *Mus Musculus*, NOOTROPIC EFFECT, MORRIS WATER MAZE, RADIAL 8-ARM MAZE.

Graphical abstract:



Financial support and/or acknowledgments.

This work was finance with funds from Chemical Sciences Faculty and project Semilla phase three, Universidad Central del Ecuador.

Drugs most used in experimental animals in a Research Center

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Abstract:

In order to know which drugs are the most used in experimental animals, a computer program has been used to obtain a list of the most used products in each of the activities carried out at the Jesus Usón Minimally Invasive Surgery Center.

After analyzing the data, we can say that the most usual drugs are those used in pre-anesthesia, the maintenance and post-anesthesia. Researchers use general and local anesthetics, opioid analgesics or another type of substances such as ketamine, propofol or even diazepam or midazolam that as muscle relaxants induce anesthesia.

They are followed by anti-inflammatory and analgesic drugs that provide a good welfare to animal, in this case we would talk about paracetamol, which is also antipyretic; metacam, carprofen or even the occasional corticoid.

We also have enough antibiotics that are used to prevent and treat possible infections (amoxicillin, enrofloxacin) and finally we would have drugs commonly used in surgical procedures (heparin, atropine).

This would be in general, then we have specific drugs depending on the unit that uses it. Some example would be: in the Assisted Reproduction Unit they use many hormones; in the Endoluminal Diagnosis and Therapy they spend many radiological contrasts and also have several projects related to the cardiovascular area and use many antiarrhythmic, antiplatelet, anticoagulant, vasodilator, etc.

Finally, comment that general medications hardly change, they always use the same or very similar, but the specific areas vary depending on the activities that are being carried out in that period.

Financial support and/or acknowledgments

Jesús Usón Minimally Invasive Surgery Centre (JUMISC).

In vitro evaluation of ethambutol analogs as drug prototypes against multidrug-resistant *Mycobacterium tuberculosis*

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Abstract:

Tuberculosis (TB) is one of the oldest diseases that still constitutes a serious pandemic, with a worrying increase of cases of multidrug-resistant TB (MDR, XDR, XXDR) to the available antimicrobials and making the disease increasingly deadly and difficult. try. The objective of this study was to evaluate the antimycobacterial activity of compounds related to sphingosine and ethambutol (EMB), as well as to determine their selectivity.

The substances synthesized and evaluated are clasified into three types: 2-aminoalkanol derivatives, derived from 1-aminoalkan-2-ols and 1,2-alkanediamine derivatives. All of them were tested against the reference strain of M. tuberculosis (Mtb) H37Rv (ATCC 27294) sensitive to first-line drugs, and against the clinical isolate MDR-1576 (LACEN-PE-BR).

The minimum inhibitory concentration (MIC) was determined by the microdilution technique in culture broth. Cytotoxicity was determined against murine macrophages J774A.1 (ATCC TIB-67). All the compounds evaluated were active against both Mtb strains, with similar potency or even higher order than EMB against strain MDR-1576. Compounds derived from 2-aminoalkanols showed greater activity against the sensitive strain, with CIM varying from 1.5 to 16 µM. However, the derivatives of 1-aminoalkan-2-ols were those that showed better activity against the MDR strain, with MIC between 2 to 16 µM. With respect to cytotoxicity, the compounds showed CC50 values between 4.7 and 135 µM. The synthetic procedure of the compounds, and the structure-activity relationship of the compounds tested will be presented.

Financial support and/or acknowledgments

The authors thanks MINECO-RETOS: AGL2016-79813-C2-2-R for the support of this research.

Halogen scan study of a bisimidazoline DNA minor groove binder that targets the kinetoplast of Trypanosoma brucei

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Institution. [1] *Instituto de Química Médica – Consejo Superior de Investigaciones Científicas*
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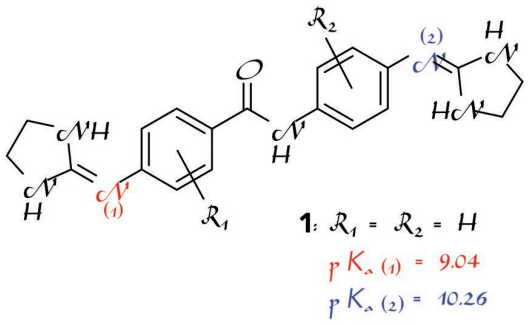
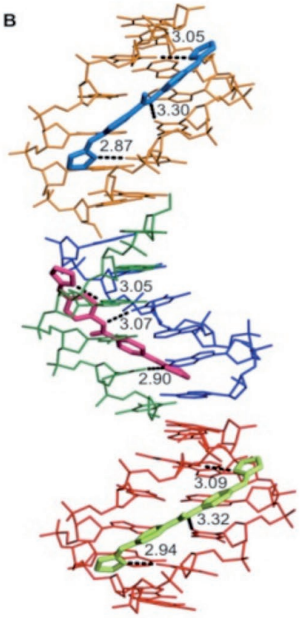
Abstract:

The parasite *Trypanosoma brucei, ethiologic agent of sleeping sickness,* contains a kinetoplast with the mitochondrial DNA (*k*DNA) comprising of >70 % AT base pairs. Hence, DNA minor groove binding molecules represent an important class of antitrypanosomal agents. Diphenyl-based bis(2-iminoimidazolidines) are promising DNA minor groove binders that are curative in mouse models of stage 1 African trypanosomiasis but devoid of activity in the late-stage disease, possibly due to poor brain penetration caused by their dicationic nature.

As a strategy to reduce the p*K*a of the basic 2-iminoimidazolidine groups, halogen atoms (R1 = Cl, F) were introduced in the structure of lead compound **1** [1]. The p*K*a of the new compounds was determined by UV-metric and pH-metric methods. A reduction of 1–2 p*K*a units for the imidazolidine group linked to the substituted phenyl ring was observed [1,2]. *In vitro* activities (EC50) against wild type and resistant strains of *T. b. brucei* were in the submicromolar range with four compounds being more active and selective than **1** (SI > 340). The chloro-substituted derivative **5a** was curative *in vivo* in a mouse model of stage 1 infection by *T. b. rhodesiense*.

To identify their cellular target inside the parasite a mechanistic study was performed. Altogether, our results show that **1** and **5a** share the same mechanism of action against *T. brucei*, acting specifically on the integrity of the kinetoplast by altering the structure and replication of kDNA [3]. The crystal structure of the complex of the d[AAATTT]2 oligonucleotide with **1** showed that the drug covers the minor groove of DNA, displaces bound water and interacts with neighbouring DNA molecules as a cross-linking agent.





Financial support and/or acknowledgments

Ministerio de Educación, Gobierno del Perú, Beca "Presidente de la República" del Programa Nacional de Becas y Crédito Educativo.

Instituto de Química Médica –Grupo de Antiparasitarios

Diagnosis of subclinical sequelae after acute kidney injury

Cristina CUESTA[1], Isabel FUENTES-CALVO[1], Omar HIDALGO THOMAS[1*], Sandra SANCHO-MARTINEZ[1], Bart STUER[1], María PANIAGUA-SANCHO[1], Carlota MALVIDO[1], Nelida ELENO[1], Ana I. MORALES[1], Francisco LOPEZ-HERNANDEZ[1] and Carlos MARTINEZ-SALGADO[1]

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Abstract:

Acute kidney injury (AKI) is a risk factor for chronic kidney disease, cardiovascular mortality and new episodes of AKI. The criteria used for the diagnosis of AKI recovery, based on serum creatinine (sCr) measurement are not accurate.We searched for new urinary biomarkers to detect the presence of AKI-induced subclinical renal damage.

AKI was induced in male wistar rats by the administration of 5 mg/kg cisplatin. Urine and blood samples and kidneys were collected at different times: basal (prior to cisplatin administration), D4 (day 4 in which AKI is developed), R0 (8-9 days after cisplatin administration, in which rats recover renal function), R1, R2, R3 and R4 (1, 2, 3 or 4 weeks after R0).

Histological analysis, performed by hematoxylin-eosin, shows structural alterations in D4. Interestingly, kidney structure is altered in R0 although sCr indicates recovery. Structural alterations are still present in R1 and R2 although in a minor degree. In R3 and R4 kidney structure shows a higher level of recovery, although there are small abnormalities.

Three biomarkers (mk-3, mk-7 and mk-14), analyzed by western blot or ELISA, appear in the urine at D4 point but also in recovery points. The urinary levels of these biomarkers decrease as the kidney recovers (from R0 to R4).

Summarizing, kidney structure is damaged after an episode of cisplatin- induced AKI although renal function seems to be recovered. Three urinary proteins (mk-3, mk-7 and mk-14) detect subclinical sequelae after AKI and may identify

patients in a non-recovery situation with an apparent normal renal function.

Financial support and/or acknowledgments

Instituto de Salud Carlos III: PI15/01055 and Retics REDINREN RD16/0009/0025, co-funded by FEDER

Natural products from *Asteriscus aquaticus*

Virgina FONSECA RIPOLL, Ángela P. HERNÁNDEZ GARCÍA, Mª Ángeles CASTRO GONZÁLEZ, Arturo SAN FELICIANO MARTÍN and Pablo A. GARCÍA GARCÍA*

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Abstract:

Asteriscus aquaticus (L.) Less. is an odoriferous herbaceous plant from Compositae family distributed through the Mediterranean area growing on calcareous soils. Its Soxhlet *n*-hexane extract was chemically studied in the early 80's by San Feliciano *et al.*[1] In that investigations, several sesquiterpenic unsaturated-g-lactones were isolated. Different bioactive properties have been reported for natural compounds possessing this structural feature.[2] We have recovered our interest for this plant with the aim to complete the phytochemical study and to make a prospection of its bioactive properties.

From powdered dry plant, five room temperature maceration extracts were obtained with increasing polarity solvents (hexane until aqueous methanol) and then an infusion with hot water. These extracts are being tested on different *in vitro* bioactivity tests: cytotoxicity against tumour cells, anti-inflammatory and antiparasitic against *Leishmania* or *Teladorsagia*. The hexane extract was dewaxed and then fractionated using acid-base extraction, vacuum liquid chromatography and flash chromatography on silica gel. The major sesquiterpene-g-lactones asteriscunolides A-D were purified for biological studies and characterization of other compounds is in progress.

[1] San Feliciano A, Barrero AF, Medarde M, Miguel del Corral JM and Aramburu A. The stereochemistry of asteriscunolides. Tetrahedron 1985, 41 (23), 5711-5717.
[2] Merford I. Perspectives on sesquiterpene lactones in inflammation and cancer. Current Drug Targets 2011, 12 (11), 1560-1573.

Graphical abstract

Financial support and/or acknowledgments

Mineco:Retos AGL2016-79813-C2-2-R (2017-2019) and Mineco CTQ2015-68175-R (2016-2018).

Age as a Factor of Differentiation in Predictive Models of Valproic Acid Pharmacokinetics

Paulo TEIXEIRA SILVA, María José OTERO LOPEZ, María José GARCÍA SÁNCHEZ* and Dolores SANTOS BUELGA

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Abstract:

Objectives: To develop and evaluate new population pharmacokinetic models (PopPK) of valproic acid (VPA) for the Spanish population.

Materials and Methods: The retrospective study was developed with data from the VPA monitoring of patients included in the University Hospital of Salamanca's TDM program. Two databases were obtained: the first with samples from the 1992 – 2013 period, used to develop the model; and the second, more recent (2013 to 2015), reserved to externally validate the developed models. For this purpose, the non-linear mixed effects models methodology was used through the NONMEM v.7.3 program.

Results and Discussion: The popPK model for VPA has allowed us to consider, according to the age, three independent models. The popPK models for the plasmatic clearance parameter (CL/F) developed for each age group presented acceptable estimation errors in all the parameters.

Age ≤5 years:

$CL/F(L/h)=0{,}236' e^{(0{,}061'(TBW-15))}$

Age between 5 and 15 years:

$CL/F(L/h)=0{,}401' e^{(0{,}655'(BSA-1{,}2))}'(1{,}40^{CBZ})$

Age ≥15 years:

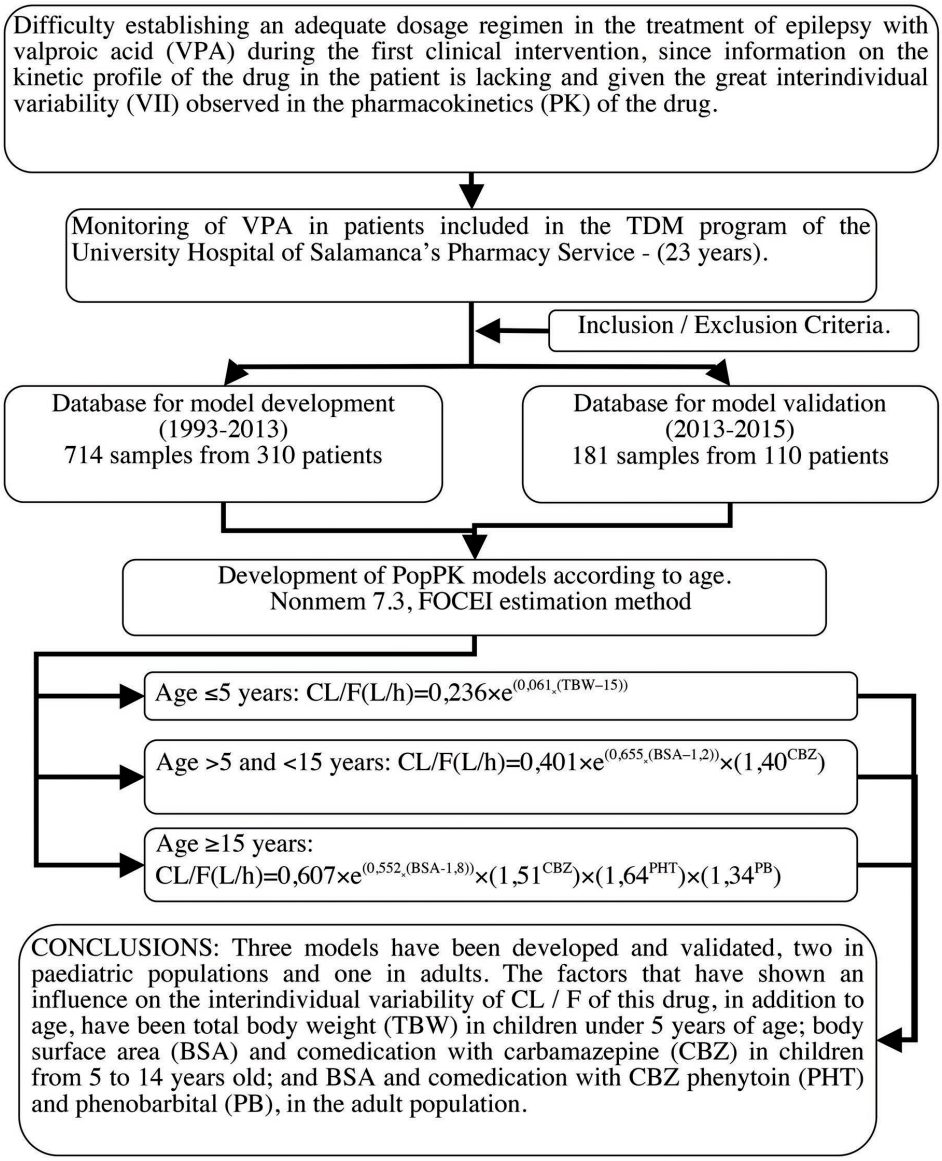
$CL/F(L/h)=0{,}607' e^{(0{,}552'(BSA-1{,}8))}'(1{,}51^{CBZ})'(1{,}64^{PHT})'(1{,}34^{PB})$

Conclusions: Three models have been developed and validated, two in pediatric populations and one in adults. The factors that have shown an influence on the interindividual variability of CL/F of this drug, in addition to age, have been total body weight (TBW) in children under 5 years of age; body surface area (BSA) and comedication with carbamazepine (CBZ) in children from 5 to 14 years old; and BSA and comedication with CBZ, phenytoin (PHT) and phenobarbital (PB) in the adult population.

Financial support and/or acknowledgments:

Thanks to the Pharmacy Service of the University Hospital of Salamanca for providing 23 years of VPA monitoring data from its TDM program.

Graphical abstract



Strong-LAMP assay as a molecular method for the diagnosis of strongyloidiasis in field conditions: a preliminary study in Puerto Iguazú, Misiones, Argentina

Pedro FERNÁNDEZ-SOTO[1*], Ernesto CANDELA[2], Carolina GOIZUETA[3], Victoria PERIAGO[3], Carla MUÑOZ-ANTOLÍ[2], Yarima CONTRERAS[1], Alba TORRES[1], Juan GARCÍA-BERNALT[1], Carmen VIEIRA LISTA[1], Belén VICENTE[1], Julio LÓPEZ-ABÁN[1] and Antonio MURO[1]

[1] *Infectious and Tropical Diseases Research Group (e-INTRO), Biomedical Research Institute of Salamanca-Research Centre for Tropical Diseases at the University of Salamanca (IBSAL-CIETUS), Faculty of Pharmacy, University of Salamanca, Salamanca, Spain*
[2] *Department of Celular Biology and Parasitology, Parasitology, University of Valencia, Valencia, Spain.*
[3] *Mundo Sano Foundation, Puerto Iguazú, Misiones, Argentina*
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Strongyloides stercoralis, the chief causative agent of human strongyloidiasis, is a nematode globally distributed but mainly endemic in tropical and subtropical regions. Chronic infection is often clinically asymptomatic but it can result in severe hyperinfection syndrome or disseminated strongyloidiasis in immunocompromised patients. Several techniques are used in diagnosing the disease, but definitive diagnosis is accomplished by parasitological examination of stool samples for morphological identification of parasite. The present study aimed to evaluate the use of our previously designed molecular LAMP assay for detection of *Strongyloides* spp. (named, Strong-LAMP) in field conditions for diagnosis of strongyloidiasis in periurban and sylvatic areas of Puerto Iguazú, Misiones, Argentina. Stool samples were collected from individuals living in the studied areas and tested for the presence of intestinal parasites by sedimentation, floating, Baermann and Kato-Katz. Additionally, urine samples were collected and tested by LAMP method as alternative to stool samples for diagnosing strongyloidiasis. In stool samples, several parasites were identified including, hookworms, *Trichuris trichiura* and *S. stercoralis*. The Strong-LAMP method showed to be more sensitive than classical parasitological methods for strongyloidiasis diagnosis using both stool and urine samples for analysis. After further validation, the Strong-LAMP assay has the potential to be used as an effective molecular large-scale screening test for strongyloidiasis-endemic areas.

Financial support: This study was supported by Mundo Sano Foundation (www.mundosano.org) and by the Institute of Health Carlos III, ISCIII, Spain (www.isciii.es) grants: RICET RD16/0027/0018, DTS16/00207, PI16/01784 European Union co-financing by FEDER (Fondo Europeo de Desarrollo Regional) "Una manera de hacer Europa".

Design, Synthesis and Biological Evaluation of Benzodiazepines Analogues as Anti-Tubuling Agents

Pilar PUEBLA*, Rafael PELÁEZ, Manuel MEDARDE, Raquel ÁLVAREZ, Myriam GONZÁLEZ and Alba VICENTE

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Abstract:

The naturally occurring combretastatin (CA-4) and its analogue phenstatin are interesting molecules in medicinal chemistry (Figure 1, I), they block the polymerization of tubulin, interacting with the colchicine binding site, and this compounds have displayed a high degree of cytotoxicity on several cancer cell lines.

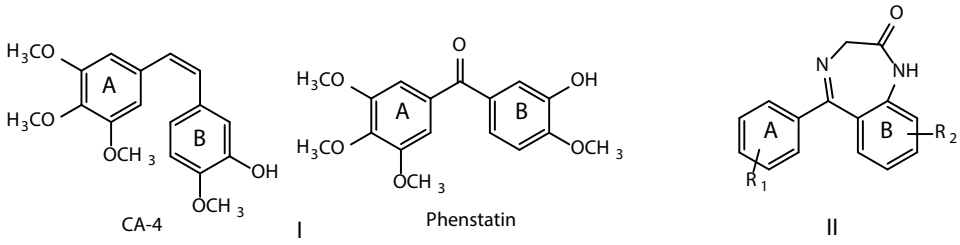

Figure 1. CA-4 and phenstatin (I). Analogue scaffold (II)

In this communication we report a novel class of compounds with a 1,4-benzodiazepine-2-one nucleus (Figure 1, I). These compounds combine structures of phenstatin with benzodiazepines, and could be a novel class of antitubulin agents, showing better pharmacokinetic profile.

We describe, the design, synthesis and biological evaluation of several analogues using as starting material 2-aminobenzophenones.

Financial support and/or acknowledgments:

This work was supported by the Consejería de Educación de la Junta de Castilla y León (SA030U16) cofunded by the EU's European Regional Development Fund - FEDER

Semifluorinated PAMAM Dendrimers liquid crystals accelerate localized transport regions formation after low frequency ultrasound treatment

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Abstract:

Dendrimeric liquid crystals (DLC) combine the properties of dendrimer scaffold and liquid crystalline state. The purpose of this work was to investigate the potential of DLC formed using PAMAM G2 dendrimers functionalized with 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-heptadecafluoroundecanoic acid (F-acid) for the formation of localized transport regions (LTRs) after low frequency ultrasound (LFU) application. PAMAM G2 and F-acid were prepared at 1:1 (primary amine: carboxylic acid groups). The resulting solution was then evaporated/vacuum dried for further incorporation in 2% hydroxyethylcellulose gel (HEC) at 50:50 (w/w) (DLC:HEC) containing or not the drug zinc phthalocyanine tetrasulfonate (ZnPcS4). Samples were analysed under polarized light microscopy to confirm liquid crystalline phase formation. Rheology studies were conducted in a Brookfield Cone/Plate Rheometer (R/S Plus PTR-I, P25) at 25°C for 60s. For LFU studies, dermatomed porcine ear skin (~700µm) was placed on Franz diffusion cells and skin resistivity to initiate the experiments was set at a minimum of 35 kΩ.cm². LFU was applied until skin resistivity of 1 kΩ.cm² was reached. The HEC gel without DLC was used as a control in all the experiments and LTRs were visualized with allura red and ZnPcS4. Pseudoplastic behaviour was revealed with apparent viscosity at 30s of 10.5±0.3/8.4±0.1 Pa.s and 19.9±0.7/16.1±1.2 Pa.s for HEC/ZnPcS4 and DLC:HEC/ZnPcS4, respectively. DLC:HEC was able to reduce more than 2-fold the time required for LFU treatment until resistivity of 1 kΩ.cm². In conclusion, the higher viscosity and liquid crystalline structure of DLC:HEC can be related to the acceleration of LTRs formation aiming its application for sonophoresis.

Financial support and/or acknowledgements

São Paulo Research Foundation (Fapesp grant #2017/05930-7 and 2014/22451-7).

Screening of newly synthetized xanthones for potential P-glycoprotein modulation at the intestinal barrier- *in vitro* and *ex vivo* studies

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ABC (*ATP-binding cassette*) transporters are a superfamily of carrier proteins that play a crucial role in cell physiology and homeostasis, promoting the efflux of substrates by using the energy resultant from ATP hydrolysis. P-glycoprotein (P-gp) is an efflux pump belonging to the ABC transporter superfamily and has an ubiquitous and constitutive distribution throughout the body, with major relevance in normal human epithelial tissues, being also involved in the development of multidrug resistance (MDR) in anticancer therapy, given their overexpression in tumor cells. Due to its wide distribution, with a polarized expression in barrier and excretory tissues, to its wide range of substrates and to its large efflux capacity, P-gp has a large impact in the pharmacokinetics of xenobiotics. This defense mechanism is particularly important at the intestinal level, significantly reducing the intestinal absorption of xenobiotics, limiting their access to the target organs, thus resulting in a decrease in their toxicity. Consequently, P-gp induction and/or activation may be a promising new therapeutic strategy in intoxication scenarios.

Therefore, the aim of the present study was to investigate the potential effect of six newly synthesized xanthonic derivatives on P-gp expression and activity, since xanthones are known to interact with P-gp through induction and/or activation mechanisms. *In vitro* studies were performed in SW480 cells and it was demonstrated their ability to significantly increase the protein expression and activity. Additionally, the most promising compound was tested for its ability to increase the protein activity *ex vivo*, using rat everted intestinal sacs and RHO123 as a P-gp fluorescent substrate. A significant increase in RHO123 efflux was observed, thus confirming the i*n vitro* results. These data highlighted a potential new source of P-p inducers and activators, disclosing new perspectives in the therapeutics of P-gp substrates-induced intoxications.

Supramolecular gels containing cyclodextrins for drug release

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Abstract:

Carvedilol (CAR) is a nonselective β-blocker commonly used in the treatment of ventricular dysfunction, angina pectoris, hypertension and congestive heart failure. Nevertheless, oral bioavailability is hindered by its hydrophobicity and its intense first pass metabolism. Thus, supramolecular self-assembled gels could be an interesting alternative for CAR transdermal delivery. The goal of this work was to design supramolecular gels with Soluplus or Solutol and alfa- and hydroxypropyl-β-cyclodextrin (α-CD, HPβ-CD). Poly(pseudo)rotaxane formation and characterization, drug solubilization, and *in vitro* release studies in vertical diffusion cells were investigated. Soluplus micelles were greater than Solutol ones (100 and 15 nm, respectively), and more efficient in solubilizing CAR. Poly(pseudo)rotaxane gels were obtained adding α-CD to Solutol and Soluplus dispersions. For Solutol, the formation of poly(pseudo)rotaxanes occurred instantly after mixing and did not significantly influence CAR solubility. Contrarily, Soluplus poly(pseudo)rotaxanes took more than 24h to be formed and CAR solubility decreased. HPβ-CD was not able to form poly(pseudo)rotaxanes with Solutol but formed soluble poly(pseudo) rotaxanes with Soluplus. Solutol (20%) + α-CD (5%) showed an inferior CAR release than Solutol 20%, while, Soluplus (20%) + α-CD (5%) released more CAR when compared to Soluplus 20%, despite its greater viscosity. These findings evidenced great versatility of the formulations, especially due drug-controlled release, which can be adjusted for CAR transdermal delivery.

Acknowledgments:

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Phytochemical research on the edible plants in the world and dissemination of the knowledge to the public

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Abstract:

Thanks to an agreement of friendship between Salamanca City and Gifu Prefecture, the University of Salamanca and Gifu Pharmaceutical University have started cooperative investigation of the medicinal plants in "Mino" where is an ancient district attributable to the current Gifu City area. It is located in the center of the main island of Japan and blessed with nature. We are easy to get access to wild herbs and fruits for preparing domestic dishes called "Mino Medicinal Cuisine (MMC)". Water pepper (*Persicaria hydropiper*) and Japanese thistle (*Cirsium yezoense*), which have been traditionally taken for the usage, are now under the phytochemical survey in our laboratories. Simultaneously, we have got some world's popular edible plants such as Pigeon pea (*Cajanus cajan*) and Banana (*Musa spp*.) for the same purpose. Through the research, we are to identify kinds of brand-new or unique natural products. Then, our collaborators are supposed to evaluate their therapeutic efficacies for endocrine and metabolic diseases, and so on. In the presentation, we would like to introduce a couple of approaches for dissemination of the latest research developments to the public. For an example, we often open several seminars for the neighboring pharmacists and citizens in the classroom and in the herbal garden as well. Also, we support Gifu City Office, which gives certificates of the MMC-license to the qualified chef/hotel, by organizing a series of specific lectures. Safety and health education adequate to the regional needs is one of our missions as specialists of medicinal plants and crude drugs.

Financial support and/or acknowledgments

All members cooperating to this presentation declare that they have no conflict of interest.

Identification of the critical variables for the development of controlled release matrix tablets: factorial design approach

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Abstract:

A current methodology for study critical variables and its influence in pharmaceutical process is Quality by Design (QbD). QbD principles set the work process under a Design Space previously defined. It establishes a risk control about the different variables intervening both materials and development processes, ensuring the final product quality, efficacy and security.

The aim of the study has been stablish the critical variables involved in the manufacturing of controlled release coated matrix tablets and carried out a factorial design in order to obtain maximum information with the minimum experimental trials. Ishikawa diagram helps to display the process and variables. Risk Analysis and Risk Evaluation were carried out following the QbD approach in order to quantify the risk, using a colour code risk classification and the calculation of a Risk Priority Number (RPN) respectively.

Variables with high risk or impact over the quality of the tablets were selected: polymer viscosity grade, ratio polymer/mucoadhesive agent, blending time, coating agent type and coating % weight gain. A fractional factorial design was settled with these 5 factors or variables, 2 levels of each factor, a central point and 3 replies. These design concluded in a total of 28 experiments. Quality by Design approach is useful to establish a set of experimental trials enough to determine the critical variables values in which the matrix tablets reach the required quality.

Determination of the levels of colinesterase and hepatic profile in farmers exposed to organophosphorus pesticides and carbamates in the la candelaria riobamba community. Ecuador

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Abstract:

A significant problem in Latin American countries is poisoning caused by pesticides. That is why the objective of this study was to determine if the use of organophosphorus and carbamate pesticides affect serum cholinesterase levels and the hepatic enzyme profile in farmers of the La Candelaria community - San Luis Parish of Riobamba, Ecuador. A population exposed to pesticides was analysed against a control group. The data was collected through a survey. The Ellman method was used to determine the cholinesterase level and the spectrophotometric level for the other enzymes. Statistical tests were applied as t-student, Sperman to find a relationship between the variables analysed. Once the analyses were carried out, it was found that 14 people (31.12%) had cholinesterase levels lower than the normal range. The level of cholinesterase in farmers was 7213.11 U / L value well below the average obtained from the control group 8246.84 U / L. It was determined that the average level of all liver profile tests performed on farmers were: ALAT 22.244 U / L; ASAT 23,698 U / L; ALKALINE PHOSPHATASE 245.04 U / L; GAMMA GT 25,733 U / L; BILIRUBIN TOTAL 0.242 mg / dL, Although significant differences were found in the average results between the groups analysed, the level of the various enzymes did not exceed the limits established, so it is concluded that the farmers do not present diseases or liver alterations and that the decrease The level of cholinesterase is due to the inhibition of the organophosphates and carbamates to which they have been exposed.

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Malnutrition influence on the development of acute kidney injury

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Abstract:

In developed countries, hospital malnutrition often goes unnoticed. Different studies have estimated the prevalence of hospital malnutrition in 30-50%. Malnutrition has a considerable influence on the development of disease and on the evolution of the patient, with social and economic consequences. Accordingly, in hospitalized patients, malnutrition may be affecting renal function, due to hemodynamic alterations leading to increased reabsorption of drugs by tubular cells and enhanced nephrotoxicity. If this proves true, preventive action at improving nutritional status will probably reduce both the incidence and the severity of the associated kidney damage, improve patient prognosis and reduce associated costs. Our aim was to study the effect of different degrees of malnutrition on the susceptibility to nephrotoxic drugs in the rat. We developed a preclinical model of nutritional deficit in different degrees of severity and treated these rats with a subtoxic dose of cisplatin to evaluate the risk of developing acute renal. An experimental acute damage kidney was observed in the groups of rats treated with subtoxic cisplatin and that also had nutritional deficit. These results were more evident in that group that presented a high percentage of nutritional deficit. In all these cases, acute renal damage is characterized by increases in creatinine and serum urea, increases in proteinuria and histological damage. In rats with a normal nutritional status and treated with or without cisplatin normal function was observed. Our results demonstrate that, in rats, the risk of developing acute renal damage increases as the nutritional status becomes more deteriorated.

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Ethnopharmacological studies in traditional markets from Bogotá D.C. (Colombia): Advances and perspectives for the search of medicinal plants with therapeutic potential

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Abstract:

In Bogotá D.C. traditional markets are the places where ethnobotanical knowledge gives rise to natural sources with therapeutic potential. In previous ethnobotanical studies the following endemic species were highlighted: *Petiveria alliacea*, *Lantana camara*, *Lippia dulcis* and *Valeriana pavonni*. Recently in agar diffusion and disc diffusion assays of antibacterial activity, the ethanolic extracts from *Lantana camara* and *Lippia dulcis* were active against strains of *Staphylococcus aureus ATCC 25923,* the extract from *L. dulcis* showed the highest inhibitory activity (MIC: 7,81mg/mL). According to scientific reports *L. camara*, *L. dulcis* and *P. alliacea* are promising for their antifungal activity, for this reason *in vitro* studies with ethanolic extracts against strains pathogens have been also raised. With regard to *V. pavonii,* in previous studies, iridoid*s* (valepotriates) were isolated from dichloromethane and petroleum ether fractions that showed anticonvulsant activity *in vivo*. Studies on molecular docking and modeling of the GABAA receptor are in progress to contribute to the mechanism of action of these metabolites. On the other hand *Petiveria alliacea* is a species widely studied for the treatment of cancer, *in vitro* studies have evaluated its cytotoxic effects in chronic myeloid leukemia and breast adenocarcinoma cell lines, however it is pertinent to perform studies that include tumor cell lines of carcinoma or adenocarcinoma of the cervix (second cause of death among women*)*. Finally, scientific reports have detected neuropharmacological and neuroprotective effects of *Petiveria alliacea* and species of the genus *Valeriana*, so these species can be a potential source for the treatment of different neurodegenerative disorders.

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Exploiting exosomes derived from spheroids of human neonatal mesenchymal stromal cells for the treatment of cutaneous wounds

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Abstract:

Novel strategies to develop alternative and effective therapies for wound healing have been explored. Mesenchymal stem cells (MSCs) gained relevance within this context due to their role in tissue regeneration via paracrine mechanisms. Our study aimed at evaluating the role of exosomes, derived from umbilical cord matrix MSCs (ucmMSCs) primed by 3D culturing, on cutaneous wound healing using *in vivo* methodologies paired with integrative proteomics. Exosomes from 3D (Exo3D) and 2D (Exo2D) ucmMSC cultures were isolated by size exclusion chromatography. Size distribution of the isolated exosomes (135.9 ± 54.0 nm and 265.0 ± 37.2 nm for CM2D- and CM3D-exosomes, respectively) point out the influence of the culture system in its morphology, however without compromising the presence of CD9 and CD81 exosomal surface markers. Moreover, proteomic analysis of the isolated exosomes revealed that 3D conditions lead to higher protein diversity than the 2D environment. The therapeutic potential of exosomes on skin regeneration was further evaluated *in vivo* in a rat wound-splinting model. Exo3D and Exo2D and both exosome-depleted culture medium (Exo-dep 3D and Exo-dep 2D) were applied via subcutaneous injection to dorsal full-thickness incisions. Macroscopic observations showed that Exo-treated wounds clearly exhibited accelerated wound closure when compared to control wounds. Accordingly, histological examination revealed that Exo3D-treated wounds showed an improvement in the healing profile, by promoting acceleration of wound closure and complete tissue regeneration with hair re-growth. Overall, the results indicate that 3D ucmMSCs-derived exosomes promoted wound healing and therefore may constitute a novel therapy for skin regeneration.

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Skeletal muscle atrophy and impaired myogenesis in spinal muscular atrophy

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Abstract:

Spinal muscular atrophy (SMA) is an inherited disease characterized by loss of spinal motor neuron and subsequent skeletal muscle atrophy. Severe muscular atrophy in SMA often leads early death. SMA is mainly caused by deletion or mutation of survival motor neuron (SMN) 1 gene and subsequent decreased SMN protein expression. We previously examined the pathological feature at spinal motor neuron in SMA and proposed neuroprotective therapeutic strategy. In addition to neuroprotection, prevention of severe skeletal muscle atrophy is one of the most important strategy for the therapy of SMA. On the other hand, the mechanism of skeletal muscle atrophy in SMA is relatively unknown. The purpose of this study was to elucidate the mechanism underling muscle atrophy in SMA and propose a new therapeutic target to prevent skeletal muscle atrophy. Here we used a severe SMA model mouse, SMNΔ7 mouse and investigated the pathological process in skeletal muscle atrophy. SMNΔ7 mouse exhibits decreased body mass and impaired skeletal muscle growth. We found decreased expression level of MyoD, myogenesis related transcription factor in skeletal muscle isolated from SMNΔ7 mouse. These results suggest myogenesis should be impaired in skeletal muscle under SMA pathology and impaired myogenesis contribute to skeletal muscle atrophy in SMA. Modulation of myogenesis in skeletal muscle may be an effective strategy for the SMA treatment.

Financial support and/or acknowledgments

The authors declare no conflicts of interest associated with this study.

Information-analytical study on methods of preparing antioxidant drugs in a liposomal delivery system form

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Abstract:

Over the past few decades innovative drugs with directional transport or targeted drug delivery systems are being researched, providing better bioavailability and biocompatibility. One of the innovative ways to achieve targeted drug delivery is the use of liposomes as carriers or localizers of active principles, controlling in that way drug distribution, metabolism and excretion. Liposome formulations have the ability to incorporate a whole set of hydrophilic and hydrophobic substances of both plant and synthetic origin and many drugs have already been encapsulated.

Reactive oxygen species formed constantly in the human body are removed by enzyme and non enzymatic antioxidant defense systems. Inadequate antioxidant defense can cause severe damage of lipids, proteins, carbohydrates and DNA, signifying the importance of effective antioxidant drugs. Antioxidant drugs in the liposomal form overcome consuetude of frequent low solubility, poor chemical stability and rapid dissolution in the gastrointestinal tract, ensuring better efficiency by synergism of action of included compounds and lipids themselves.

The literature describes various methods for the preparation of liposomal particles (convection, sonic methods, high pressure method, reverse phase evaporation method etc.) using omnifarious amphipatic molecules all of which strive for enhanced release, kinetics and diffusion of the active ingredient, better size and structure control, better encapsulation as well as simplicity and capacity of the production process itself. This work highlights the thin-film hydratation method followed by vocalization as the best procedure for preparing liposomal carriers with antioxidant activity.

In vitro study for antiplatelet activity screening and thrombolytic activity of fermented arabica coffee ethanol extract

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Abstract:

Stroke is still a serious problem which has the highest rate of mortality in Indonesia. Abnormality of platelet aggregation causing the antiplatelet drugs become the main therapy for stroke. Aspirin as the anti-platelet drug has the limitation such as gastrointestinal toxicity and aspirin resistance. Thus, an alternative strategy should be explored. Indonesia has many potentials of natural source including Arabica coffee. Fermented Arabica coffee processing with yeast tempe (Rhizopus oryzae) is supposed to have thrombolytic and antiplatelet activity**.** The fermented arabica coffee extract were tested for phytochemical screening, antiplatelet activity screening, and thrombolytic activity. Briefly, Arabica coffee beans fermented with yeast Rhizopus oryzae then macerated with 96% ethanol. The extract was dissolved using aquadest into varying concentration 2,5%;5%;7,5%, and 10%. Anti-platelet activity screening was measured by using adenosine diphosphate (ADP) as platelet aggregation inducers. Thrombolitic activity was evaluated by using blood clot assay.The fermented coffee contains 0.6825% phenol, 1,283% caffeine and pH 5.5. The lowest platelet aggregation value was recorded in 10% of the extract concentration that was 3,1% while the highest value was found at 2,5% of the concentration that was 62%. The highest thrombolytic activity value was found at 10% of the extract concentration obtained lysis value (30',60',90') 30,66±3,40; 21,83± 8,58; 13,99±3,45 while the lowest value was at 2,5% of the etract concentration with lysis value (30',60',90') 18.81±4,14; 11,93±7,24, 10,58±3,57. The fermented Arabica coffee ethanol extract has the potential as anti-platelet and thrombolytic activity ($p<0,05$).

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Optimized design of double layer coated PLGA nanoparticles loaded with celecoxib

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Abstract:

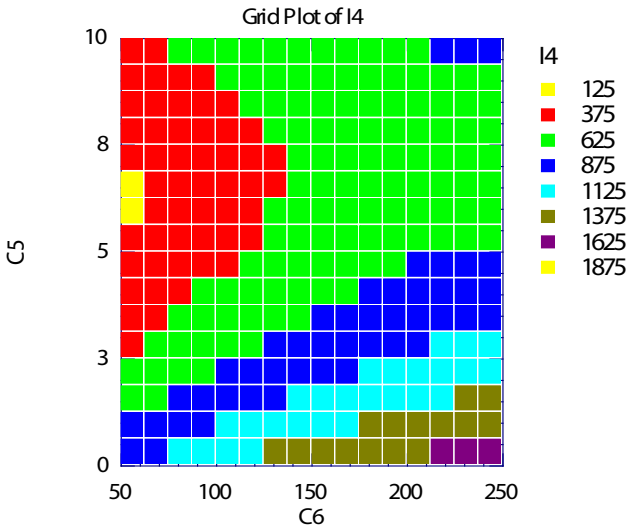
Nanoparticles have shown potential in the treatment of several epithelial cancers due to their ability for drug targeting and controlled release[1]. In order to reach the tumour site nanoparticles can be surface decorated to allow for specific recognition by cell receptors after systemic administration. However, nanoparticles require long circulation times in blood and interstitial pressure or particle accumulation in the tumor surface still remain a challenge. Intratumoral administration of nanoparticles can represent an alternative administation route for surface accessible tumours such as breast and prostate cancer.

The main goal of this project was the optimization of nanoparticle characteristics in order to achieve particle internalization through CD44-hyaluronic acid binding after intratumoral administration.

Celecoxib-loaded PLGA nanoparticles were prepared by solvent evaporation and coated with chitosan and hyaluronic acid using layer-by-layer deposition. In order to optimize parameters such as drug loading, particle size or zeta potential a four-variable central composite design was carried out. Independent variables were sonication time (1-9 min), polymer amount (50-250mg), CS and HA (0.05%-0.25%) concentrations. Response surface analysis was performed by using the NCSS package software.

Drug loading was high in all cases (66.9 to 99.2%). Particle size varied between 336 nm and 1341 nm with a strong dependency on sonication time (C5) and polymer amount (C6). Zeta potential values changed from negative to positive and then to negative after each layer deposition suggesting a successful nanoparticle coating.

Graphical abstract ***(optional)***



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Trypanosoma cruzi prevalence in animal trafficking by *Loop-mediated isothermal amplification* assay

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Abstract:

Trypanosoma cruzi, are an important protozoan parasite for humans and animals. Chagas disease is a neglected tropical disease that could affect roughly 6-7 million people in the world, mainly on underdeveloped countries and requires a specific treatment. The vector is a blood-sucking insect and so many mammals could be reservoirs. Animal trafficking, smuggling and illegal trade is the fourth most common illegal activity in the world. An important point concerning illegal animal trade and the increasing globalization is that represents a possible vehicle for illness spreading, including zoonosis, creating a health public issue. Hence the diagnosis in endemic regions and limited resources is very important, an alternative is a molecular technique named *Loop-mediated Isotehrmal Amplification* (LAMP), this assay is a one-step amplification reaction that amplifies a target DNA with high specificity, efficiency and rapid under isothermal conditions. This study determines the incidence of the zoonotic agent *T. cruzi* in wildlife mammals' blood, muscle and skin samples from animal trafficking using LAMP assay. In our research 47,06% of animals were positive in LAMP assay to *T. cruzi*. This analysis could be important to identify reservoirs and the risk of animal trafficking to human health, and the use of LAMP assay in fast and trial diagnosis. Not only the Chagas' diseases, but other potential pathogens that cause multiples neglected tropical diseases.

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Cell proliferation and CD16 expression induced by liposomes containing $PI(4,5)P_2$

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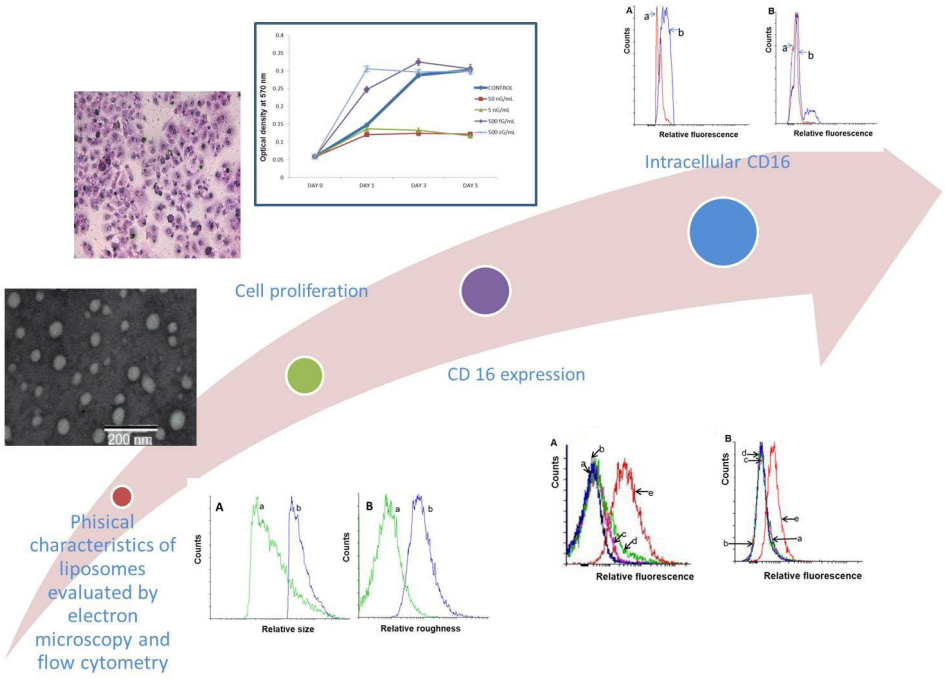
Abstract:

Liposomes can be designed to carry different molecules to cells because of their ability to fuse with cellular membranes. PI(4,5)P2 has been characterized as a plasma membrane component that is associated with different cellular functions, including vesicle trafficking and cell proliferation. In this work we designed, manufactured and characterized liposomes that contain PI(4,5)P2 and evaluated their ability to induce cell proliferation in the cervical cancer cell line INBL and expression of CD16 on the membranes of these cells as well as on blood leukocytes. We obtained 40-nm cationic liposomes that significantly increased the proliferation of INBL cells and also induced membrane expression of CD16 on these cells as well as on blood leukocytes. We discuss the possible endocervical origin of cervical cancer and the use of our liposomes to induce cell proliferation in other cell lines, as well as trafficking of other membrane receptors, and their possible application in the treatment of cancer.

Keywords: $PI(4,5)P_2$, cell proliferation, CD16, liposomes, carcinoma cell line, cell trafficking, leukocytes, endocervix.

Graphical abstract



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Evaluation of the nootropic activity of arabica coffee pulp extract (*Coffea arabica)*

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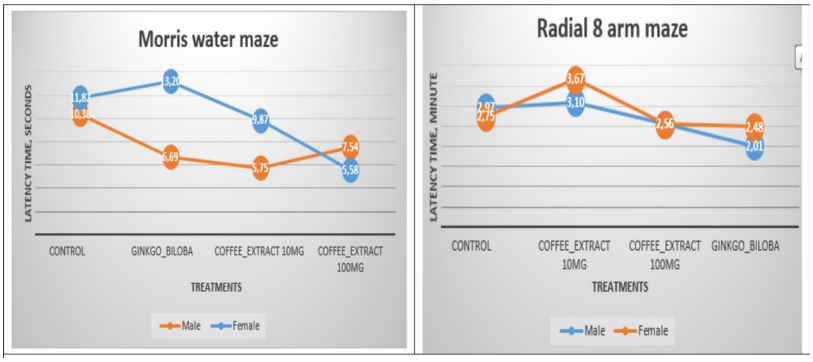
Abstract:

The nootropic activity has the purpose of optimizing the cognitive functions of the brain, which entails, to fight againts the lack of concentration, memory loss and brain fatigue, which are age-dependent symptoms. This study evaluated the nootropic activity of the extract of the pulp of the Arabica coffee (Coffea arabica). In the first stage we performed a quality control of the arabica coffee pulp and the quantification of total phenols. It was determined that the extract obtained by dynamic maceration and using ethanol as solvent: water (50:50), contains a greater quantity of total phenols. In a second stage, an in vivo study was carried out with mice of the species *mus musculus* as experimental subjects. These mice were divided into 4 groups with the purpose of administering water, Ginkgo Biloba and two different doses of pulp extract coffee. The results obtained, using learning tests such as Morris water maze and the radial 8 arms maze, allowed to evaluate the spatial learning and the animal's memory. A mathematical analysis of a mixed linear model was used to analysis the information. It showed that the extract of the Arabica coffee pulp has nootropic activity, and that the dose of 100 mg / Kilogram of the body weight / day of chlorogenic acid, has greater effectiveness in the improvement of cognitive properties.

Key words: *pulp of coffe, nootropic activity, learning, memory.*

Graphical abstract:



Design of a mucoadhesive prolonged release gel with hydroalcoholic extract of *Myrcianthes hallii* (Arrayán) for inhibition of *Streptococcus mutans*

Víctor AVILA, Dayana BORJA- ESPIN, Pablo BONILLA
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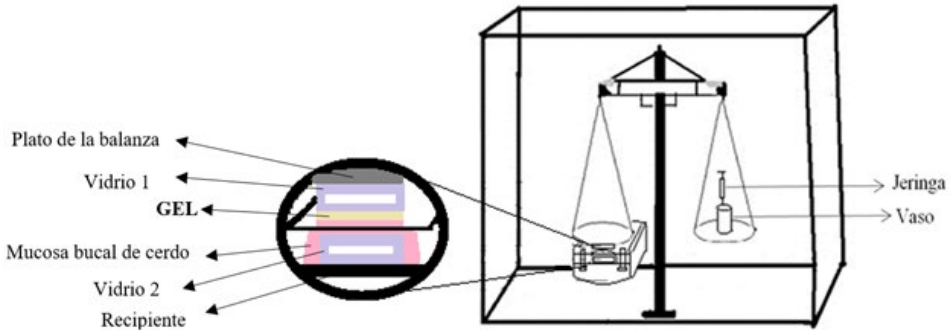
Abstract:

Periodontal diseases such caries affect the majority of the population; however there is very few natural based pharmaceutical forms that can be used as prevention or treatment. The objective of this study was to design a mucoadhesive gel with hydroalcoholic extract of Arrayán able to inhibit to *Streptococcus mutans*, main pathogen that forms biofilms in the buccal cavity; bioadhesive polymers sodium carboxymethylcellulose and hydroxyl propyl methyl cellulose were used at ratios of 3:2 and 2:3; the mucoadhesivity of each formulation was determined by an ex vivo technique using a modified balance; the formulation with the strongest mucoadhesivity was tested for antibacterial activity by the Kirby - Bauer test; prolonged release behavior last five hours, following order one kinetics in USP Apparatus 2.

Graphical abstract



Financial support and/or acknowledgments

This work was partially financed with funds from Chemical Sciences Faculty, Universidad Central del Ecuador.

Elaboration of a cream with exfoliating activity with cocoa shell (*Theobroma cacao L.*), from the province of manabí

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[1] *Natural Products, Central University of Ecuador, Quito*

Abstract:

The objective of the present research was to elaborate a cream with exfoliating activity with cocoa shell (*Theobroma cacao* L.), from the province of Manabí. Previously, the cocoa shell microgranules were characterized in three particle size ranges: 150-180 µm, 180-300 µm and 300-600 µm, and in three concentrations 1, 2 and 3% by weight. They were added to an O / W base cream in which parameters of viscosity, extensibility, pH, stability and rheological behavior were monitored by applying the factorial design A x B. Subsequently, the exfoliating activity of the cream was evaluated by quantification of the decrease in roughness in the pig skin determined in the COSCAM USB 225 using a two-factor analysis of variance with a single sample. Finally, organoleptic, physical and microbiological controls of the finished product were performed, complying with the Ecuadorian technical standard INEN 2867: 2015. The results show that the exfoliating cream has high viscosity, low extensibility, optimum pH for the skin, stable and viscoelastic thixotropic pseudoplastic behavior, in addition the cocoa shell microgranules have exfoliating activity, this property increases to a larger particle size and higher concentration.

Keywords:

Cocoa shell, exfoliating activity, coscam usb 225, pig skin.

Financial support and/or acknowledgments

The authors thank the Faculty of Chemical Sciences of the Central University of Ecuador and the Vega family for their help in the recollection of cocoa in the province of Manabí.

Pseudomonas bohemica sp. nov, a novel bacterium with a great genomic potential of produce novel drugs

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Abstract:

Nowadays, one of the major risks to Public Health is the antimicrobial resistance, which threatens the effectiveness of treatments against microbial infections[1]. The World Health Organization (WHO) prioritizes the fight against these resistances and one way is the discovery of new antimicrobial compounds. Therefore, the study of unexplored ecological niches that can serve as novel sources for potentially novel antimicrobial substances is of utmost importance[2].

In this study, we have isolated microbial isolates from the bark beetle (*Ips acuminatus*) and screened them against different microorganisms. Out of these isolates, the most promising one resulted to be a novel bacterium, *Pseudomonas bohemica* sp. nov. able to inhibit the growth of *Klebsiella oxytoca*, *Arthrobacter phenanthrenivorans, Candida humilis*, *Pichia fermentans*, *Aspergillus* sp. and *Fusarium* sp.[3].

To study if *P. bohemica* could produce some interesting substance, its draft genome sequence was obtained using the Illumina platform. Assembly was performed using Velvet 1.2.10 and gene calling and annotation were done with RAST[4]. The study of the genome was carried out with The SEED viewer framework[5] and antiSMASH 3.0[6]. Using these bioinformatic tools we found several gene clusters related to already known metabolic pathways that produce antimicrobials, antitumorals and antivirals; nevertheless, the low similarity between some of these clusters and the closest described ones plus the detection of some gene clusters probably implicated in the synthesis of bioactive compounds but not correlated to any previously described cluster, seems to indicate that this genome encodes the production of novel bioactive compounds.

Financial support and/or acknowledgments

This work was supported by the Czech Science Foundation (GAČR) under the project number 16-15293Y.

[1] Hoffman et al., «An international legal framework to address antimicrobial resistance».

[2] Cragg y Newman, «Biodiversity».

[3] Saati-Santamaría et al., «Discovery of Phloeophagus Beetles as a Source of Pseudomonas Strains That Produce Potentially New Bioactive Substances and Description of Pseudomonas Bohemica Sp. Nov.»

[4] Aziz et al., «The RAST Server».

[5] Overbeek et al., «The SEED and the Rapid Annotation of microbial genomes using Subsystems Technology (RAST)».

[6] Weber et al., «antiSMASH 3.0-a comprehensive resource for the genome mining of biosynthetic gene clusters».

Determination of adsorption power of activated charcoal by spectrophotometry

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Abstract:

Introduction: Activated charcoal has been widely used as a highly effective adsorbent due to its large specific surface area, high porosity and favorable pore size distribution. These favorable characteristics are what support its application in industrial scale water and air purification as well as in the adsorption / increase of the elimination of drugs present in the gastrointestinal tract. The physical, chemical and physicochemical activations are the main techniques applied for the production of activated charcoal, whose main constituents for its synthesis are petroleum residues, natural coal and wood and, more recently, the derivatives of agroindustrial residues.

Objective: To determine the adsorption power of the activated charcoal by spectrophotometry in different samples.

Method: By spectrophotometry the amount of phenazone adsorbed per 100 g of activated charcoal is calculated by calculating the adsorption capacity of the activated charcoal, which in the end is compared with the requirements registered in the Portuguese Pharmacopoeia.

Results: Only one sample showed to be in compliance with the requirements of the Portuguese Pharmacopoeia, unlike the other two that presented values that were much lower than the values they should have to be in agreement with the Pharmacopoeia.

Conclusion: The differences demonstrated mean that the samples do not meet the standards required to be classified as activated charcoal. On the contrary, there was a sample that proved to have all the requirements to be classified as such. Hence, more quality control studies are needed to guarantee the therapeutic end to the user.

Pentedrone and methylone enantiomers: cytotoxicity studies in dopaminergic SH-SY5Y cell line

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The consumption of synthetic cathinones has increased exponentially as drug of abuse. Once cathinone derivatives are chiral molecules, each enantiomer may have different kinetic or dynamic biological responses.

Therefore, a resolution method to obtain pure enantiomers of pentedrone and methylone was developed, and their biological/toxicological enantioselectivity was evaluated. For this purpose, an optimized liquid chromatography (LC) chiral method using a semi-preparative Chiralpak AS-H® column was carried out to isolate the enantiomers of both cathinones. Enantioselectivity studies were performed in dopaminergic SH-SY5Y cell line.

An overall recovery of 72% and 80% was achieved for pentedrone and methylone enantiomers, respectively. Furthermore, the absolute configuration of the enantiomers of both cathinones was determined by electronic circular dichroism (ECD) spectroscopy aided by theoretical calculations, as (+)-(*S*) and (-)-(*R*)-pentedrone, and (-)-(*S*) and (+)-(*R*)-methylone. Enantioselectivity studies on cytotoxicity were performed as well as studies looking for the understanding of the related cytotoxic mechanisms. It was possible to verify that *S*-(+)-pentedrone and *R*-(+)-methylone were more cytotoxic and induce higher reactive oxygen species (ROS) production.

In conclusion, the optimized analytical LC conditions were successfully scale-up for the milligram enantioresolution and the absolute configuration of pentedrone and methylone enantiomers were established for the first time. Studies in dopaminergic SH-SY5Y cell line with the racemic pentedrone and methylone showed cytotoxic effects in a concentration-dependent manner. For both enantiomers of pentedrone and methylone, enantioselectivity in cytotoxic effect was observed as well as in ROS production.

Financial support and/or acknowledgments

Financial supported from Universidade do Porto/FMUP through FSE-Fundo Social Europeu, NORTE 2020-Programa Operaconal Regional do Norte (NORTE-08-5369-FSE-000011). Partially supported by the Strategic Funding UID/Multi/04423/2013 through national funds provided by FCT and ERDF, in the framework of the programme PT2020. Partially supported by FEDER funds through the Operational Programme for Competitiveness and Internationalisation (COMPETE 2020), Portugal, and UID/MULTI/04378/2013 - POCI/01/0145/FEDER/07728.

POSTER SESSION SYMPOSIUM PHARMACEUTICAL APPROACH

Analysis of the consumption of anxiolytic drugs from a Pharmacy Office on the island of Tenerife

Sandra DÉVORA GUTIÉRREZ [1], Alexis M. OLIVA MARTÍN [2*], Tatiana M. DE LA ROSA SUÁREZ [1], Domingo MARTÍN-HERRERA [1], and Susana ABDALA KURI [1]

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Abstract:

Generalized Anxiety Disorder is, along with depression, the most frequent psychiatric problem in Primary Care, which is why anxiolytics have become one of the most prescribed therapeutic groups, with a considerable increase in their use since the 1990s.

The aim of this communication is to analyse, over a period of one year, the consumption of psychotropic drugs in a rural area of the island of Tenerife. To this end, data were collected on all the active ingredients dispensed during this period, grouping them by month, distinguishing whether they had been dispensed as a generic drug or a brand name and differentiating the sex of the patient.

A total of 8,427 dispensations of anxiolytics, hypnotics and sedatives were quantified, and their consumption was higher in female patients than in men (2:1). An average of 648.23 ± 22.03 monthly dispensations (mean ± standard deviation) were observed, with short-acting benzodiazepines being the most prescribed. It was also found that the dispensing of brand names was clearly superior with respect to generic medicines.

This study provides evidence and confirms the information gathered in the bibliography regarding the high consumption of psychotropic drugs in our society, with a higher prevalence among female patients. For all these reasons, it is necessary for the Community Pharmacist to act through Pharmaceutical Care, in close contact with the Primary Care staff, to try, as far as possible, to reduce this excessive prescription of benzodiazepines.

Financial support and/or acknowledgments

Our thanks to the Colegio Oficial de Farmacéuticos de Santa Cruz de Tenerife for the financial support provided.

Evaluation of the clinical efficacy of the nephroprotectants used against renal damage induced by cisplatin through the meta-analysis technique

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Abstract:

The main limiting factor of cisplatin is nephrotoxicity; therefore, products that can avoid or reduce it are being investigated. The objective of this work was to carry out a systematic review of the clinical studies evaluating protective substances against cisplatin nephrotoxicity, followed by a meta-analysis.

Studies published until December 2017 (Medline and Google academic) were identified. After applying the inclusion criteria, 21 studies were selected. A database was created with: (i) number of patients receiving nephroprotective or placebo (ii) incidence of nephrotoxicity and/or averages and standard deviations of plasma creatinine, blood urea nitrogen (BUN) and creatinine clearance. The studies were divided into two groups according to the mode of evaluation of nephrotoxicity (dichotomous or quantitative variables). The combined parameter was calculated after the analysis of each group of studies.

The results derived from the analysis of the variables showed that the use of compounds to protect against cisplatin nephrotoxicity is slightly effective. A great heterogeneity of results was observed. In the analysis of the dichotomous variables the Odds ratio was 0.22 (0.15, 0.33) and in the quantitative variables plasma creatinine, BUN and creatinine clearance the differences of means were -0.16 (-0.24; -0.077); -4.53 (-7.18; -1.87) and -11.66 (-20.49; -2.83) respectively. Of all protectors evaluated, those that showed more efficacy were magnesium sulphate and cystone.

In conclusion, this meta-analysis shows that none of the strategies carried out seem to significantly reduce the damage. In fact, some compounds could even worsen kidney function. That makes further research in this field necessary.

Financial support and/or acknowledgments

Hernández-Sánchez MT is a recipient of a predoctoral fellowship from the Junta de Castilla y León (Spain) and the European Social Fund from the European Commission.

Analysis of the request for anti-bacterial agents in the Spanish Community Pharmacies

Ana MOLINERO*, Fernando CANTALAPIEDRA-FERNÁNDEZ, Pedro GUTIÉRREZ-RÍOS, Alejandro EGUILLEOR-VILLENA and José A. CARBAJAL-DE LARA

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Anti-bacterial resistance is one of the main challenges facing medicine today. In Spain, the type of private physician who prescribes antibiotics and for what purpose is unknown.

Objective:

To quantify oral antibiotic J01 with private prescription (PP), irregular (IP) and self-medication (SM) in the community pharmacy (CP).

To analyze the prescribing physician profile, for what prescribes antibiotics and why people demand antibiotics without a prescription.

Design and method

A prospective, cross-sectional, descriptive, observational multicenter study was carried out in Spanish CP during 4 weeks, one in each season of the year (2016-2017). EPA-OD Study with ethics committee approval.

Case report form (eCRF) variables: type of prescription/self-medication and reason for request, type of physician and antibiotic requested.

Statistical Analysis: STATA MP13.1

Results

5,577 requests; 64% PP, 15% IP and 21% SM.

PP: 43.7% dentists, 26.2% general practitioners (GPs) and 10.3% paediatricians for dental infections (39.8%), upper respiratory tract infections (URIs-25.6%), lower respiratory tract infections (LRTIs-10.3%). Antibiotic prescribed amoxicillin (amx-27.9%), amoxicillin/clavulanic (amc-25.2%) and azithromycin (azm-14.2%).

IP: 25.2% GPs, 24.7% dentists, 12% paediatricians for URIs (32.5%), dental infections (25.8%), urinary tract infections (UTIs-14.2%). Antibiotic prescribed amc (27.4%), amx (21.6%) and azm (13.5%).

SM demand: 35% URIs, 28% UTIs, 20.2% dental infections. Antibiotic requested amx (17%), azm (8.1%) and amc (5.9%).

Conclusions

Dentists prescribe half of all PPs for dental infections.

1/4 IP are made by GPs and 1/4 by dentists for URIs treatment.

SM is requested for URIs, UTIs and dental infections.
Amx (on PP and SM) and amc (on IP) are the most prescribed.

Financial support

This research has the collaboration of Spanish National Antimicrobial Resistance Plan.

Acknowledgments:

Community pharmacists who have collaborated in the project.

University approach to the training in Professional Pharmaceutical Care Services

Ana MARTÍN SUÁREZ[1,2*], Tomás CODESAL GERVÁS[1,3], Raquel VARAS-DOVAL[1,4], Elena VALLES MARTÍN[1], Sara MARTÍN REVELLADO[1,5], Francisco GONZÁLEZ LÓPEZ[1,2] and Antonio MURO ÁLVAREZ[1,2]

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Introduction: Five years ago, in the Faculty of Pharmacy, a working group of students, pharmacists and teachers was established to lead training activities and research projects in pharmaceutical care (AUSAF). The classroom initially used as headquarters has recently been transformed into a simulated pharmacy.

Objective: To present results obtained by the AUSAF team in collaboration with other health professionals and institutions.

Results: Training activities have been carried out for the development of pharmaceutical care competences aimed not only at undergraduate and postgraduate students, but also at professionals and all members of the Faculty of Pharmacy (Educafarma program: 30 workshops). An accredited permanent training course for pharmacists has been developed too. It has also given theoretical-practical training in Professional Pharmacy Services to postgraduate students in foreign institutions. Ten Final Degree Projects have been tutored. Teaching Innovation Projects have been succeeded in all the calls.

AUSAF has conducted research on activities developed in the healthcare field. The results have been disseminated in national journals (3 papers), lectures (2) and communications to congresses (11), receiving two awards. Currently it is also involved in the *Concilia Medicamentos* research programme promoted by the *General Pharmaceutical Council of Spain* (CGCOF).

A cooperation agreement with *COFARES Training Institute* (IFC) has financed the building of the simulated pharmacy and several training activities have been likewise scheduled.

Conclusions: The change towards a Pharmacy of Professional Services must necessarily involve the education of future professionals. The collaboration between University and Pharmaceutical profession, allows to advance jointly in research and training.

Financial support and/or acknowledgments

We thank CGCOF, COF Salamanca, CINFA Lab and IFC for their support.

Clinical outcomes of Medicines Use Review (MUR) service in Spanish Community Pharmacies. Revisa® Project

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The Medicines Use Review (MUR) service consists of a pharmacist performing alonside the patient a structured review of the knowledge degree that the patient has about his medicines and the use that he makes of them. Revisa project has been developed by Spanish Family and Community Pharmacy Society (SEFAC) to implement this service in Spanish community pharmacies.

Objective:

Know clinical outcomes of the MUR Service in Spanish community pharmacies.

Design and method

Observational, descriptive, transversal and multicentric study of MUR performed in Revisa project®. RUM study was performed in the pilot of 2016 and in the trainig program of the service from november 2017 until march 2018. MUR were registered in SEFAC_Expert® and analyzed with Microsoft excell®. Main variables were the patient medication knowledge, the therapeutic adherence and the number of drug-related problems (DRP) detected.

Results

A total of 550 MUR were registered including 3.114 drugs.

Knowledge: patients had a low knowledge degree about their treatment. In the pilot study patients didn´t know 73,5% of their medication and in the training program only 29% of patients knew it.

Adherence: patients had a low adherence to their pharmacological treatment: 31,5% in the pilot study according to the Morisky-Green test and 9% in the training program according to the Hayness-Sacket test.

DRP: a total of 642 DRP were detected, 298 in the pilot study, and 344 in the training program.

Conclusions

The results obtained show the need of continuing the implementation of the MUR service in community pharmacies.

Financial support

REVISA has the collaboration of Ratiopharm and Teva laboratories without conflict of interest.

Acknowledgments:

Community pharmacists who have collaborated in the project.

Proyecto Boticarios - Model of innovation in pharmaceutical volunteering in development cooperation

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The objective is to show the Boticarios Project as a pharmaceutical intervention model in developing countries. This project was born in 2012 with the aim of optimizing pharmaceutical cooperation through participation in the format of pharmacists specifically trained to carry out development cooperation interventions, humanitarian aid and other activities specific to the social area of pharmacy. This goal is right on the need to cover with human resources areas that we believe are specific to the pharmacist in fields such as comprehensive medication management, pharmacotherapy monitoring and health protection in rational use of medicine, nutrition, water and sanitation.

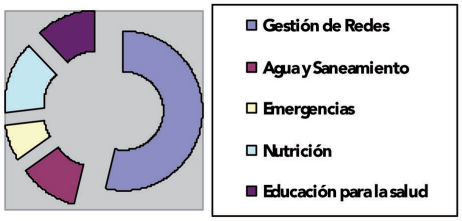
It is a multi-year project that takes place in three phases. The first, eight months of training through the course "Specialization in Pharmaceutical Cooperation". After this phase, students have the option of entering the field intervention phase (PIT) in FSFE projects or other entities that belong to the project network. Finally, a network of work – *Red Boticaria* - has been created, including the pharmacists participating in the program.

In six years, 192 pharmacists have been trained, 78 of whom have intervened in 36 cooperation projects in 18 countries, working with 28 local entities in those countries.

At the international level, this project was presented as a model of pharmaceutical care in cooperation and humanitarian aid in the World Congress of Pharmacy and Pharmaceutical Sciences organized by the International Pharmaceutical Federation (FIP) Buenos Aires - August 2015.

Video summary of apothecaries project: https://www.youtube.com/watch?v=ZDugmbx0dro

Interventions by area: **36 projects / 18 countries**



Financial support and/or acknowledgments

Financial support by CINFA. The Project also has the support of the Consejo General de COF, COF de Madrid, Ciudad Real, Guadalajara, Soria, Ceuta, SEFAC, SEFAR, Facultades de Farmacia de la Universidad Complutense, Santiago de Compostela, Sevilla, Alfonso X El Sabio, Salamanca; Fundación Cofares and Academia Iberoamericana de Farmacia.

Ibuprofen gummies as a new pediatric dosage form

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Some of the daily problems that pediatricians find are the need to adapt the dose to the needs of the patient, to have pharmaceutical forms that allow a more accurate dosage and to solve frequent problems in the child population such as intolerance. The formulation of individualized medicines supposes a first level health care that provides an exceptional tool to the prescriber in order to adapt the treatment to the patient.

The objective has been the design, the production and the control of medicinal gummies of ibuprofen (100 mg) as an alternative to the therapeutic arsenal that exists in the market, with the purpose of giving a solution to a need that pediatricians demand. The methodology has been the elaboration of the formulation, evaluating the assay, dose uniformity, dissolution profile and acceptance of the formulation.

The process of elaboration of proposed Ibuprofen gummies allows obtaining homogeneous dosage units (AV 9.2), with an assay of 101.12%, a dissolution profile similar to that of solid and liquid formulations existing in the market (figure 1) , obtaining a dissolved % at 15 minutes> 85% and with a good organoleptic acceptance.

Conclusion: The interest of the formulation developed, applied to this and other active ingredients, is motivated by reasons such as filling therapeutic gaps, adapting the dose and associating different APIs with the objective of optimizing treatments with an attractive pharmaceutical form for pediatric patients that will help them to adhere to treatment in order to adapt the medication to the patient and not the patient to the medication.

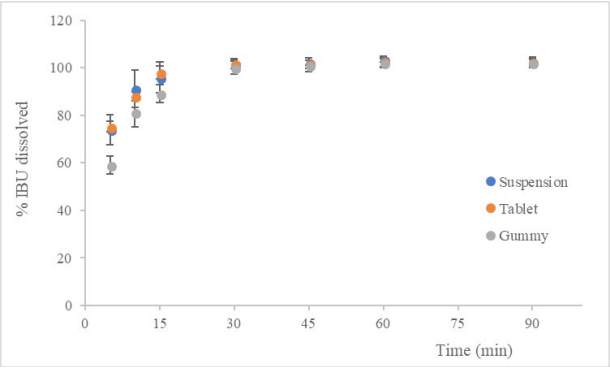

Figure 1.- Dissolution profiles of Ibuprofen in different pharmaceutical formulations

A Medication Card for Therapeutic Reconciliation in a Hospital Setting

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Abstract:

The development and implementation of a therapeutic reconciliation tool, in a hospital setting, is a challenge faced today by the majority of healthcare professionals. Cova da Beira Hospital Centre in Covilhã, Portugal, implemented its own therapeutic reconciliation project in 2010. This project consists in a computer program that generates a Medication Card (MC) for each patient, with a complete and updated medication list. The program has a medication database, including specific information on how to take the medicine and special precautions, which is updated every month according to data from National Medicines Database.

Our main goal was to assess the impact and the results obtained with this project, from its inception date, 05-05-2010, to 31-05-2018.

During this period, 2815 MCs were created. The average patient age was 71 years old. The number of doctors involved in the project was 54, which reveals a great adhesion to the project. There is a number of 13684 active drugs in the computer program's database, of which 3132 (≈23%) have specific information for the patient. The average number of drugs present in the MC was 8, a clear indicator of polipharmacy among the patients. The clinical services which most utilize the MC were Internal Medicine, Pneumology and Neurology services, which accounted for 18%, 13% and 12% of all the MCs produced, respectively.

The Medication Card revealed itself to be very useful when performing therapeutic reconciliation at discharge and consultation, contributing to a reduction in medication errors and promoting patient health literacy.

Financial support and/or acknowledgments

Nothing to disclose.

Which factors influence pharmacotherapeutic prescription on pensioners in primary health care?

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Abstract:

An analysis was performed of the quality of drugs prescribing in 200 primary care physicians in 2014. To this end, regional expenditure on prescription drugs for old-age pensioners was evaluated according to several predictors and indicators established in the Basque Health Service Contract-Program.

A decision tree was developed to classify the variable 'Expenditure on prescription drugs for old-age pensioners' according to the rest of variables used. The average annual expenditure per pensioner was 551.7 ± 145.6 euros. This expenditure depends mainly on the 'Percentage of drug novelties that do not provide any therapeutic advantage over older drugs'. At this tree level, the 'Percentage of Pensioners' in the physician's patients quota was determinant for classification in the branch with the highest drug expenditure.

Surprisingly, expenditure per patient was substantially higher among those physicians who manage fewer pensioners (less than 9.5% of their population) *vs* those with a higher percentage (801.5 ± 98.9 euros *vs* 555.2 ± 122.4 euros, respectively). This suggests that physicians with a high percentage of pensioners, make an effort to moderate drug prescribing and reduce pharmaceutical expenditure.

Expenditure in prescription drugs by physicians having more pensioners in their quota depends on the 'Defined daily dose of antibiotics per 1000 inhabitants per day' (DHD). Thus, among physicians who prescribe less than 23.5 DDD of antibiotics, the 'DHD of gastroduodenal antiulcer drugs' is the variable with a highest weight on their drug expenditure. In contrast, the 'DHD of third-level antibiotics' variable with the highest impact on the drug expenditure of physicians who prescribe a larger volume of antibiotics.

Effectiveness of the personalized dosing service in polymedicated patients

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Abstract:

Objectives: to know the factors that affect therapeutic adherence and those tools that can reduce the percentage of therapeutic non-compliance from the community pharmacy, such as personalized dosing systems, or to identify possible issues related to medications that negatively influence in adherence.

Design and materials: review of scientific articles.

Methods: scientific articles published on scientific bases are selected. In an initial screening, those that present the following filters are included: "review", "full text", "15 years", "humans". Those that are not related to the topic or show duplication of information are excluded.

Results: 9 articles are selected. The possible factors that affect therapeutic adherence were demonstrated, and the common profile of a multi-pathological patient aged over 65 was provided. Among the possible factors that can reduce adherence, it highlights the treatment plan itself, due to its complexity and the large number of medications. On the other hand, tools available to improve therapeutic adherence are examined, such as personalized dosing systems or Stopp/Start criteria, used to detect problems related to medicines.

Conclusions: There are different factors that affect therapeutic adherence, as the very complexity of the treatment. Customized dosing systems have a positive trend to increase adhesion. Stopp Start criteria detect problems related to medications that decrease adherence.

Hygienic-dietetic measures in hypertension

Concepción AYALA ORTIZ* and José AYALA PARRA

Farmacia Ayala

Abstract:

Summary:

From the pharmacy office we measure the tension to several patients. We make a questionnaire to hypertensive patients to find out if they know the impact of their habits on their health. Then, we give them a written decalogue on hygienic-dietetic measures in hypertension and we explain it to them.

Introduction:

We carry out health education on hygienic-dietetic measures in hypertension.

Goals:

1. Measure the blood pressure of the included patients.
2. Find out their knowledge about proper habits in hypertensive patients.
3. Detect the mistakes they make and tell them what to change.

Materials and methods:

- Taking the tension in the same pharmacy office in March 2018.
- Survey of 17 hypertensive patients on life habits. Previously, they read and sign the "informed consent-written consent of the patient" sheet.
- We give and explain a decalogue of hygienic-dietetic measures in hypertension.

Results and Discussion:

- 24% have taken medications that have been able to momentarily increase their tension
- 41% consume beverages that may increase tension transiently or eat more recommended daily alcohol
- 59% do not perform moderate physical activity
- 53% are overweight
- 24% smoke
- 47% consume excess salt
- 47% do not follow a balanced diet
- 65% suffer stress or anxiety

In the study, 100% of the patients surveyed can improve their hygienic-dietetic measures in one or more aspects.

Conclusions:

From the pharmacy office we make outreach in health education that benefits public health thanks to our knowledge and closeness.

An Objective Structured Clinical Examination (OSCE) to evaluate clinical/communication skills of pharmacy students

Assess Pharmacy
Cristina BALAGUER-FERNÁNDEZ, Lucrecia MORENO,
M. Aracely CALATAYUD-PASCUAL and Alicia LÓPEZ-CASTELLANO*

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Abstract:

The Objective Structured Clinical Examination (OSCE) has become the standard for clinical skills evaluation of Pharmacy students. The Cardenal Herrera-CEU University conducts its first OSCE in Pharmacy, with 5 individual assessments or "stations", for 30 students that concluded their training in 2018. The OSCE includes several stages: to prepare the stage/cases; simulation; and evaluation. Individual simulated cases provide information to students at the beginning of the simulation, complementary information only becomes known if student investigate. Candidates read the instructions then enter the station and proceed to perform the clinical task. Examiners observe the candidate carrying out the task and their performance is scored by using a predefined checklist. The competencies tested in OSCE include *inter alia* patient counselling and communication, identification and resolution of drug-related problems (DRPs) literature evaluation/drug information provision and manual skills. The implementation of OSCE among fifth-year students is technically feasible and allowed evaluation of clinical competences and communication skills.

Graphical abstract

Financial support and/or acknowledgments

The authors wish to acknowledge the significant contributions made by staff of the Faculty of Health Sciences (Project PI01A-SV-17).

Osteoporosis and bisphosphonates-related osteonecrosis of the jaw

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Abstract

Introduction

Biphosphonates are a class of drugs used for the treatment of osteoporosis. As one of the most frequent prescribed drugs on the market, they are also drugs which are used prolonged in time, with rare side effects, but potentially severe such as bisphosphonate-related osteonecrosis of the jaw (BRONJ). To date, research has focused on the knowledge of the patients about prevention, possibilities of developing the disease, dental health follow up and visit to the dentists once the treatment with biphosphonates had started.

Patients and Methods

It was a Pharmaceutical Care Program in Morales Meseguer Hospital (Murcia). This current study was prospective cross-sectional observational and assessed 100 patients in treatment with biphosponates.

Results

Only 7% of the sample had been informed of the importance of going to the dentist before beginning the treatment with bisphosphonates. The follow up of the patient taking antiresorptives is also very important, and in our sample only 45% went to the dentist once the treatment started. Regarding the knowledge of the patient about the risk of developing BRONJ after a dental intervention taking bisphosphonates, only 11% were aware of it.

Discussion

The results of the study remind us of the urgent need to increase knowledge in patients. Since the treatment of BRONJ is conservative and can only be treat the pain and infection. Therefore, prevention is key to reduce the risk of suffering from osteonecrosis of the jaw in these patients.

Training and certification of committee members for the methodological and ethical analysis of protocols

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[2] *Center for Research on Tropical Diseases (CIETUS-IBSAL). University of Salamanca. Department of Parasitology*
* mocitamunoz@usal.es

Abstract:

Introduction: The Research and Ethics Committees are independent areas whose main objective is to ensure the relevance of research, methodological rigor, respect for the rights of research subjects, the preservation of their well-being and, in general, the quality of projects submitted for study, to ensure maximum scientific rigor and compliance with international standards, national and international standards. **Objective**: Promote the monitoring and control of ethical and bioethical aspects in the development of health research in Perú. **Materials and methods:** A situational diagnosis was made to each of the health networks to evaluate their regional capacities, the National Guidelines, Technical Documents, Operational Procedures, etc., Advocacy and Implementation of the CIEIs were applied (Institutional Ethics Committees in research), Development of capacities and technical support to the regions, development of alliances and decentralization of training, dissemination mechanisms, expansion, sustainability and strengthening of the CIEI, review and application of universal ethical and legal standards, such as the Code of Nuremberg, the Declaration of Helsinki, the Belmont Report and the Universal Declaration on Bioethics and Human Rights of UNESCO. **Results:** Ethics committees were implemented in the different regions of Peru. Efforts were focused on the detection of corruption in research, criteria were unified to determine the minimum number of multidisciplinary professionals that should form the committee in Lima and Regions. standardized the use of tools during induction or training. **Conclusions:** It is important to carry out surveillance and control of research protocols on all clinical trials in order to avoid death, adverse effects and health expenditure.

Financial support and/or acknowledgments:

CIETUS. ISCIII-RICET-IBSAL D16/0027/0018, USAL-DSa-CR 2/18
National Institute of Health. Peru.
E. MUÑOZ is a grant holder of the Carolina Foundation

Analysis of tobacco abstinence with varenicline treatment

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Ángeles CAÑIZARES and Pilar ZAFRILLA*

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Abstract:

Background and objective

The objective of this study is the presentation of results obtained in the abstinence rate and relapse of the smoking practice after a 12-month pharmacotherapeutic follow-up in a pharmacy office.

Subjects and methods

Smokers assigned referred to the pharmacy for a pharmacotherapeutic follow-up with varenicline treatment.

Variables of the smoking history, present treatment, nicotine dependence and motivation.

Abstinence and relapses were evaluated at 5, 12 and 52 weeks. The abstinence obtained was by self-declaration verifying it with coxymetry of 6 ppm or less.

Results

78 patients (53.8% males), 43.92 (± 9.41) years and 27.36 (± 10.54) years of mean duration.

71.8% patients treated varenicline therapy and 28.2% were not treated with a drug. Of the 56 patients treated, completed 12 weeks of treatment 21.4%.

50% of subjects remained non-smoking at 12-week treatment and at the end of follow-up at 52 weeks only 33.9% remained abstinent.

Conclusion

There were high rates of relapse per year, which depended on adherence. Patients who had more adherence to treatment had better annual abstinence rates.

Mobile Application for the improvement of pharmacological adherence to antihypertensive treatment among elderly people

Jacqueline SEPÚLVEDA[1]*, Rayén PINTO[1], Roberto ITURRA[1], Hans MÜLLER[2], Isis CHAMBLÁS[3], Montserrat VICTORIANO[4], María Paz CASANOVA[5], Pamela GUEVARA[6], Rosa AGUILERA[7], Patricia CID[8], Tabita MORENO[9] and Fernando VENEGAS[9]

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** jsepulve@udec.cl*

Chronic Arterial Hypertension (CAH) is a disease whose prevalence reaches values between 17,2% -45.2%. The lack of adherence to pharmacological treatment constitutes one of the main problems, only about 50% of hypertensive patients fully adheres to their treatment.

As support to traditional treatment of primary care in Chile, for elderly people, diagnosed with hypertension, we propose a Transmedia Psychoeducational pro-Adherence (TPA) Program.

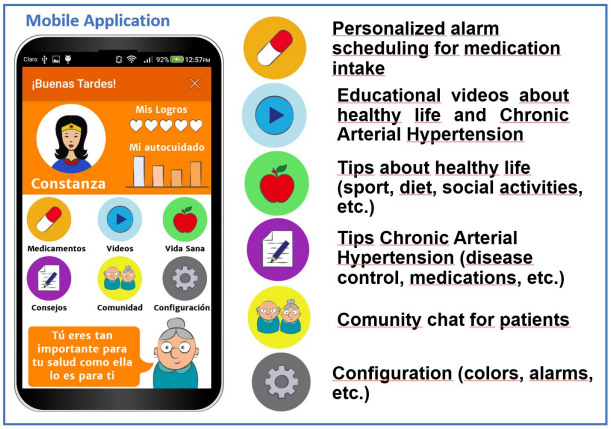
A basic TPA program proposes health promotional videos, while the full program includes a mobile application (*AFAM-Salud*) developed to improve adherence to treatment. The application contains personalized information of each person. It allows the scheduling of alarms for the intake of each medication, along with other components like educational tips for a healthy life and control CAH, a community chat and a personal chart of adherence achievements. A web application was developed to upload patient information related to medication and clinical exams.

The study was carried out with three groups, Group A (n=86), was exposed to the full TPA program, including the delivery of a smartphone with *AFAM-Salud*. Group B (n=89) was exposed to the basic TPA program and Group C (n=73), as control group.

After three months, Group A improved from 43% to 72.4% (p=0.0001) adherence to pharmacological treatment, while Group B and C did not have effect.

In conclusion, elderly people, treated for CAH in primary care, who employed the full TPA program in addition to traditional Health System programs, improved their adherence to pharmacological treatment, compared with those who received only the traditional treatment program.

Mobile Application for the improvement of pharmacological adherence to antihypertensive treatment among elderly people



Three groups of patients with Chronic Arterial Hypertension.
Group A (n=86) was exposed to the full program, including a smartphone with the application, and educational videos.
Group B (n=89) was only exposed to the videos.
Group C (n=73) was a control.
All receiving also the traditional treatment program.

After three months, **Group A** improved from 43% to 72.4% (p=0.0001) adherence to pharmacological treatment, while **Group B** and **Group C** did not have effect.

Financial support:

Funding Agency Grant CONICYT-FONDEF ID16AM0007

Cesar Programme. Qualification for Providing Smoking Cessation Service in Spanish Community Pharmacies

Jesús C. GÓMEZ[1]*, Navidad SÁNCHEZ[1], Ana MENDOZA[1], Josep M. RAMÓN[2], Miquel AGUILÓ[1] and Miguel CANO[1]

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Community pharmacists must participate in prevention activities that promote public health and prevent disease. Smoking in Spain reaches a prevalence of 24%, causing high rates of morbimortality. Pharmacists play an important role in dealing with smoking.

SEFAC has launched different training programs to implement pharmaceutical services, one of which is the CESAR program.

OBJECTIVES

To offer a qualification to community pharmacists and promote training and practice.

To provide tools and interventional strategies to deal with patients who smoke.

To evaluate the number of pharmacists participating in the training, the attendees to the face-to-face sessions and the number of patients included and the successful at six months.

DESIGN AND METHOD

A descriptive, transversal and retrospective research.

CESAR program consists in an online course, a face to face practical workshop given by pharmacists and physicians on the implementation and management of smoking cessation service in community pharmacy and a record of clinical cases in a website.

A consensus document with Spanish Society of Pulmonology and Thoracic Surgery (SEPAR), Spanish Society of Family and Community Medicine (semFYC), Spanish Society of Primary Care Doctors (SEMERGEN), Spanish Society of Family Doctors and General Practitioners (SEMG), Spanish Society of Smoking Specialists (Sedet) and Spanish Society of Family and Community Pharmacy (SEFAC) was designed to refer to physician.

RESULTS

As of June 2018, there were 1886 registered pharmacists. The online course has exceeded 774, the face-to-face sessions 2175 (in 77 workshops) and 1457 clinical

cases have been registered. 446 cases are in follow-up, 224 have left the program and 787 have already passed the six months of follow-up (665 continued without smoking and 122 had relapsed)

CONCLUSIONS

There is a demand for training among community pharmacists to help patients to stop smoking. The successful cases compared with those who withdrew indicate that the CESAR programme could be a useful instrument for promoting smoking cessation through community pharmacies.

Financial Support:

CESAR has the collaboration of Pfizer without conflict of interest.

Probiotics and Obesity Reduction. Nutritional and Dietetic Advice in the Community Pharmacy

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Pharmacist-Nutritionist in Sendino Pharmacy, Parla and Complutense University Collaborator, Madrid, Spain

Abstract:

INTRODUCTION

Probiotics improve intestinal microbiota and can cause a decrease in obesity. Community pharmacists with specialized training in nutrition and dietetics address these aspects on a daily basis, with a combination of based on proper diet and hydration, physical activity and probiotics.

GOALS

To evaluate the role of community pharmacists in the control of obesity and the acceptance of the population of pharmaceutical interventions with Mediterranean diet and probiotics.

Continuous training for the work team and the care population can produce an improvement in the results.

METHOD/DESIGN

Obese patients were derived to the nutrition service of a community pharmacy in 2017.

Evaluation by the pharmacist-nutritionist included: anamnesis, height measurement, bioimpedance. The dietary-nutritional approach consisted on Mediterranean diet, reinforcement in probiotics (fermented vegetables, yogurt, cheeses, kefir, pickles (sauerkraut, kimchi), kombucha, misso, natto, dark chocolate, microalgae, apple cider vinegar) and an increase of prebiotics (artichokes, chicory, garlic, onion, leek and bran). In addition, the intervention included correct hydration and physical activity, probiotics and health training and the population.

RESULTS

During the period of study a significant decrease in patients obesity was observed (30% compared 2016). The decrease in obesity was associated with an increase in probiotics sales in 2017 (by 300%). There was an improvement satisfaction surveys in 2017.

CONCLUSIONS

The community pharmacy may be an optimal place to fight obesity if it is developed by pharmacists-nutritionists and there are health training (for the team and for the population). The Mediterranean diet and certain foods and probiotic supplements improve the results.

keywords: Probiotics, Obesity, Pharmacy, Mediterranean diet

Crimean Congo Haemorrhagic fever in the WHO European Region: A systematic review

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Infectious and Tropical Diseases Group (e-INTRO). IBSAL-CIETUS (Biomedical Research Institute of Salamanca-Research Center for Tropical Diseases at the University of Salamanca), Faculty of Pharmacy, University of Salamanca, Salamanca, Spain
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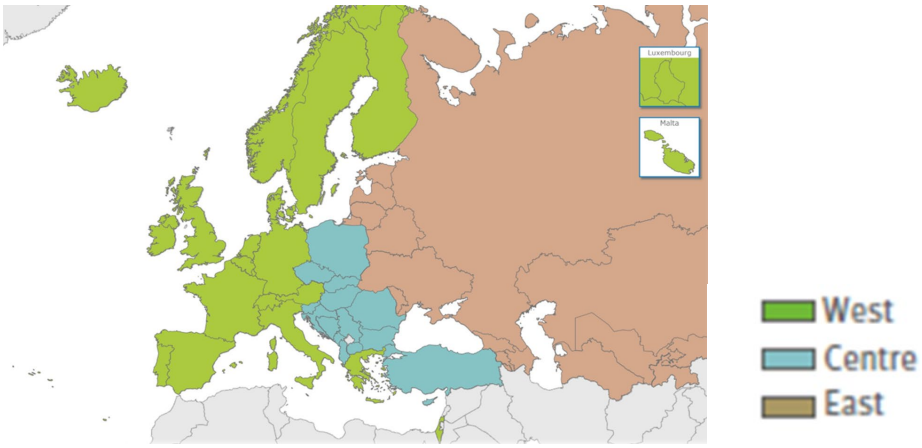
Abstract:

Background / objective: The Crimean Congo haemorrhagic fever (CCHF) is an emergent virosis associated with tick-bites, fundamentally to those of the genre *Hyalomma*, distributed in Africa, Asia and Europe. Habitually it appears as a subclinical form. Nevertheless, in some cases it can appear as a haemorrhagic fever with high mortality risk. The aim of this study was to evaluate the seroprevalence of this disease in the European region of the World Health Organisation (WHO) through the scientific evidence published in indexed journals.

Methodology / Principal findings: A systematic review, without year of publication or language restriction was conducted until the January the 26th of 2018, in order to evaluate our objective. Sixteen studies were included in the analysis (10 articles of the center Europe, 1 in the east Europe, and 5 in the West Europe), 4 articles were geographically located in Russia, but none of them with full text access. Most of the articles were descriptive studies, like cross sectional studies and case series [EL:4; RG:C, OCEBM]. Only one study of cases and controls of low quality has been found [LE:4; RG:C, OCEBM].

Conclusions / Significance: The highest seroprevalence of this disease is in the countries of the centre of Europe. Countries like Greece, with only one fatal incidence case, have zones with high prevalence of antibodies against CCHF. However, countries in the Balkan peninsula like Bulgaria and others in Eurasia predominantly Turkey have cases every year high a level a mortality risk, this is associated with the different lineage of the virus circulating in each zone.



Source: ECDC/WHO (2017). HIV/AIDS Surveillance in Europe 2017– 2016 data

Cognitive Reserve and Risk of Mild Cognitive Impairment among non-institutionalized elderly users of Community Pharmacy

Mª Teresa CLIMENT[1], Juan PARDO[2], Francisco Javier MUÑOZ-ALMARAZ[2], Daniela FEIJOO CALLES[3] and Lucrecia MORENO*[3]

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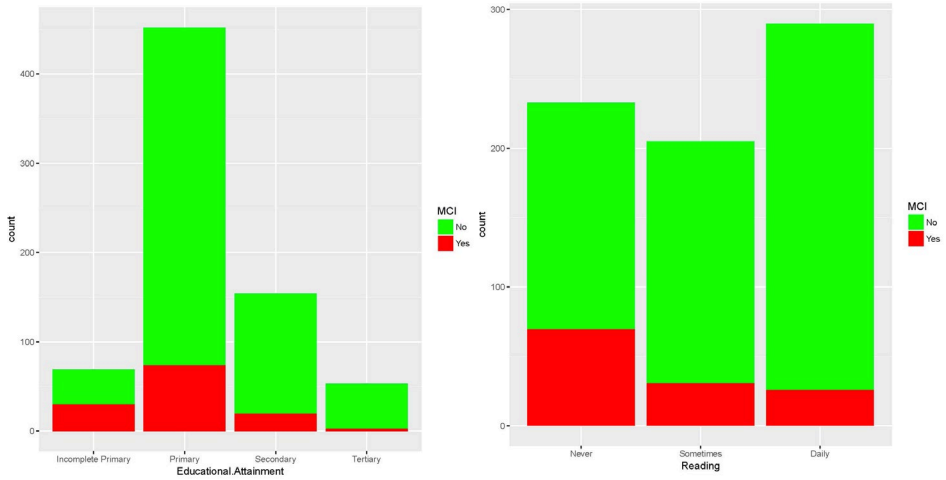
Abstract:

Introduction The early detection of mild cognitive impairment (MCI) is essential in aging societies where dementia is becoming a common manifestation among the elderly. Our aim is to discriminate individuals in risk of MCI, analyze the relationship between cognitive reserve and MCI and look for preventative lifestyle measures among non-institutionalized elderly users of community pharmacy.

Methods. A cross-sectional study was conducted. A total of 167 variables were collected. Two screening tests were used to detect MCI: Short Portable Mental State Questionnaire and the Mini-Mental State Examination.

Results. Seven hundred twenty eight patients participated (60% women and 40% men), with an average age of 74.5 ± 6.4. Regarding the level of studies, 9.5% are illiterate, 62.1% with primary education, 21.1% secondary and only had 7.3% higher education. A 17.4% of cognitive deterioration are detected. The independent variable related to lifestyle which is presented as a protective factor for MCI prevention, after univariate logistic regression analysis is read sporadically or daily versus not read, with a p value in both cases <0.001 and a OR and 95% confidence interval (CI) in both cases of 0.46 (0.28-0.73) and 0.24 (0.14-0.39). In a multivariate analysis, the daily reading continues to be a great protective factor against MCI.

Conclusion. Lifestyle-related factors such as the lack of reading habits are associated with the presence of positive in MCI test. Activities aimed at promoting the daily reading of our elders should be considered as a protective factor of MCI.


count
400
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Incomplete Primary
Primary
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Tertiary
Educational.Attainment
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No
Yes
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100
0
count
Never
Sometimes
Daily
Reading
MCI
No
Yes

Design and implementation of an awareness educational campaign promoting the prudent use of antibiotics by Pharmacy students

Celia BENDALA, María de la Paz BAUTISTA, Arián IGLESIAS, Samuel DELGADO, Manuel LÓPEZ-SILVA, Inés SUÁREZ, Asunción Nosti, Ana FERNÁNDEZ-MERA, Miranda VÁZQUEZ, María del Carmen MARTÍNEZ, Belén APARICIO and Marina SÁNCHEZ-HIDALGO*

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Antibiotic resistance, a major public health problem, has been linked to antibiotic consumption. In an attempt to promote the prudent use of antibiotics, a multifaceted campaign targeting Pharmacy students, Community Pharmacies, Hospital Pharmacy Services and general population was implemented for the first time in the Faculty of Pharmacy at University of Seville. This activity was carried out within the framework of "National Strategic and Action Plan to reduce the risk of selection and dissemination of antibiotic resistance", "Comprehensive program of prevention, control of infections related to health care and appropriate use of antimicrobials" (PIRASOA, "European Day for the prudent use of antibiotics" and "World Antibiotic Awareness Week" (12th – 18th November). Tutored students of Pharmacology and Pharmacotherapy III and Clinical Pharmacy held a public health campaign to fight antimicrobial resistance and promoting prudent use of antibiotics, holding interactive educative triptychs and posters educating the public in pharmacies and other health establishments. Likewise, digital media was used for campaign diffusion, through social networks (Facebook, twitter and Instagram) reaching a greater visibility and repercussion. At the end, campaign was rated as very successful by numerous Health and Academic institutions. A feedback regarding to the use of this innovative approach was taken from participating students. The results showed that this experience constitutes a useful tool that increases the acquisition of transversal skills in students, allowing across the enjoyment of learning, knowledge and critical thought and prepares to them to the professional future, with a closer contact with the real labor world.

Financial support and/or acknowledgments

We gratefully thank the Faculty of Pharmacy at the University of Seville for the financial support and the participation of Academic Institutions located in the campus, Community Pharmacies, Health Centers, students volunteers and the Regional University Hospitals which have joined to this initiative.

Singularities of the Pharmacy Service in the JUMISC

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and Francisco Miguel SÁNCHEZ-MARGALLO

Jesús Usón Minimally Invasive Surgery Centre (JUMISC)
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Abstract:

The Jesús Usón Minimally Invasive Surgery Center (JUMISC) is a multidisciplinary institution dedicated to research, training and innovation in the health field. It covers several fields of specialization such as: Laparoscopy, Endoscopy, Microsurgery, Endoluminal Therapy and Diagnosis, Pharmacology, Anesthesiology, Bioengineering, Cell Therapy, Assisted Reproduction and Animal Modelling.

This center is dedicated to collaborative preclinical R & D under contract following Good Laboratory Practices (BPL), creation of experimental models, practical training of minimally invasive surgery techniques and other specialties related to health.

JUMISC have our own Pharmacy Service responsible for the acquisition, dispensation and management of the consumption of medicines and other health products necessary for the proper functioning of the activities carried out in the center.

Due to our work we have many experimental animals, both large (pig, sheep) and small (rat, mouse), so one of the peculiarities of this service is that most of our drugs are for veterinary use. Although we also have medicines for human use that are used in the event that there is no drug marketed for veterinary use, with the same characteristics and indications.

Another unique function is the storage of trial products, whether new drugs or formulations as novel medical devices that will be used in preclinical trials. From the pharmacy takes control of entry and exit and the proper storage of these products. We also have a formulation laboratory where we can perform certain operations such as reconstituting the test product.

Financial support and/or acknowledgments

Jesús Usón Minimally Invasive Surgery Centre (JUMISC).

The Medication Impact on Quality of Life in patients with type 2 diabetes

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Abstract:

Introduction: Diabetes Mellitus (DM) is a chronic disease increasingly common in our society, and its prevalence increases dramatically with age, affecting both sexes and all ages. The most prevalent subtypes is the type 2 diabetes mellitus (T2DM). This is a disease that is often associated with decreased quality of life. **Objective:** The aim of this study is to characterize the quality of life of diabetic patient's polymedicated and check the degree of impact of drugs in it. **Methods:** We conducted an observational study with analytical and transversal cohort, with 74 users diagnosed with T2DM in community pharmacies in the municipality of Coimbra. The data collection was made through a questionnaire prepared for this purpose, included the questionnaire EQ-5D-3L.

Results: The results it has been found that the quality of life index has a positive association and statistically significant, although low, with the number of medications. The quality of life is lower in women, and its index is 0.556 and men is 0.682. The greater the age and the time of diagnosis, the lower is the quality of life. On average, overall, it was found that the quality of life index and health generate are reduced in users with T2DM, and the values are 0.617 and 64.5, respectively.

Conclusion: We conclude that these results are not very positive, and it is important the study and evaluation the factors that most affect the quality of life for each patient with T2DM for effective intervention.

Financial support and/or acknowledgments: not applicable

Analysis of opiate use during the period 2010 to 2016 in an urban pharmacy in the province of Santa Cruz de Tenerife

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[2] *Department of Chemical Engeniering and Pharmaceutical Technology, Section of Pharmacy, Universidad de La Laguna. Tenerife. Spain*
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Abstract:

Opioid analgesics are widely used in the treatment of acute-severe pain as well as moderate to severe chronic pain that does not respond to other treatments. In recent years, the prescription of this type of analgesic has been increasing, even for chronic non-oncological pain. This means that this "opiophobia" based on fear of addiction, possible toxicity, tolerance or bureaucratic obstacles have been left behind. However, its obvious sedative effects and potential for abuse is a sufficient reason to try to find a balance between licit and illicit use, between therapeutic effects and adverse reactions.

This study used the notes of the drugs belonging to the ATC group "N02A. Opioid analgesics", extracted from the Official Book of Narcotic Drugs of an urban pharmacy in the province of Tenerife, for a period of seven years and differentiated by sex.

At the end of the study period, a total of 1,528 dispensations were recorded, mostly to male patients. The most prescribed active ingredient was tapentadol, and mainly in female patients. It was also noted that new narcotic molecules, alone or in association, as well as the most innovative pharmaceutical forms, have almost completely relegated classic opiates, such as morphine, to the background.

For the above reasons, this study highlights the current demand for more potent analgesics that can relieve severe pain in oncological or non-oncological patients, minimizing the adverse effects produced by classic opioids as much as possible.

Financial support and/or acknowledgments

Our thanks to the Colegio Oficial de Farmacéuticos de Santa Cruz de Tenerife for the financial support provided.

Formulation and evaluation of gastroretentive floating tablets of metformin hydrochloride based on effervescence and swelling

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Abstract:

The main purpose of this study was to prepare metformin controlled released floating tablets by using swelling and effervescence technique to extend the gastric residence time and enhance its bioavailability. The floating matrix tablets were prepared by using different proportion of polymers of gums of natural origin (karaya, guar, arabic and sodium alginate), in addition to hydroxypropylmethylcellulose (HPMC K15M) with sodium bicarbonate and citric acid as gas generating agents, being as follows: formulations F1 and F2 contained karaya gum, F3 and F4 arabic gum, F5 and F6 sodium alginate, and F7 and F8 guar gum by wet granulation technique. The prepared floating tablets were evaluated for weight uniformity, drug content uniformity, friability, hardness, floating characteristics such as lag time, total floating time, compatibility studies of drug with excipients and *in vitro* release. Results shows that all prepared tablets met the Pharmacopoeia of the United Mexican States (FEUM) and pharmacotechnic criteria. Only formulations F1 and F2 floated, presenting a float delay time of 26.67 ± 3.25 s and 25.29 ± 5.41 s, respectively with a flotation of up to 24 hours. The dissolution profile showed as a result an extended release for F1 and F2 up to 88 and 93%, respectively, fulfilling the proposed objective.

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Facultad de Ciencias Químicas, Universidad Autónoma de Nuevo León

Essential contribution of The Apothecary of the Monastery of Guadalupe

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Abstract:

In the hospitals of the Monastery of Guadalupe existed a true and highly prestigious school of medicine, with a similar level to the best civil hospitals in Spain and Europe at that time. It was at the peak of its splendour in the the 14th and 15th centuries.

The complement of the hospitals of the monastery was their famous Apothecary, which had true worship. There, all the requirements for a pharmacy of that time were met. In the inventory of the Apothecary made on 23th August 1527, an abundant provision of all kind of simples and pharmaceutical products to elaborate plasters and "saucepans and little frying pans" to prepare them.

Andrés Laguna talks about the inflammations produced in the gouty people by the dilation of the tissues and, when they ulcer and open to give out a serous liquid, they can infect and become purulent. For this case, he recommends as local treatment, according to the discoveries of the hospital of Guadalupe, a kind of plaster made of old rotten cheese (fungus of the type penicillium), light turpentine, cinnabar and rancid pork fat. He was the doctor of Phillipe II and he could treat his gouty inflammations. We know that Phillipe II was (in 1570) in the Monastery of Guadalupe. He was suffering gout and he could be treated there with the old rotten cheese plasters. It can be said that in Guadalupe is the precedent of the discovery of the penicillin.

Study of the antidepressant drugs consumption in a Hospital Pharmacy Service

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Abstract:

Depression is a disabling disease that affects more than 300 million of people around the world, causing more than 800,000 suicides annually. This high incidence and the increasing consumption of antidepressants in recent years encouraged us to quantify and analyze the consumption of this therapeutic group for one year in a Hospital Pharmacy Service, located in Santa Cruz de Tenerife. Between january and december 2016, 18,874 units in unitary dose were dispensed and the most commonly group used, which included trazadone and mirtazapine, was the named "Atypical Antidepressant" (50.66%). Because of its broad therapeutic spectrum, this group seems to be the most adequate for elderly patients, commonly users of the hospital under study. Selective Serotonin Reuptake Inhibitors drugs, headed by sertraline, were the second most commonly group prescribed. Their adequate profile of adverse effects, which usually results in a very low drop-out rate together with a lower incidence of drug interactions, makes them a good therapeutic option for eminently polymedicated elderly people. It is well known that the effectiveness of the antidepressant drugs depend mostly on an adequate and long term treatment adherence. For this reason, the hospital pharmacist interventions are necessary in order to guarantee the right compliance and reduce the treatment withdrawal rate.

Financial support and/or acknowledgments

The authors thank the Colegio Oficial de Farmacéuticos de Santa Cruz de Tenerife for the financial support provided.

POSTER SESSION
SYMPOSIUM EDUSFARM

Silver nanoparticles as antibacterial agents in bone tissue infections

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Abstract:

Bone tissue engineering is an area of increasing interest because its main applications are directly related to the rising life expectancy of the population, so innovative strategies are needed for bone tissue regeneration therapies. Advances in biomedicine and materials science are determining factors in this field, since they pursue to design new biomaterials to subsequently implant them in order to replace, repair and regenerate damaged bone tissue.

Post-operative implant infections are one of the most serious complications associated with surgical treatments of bone diseases. These inflammatory processes can lead to bone destruction (osteomyelitis). Bacteria typically secrete polymeric materials after their association to form protective coatings known as biofilms. Biofilms have been defined as "aggregates of microorganisms in which cells are frequently embedded in a self-produced matrix of extracellular polymeric substances that are adherent to each other and/or a surface". The biofilm further impedes the activity of the host defenses and/or antibiotic therapy, requiring surgical intervention to remove the implant as the only effective option.

The present work is focused in finding a preventive treatment of bone infection based on Mesoporous Bioactive Glasses (MBGs) with metallic silver nanoparticles (AgNPs) embedded. MBGs exhibit unique nanostructural, textural and bioactive characteristics, optimal for bone regeneration. On the other hand, silver is an antibacterial agent that could be used as a preventive measure to avoid the formation of a bacterial biofilm in implants by incorporation of AgNPs into the MBG matrices. It summarizes the different methods AgNPs synthesis and describes their behavior as antibacterial agents.

Financial support and/or acknowledgments

There are many people I would like to thank this project. Fisrt of all, Jesús Román to give me the opportunity to participate in this Congress. Also, Inorganic and Bioinorganic Department of UCM and specially my supervisor Ana García Fontecha.

Sustainable synthesis in the synthesis of heterocycles of different sizes contained in marine toxins

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Abstract:

Oxacycles are very important structural motifs in natural products. The use of formal or total synthesis allows the biological study of the whole family of products generated. In our case, we will carry on a sustainable metal catalysis of this heterocycles using iron (III) salts. In this way, we will synthesize seven membered oxacycles, very similar in structural motifs of natural products such as ciguatoxin, brevetoxin, etc.

This synthesis will be carried out in three sequence reactions. First, a Grignard reaction to obtain different secondary tris-homolallylic alcohols. The second reaction, based in a tandem 1,5 hydride shift-Prins cyclization to obtain halogenated seven membered oxacycles, this novel reaction works with iron (III) chloride, trimethylsilyl chloride and different aldehydes to perform several chemical events. The final reaction, a dehalogenation, gave the desired oxacycles.

As we commented above, all these oxacycles present in many natural products, will be submmited for biological assays, expecting good results for this family.

Financial support and/or acknowledgments

Our thanks to the Universidad de La Laguna and Universidad de Salamanca for the financial support provided.

Preparation of supramolecular gels by self-assembly of cyclic peptides with potential pharmacological application

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Abstract:

Nowadays hydrogels are one of the most versatile systems in the field of medical engineering materials. Moreover, stimuli-responsive gels are able to rearrange their supramolecular structure according the environment conditions, thus triggering a response to a set of determined specific conditions. A plausible approach for the preparation of such systems is the use of peptide derivatives.

Here we propose the use of amphiphilic cyclic peptides as building blocks for the preparation of gels triggered by pH changes. We have prepared two scaffolds bearing one or two alkoxyamine moieties intended for the selective functionalization with hydrophobic aldehydes. We also included basic residues of histidine and lysine in order to implement a pH response. We studied their ability to form gels as response to pH changes and their viscoelastic properties. Atomic Force Microscopy imaging revealed that these gels are composed by a network of cyclopeptidic nanotubes of different length. Our results suggest that both the hydrophobicity of the oxime and the number of oximes determine the properties of the gel network.

Financial support and/or acknowledgments

Financial support

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Characterization of matricellular protein hevin in post-mortem human brain

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Abstract:

The relationship between neuropsychiatric disorders and alterations in extracellular matrix (ECM) molecules has been recently described. In contrast to most matricellular proteins that are only expressed during brain development hevin remains expressed at high levels in adult brain, where it participates in neuronal plasticity by linking pre- and post-synaptic proteins. Hevin is secreted as a glycoprotein and we hypothesize that differential glycosylation of hevin might be implicated in physiological and pathological CNS functioning. The aim of the present study was to characterize the regional and subcellular expression of hevin immunoreactivity by western blot in postmortem human brain. First of all, a specific anti-human hevin antibody was found and the appropriate sample amount and antibody dilutions were determined. Two specific immunoreactive bands were observed: one migrating at around 130 kDa and another one around 100 kDa, which seems to correspond to the two forms previously described in rodents. Both bands presented similar regional and subcellular distribution: higher expression in prefrontal cortex and in the fraction enriched in neuronal membranes. In order to define the biochemical nature of two hevin forms, i) time-dependent degradation, ii) deglycosylation and iii) dephosphorylation assays were performed. Hevin 100 kDa band does not seem to be a degradation product of the 130 kDa band. Besides, we demonstrated that two hevin forms are glycosylated proteins, but do not seem to be phosphorylated.

Altogether, these results indicate a role for hevin in adult brain, and constitute a useful reference for future studies of hevin in pathological and non-pathological human brain.

Financial support and/or acknowledgments

This work was supported by Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Spain; Basque Government (IT616/13); Fundación Vital (2018 to AE); and Agence Nationale de la Recherche (ANR JCJC 2015 Hevinsynapse to VV).

Dose Administration Aids

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Abstract:

The Dose Administration Aids (DDA) is a useful tool to improve the therapeutic adherence of certain patient profiles and is a service that can be provided by the Community Pharmacy. However, owing to the fact that this service has increased, it can also be extrapolated to other levels of care, such as hospitals or social health centers. There are many devices with different kinds of features, as well as tools and devices which help or optimize the development of DDA. Overall, we should know about the different types of DDA on the market, their characteristics and their advantages /disadvantages in order to choose the most suitable one.

The **objective** is to make a review of the different types of DDA that exist on the market, analyze the advantages and disadvantages of each one and evaluate their suitability according to their use, the patient´s profile and type of pharmacy.

Results and conclusions: Three groups of DDA have been identified: manual, semi-automatic and automatic with their different subtypes. The evaluation of their advantages and disadvantages has as a result that a pharmacy that wants to start in the MDP Service, is recommended to make use of a non-reusable manual DDA for the ease of its implementation and minimum cost. Depending on the processing level and the investment availabilities, a semiautomatic DDA can be considered. Automatic robots should be reserved for many patients because they involve very high investments which are difficult to amortize for the current average production of the Spanish pharmacy.

Review of alzheimer's disease: treatments and new pharmacological strategies

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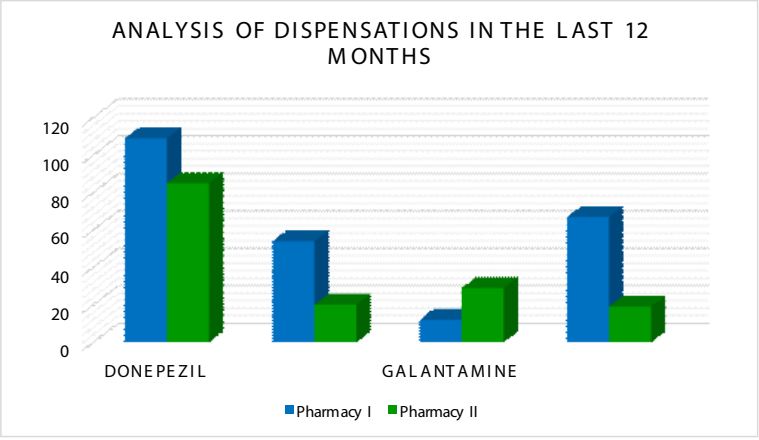
Alzheimer's disease (AD) belongs to a group of pathologies called dementias, being this one the most common type. It is a neurodegenerative disease that causes a progressive and disabling impairment of cognitive functions, which include memory, comprehension, language, attention, reasoning and judgment. Till the date there is no cure, although there are treatments available that can improve the symptoms. In this work we describe the disease, its classification and prognosis, as well as its physiopathological mechanism and the different diagnostic techniques currently used. In addition, we perform an analysis of different therapies both pharmacological and non-pharmacological, focusing on conventional drugs marketed so far, making a comparison between them, and those strategies or therapeutic targets that are in research and in different phases of clinical trials and that project different perspectives towards the future. For this, we carry out a bibliographic review of the most updated scientific literature, analyzing the most relevant information about this disease. Finally, as a practical contribution to complement and conclude this study, we collect the dispensing data of several pharmacy offices, to approximate the data obtained through the bibliographic analysis with the treatments that are currently used in the Spanish population.



Dispensed units of drugs for the treatment of AD in 2017. Data obtained from Pharmacy I and Pharmacy II.

Evaluation of the preparation of sterile intravenous mixtures in the pharmacy service of the general university hospital of elche, according to the risk matrix

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Abstract:

The preparation of intravenous mixtures is an important part in all hospital pharmacy services, since parenteral drugs present a greater risk for the patient and an increased risk of microbiological contamination during handling. For this reason, the *Guide for good practices for the preparation of medicines in hospital pharmacy services* has been prepared, which proposes a risk matrix for the evaluation of sterile preparations. Depending on the level of risk obtained (high, medium or low), it establishes the most appropriate preparation and conservation requirements. The objective of this study is to evaluate all the preparations of intravenous mixtures made in the pharmacy service of the General University Hospital of Elche, applying the proposed risk matrix.

In order to achieve the study, all the cards for the preparation are reviewed and updated in order to subsequently collect all the necessary data and carry out the classification.

Results: A total of 87 preparations are analyzed; none is high risk, 85% are medium risk, and 15% are low risk. These last ones are the most interesting, as they are the only ones that could be prepared in the nursing units of the hospitalization floors. Therefore, depending on the classification, it would be justified to have some preparations done by the pharmacy service and others could be done by the nurses with the necessary recommendations.

Conclusion: Thanks to the application of the risk matrix, we can ensure more adequate preparation conditions; providing a better organization and use of resources to all parties involved.

Effect of ozone expossure on a model of maternal deprivation in rats

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Abstract:

Childhood maltreatment (CM) is one of the biggest social and economic problems worldwide. Among people affected by CM there is a high prevalence, inter alia, of violence, drugs abuse and psychiatric disorders. At the physiological level, the Hypothalamic-Pituitary-Adrenal axis and the stress response are key to this prevalence. Moreover, in recent years, pollution has become an important issue because it affects directly human health. The objective of this experiment is to elucidate the effect of a chronic exposure to pollution, in particular ozone, on some biomarkers in a maternal deprivation animal model. We will measure how ozone exposure affects cognitive ability as well as anxiety state. Besides, the plasma variation of corticosterone and ACTH after an acute stressor will be analysed. We will also see if hippocampus and hippocampal subareas volume is altered in the animal model after the exposure to ozone. Finally, we will evaluate the methylation state of the exon promotor of glucocorticoid – receptor 1F and the exon promotor of vasopressin. This study is thought to start looking for the answer to how pollution affects the cognitive development of children who have suffered from CM.

Financial support and/or acknowledgments

I would like to thank my family for the unconditional support along these five years, and to my tutor for the guidance in this project.

Novel in Situ Gelling Systems in Ophtalmic Preparations

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Abstract:

The administration of drugs through the ocular topical route supposes a considerable reduction of its bioavailability (naso-lacrimal drainage, protection mechanisms of the eye such as blinking and loss towards systemic circulation), which translates into a short therapeutic effect.

Currently, *in situ* gelling systems are being studied as a new alternative for the ocular topical route. They are drug controlled release systems that are in a solution phase before their administration in the eye, and which are transformed into gel after instillation. This mechanism depends on parameters such as temperature, presence of ions or alteration of pH. These systems are based on the use of polymers called "intelligent polymers", depending on the physicochemical conditions of the environment. The gelation involves an increase in viscosity and, therefore, an increase in resistance to naso-lacrimal drainage. This converts them into controlled release systems that prolongs the local action of drugs. Compared with conventional delivery systems, they have the following advantages: lower frequency of dose administration and greater therapeutic adherence to the patient.

This final degree project consists of a detailed bibliographic review of the main polymers used in these systems. Information has been gathered about the optimal concentrations of each polymer. Likewise, it has been observed how several authors prefer the association of different polymeric materials in order to improve their rheological properties and how this synergistic effect is translated into different commercial preparations.

For its realization, several articles obtained from scientific databases, book chapters and websites of official institutions have been consulted.

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University of Seville.

New Therapeutic Approaches in the Treatment of the Non Alcoholic Fatty Liver Disease

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Abstract:

Non alcoholic fatty liver disease is defined as excessive lipid accumulation in the liver. It goes from simple hepatic steatosis to non alcoholic steatohepatitis where inflammation, fibrosis and cell death are already present. Its prevalence is increasing exponentially, following the tendency of increase of the metabolic syndrome, which is very common among individuals with this disease. It is estimated to become the leading cause of hepatic transplantation in the near future.

The final goal of this monography is to systemize the existing information about the treatment of the non alcoholic fatty liver disease. The first option of treatment consists of lifestyle changes with loss of weight through diet and physical activity.

Unfortunately, this strategy is unsuccessful in most cases, thus it is essential to be conjugated with a pharmacological approach that treats the several components of the metabolic syndrome or halts the physiopathological mechanisms of the disease.

Until now, no drug has demonstrated having therapeutic benefit high enough to be approved as specify treatment for non alcoholic fatty liver disease. With the notion that the prevalence of this pathology is going to keep rising, the therapeutic emptiness associated with this disease becomes a problematic issue, making it necessary that the investigation in this field continues. Therefore it is essential to know more about the disease pathology and to identify risk factors associated with worse prognosis in order to make it possible to effectively focus the treatment, discover new targets and adapt the treatment to each individual.

Financial support and/or acknowledgments

None

Antimicrobial Resistance in Bacteria: Causes and Solutions

Cristina BAUSET* and Jesús ZUECO

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Abstract:

Antimicrobial Resistance in Bacteria is one of the most serious and worrying life-threatening issues that health systems are fighting against nowadays. Experts establish that we are witnessing the beginning of the end of the Antibiotic Era and that, consequently, infectious diseases are about to become an unsolvable problem again. To address this crisis, scientists from different fields are focusing their efforts on evaluating, analysing and trying understand why and how this process is taking place so quickly. Since the discovery of antimicrobial drugs, resistance mechanisms were predicted but no one would have believed that the situation would become as troubling as it is nowadays and that we would return to the Pre-Antibiotic Era. The present revision analyses the causes of the emergence of bacterial strains resistant to antibiotics, both, from the point of view of the molecular mechanisms that act at the bacterial cell level, and from the point of view of the misuse and abuse of antibiotics by health care professionals, patients and the farming industry. It also includes an approach to the consequences which would arise if this situation continues in the future, as well as a series of measures and programs addressing the problem. Some of the initiatives presented are already put in place in different countries, from antibiotic stewardship programs and information campaigns to the Small World Initiative, a crowdsourcing initiative aimed at discovering new antibiotics. To recover the situation and prevent further complications, public awareness and funding are required.

Targeted pharmacotherapy in autoimmune arthritis: global review and comparative analysis

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Abstract:

Rheumatic diseases are very diverse pathologies with high prevalence and impact on society. Recently, a new therapeutic approach has arisen: targeted therapy, which has been implanted especially in autoimmune arthritis. These new drugs are diseases modifiers, both biological and synthetic, with wide variability of action mechanisms and dosage forms. Their effectiveness seems evident compared to the previous alternatives (although they do not control 100% of the cases), and their safety profile is acceptable despite their immunosuppressive mechanism, but long-term pharmacovigilance seems essential. Their high cost is a big limitation, being always necessary to analyse their cost-effectiveness, and the recent availability of biosimilars may be the key to expand the use of targeted therapy. At the same time, new therapeutic strategies have appeared, highlighting the good results achieved by *Treat-to-target*, an aggressive approach with response monitorization. In addition, research in the field is constant, with new options focussed on known or new targets that may be available soon. Despite all of this, due to the scarcity of head-to-head studies among these new drugs, positioning them is really difficult, and pointing out an option as superior to the others does not seem possible. It is necessary to individualize the therapy considering the characteristics of each patient and the particularities of each drug.

Financial support and/or acknowledgments

To my tutor, Jose Ángel Fontenla.
To Eva López-Urrutia and Francisco Martínez for their critical view.
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Design of an experimental translational medicine protocol to evaluate the effect of *Sugammadex* on cognition

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Abstract:

INTRODUCTION

Translational medicine aims to use clinical practice to generate hypotheses that, after being confirmed by using basic investigation, implies an improvement in diagnosis and treatment of diseases. Postoperative Cognitive Dysfunction (POCD) is a well-known clinical phenomenon and occurs after anaesthesia applied in major surgery. Based on clinical observation, we hypothesized that Sugammadex could facilitate postoperative cognitive function and early recovery after cardiac surgery.

OBJECTIVE

To design a protocol of a translational medicine to be able to measure the effect that Sugammadex has on cognition, and to carry out in an animal model a preliminary study on the effect of it.

METHODS

Bibliographic review of the different scientific databases, PubMed, and Cochrane, about the most frequently used diagnostic methods of POCD, subsequent evaluation by experts in neurology and adaptation to our study model.

The preliminary animal study was conducted in Valencian Principe Felipe Investigation Centre, 28 rats were used, which were divided into 4 groups with or without surgery and with saline or with Sugammadex, and the Morris Water Maze test was performed.

RESULTS

The preliminary study shows that in animals treated with Sugammadex ($P<0.05$), there is an improvement in its postoperative cognitive recovery. With Postoperative Quality Recovery Scale (PQRS), physiologic, nociceptive, functional, cognitive, emotional recovery domains assessed as well as overall patient perspective and repeated measures allow for assessment over time, from immediate recovery to long-term follow up.

CONCLUSION

The PQRS scale presents an objective assessment of postoperative cognition recovery, and preliminary study suggests further investigations are needed.

Study of pharmacological potential of plants and algae from the Caribbean Sea

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Abstract:

The discovery of pharmacologically active compounds based on marine natural products is a relatively new trend and strategy in Pharmaceutical Sciences since Yondelis® (trabectedin) was isolated from the marine tunicate *Ecteinascidia turbinata* and approved for osteosarcoma. After such discovery, many pharmaceutical industries and research groups are focusing their drug discovery programmes on marine organisms. In this study, extracts from different species of marine plants and algae from the Caribbean Sea (*Syringodium filiforme*, *Thalassia testudinum*, *Sargassum fluitans* and *Ulva lactuca*) have been screened in a wide range of bioassays. The pharmacological activity of these extracts was evaluated as enzyme inhibition potential related to neurodegenerative diseases (acetylcholinesterase, monoamine oxidase A), metabolic diseases (lipase, alpha- glucosidase) or inflammation (lipoxygenase). Enzyme inhibition assays were run using colorimetric tests with appropriate substrates, enzymes and reference substances. Polyphenol content was quantified through the Folin-Ciocalteu method, the antioxidant activity by the DPPH radical scavenging test and the cytotoxicity was evaluated using the MTT test in hepatocarcinoma cells (Huh-7-Lunet). Among all extracts, *Thalassia testudinum* was the most promising sample because of its antioxidant, neuroprotective and antidiabetic potential without being cytotoxic at the tested concentrations; this marine plant might be a good starting point of bioactive molecules with pharmaceutical or nutritional interest.

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Implication of microRNAs in the development of melanoma and its application in the prevention of resistance to target therapy

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Abstract:

Until 2010, the prognosis of patients with stage IV melanoma was not very encouraging since "traditional" chemotherapy offered low responses and even smaller survival rates. Nevertheless, advances in the field of genetic alterations allowed the development of the target therapy against the B-Raf proto-oncogene serine/threonine kinase (BRAF) of the Mitogen Activated Protein Kinase (MAPK/ERK) pathway, which achieved unprecedented results in this type of cancer. Despite these promising results, resistance began to appear after a certain period of time. Nowadays, the therapy of choice in metastatic melanoma is either the combination of two inhibitors of the MAPK/ERK pathway, or immunotherapy. However, patients continue to progress, which may be due to an incomplete knowledge of the mechanisms underlying melanoma. Following on from this, recent research suggests that the deregulation in the microRNA's profile is responsible for a series of alterations in the MAPK/ERK pathway that contribute to cancer progression. miR-524-5p and miR-579-3p are two of the microRNAs that show lower levels in melanoma, and certain studies suggest that the restoration of their basal levels could reverse the malignant phenotype and help prevent the appearance of resistance to target therapy, as well as to overcome them once established.

Key words: "melanoma", "microRNA", "treatment" and "drug resistance".

Contribute to the sustainability of the Portuguese healthcare system in the health technologies area

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Abstract:

During the last years the pharmaceutical market has gone through profound modifications, and although some of the reasons are related with spontaneous and natural phenomena, most of them are deeply connected with a change in perspective, which is almost the harbinger of a paradigm shift. This work analyses the transformation and transition that healthcare systems around Europe are undergoing regarding access to medicines, and particularizes the case of Portugal. Firstly, measures related with pricing and reimbursement are discussed, and then policies related to budget containment are also analysed, although there is a strong correlation between these two. These topics are exposed from a European Union perspective (incentives and proposals from centralised entities), Member States viewpoint (embracing measures and strategies, with relevant examples), and lastly, bearing in mind the Portuguese approach. These sections that concentrate their focus in Portugal are important because, although it is not a top target country for European market access, it is interestingly considered a guide for the Europe's future in what control of costs with healthcare is concerned. From this point, a brief description of a European joint negotiation and purchasing model follows, which was thought to be aligned with the European tendencies on these matters. This model is presented as being sustained by several entities such as NCAs and some of the EMA's branches, and by processes such as the one found in the Joint Procurement of medical countermeasures. A small reflection is then carried on about the benefits and eventual constraints of this proposal.

Financial support and/or acknowledgments

This research was done under the remit of the Integrated Master's degree in Pharmaceutical Sciences at the Faculty of Pharmacy of the University of Lisbon, to which I address my recognition and thankfulness.

A particular word of gratitude to Professor Dr. Hélder Mota-Filipe for his guidance and support.

The role of nutrition, obesity and alcohol in the development of cancer

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Abstract:

Nowadays, cancer is one of the biggest public health problems worldwide, and even though it is a complex and multifactorial disease in which the genetic mechanisms of regulation and growth control are affected, it is largely preventable.

This is because, although it is partly a genetic disease, it originates mainly as consequence of lifestyle, diet, tobacco and alcohol consumption, obesity and infectious agents (with an estimated aetiologic fraction of 90%). That is, although hereditary factors can not be modified, lifestyle and environmental factors - regardless of their aetiologic fraction - are potentially modifiable.

In the present work, diet, obesity and alcohol are addressed, making a review of the most recent data on the positive associations of these factors with different types of cancer.

The relationship of the different food groups and the importance of the methods of preparation and conservation are described; also, the molecular bases responsible for the carcinogenesis caused by obesity and the intake of alcoholic beverages are detailed.

Financial support and/or acknowledgments

Universidad Europea de Madrid

Nanometric and vectorized gold as a potential strategy towards Treatment of Rheumatoid Arthritis

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Abstract:

Gold nanoparticles have been used since ancient times for ornamental and healing purposes. In the last decades, its study has been promoted by the scientific community due to to its unique physical, chemical and optical properties, dependent on size. Recently, this has constituted one of the biggest advances in applied nanotechnology in health. In pharmaceutical science, nanoparticles can be innovative tools for analysis, diagnosis and therapeutic procedures. Nowadays, nanoparticles are used as drug delivery devices in order to reduce either doses or adverse effects since they improve the biodistribution of drugs by making a modified and adapted release to treat diseases such as rheumatoid arthritis. This pathology of unknown origin is treated with disease-modifying anti-rheumatic drugs, such as methotrexate and tocilizumab, whose purpose is to slow down the process, which can even stop the evolution of the disease and prevent further damage to the disease affected areas. However, these drugs have high toxicity when they are used for long periods of time. As an alternative to current therapy, this work aims to study the potential improvement in treatment by encapsulating methotrexate in gold nanoparticles, as well as vectorizing them with tocilizumab.

Key words: nanotechnology, gold nanoparticles, rheumatoid arthritis, methotrexate, tocilizumab.

Financial support and/or acknowledgments

I would like to thank my family for the unconditional support along these five years, and to my tutor for the guidance in this project.

Effectiveness of a multidisciplinary Medication Review Service with Follow Up for patients receiving coumarin anticoagulant therapy in the primary care setting

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Abstract:

The treatment with coumarin anticoagulants presents an optimal risk-benefit balance for patients with a TRT (Time in Therapeutic Range) >70%. The difficulty in reaching this goal in some patients limits the usefulness of this effective and experienced treatment. The integration of the pharmacist in the multidisciplinary team could improve the control of anticoagulated patients. This study was a randomized controlled trial in which patients with TRT less than 70% participated to compare the effectiveness of the Medication review with follow up (MRF) in these patients with respect to the usual practice. Community pharmacies from the area of Arrabal and Picarral (Zaragoza, Spain) participated, and provided the service. As a result of the Service, a report was prepared to the general practitioner. The outcome variables were: TTR of Rosendaal, health related to quality of life, pharmacologic adherence, intake of vitamin K and patient knowledge about the use of acenocoumarol at 6 months. A statistical analysis was carried out using the Fisher exact test and McNemar test for qualitative variables and the Student's T test or MannWhitney "U" for quantitative variables. TRT, vitamin K intake and knowledge improved statistically significantly after 6 months of service provision ($p<0,05$). The results show that the inclusion of the pharmacist in the multidisciplinary team, educating the patient and providing information of high utility for the prescribing physician, can be essential in the comprehensive approach of these patients, with favorable clinical results.

Financial support and/or acknowledgments

Authors want to thank Innovation in Pharmacy: Advances and Perspectives congress and Universidad San Jorge.

Health significance of transmission of carbapenem-resistant *Klebsiella pneumoniae* in the hospital

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Abstract:

Klebsiella pneumoniae is a bacterium that in many cases is the carrier of a multidrug resistance gene, so it is of great importance in the hospitals of our country. It can produce different carbapenemasas which provides the bacteria resistance to different types of antibiotics. Due to this resistance it has become a major concern in the hospitals, since these antimicrobials are used as alternative treatment in critical patients.

The main objective of this review was to delve into the importance of this multidrug resistant bacteria in the hospital field. So a research has been carried out following numerous articles published about *Klebsiella pneumoniae* producing carbapenemases in hospitals, divideng the research in 3 main blocks: Resistance, epidemiology, prevention and control measures.

Results: It is a bacterium that colonizes and infects hospitals and patients immunocompromised or with an underlaying pathology, causing infections in the bloodstream, pneumonia or meningitis among others. Studies show an increase of prevalence of this pathogen. Highlighting the presence of OXA 48 and VIM where there is an interregional spread, with an increase in the outpatient hospital cases. The preventive measures are important to prevent or control the outbreaks that could be originated in hospitals.

Conclusions: The presence of this multidrug resistant pathogen has been increasing and with it, its serious consequences since it has a high rate of mortality. This is why it is important to know the prevention measures as well as the need of further studies and research, to avoid the appearance of nosocomial outbreaks.

Financial support and/or acknowledgments

Our thanks to the Universidad de La Laguna and Universidad de Salamanca for the financial support provided.

Cannabinoid receptor type 2 characterization in bile duct ligation-induced hepatic fibrosis

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Abstract:

Liver fibrosis is a pathological process involving different cellular populations of hepatic and extrahepatic nature that arises after a persistent pernicious stimulus on the liver regardless of its etiology. Despite what was initially stated about the irreversibility of the fibrogenic process, current research suggests that it could be reversible. In the last decade, heterogeneity has been demonstrated in tissue and cellular distribution of the endocannabinoid system (SE) as well as its important regulatory role in multiple chronic inflammatory pathologies, among them, hepatic fibrosis. The expression of the cannabinoid receptor 2 (CB2) in the main cell populations altered in hepatic fibrosis positions it as an important target for study due to its potential antifibrogenic function.

The use of experimental animal models is fundamental to achieve the aforementioned objectives. Inflammatory cholestasis is one of the most frequent causes of hepatic fibrosis and a surgical model has been developed, the bile duct ligation (BDL), which effectively mimics this pathology and its different stages.

The present study evaluates the ability of the experimental model of BDL to induce hepatic fibrosis and the characterization of CB2 expression under this condition. The mice subjected to BDL showed signs of liver damage with significant increases in transaminase activity, bilirubin levels and hepatic collagen content, as well as structural alterations which are characteristic of hepatic fibrosis. Results indicated a differential expression of the CB2 receptor between sham and BDL mice, suggesting a regulatory and attenuating role on the fibrogenic process mediated by CB2 in cholestasis-induced liver diseases.

Financial support and/or acknowledgments

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Cinnamic acid derivatives: a contribution for the study of cyclooxygenase inhibition

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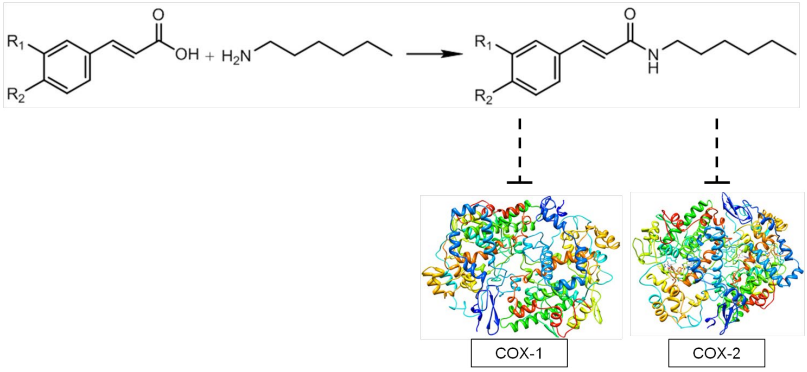
Abstract:

The role of cyclooxygenase (COX) in inflammation, pain and fever has long been established: this enzyme catalyzes the conversion of arachidonic acid into prostanoids PGG2 and PGH2, with the latter being the substrate for the formation of other prostaglandins, as well as prostacyclin (PGI2) and thromboxane A2 (TXA2, stimulator of platelet activation and aggregation). COX inhibitors known as nonsteroidal anti-inflammatory drugs (NSAIDs) have long been used to treat the previously mentioned symptoms. Knowledge on this field was significantly upgraded when a second isoform of COX was discovered (COX-2). It is now accepted that COX-1 is mostly constitutively-expressed, assuring homeostasis and normal physiological function of the cells and tissues where it is found, while COX-2 is for the most part inducible-expressed, with a decisive role in inflammatory responses. Such findings led to the development of new drugs which specifically inhibit COX-2 – the coxibs.

Following a number of studies with cinnamic acid derivatives, which revealed antioxidant and antitumoral activities, hexylamides of different cinnamic acids were synthesized and their inhibitory activity on COX-1 and COX-2 was assessed. The current thesis aims to present the synthesis methodologies for three of those hexylamides (as well as for more complex hexylamides which could be assessed for their COX-inhibiting activity in the future), in addition to the results of their COX-inhibiting activity studies.

Graphical abstract



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Neurotoxicity of synthetic cathinones and evaluation of putative neuroprotectors

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β-keto amphetamines are a group of cathinone derivatives, recently emerged as new psychoactive drugs, advertised as safe and legal alternatives to classical amphetamines. However, it has been demonstrated that many of these drugs display a similar or even worse toxicological profile.

Herein, we used differentiated dopaminergic SH-SY5Y cells as *in vitro* model to study the neurotoxicity of 2 β-keto amphetamines lacking the methylenedioxy ring, 3,4-dimethylmethcatinone and mephedrone, and compared their effects with methamphetamine. All tested compounds have particular affinity to dopaminergic transporters.

In order to obtain a dopaminergic phenotype, SH-SY5Y cells were differentiated with retinoic acid and 12-*O*-tetradecanoyl-phorbol-13-acetate for 6 days. Cells were then acutely exposed to drugs on a concentration range (0-5mM) for 6h, 12h or 24h, after which cell viability was evaluated by MTT reduction and neutral red uptake assays. Production of ROS/RNS was assessed using the 2',7'-dichlorodihydrofluorescein diacetate probe. Neuroprotection studies were done with NAC (1 mM), an antioxidant, or clorgyline (100 nM), a specific and irreversible MAO-A inhibitor, pre-treating cells 30 min prior the exposure to the drug concentrations that promoted 25%, 50% or 75% of toxicity (TC25, TC50 or TC75, respectively), as assessed by the MTT reduction assay at 24h exposure.

All tested compounds induced cell death in a concentration and time-dependent manner on both viability assays, evidencing 3,4-dimethylmethcathinone as the most toxic drug, followed by mephedrone and methamphetamine. Pre-treatment with NAC or clorgyline was neuroprotective for the two cathinones tested, in accordance to the MTT reduction assay and also to a decreased ROS/RNS production.

In conclusion, cathinones lacking the methylenedioxyring exhibited higher toxicity than methamphetamine. Further studies are needed to unveil the mechanism of their dopaminergic toxicity and to reveal therapeutic targets.

Acknowledgments:

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Metabolomics of extracts and biomolecules of *Palmaria palmata*

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Abstract:

There are few researchs on *Palmaria palmata* seaweed and mycosporine-like amino acid (MAA), just describe about species from Irish and Canadian Atlantic coast. These biomolecules present antioxidant bioactivity, as donor of electrons to reactive oxygen and nitrogen species, and photoprotective capacity that absorb in UVB and UVA wavelengths, these properties protect these marine organisms during long exposures to the sun.

The solid/liquid sequential extracts in water, 50% ethanol, 100% ethanol and in hexane, derived from the *P. palmata* seaweed collect from the Northwest coast of Galicia, were evaluated their photoprotective properties and antioxidant bioactivity, by methods of UV-Visible spectrophotometry, also ORAC and ABTSR essays, respectively. These results indicated the potential presence of MAA in our aqueous extract of *P. palmata*.

The aqueous extract was analyzed by high performance liquid chromatography (HPLC) and mass spectrometry, to identify possible MAA that could found in *P. palmata* and determinated its biochemical composition about these bioactive biomolecules. The analytical chromatographic method was optimized until a good resolution between the peaks obtained and, in this way, recovery the preparative fractions with high levels of biomolecule purity. In our aqueous extract we finally identified seven main MAAs (shinorin, palithine, mycosporine-methylamineserine, mycosporine-methylamineglyicine, porphyra-334, asterine and palithinol), setting up their chemical structures by molecular modeling. The MAAs with highest amounts were quantified, using the molar absorptivities described in the maximum wavelength, of the different fractions collected in preparative HPLC.

Acknowledgements

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Nephrotoxicity biomarkers able to identify oncological patients at risk of developing kidney damage

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Abstract:

Cisplatin and carboplatin are very used drugs for the treatment of solid tumours. However, their efficacy is limited by their nephrotoxicity. It is known that 25-30% of the patients that have been exposed to these treatments will end up developing acute kidney injury (AKI). Nowadays, for the clinical diagnosis of AKI some biomarkers are used, such as plasma creatinine and urea, which are not very sensitive and specific. The aim of this work is focused on searching some urinary biomarkers able to predict the occurrence of a possible kidney damage even before starting the treatment, being able to classify the patients according to their severity, to predict the evolution of kidney function and to carry out a more adapted treatment for every patient.

A clinical study was carried out with voluntary patients from the Oncology Service of the University Hospital of Salamanca. The studied biomarkers were proteinuria, N-acetil-β-glucosamidinase (NAG), neutrophil gelatinase-associated lipocalin (NGAL) and albumin. The quantification of these proteins in urine was performed by colorimetric methods and ELISA.

It was evidenced that the levels of the biomarkers in the basal time and in the one before the maximum kidney damage are practically the same, what indicates that these levels do not vary during the chemotherapy cycle. Moreover, they could indicate, before starting the treatment, that kidney damage is going to happen. These biomarkers would be a great advantage in determining, before undergoing the first chemotherapy cycle, whether a patient will suffer kidney complications.

Financial support and/or acknowledgments

Hernández-Sánchez MT is a recipient of a predoctoral fellowship from the Junta de Castilla y León (Spain) and the European Social Fund from the European Commission.

Development of cubosomes for topical application

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Abstract:

The skin is an excellent barrier that avoids the access of exogenous substances to the organism; however it is also considered one of the main routes for drug delivery. Nevertheless, skin absorption of drugs strongly depends on the physicochemical properties of the molecule that is trying to cross it. One of the strategies currently investigated is the use of nanoparticles to enhance drug permeability through the skin. Liposomes have been widely studied with this aim. Another interesting nanoparticle type, which is less known, is cubosome.

The aim of this work was to try to reproduce a method reported in the literature to prepare cubosomes in the laboratory. Three preparation procedures were assayed comparing size (mean diameter), distribution and Z potential. Cubosomes were then compared with liposomes, already prepared in the research group, in terms of drug entrapment efficacy and release profile.

As model drugs two active pharmaceutical ingredients were selected based on its lipophilicity: caffeine and naproxen.

None of the nanoparticles entrapped the hydrophilic drug, while both yield similar entrapment efficiency of the lipophilic model. Both nanoparticles showed controlled release but different behaviour was observed.

Peptide Vaccines and their use for the Treatment of Breast Cancer

Lorena GONZÁLEZ*, Rosa HERNÁNDEZ, Manoli IGARTUA and Aiala SALVADOR

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Abstract:

The word "cancer" comprehends all those malignancies involving abnormal cell growth with the potential to invade other parts of the body. Among them, breast cancer is the most frequent in women, consisting on nearly 30% of cancers, and the one that causes more deaths. Every year, breast cancer incidence rates increase, what it comes to mean that 1 woman out of 8 will develop breast cancer in some point of their life.

Most of the treatments we nowadays have are harmful to the patient's body, and not only to the malignant cells, provoking pain, blood disorders... Moreover, as the evolution of tumors does not depend on a single factor, with this type of therapy total recover is not always possible. Chasing for information on breast cancer development, and with the aim of finding a more specific and effective way for treating it, a new line of therapy has appeared: immunotherapy.

Therefore, the purpose of this end of degree project has been to review one of the main strategies in cancer immunotherapy. In this review, we have focused on peptide-based vaccines, which consist in the administration of tumor-related antigens to induce a correct activation of the immune system. To this end, the different qualities of the tumor microenvironment have been described, as well as the strategies by which peptide vaccines aim to achieve their function, such as antigens or formulations that already have reached the clinical stage.

Clearing of 3D Intact Tissues by optimizing switch methodology

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Abstract:

The high-resolution information required to understand the complex interactions between different cell types, endogenous molecules, as well as structure-function relationships, remains a challenge today. The limitation in the use of serial thin sections turns into a growing trend to develop tissue-clearing techniques that enable imaging of transparent and permeable samples for an adequate phenotyping of intact organs.

In the present work, our goal is to optimize a simple clearing method for optimal proteomic imaging in three dimensions using different murine tissues (brain, spleen, liver and kidney) in order to study structural and molecular properties.

To achieve this, the SWITCH methodology is able to obtain transparent tissues without significant alterations, through the lipid removal and the balance of the refractive index, which causes the obscuring effects of light scatter. One of the advantages that provides, in contrast to other techniques, is a stable fixation by using the crosslinking agent glutaraldehyde (GA). Uniform GA-tissue-gel has allowed the use of extreme temperatures (80ºC) for clearing in 24 hours without tissue damage. The method does not require perfusion or needs any special equipment/reagents.

After characterizing the expression of different cell markers by immunofluorescence and multiphoton microscopy, the results indicate high structural integrity, high preservation of endogenous biomolecules as well as their antigenicity after treatment.

Knowing the integrated high-dimensional information may accelerate our understanding of biological systems at multiple levels, assuming a great interest in many fields of basic clinical-therapeutic research.

Financial support and/or acknowledgments

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Acquired predisposition to renal damage associated to tobacco consumption

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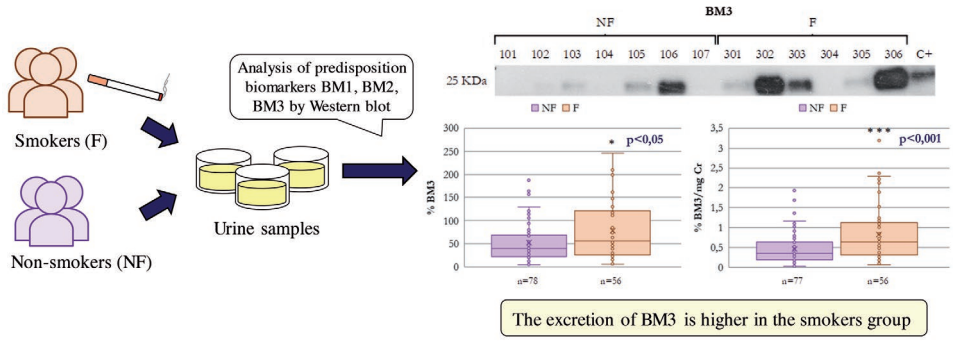
Abstract:

Tobacco is a risk factor for several diseases such as cardiovascular and respiratory disorders or some tumours. Moreover, a relation between tobacco and renal damage has also been described during the last years. Referring to early diagnosis of renal disease, our group has developed the acquired predisposition concept, which can be applied to the smoking patient context. So, our hypothesis is that tobacco may cause predisposition to acute kidney injury (AKI), which means smokers may suffer AKI after being exposed to any nephrotoxic substance, including under toxicity level doses. Our aim was to study the relationship between the predisposition biomarkers 1 (BM1), 2 (BM2) and 3 (BM3) (characterized in our laboratory and encrypted for patentability reasons) and tobacco consumption.

Urinary samples were taken from smokers and non-smokers volunteers with no renal damage nor exposure to risk factors of renal disease. The plasma creatinine of the patients was obtained from their medical history. The cotinine levels, which inform of the grade of smoking, were measured by ELISA. The urinary creatinine, used to correct urinary concentrations of biomarkers, was measured with a commercial kit based on Jaffé reaction, and the urinary biomarkers levels were measured by Western blot.

Only BM3 showed greater excretion in smoking patients than in non-smokers. However, that excretion is not related to cotinine levels. In any case, BM3 could be a good clinical biomarker of AKI predisposition which would help to prevent renal damage in smokers.

Graphical abstract



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Effects of two personalized and hypocaloric dietary interventions in subjects with non-alcoholic fatty liver disease and overweight/obesity after 6 months of follow-up

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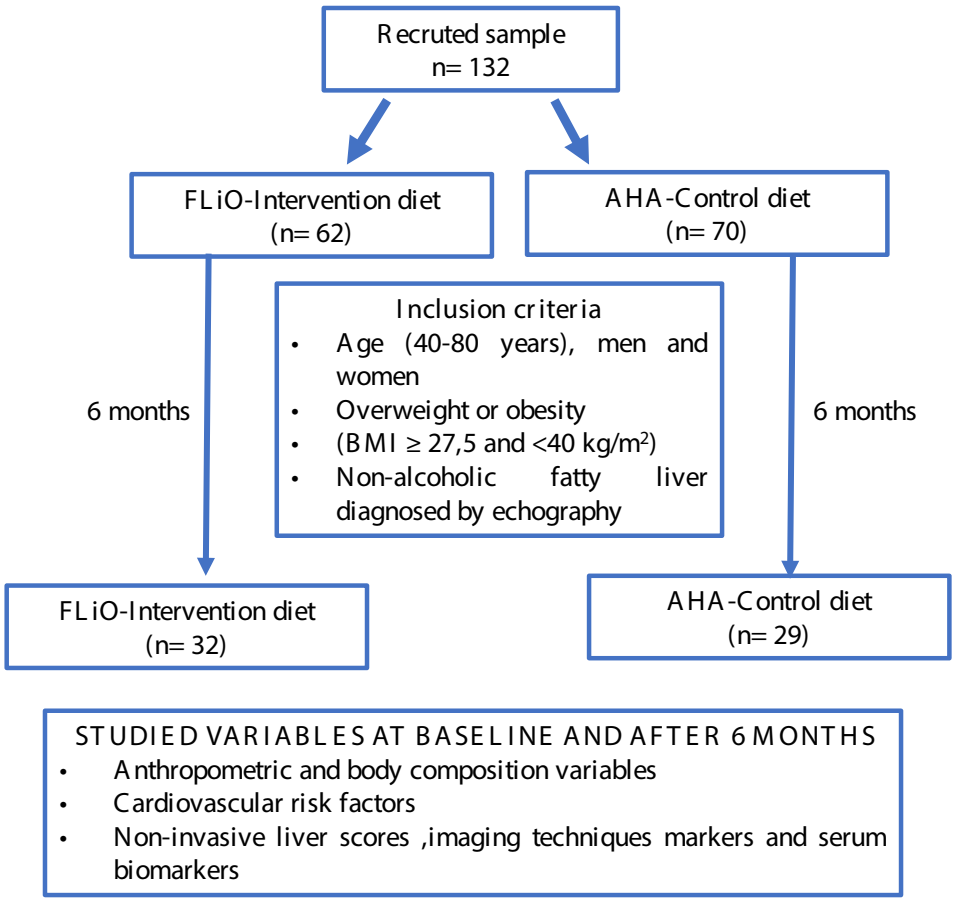
Abstract:

Nonalcoholic fatty liver disease (NAFLD) is considered as one of the most health-related causes of chronic liver disorders. NAFLD is related to obesity and metabolic syndrome (MS) features. The aim of this investigation was to evaluate the effectiveness of two hypocaloric and personalized diets, AHA and FLiO, for the treatment of NAFLD in overweight/obese subjects. A total of 132 subjects were randomized allocated into the two dietary interventions. AHA, used as control, followed the American Heart Association guidelines and had composition of 30% lipids, 55% carbohydrates, 15% protein and 25-30g/day of fiber. FLiO was based on the Mediterranean guidelines and designed containing 30% lipids, 40% carbohydrates, 30% proteins and 30-35g/day of fiber. Both diets had a 30% of energy restriction based on the requirements for each participant.

At baseline and after 6 months anthropometric and body composition variables and cardiovascular risk biomarkers were evaluated, as well as the liver status by serum biomarkers, imaging techniques and non-invasive validated liver scores. Results showed significant improvements ($p<0.001$) in all body composition and anthropometric variables, achieving a mean weight loss of around 8% in both groups. Cardiovascular risk factors (lipid and glycemic profile, blood pressure) were significantly reduced. Non-invasive liver scores (FLI, HSI, BAAT) showed positive results in both dietary groups. Magnetic resonance liver fat content was significantly reduced in both groups. However, no significant differences were found between diets. In conclusion, both dietary patterns, AHA and FLiO, might be recommended in the treatment of patients with NAFLD and overweight or obesity.



Financial support and/or acknowledgments

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Infosops

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Abstract:

Polycystic ovary syndrome, PCOS, is one of the most common endocrine-metabolic disorders in women and affects 80% reproductive age women. It interacts multiple genetic and environmental factors that produce the development of this disorder, as alterations that affect the secretion and action of gonadotrophins, insulin or androgens, and alterations that interfere with the regulation of weight and energy metabolism.

Material and methods: Exhaustive bibliographic search in different databases of scientific articles in the area of health sciences on PCOS and its non-pharmacotherapy approach.

Results and discussion of the articles that study the nutrients and different types of diets as an approach of the PCOS, as well as the management of the weight and the realization of the physical exercise in the PCOS.

Conclusion: A Dietoterápico approach alone or accompanied by regular physical activity can significantly improve the symptoms of the syndrome in the short term and decrease the likelihood of developing the possible manifestations that this implies in the long term. To raise awareness of this approach in patients is necessary to bring knowledge about their pathology, so I have developed a method of health education ideal for them and suited to our time.

Financial support and/or acknowledgments

This project has been made possible thanks to the support given to me by my tutor, Rafael Giménez, when I proposed him my topic for the final project, and especially thanks to José Carlos Jiménez, my partner of life and efforts, who has helped me to make my project come true.

Validation of SH-SY5Y cells as the *in vitro* model for the study of new SIRT2 inhibitors

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Abstract:

The sirtuin 2 (SIRT2) is a histone deacetylase which has shown an age-dependant accumulation in the neurons. The selective inhibition of this sirtuin with the compound 2-{3-(3-fluorophenethyloxy) phenylamino} benzamide (33i) improves the memory and learning impairments in an accelerated senescence mouse model. Although encouraging results have been achieved, further research about SIRT2`s mechanisms in different biological processes need to be accomplish. Here we asked if the SH-SY5Y cells could be an appropriate *in vitro* model for understanding the role of SIRT2 in the neurons and for checking the pharmacological activity of 33i`s and other future new SIRT2 inhibitors. Firstly, the cellular toxicity of 33i was evaluated, and the most safe-effective concentrations were chosen (0.1, 1 and 5μM of 33i). In addition, the effect of the SIRT2 inhibition was observed on the expression of three proteins (AcH4, Ac tub. and GluA1) 3, 6 and 24 hours after the treatment. SIRT2 inhibition increased the levels of all the proteins 3 hours after the treatment. The histone 4 remained acetylated after 6 hours of treatment but the effect was reverted in GluA1 levels and acetylated tubulin, suggesting that fast compensatory mechanisms may be controlling the acetylation equilibrium of these proteins in the cell. In conclusion, it is appropriate to say that the SH-SY5Y cells could be eligible for further *in vitro* studies with the selective SIRT2 inhibitor, 33i and other SIRT2 inhibitors.

Keywords: SIRT2, SH-SY5Y cells, AcH4, GluA1, tubulin.

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I would like to thank the team that conform the Department of Pharmacology and Toxicology at the University of Navarra, specially to Elena Puerta and Teresa Diaz-Perdigón.

Role of CP-154,526 and propranolol in relapse caused by stress associated with morphine. Expression of phosphorylated ERK in dentate gyrus

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Abstract:

Addiction to substance of abuse is a chronic neurological disorder characterized by drug-seeking, compulsive consumption and frequent relapses. A factor of great influence in relapses is stress.

Our objective is to study the association between the environment and the aversive memory produced by the withdrawal, as well as the role of stress in this process, through the model of conditioned place aversion (CPA).

60 mice of strain C57BL / 6J have been treated with morphine at increasing doses. Subsequently, a naloxone abstinence syndrome has been induced. After the extinction of the aversive memory and the administration of CP-154,526 and propranolol to selected mice, in 34 of them has been provoked social defeat (SD). The other 26 did not receive any stressful stimulus.

We analyzed the expression of pERK1 / 2 proteins in dentate gyrus by Western blot.

Our results show that application of social stress after the extinction gives rise to the induction of relapse. The administration of CP-154,526 and propranolol antagonize this effect.

Also, we have noted a significant increase in the phosphorylation of both pERK in animals subjected to SD that were not previously treated with any drug. Besides, administration of CP-154,526 and propranolol in animales submitted to SD resulted in significant decrease in both proteins.

In conclusion, these results show the important relationship between stress and compulsive drug seeking, as well as a potential therapeutic value of propranolol and CP-154,526 in the treatment of relapses.

H2S metabolism in mitochondrial Complex I deficiency. Influence of Coenzyme Q10 supplementation

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Abstract:

Sulfide metabolism in mammalian cells mainly consists in the transsulfuration (biosynthetic) and the hydrogen sulfide (H2S) oxidation (catabolic) pathways, being the latter one involved in the mitochondrial energy production through the activity of Sulfide:Quinone Oxidoreductase (SQOR). Recently, we have reported that under severe CoQ deficiency the levels of SQOR are drastically reduced, inducing an alteration in the H2S oxidation pathway. However, it is unknown whether sulfide metabolism is also comprimised in other mitochondrial diseases, e.g. Complex I deficiency, and how sulfide metabolism responds to supraphysiological levels of CoQ10 after exogenous supplementation. Thus, we have evaluated how supplementation with CoQ10 affects the enzymes of the sulfide metabolism pathway in control subjects and in conditions of mitochondrial complex I deficiency. First, we observed that the levels of SQOR are variable in CI deficient cells and increased in a mouse model of leigh syndrome; second, supplementation with CoQ10 increases SQOR gene expression and protein levels and decreases the enzymes of the transsulfuration pathway; and third, the correlation between the levels of COQ10 and SQOR protein was confirmed *in vivo* in liver of c57 mice treated with oral CoQ10. These data contribute to the understanding of sulfide metabolism regulation and may have a potential impact in the treatment of diseases with mitochondrial dysfunction or disruption of sulfide metabolism.

Financial support and/or acknowledgments

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Upgrade in the biological therapy of rheumatoid arthritis

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Abstract:

Rheumatoid arthritis (AR) is an autoimmune disease that nowadays we can see more frequently and it does not have a curative treatment yet. Due to the improvements in biotechnology over the past years, the use of biological drugs to treat many autoimmune diseases, including RA, is now under consideration.

Many of these drugs have been assessed in RA since early in the beginning of their development, and many studies have proved their effectiveness, which is lower in Anakinra. Despite the many studies, biopharmaceuticals haven't been long commercialized, so more studies are necessary to assess long-term safety, taking into consideration that many of these drugs are still in phase IV clinical trials, i.e.investigate drug safety after approval.

After the review of efficacy, safety and cost of these biopharmaceuticals, we can conclude that the use of one or another drug does not make much difference. On the one hand, Anakinra can be in a second place due to having lower efficacy than the other biopharmaceuticals and on the other hand, Tocilizumab, Golimumab and Adalimumab shouldn't be the first option in the treatment of RA due to their high cost. Nevertheless, all of these biopharmaceuticals would be safe and effective. There is room to emphasize Tocilizumab's safety and the advantage over the others drugs: they can be administered orally.

Biological therapy means a big advance in the therapy of RA but because of their high cost and some usual adverse effects, it still continues not representing the first therapeutical option in this illness.

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Design and clinical evaluation of a Medication Review with Follow Up Service provided by students in an Anxiety and Depression Association

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Abstract:

Patients who suffer from anxiety and depression have difficulty controlling their disease, usually due to the presence of drug interactions, adverse side-effects and poor adherence to treatments. Professional pharmacy services (PPS) have an important role to achieve the effectiveness and safety of antidepressants. However, there is still a controversy on the scientific evidence on the clinical impact of these interventions. The objective of this study is to design a PPS and to evaluate the effect of the intervention of the pharmacist on the degree of control of depression and anxiety in patients of the Association of Depressive Disorders of Aragon, additionally to detect drug-related problems (DRP), identify negative outcomes associated with medication (NOM) and describe the interventions which have been undertaken. The methodology consists of Intervention Mapping (IM) to design the PPS and use of the questionnaires "ESTA", PHQ-9 and the Morisky-Green test to evaluate their effectiveness. The PPS provided has decreased the number of DRP and NOM per patient. The interventions of the study have been the delivery of a report, information on phytotherapy, educational material, clarification of doubts and raising awareness on the disease. Using the developed PPS, the pilot study has managed to increase satisfaction with treatment and to decrease the severity of depression but it has not improved adherence to treatment. The results suggest that changes in indicators due to this PPS have been favorable and the new design of the PPS has achieved (in the pilot phase) results demonstrating clinical effectiveness in patients.

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Antimicrobial activity from *Rubus ulmifolius* extract: an experimental study

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Abstract:

Introduction: According to the traditional Mediterranean phytomedicine, several activities of the elmleaf blackberry extract, *Rubus ulmifolius*, have been described in the literature.

Objectives: In order to study the antimicrobial properties of leaves and shoots from this plant, it has been studied the effect of the solvent used in each extract; evaluated the antimicrobial activity of each extract, and compared the results with the reported studies.

Methods: Extract preparation using methanol, n-hexane and dichloromethane as solvents in two different process. Disc diffusion method was performed to measure the zones of growth inhibition surrounding the disc.

Results: From the ten obtained extracts, the methanolic extracts showed antimicrobial properties. N-hexane and dichloromethane extracts did not show any activity. Eight tested microorganism were sensible to the methanolic extract from shoots: *Candida spp*, *Klebsiella spp*, *L. casei*, *Pseudomonas spp* and *S. aureus*. The gram-positive bacteria such as *S. aureus* had the best sensibility. There was any study of *R. ulmifolius* shoots to compare, but these results agree with the reported literature from other drugs, although *E. coli* was negative because of the strain was enterotoxigenic.

Conclusions: Methanolic solutions are the best solvents to obtain phenolic compounds that allows the extract to show antimicrobial activity. Moreover, the methanolic extract from shoots has better activity than the methanolic one from leaves. The characteristics of outer membrane from gram-positive bacteria allow the phenolic compounds to work as antimicrobial easier than gram-negative bacteria or yeasts. Therefore, the phytochemical profile of *Rubus ulmifolius* shoots should be analyse in future studies.

Financial support and/or acknowledgments

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Preparation of magnetic molecularly imprinted polymer for selective removal of fluoroquinolone antibiotics from river water

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Abstract:

A novel magnetic molecularly imprinted polymer (MMIP) was synthesized by using Levofloxacin as template, [2-(methacryloyloxy) ethyl] dimethyl-(3-sulfopropyl) ammonium hydroxide (SPE) as functional monomer, N, N-methylene-bis-acrylamide (MBA) as crosslinker and potassium persulfate (KPS) as initiator on vinyltrimethoxysilane coated Fe3O4 (Fe3O4-VTMS) though surface imprinting process. This polymer was characterized by FT-IR, XRD, SEM and TEM. Adsorption studies showed that levofloxacin-MMIP has a good recognition to fluoroquinolones (FQs) and the optimum pH for binding FQs was found to be 6.0. Binding process was very fast and pseudo-second-order model fitted with the kinetic data. Adsorption isotherm followed Langmuir isotherm model of monolayer adsorption with a maximum levofloxacin binding efficiency of 54.30 mg/g. The feasibility of removing FQs antibiotics from environmental water was demonstrated using river water spiked with levofloxacin, gatifloxaxin, ciprofloxacin and lomefloxacin.

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Construction, characterization and evaluation of self-propelled microengines made from chitosan/zinc as a potential strategy for controlled drug delivery

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Abstract:

Microtubular engines are self-propelled molecular machines with micrometers dimensions capable of converting chemical energy into autonomous motion. The design of these tiny machines states their propulsion strategy. Their conical shape, made up of concentric-multiple layers, assists in unidirectional bubble propulsion as a result of the fuel catalytic decomposition present in the medium by the metal located in the inner layer. Their speed and propulsion power make them excellent vehicles to perform different biopharmaceutical applications like controlled drug delivery systems.

The main aim of this bachelor thesis is to fabricate microtubular engines from biocompatible materials such as chitosan, a natural polymer, and zinc, an essential mineral for maintaining good health; and to evaluate their capacity to perform different tasks in biological systems: propulsion in acidic medium, drug transport and release and, finally, target recognition and its capture.

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Computational approach for the study of dual CK2/HDAC inhibition: A comparative analysis of ligand-target binding modes

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Abstract:

Molecular docking computational methodologies, able to model ligand-target predicted interactions and depict the ligand behavior within the binding site, have become a useful tool for drug discovery. In this aspect, CK2 and HDACs have been found to be druggable targets involved in cancer pathologies. Here, a comparative analysis of ligand-target binding modes is performed for a series of designed chimeric HDAC1/6-CK2 inhibitors, (**DM35**, **DM20**, **DM31**, **RG38**, **RG39**, **RG40** and **RG41**), as a way to understand, not only how they interact individually within each target, but also their potential to bind to more than one protein targets.

None of the studied ligands appeared to be a clear candidate for CK2/HDAC dual inhibition, however **DM31** was found to be the most promising compound for HDAC1 binding. Alternatively, the docking results revealed **RG41** as an interesting compound for CK2-binding, being able to occupy apart from the ATP-binding cleft, a shallow groove leading to the entrance of a recently known alternative binding site, which is the αD pocket. It is hypothesized that the use of alternative docking methodologies, able to confer flexibility to the protein targets, would allow to deepen into the study of the binding modes for the designed inhibitors, specially **RG41** and **DM31**, and to obtain more accurate conclusions about HDAC6 binding.

Keywords: drug design, cancer, molecular docking, dual inhibitor, metalloenzyme, protein kinase inhibitor.

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CAR-T cells as an anticancer therapy: current challenges and emerging opportunities

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Abstract:

Infusion of chimeric antigen receptor (CAR)-genetically modified T cells (CAR-T cells) have shown outstanding results in clinical trials with patients suffering from relapsed or refractory B-cell malignancies, mainly B-cell acute lymphoblastic leukemia (r/r B-ALL). The expression of the CAR enables the redirection of T-cell's endogenous antitumor activity to a target surface antigen, resulting in the destruction of a specific type of tumor. During the last year, the U.S. Food and Drug Administration (FDA) approved the first two CAR- T cell products - ***KYMRIAH***® from Novartis and ***YESCARTA***® from Kite Pharma – for the treatment of r/r B-ALL and B-cell Non Hodgkin's lymphoma (B-NHL), respectively. However, besides the clinical benefit established for CAR-T cell-based therapy, there are several issues, mostly due to safety challenges, yet to be overcome.

This work presents some of the key points that are currently related to CAR-T cell therapies, such as, the emerging applications from both large pharmaceutical companies and small/medium biotechnology industries and the fatal outcomes of clinical trials related to the life-threatening toxicities - cytokine release syndrome and neurologic adverse events. The goal of this work is to address the major associated risk factors and the progresses made so far in CAR-T cells-based therapies, as well as the latest innovations in CAR design.

Acknowledgments:

This work was supervised by João Nuno Moreira, PharmD, MSc, PhD[1]

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Synthesis and Biological Evaluation of a Histone Deacetylase Inhibitor, Analogous of SCRIPTAID

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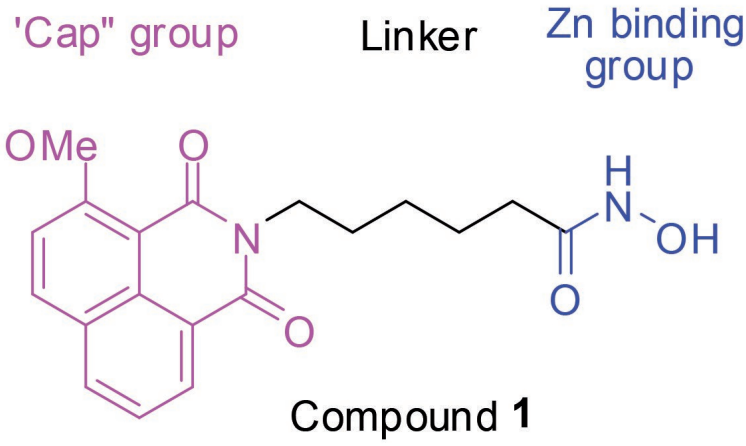
Abstract:

Scriptaid is a potent histone deacetylase inhibitor belonging to the hydroxamic acid group, preferentially inhibiting the Class I HDAC (1,2,3). This compound induces the inhibition of cellular growth in several tumour cells[1]. On the other hand, Scriptaid shows a potent anti-Toxoplasma gondii activity in vitro[2].

Based on this promising molecule, we have synthesized a derivative of Scriptaid (compound **1**) in a new and effective way, as a possible anti-tumour and antiparasitic agent.

The pharmacophore of HDAC inhibitors is composed of a Zinc Binding Group (ZBG) capable of chelating the Zinc atom present in the active site; a linker that connects the ZBG with the cap group fitting in a tunnel defined by two phenylalanines; and the cap group, which is designed to interact with the rim of the active site, at the entrance of the catalytic tunnel.



Compound **1**

[1] L. Giacinti, C. Giacinti, C. Gabellini, E. Rizzuto, M. Lopez and A. Giordano, *J. Cell. Physiol.* **2012**, *227*, 3426-3433.

[2] J.S. Strobl, M. Cassell, S.M. Mitchell, C.M. Reilly and D.S. Lindsay, *J. Parasitol.* **2007**, *93(3)*, 694-700.

The target compound was synthesized in a five-step pathway, and its inhibitory activity was tested using a Fluorescent Activity Assay. The compound is active in the low micromolar range (IC_{50} = 0.97 μM), making it a potential candidate for the development of anti-tumour and antiparasitic agents.

A docking study allowed us to propose a mode of binding to HDAC 1. Thus, the ZBG establishes a bidentate chelation to the catalytic Zn^{2+}, and three hydrogen bonds with the side chains of amino acids in the active site. The linker and cap group occupy the tunnel and the rim surface of the enzyme, respectively.

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