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Science Sessions 2020

Catarina Rosado and L. Monteiro Rodrigues, eds.

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CBIOS Science Sessions 2020

Oxygen Ozone Therapy - Tool in Veterinary Medicine

Oxigênio Ozônio Terapia - Ferramenta na Medicina Veterinária

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Abstract

Ozone therapy (or oxygen therapy) is a medical technique that makes use of the mixture of oxygen gases (O2) and ozone (O3) to treat a large number of diseases. Medical ozone can be applied by various routes in non-toxic concentrations by various percutaneous methods. Medical ozone has bactericidal, fungicidal, and antiviral properties and is used to disinfect wounds as well as to treat bacterial and viral diseases. Administered correctly and in low concentrations, ozone can activate the body's immune system. The use of medicinal ozone with curative intent is not recent. During the First World War, it was used by the Germans against post-traumatic gas gangrene in their soldiers and since then many authors analyze ozone as a therapeutic method associated with minimally invasive techniques. Veterinary medicine has also used the medical ozone technique in recent years and, as in human medicine, only a skilled professional can be responsible for using it. The constant technical improvement allows the professionals to determine the adequate dose and the route of application that is most in accordance with the needs and conditions of each patient. In this meeting, we will discuss veterinary ozone therapy, its indications, forms of application, care, and contraindications in order to expand the information on the use of medical ozone.

Lecture's resumé

Graduated in Veterinary Medicine from the Universidade Federal Fluminense (UFF/RJ) with Master's and Doctorate in Sciences (Area of concentration: Immunology) at Universidade de São Paulo (ICB-USP). He has an equivalence degree at the Master's level (Veterinary Medicine) and Ph.D. (Pathology and Molecular Genetics) from the Institute of Biomedical Sciences Abel Salazar, Universidade do Porto (ICBAS - UPorto). Specialist in Acupuncture and Electroacupuncture by the Brazilian College of Acupuncture/ Brazilian Academy of Oriental Art and Science (CBA/ BACO), with clinical experience in the use of acupuncture and oxygen-ozone therapy in animals (small, large, and wild). In 2007, he worked in the Department of Biochemistry, Genetics, and Immunology of the Universidad de Vigo (Spain) under the supervision of Prof. Dr. Armando Caballero where he improved in techniques such as Geometric Morphometry (MG), DNA extraction from marine snails (Melarhaphe neritoides) and DNA marker type AFLP (Amplified Fragment Length Polymorphism). He has experience in teaching, research, and extension in the areas of Physiology, Immunology, and Biochemistry, at undergraduate and graduate levels. A member of the Portuguese Veterinary Association, he currently teaches Introduction to Acupuncture, Homeopathy and Phytotherapy in Veterinary Medicine at Universidade Lusófona de Humanidades e Tecnologias (ULHT), Lisbon-Portugal, and conducts care at the Hospital Veterinário Escola of ULHT.

Eco-friendly mon-biocide-releasing antifouling coatings for biofouling prevention

Revestimentos antivegetativos monocidas amigos do ambiente para a prevenção de biofouling

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Abstract

Environmental concerns are leading to efforts among the industrial and research communities to face the actual challenges. One of the biggest concerns is bio-contamination on submerged industrial surfaces promoted by the spontaneous colonization of aquatic organisms (biofouling), which is associated with serious environmental and economic penalties, as well as health risks on several applications (e.g. water treatment and desalination units, marine structures). In particular, for the marine transportation, it can promote premature substrate deterioration and drag resistance increases up to 40%, leading to more subsequent fuel consumption and Greenhouse gas emissions (up to 250% by 2050). The impact of this marine biofouling is huge. For instance, a total cost of 150 billion USD per year just for transport delays, hulls maintenance has been reported for marine transportation. On the other hand, the aquatic ecosystem has been suffering the impact of conventional biofouling control strategies, which are based on the continuous release of toxic biocides into the waters, implying significant ecotoxicity effects and extending their action to an area far beyond the initial surfaces bio-decontamination. A recently developed non-biocide release alternative, able to control this bio-burden on submerged surfaces, showed the potential to embrace a new generation of non-toxic strategies. Briefly, it comprised the development of functional isocyanate-reactive biocides able to be tethered in polymeric coatings, hence providing an antifouling action by contact, and minimizing the toxic side-effects allied to the conventional release strategies. This approach can provide a low environmental impact and promising antifouling efficacies at both static and dynamic aquatic conditions [1]. Besides, the ability of this strategy to be tailored to generate antimicrobial coatings against multi-resistant bacteria has also given its first footsteps [2], proving its high potential to with new functional protective material against bio-threads in several industrial activities.

References

[1] E. R. Silva, O. Ferreira, P. A. Ramalho, N. F. Azevedo, A. Igartua, J. C. Bordado, M. J. Calhorda. *Eco-friendly non-biocide-release coatings for marine biofouling prevention*. Science of the Total Environment (STOTEN) 650 (2) (2019) 2499-2511. DOI: 10.1016/j.scitotenv.2018.10.010

[2] Olga Ferreira, Patrícia Rijo, João F. Gomes, Ricardo Santos, Silvia Monteiro, Cátia Vilas-Boas, Marta Correia-da-Silva, Stephanie Almada, Luis G. Alves, João C. Bordado, and Elisabete R. Silva*. *Biofouling Inhibition with Grafted Econea Biocide: Toward a Nonreleasing Eco-Friendly Multiresistant Antifouling Coating*. ACS Sustainable Chemistry & Engineering, 8(1) (2020) 12-17.

Lecture's resumé

Dr. Elisabete R. Silva is a Chemical Engineer, graduated by Instituto Superior Técnico - IST (University of Lisbon, Portugal) in 2002. After her graduation, between 2003 and 2005 she worked in two research scholarships in the frame of a granted project from Fundação para a Ciência e da Tecnologia (FCT, Portugal), and a year (13 months) in the R&D Development Departments of two chemical companies, UNITECA- União Industrial Têxtil e Química S.A., and the international Navigator paper company (old Portucel-Soporcel). For her work, she was approved with distinction by the Engineering College of Portugal in 2004. In 2006 she started a Ph.D., granted by FCT, achieving her doctoral degree in Chemical Engineering in December 2009 by IST. She developed expertise in diverse chemical research subjects, in particular, cellular catalytic foams filters for air pollution remediation. For her R&D activities, she received a Chemical Engineering Honour mention at the Young Researchers UTL/Deloitte Contest, Technical University of Lisbon &Deloitte, 2010. After her Ph.D., she embarked on Post-Doctoral research at Institute for Bioengineering and Biosciences (IBB) at IST. Since 2013, she embraces a new research field, motivated by the global need of eco-friendly technologies for the protection of submerged industrial surfaces against biofouling, and joined both Centro de Química e Bioquímica (CQB) at Faculdade de Ciências (University of Lisbon, Portugal) and Centro de Recursos Naturais e Ambiente (CERENA) at IST. In 2018 she also joined BioSystems & Integrative Sciences Institute (BIOISI), Faculdade de Ciências (University of Lisbon, Portugal). Currently, Dr. Elisabete R. Silva is a Researcher and Invited Assistant Professor at Faculdade de Ciências (University of Lisbon, Portugal). In the last years she has been actively involved in new environmentally friendly and cleaner technologies, mostly applied as functional synthetic or natural-based polymeric materials, for the protection of submerged industrial surfaces either applied under marine and/or the freshwater environment against bio-contamination and for pollutants remediation. Her achievements originated several published works though 6 book chapters, 8 granted patents (2 licensed and 4 supported by international chemical industries), 28 peer-reviewed international papers, 6 conference publications with scientific referring, and 2 peer-reviewed national papers. She has also disseminated her work internationally and nationally through 35 oral communications and 54 panel communications, received 6 best posters/ communications awards, and 4 R&D work distinctions. She has been also dedicated to knowledge transference as Invited Assistant of Faculdade de Ciências da Universidade de Lisboa and as supervisor of graduate and undergraduate professionals and students.

The sustainable chemistry of sugars: New antibacterial with a new mechanism of action

A química sustentável dos açúcares: Novos antibacterianos com um novo mecanismo de ação

Amélia Pilar Rauter

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Abstract

Molecular sciences become more and more important to unveil the secrets of nature, and carbohydrate chemistry, by playing with multifunctional and stereochemically rich molecules, is a unique domain to exploit the art of innovation in organic and biomolecular chemistry. Bacterial infections were major concerns before antibiotic discovery. However, bacteria can resist the effects of medication that once could successfully treat the microbe by changing in response to those medicines. This antibiotic resistance remains a problem that can only be overcome with the discovery of new antibiotics with new mechanisms of action. We disclose now a series of deoxy glycosides that are potent bactericides. Synthetic approaches for a compound series differing in the anomeric atom, glycone configuration, and deoxygenation pattern will be presented, and the role of glycoside sugar deoxygenation for tuning bactericides' bioactivity will be demonstrated. This study led to the discovery of the first sugar-based bactericides acting over phosphatidylethanolamine-rich microbe membranes by targeting membrane lipid polymorphism. This mode of action also prevents bacterial resistance as cell envelope ultrastructures cannot easily change without substantial loss of function.

Acknowledgments

The author is grateful to Fundação para a Ciência e a Tecnologia for supporting the strategic project UIDB/00100/2020 that sponsors research at the Carbohydrate Chemistry Group (G11) of the Centro de Química Estrutural.

Lecture's resumé

Amélia Pilar Rauter is Full Professor of Organic Chemistry, the President of the Department of Chemistry and Biochemistry, at the Faculdade de Ciências, Universidade de Lisboa, and the Coordinator of the Carbohydrate Chemistry Group (G11) of Centro de Química Estrutural. She is the President of the International Carbohydrate Organisation and the Secretary of the European Carbohydrate Organisation, and serves IUPAC as Vice-President of the IUPAC Division on Organic and Biomolecular Chemistry, as Titular Member of IUPAC Division of Chemical Nomenclature and Structure Representation and as Associate member of its Interdivisional Committee on Terminology, Nomenclature and Symbols. She is the founder of the Portuguese Society of Chemistry Carbohydrate Group, and the founder and leader of the Carbohydrate Chemistry Group at Faculdade de Ciências, Universidade de Lisboa (FCUL). Her research covers the development of new molecular entities for the treatment/prevention of metabolic (diabetes), degenerative diseases (Alzheimer´s and Prion diseases, cancer), and infection, either isolated from natural resources or accessed through rational design and synthesis. She has coordinated/participated as principal investigator of FCUL in projects sponsored by EU, IUPAC, NATO, FCT, QREN, FLAD, CRUP, among other funding agencies and programs, with national and international companies. She is Editor of the Royal Society of Chemistry Carbohydrate Chemistry book series, Associated Editor of the

Mediterranean Journal of Chemistry, and member of journals advisory board in medicinal/Organic/Carbohydrate Chemistry, namely the European Journal of Organic Chemistry (Wiley), Medicinal Chemistry (Bentham Science), Journal of Carbohydrate Chemistry (Taylor & Francis), Pharmaceuticals, Marine Drugs, among others. She has published more than 150 papers and book chapters, authored 8 granted patents, and has been invited as speaker of national and international meetings (Gordon Conference, ECO and ICS meetings, and many others). Among her honors, she was awarded as Fellow of the Royal Society Chemistry since 2017, with the Madinaveitia-Lourenço Prize by the Spanish Royal Chemical Society in 2017 and with the Mention of Excellence by FCUL (2008-2018).

Expression profile of cellular redox and calcium signaling-related genes: role in breast cancer progression

Perfil de expressão de genes redox celulares e de sinalização de cálcio: papel na progressão do cancro da mama

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Abstract

Breast cancer is the most common cancer that affects women and its metastases compromise the longevity of the patients. Many hypotheses have been advanced to explain the progression of metastatic cancer, and Ca2+ and ROS dependent pathways have been pointed as mediators of tumor cell migration and survival. In the interplay between Ca2+and ROS signaling systems, Ca2+ affects ROS homeostasis and ROS affects Ca2+ homeostasis in different physiological processes. The objective of this study is to define the combined expression profiles of cellular redox and calcium signaling-related genes that contribute to breast cancer cell migration and survival and tumor metastasis. For that, we will adopt exploratory research, using a group of platforms that allow the analysis of gene expression levels and correlate them with patient survival, to verify the impact of this relationship in breast cancer progression. We selected the platform UALCAN to determine gene expression and the platform GEPIA to analyze survival and calculate Hazard ratios. Both supported our selection of redox and calcium signaling-related genes, allowing them to determine patterns of expression, differences in expression between cancer stages, and the correlation between expression and survival. One-third platform, the OncoLnc, provides data on the days after diagnosis in last follow-up and status, which allow developing our statistical model of correlation between pairs of genes, based in quartiles of expression. With this investigation, we expect to contribute to the understanding of the complex interplay between calcium and ROS signaling processes involved in cancer progression and, ultimately, to the finding of new biomarkers and therapeutic targets.

Lecture's resumé

Sofia Ramos graduated in Biotechnological Engineering in 2003 and finished his Master in Biotechnological Engineering in 2011, both at Universidade Lusófona de Humanidades e Tecnologias, in Lisbon. Presently, Sofia is working in her Ph.D. in Health Sciences at CBIOS at the same University, where she investigates the combined impact of redox and calcium signaling-related genes that have an impact on breast cancer progression.

Studying the conformational plasticity of KcsA potassium channel by homo-FRET

Estudo da plasticidade conformacional do canal de potássio KcsA por homo-FRET

Ana Coutinho

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Abstract

The potassium channel KcsA is a prokaryotic, proton-activated, and voltage-modulated channel with four identical subunits around a central pore, containing the homologous sequence, TVGYG, to the selectivity filter (SF) of the eukaryotic potassium channels. In this study, we have used polarized time-resolved fluorescence measurements to investigate the conformational dynamics of KcsA SF using a mutant bearing a single tryptophan residue per monomer (W67 KcsA). Our steady-state and time-resolved fluorescence measurements indicate that the W67 residues undergo an efficient homo-FRET process among the four-channel subunits. An analytical solution describing homo-FRET among a homo-tetramer in a square geometry allowed retrieving W67-W67 lateral distances from the W67 KcsA fluorescence anisotropy decays. The fluorescence anisotropy of the detergent-solubilized W67 KcsA was found to be an excellent reporter of the conformational changes undergone by the outer vestibule of W67 KcsA, which were markedly influenced by the average ion occupancy of its SF. The implemented homo-FRET approach allowed us to characterize the conformational plasticity of an unlabeled membrane protein at room temperature, giving complementary information to the high-resolution X-ray studies in which the conformational plasticity of the protein can be compromised due to the crystal packing forces and/or use of auxiliary Fab fragments.

Lecture's resumé

Ana Coutinho is an Assistant Professor at the Department of Chemistry and Biochemistry, Faculdade de Ciências da Universidade de Lisboa (FCUL) and a researcher of the Biospectroscopy and Interfaces group (BSIRG) from iBB, Instituto Superior Técnico da Universidade de Lisboa. She graduated in Biochemistry from FCUL and obtained her Ph.D. in Biochemistry in 2000, also from Universidade de Lisboa. She did postdoctoral studies at the Instituto de Química-Física "Rocasolano" (Dr. M. Pilar Lillo, Madrid, Spain). Her main research areas are (i) studying the influence of lipid membranes on the molecular mechanism of fibril formation by amyloidogenic proteins/peptides, and (ii) using Fȍrster resonance energy transfer (FRET) to study the conformational dynamics of membrane proteins. She has authored 37 refereed international papers and participated in several national and international research projects.

Targeted cancer therapy using ruthenium compounds

Terapia específica do cancro usando compostos de ruténio

Andreia Valente

Centro de Química Estrutural da Faculdade de Ciências da Universidade de Lisboa

Abstract

The latest statistics from the World Health Organization (WHO) place cancer as the second leading cause of death worldwide with 9.6 million fatalities in 2018. Thus, the discovery of new chemotherapeutics that can treat this disease and its secondary cancers (metastases), which are indeed the main cause of death by cancer, is a very relevant subject. In this frame, we have been developing new ruthenium compounds based on the 'RuCp' scaffold (Cp = η5-C5H5) endowed with specific targeting mechanisms to take advantage of the particular characteristics of tumor cells and tissues, such as their permeability to macromolecules and overexpression of certain receptors.[1-4] Up to date, we have been focusing our studies on cancers without a clinical cure, such as triple-negative breast cancer (TNBC) and colorectal cancers with specific genetic alterations (such as KRAS and BRAF mutations). In this presentation, we will show the potential of these compounds against triple-negative breast cancer and how they inhibit key proteins known for their role in mechanisms of cell resistance. Their targets, related to the proteins that regulate the cell mobility and cytoskeleton dynamics, place them as potential antimetastatic agents.

Lecture's resumé

A. Valente has a Ph.D. in polymerization catalysis from Université Lille I - Sciences et Technologie, France (2010). She moved to Faculdade de Ciências da Universidade de Lisboa, as a post-doc, into the area of organometallic synthesis, firstly applied to non-linear optics and then to medicinal purposes. In 2014, A. Valente started an FCT Investigator position and independent research at CQE-FCUL where she develops polymer-metal conjugates for targeted cancer therapy. She merged her know-how in organometallic chemistry with her expertise in polymers to create an innovative family of compounds. The finding of the anticancer potential of her compounds led A. Valente's team to patent this work (WO2016/087932) that has currently secured private investment. During the last years, she expanded her panel of expertise, while at Rutgers University, USA, under the scope of a Fulbright Grant, in cell proliferation and viability assays, flow cytometry, and speciation and metal quantification by ICP-MS. So, her path is marked by a thematic mobility and competences synergy allowing her to gain extensive and wide-ranging experience in several key areas for the successful development of new anticancer drugs. At present, A. Valente is a Researcher at CQE-FCUL with a 6-years contract (CEEC 2017). A. Valente has 38 papers published in high ranked journals such as Chem Rev (IF=45.66, ~180 cit.), Angew Chime (IF=11.26, ~40 cit.), or Eur J Med Chem (IF=4.59), from these 14 were published as senior corresponding author. She also published 5 book chapters in her current area of research. A. Valente has been recognized both nationally and internationally in different contexts: gave 21 talks in international conferences (10 as invited speaker), being co-author of several more, and several invited seminars in post-graduate courses; was awarded a Royal Society of Chemistry Research Fund Grant (AV), an FCT starting grant (AV); a Young Investigator Award (AV), a Fulbright grant (AV), and the 1st prize at the ScienceIN2Business 2015 by TecLabs (team); is part of Fulbright panel of evaluators; is member of the COST action "New diagnostic and therapeutic tools against multidrug-resistant tumors" – STRATAGEM (CA17104); was a member of the organizing committee of 3 international conferences;

Natural products and their potential to treat gastrointestinal inflammatory and ulcerative diseases

Produtos naturais e o seu potencial para tratar doenças inflamatórias e ulcerativas gastrointestinais

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Abstract

Gastrointestinal disorders are among the most common bothersome that affect people nowadays. Their prevalence and incidence have been on the rise during the last decade. This high prevalence and incidence are due to the contemporary lifestyle we live in, which includes bad dietary habits, consumption of drugs, alcoholic drinks, and stress. Commonly, gastrointestinal disorders are characterized by inflammatory and ulcerative processes from the stomach or gut. The main inflammatory and ulcerative disorders associated with the gastrointestinal tract include gastritis, ulcers, colitis, Crohn's disease, and mucositis which are difficult to treat. The recurrence and side effects are very common after treatment with available drugs. Based on that, there is an urgent need for the search for more effective and safe pharmacological options for the treatment of gastrointestinal inflammatory and ulcerative disorders. Recently, plant extracts and natural products have been approached like an important possibility for the treatment of the previously mentioned disorders. Thus, a great deal of effort and research has been undertaking to find suitable natural plants and substances and to prove its potential.

Lecture's resumé

Sergio Faloni de Andrade is currently a Researcher within the CBIOS unit of the Universidade Lusófona, Lisbon, Portugal. He holds a bachelor's degree in Pharmacy from the University of Alfenas (1998), a master's in Pharmacology from Sao Paulo State University (2001), and a Ph.D. in Pharmaceutical Sciences from the University of São Paulo (USP) (2005) (Brazil). He undertook a postdoc at Lund University-Sweden (2017-2018), where he developed a project regarding probiotics associated with natural products and their beneficial effects on the gastrointestinal tract. S. Andrade's preferred domains are in vivo pharmacological evaluation of natural products and probiotic products, with interest in gastritis, an-tiulcer activity, gastroprotection, gastric healing, intestinal inflammatory diseases, and effects on the renal and cardiovascular systems. During his career, he has served as an advisor of 4 Ph.D. thesis, 18 master thesis, 38 bachelor degrees, and supervised 3 postdoc researchers. He was also vice-coordinator of the Pharmaceutical Sciences Postgraduate Program at the University of Itajai Valley, Brazil. S. Andrade has published 115 articles in peer-reviewed international periodicals (53 of those in the last five years) and five book chapters. He was twice guest editor of an inter-national periodical and serves as an article reviewer for several scientific periodicals. .

Fat nanoparticles: a diet towards targeted nano delivery

Nanopartículas de gordura: uma dieta orientada para a nanodeficiência

Cláudia Nunes

LAQV, Requimte, FFUP

Abstract

In recent decades, pharmaceutical research has taken a keen interest in nanotechnology, due to the remarkable characteristics of nanoscale vectors for drug delivery, mainly in their selective capabilities. Among the multiple approaches, lipid-based nanoparticles are considered the most promising since they are composed of highly biocompatible molecules and may enable the site-specific release of bioactive compounds due to their high stability, high carrying capacity, and ability to load both hydrophilic and hydrophobic substances. Most recent literature on this subject refers to four distinct types: liposomes, solid lipid nanoparticles (SLN), nanostructured lipid carriers (NLC), and multiple lipid nanoparticles (MLN). In this presentation, some examples of these types of nanoparticles as drug delivery systems will be discussed. Emphasis will be given to the rational design, focused on nanoparticle features, the physicochemical properties of the encapsulated bioactive compounds, the target microenvironment, and how the three should guide formulation choices. Simultaneously, key characterization procedures and in vitro interaction studies will be pointed out.

Lecture's resumé

Cláudia Nunes (CN) completed her Ph.D. degree in Pharmaceutical Sciences – Medicinal and Therapeutic Chemistry (FFUP) in 2011. Immediately after, she started her Post-Doc at LAQV-REQUIMTE, where she developed her research for 5 years. From 2017 until now, CN is an FCT investigator in the same institution. Furthermore, CN is an invited auxiliary professor of the curricular unit: "Nanoterapêutica e Nanodiagnóstico", at ICBAS. CN is specialized in the study of drug-membrane interactions using cell-membrane mimetic models of different dimensionalities coupled with biophysical techniques, to unveil related mechanisms of action. Over time, such knowledge has also boosted her interest in the development of drug delivery nanosystems, based on lipid nanoparticles, able to overcome the side-effects of commercial drugs. Overall, she is the co-author of 63 peer-reviewed publications in international journals, 6 invited book chapters, and an international patent. Her h-index is 21 (Scopus) and has over 1100 citations. She was the main supervisor of 2 finished Ph.D. students and 5 MSc, besides being now responsible for the supervision of several students. She is the principal investigator of 10 and executive researcher of 12 funded R&D projects, including European funding programs.

Mediterranean diet adherence, eating behavior and body shape concerns in Portuguese university students

Adesão à dieta mediterrânica, comportamento alimentar e preocupações com a forma do corpo em estudantes universitários portugueses

Cíntia Ferreira-Pêgo

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Abstract

Young adults when arrives at the university generally face a variety of challenges, such as adapting to a new environment, study stress, lack of proper time management, and busy class schedules. During this moment of life, students usually present some unhealthy eating choices which may be detrimental to cognitive processing, influencing academic performance, which is related to future professional success.

Cross-sectional information regarding Mediterranean diet (MedDiet) adherence, eating behavior and body shape concerns was collected in 305 students from the Universidade Lusófona de Humanidades e Tecnologias, from different academic courses, related or not with health sciences. Approximately 29% of the total population presented poor MedDiet adherence, meanwhile, 59% presented an average adherence and only 12.50% presented a high MedDiet adherence. Nutrition students presented the highest MedDiet adherence of all the students analyzed. In contrast, 62.10% of these nutrition sciences students presented an emotional eating behavior. Finally, regardless of age, academic course or adherence to the MedDiet, presenting concerns about body shape was significantly related to the fact of being women. These results emphasize the importance of nutritional education programs inside the universities to improve the eating choices of their students, either in courses not related to health sciences but also in health sciences students, since these also demonstrated several dietary problems.

Lecture's resumé

Cíntia Ferreira-Pêgo graduated with a degree in Human Nutrition and Dietetics from the Universitat Rovira i Virgili, Spain (2010), and has a master's degree in Training and Sports Nutrition from the Universidad Europea de Madrid, Spain (2012).

She obtained her Ph.D. with International Mention in Nutrition and Metabolism from the Universitat Rovira i Virgili, Spain, and the University of Arkansas, USA (2016).

Her main epidemiological research interests are Mediterranean Diet, the consumption of dairy products, hydration, and / or the consumption of different types of beverages and their relation with health and disease. Currently, her main interest resides in the evaluation of dietary habits and behavior of University students. Since 2019, C.F-P has been an auxiliary researcher in CBIOS Lusófona's Research Center for Biosciences and Health Technologies.

"Pharmacists' guide to the future: challenges and opportunities for research and development of pharmacy services"

"*Guia dos farmacêuticos para o futuro: desafios e oportunidades para a investigação e desenvolvimento dos serviços de farmácia"*

João Gregório

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Abstract

The future of pharmacy has always been a matter of concern for academics and practitioners alike. Recently, the emergence of new technologies, such as Artificial Intelligence and Blockchain, and market forces like Amazon or Google, has brought the future of the pharmacy profession once again into the limelight. This is especially true and urgent in the practice area of Community Pharmacy, being the most numerous group within the profession, where the fear of redundancy has always been looming since the start of the Industrial Revolution. In this communication, we argue that the envisioned technologies will become a reality, but by now they are not mature enough to be the disrupters everyone expects. Moreover, without major shifts in the legal environment regulating the organization of health care and the provision of medicines, big players (such as Amazon or Google) will find it difficult to substitute pharmacies. As for pharmacists, they have always adapted to the challenges presented by technological revolutions. For the coming Patient-Centered era, it is more important to continue to focus on the sustainability of an enhanced role for community pharmacists, providing services that highlight pharmacists' social role, measuring outcomes related to pharmacy services, and managing populations' health.

Lecture's resumé

João Gregório has a professional career divided between Pharmacy and Research. He is a specialist in Community Pharmacy since 2009, accumulating more than 10 years of experience. He completed a Master's in Health and Development and a Ph.D. in International Health with a Specialization in Health Policies, by the Institute of Hygiene and Tropical Medicine at Universidade Nova de Lisboa. He is currently Assistant Researcher at CBIOS - Research Center for Biosciences & Health Technologies at Universidade Lusófona. Currently, his research interests focus on all aspects necessary to the use of IT to develop new health services, from information management and health decision-making systems to training of health professionals, as well as the definition of Public Health Policies.

TIM2: a new membrane receiver for ferritin-H in the retina of murganho

TIM2: um novo receptor de membrana para a ferritina-H na retina de murganho

Andreia Valença

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Abstract

Iron imbalance is associated with oxidative stress and the progression of several retinopathies, thus careful control of its availability in the retina is crucial to the maintenance of iron homeostasis. Ferritin, known for its role in iron storage and detoxification, has also been proposed as an iron-transporter protein, through its binding to Scara5 and TIM2 membrane receptors. In this study, the presence and iron-related functions of TIM2 in the mouse retina were investigated. Our results revealed for the first time the presence of TIM2 receptors in the mouse retina, mainly in Müller cells. Experimental TIM2 downregulation in the mouse retina promoted, probably due to a compensatory mechanism, Scara5 overexpression that increased retinal ferritin uptake and induced iron overload. Consecutive reactive oxygen species (ROS) overproduction and vascular endothelial growth factor (VEGF) overexpression led to impaired paracellular and transcellular endothelial transport characterized by tight junction degradation and increased caveolae number. In consequence, the blood-retinal barrier (BRB) breakdown and retinal edema were observed. Altogether, these results point to TIM2 as a new key player in retinal iron homeostasis.

Lecture's resumé

Andreia Valença received her Ph.D. in Veterinary Sciences - a specialty of Biological and Biomedical Sciences - from the Universidade de Lisboa in 2019. She also holds a Master's degree in Human Biology and Environment and a Bachelor's degree in Genetics and Molecular Biology. Currently, she is an assistant professor at Universidade Lusófona and an invited professor at Instituto Politécnico de Lisboa. She has been a member of the Centre for Interdisciplinary Research in Animal Health (CIISA) – FMV, ULisboa since 2011. Her research interests include retinopathy mechanisms, especially alterations of blood-retinal vessels during eye disease and aging.

Type 1 therapeutic review based on a pharmacy's electronic medication records: first steps towards an algorithm to identify patients for pharmacy professional services

Revisão terapêutica e definição de um algoritmo de classificação de doentes em farmácia

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Abstract

The process of medication review involves the identification of drug-related problems (DRPs) and making recommendations to resolve or prevent them. Algorithms, queries, and knowledge-based systems are some approaches to screen patient databases and support pharmacist provision of medication reviews. The aim of this study was to perform a type 1 medication review and identify cut-off points that enable the definition of an algorithm to tailor structured pharmacy professional services. A retrospective observational study was carried on a convenience sample of pharmacy records. Records were included if patients had a medication dispensing history between June 2017 - July 2018 and used 2 or more chronic medications. Statistical analysis identified common characteristics among patients, most frequent patterns of DRP and cut-off points. Fifty-five patient records underwent type 1 medication review. Mean age was 65.67 years. On average, participants used 5.25 medications. It was found that 18.2% had inappropriate drugs and 30.9% had moderate or major interaction potential. Based on cut-off points the sample was stratified into 5 levels of pharmaceutical intervention, each corresponding to a professional pharmacy service. Electronic pharmacy patient records enabled a type 1 medication review and the identification of cut-off points. It was found that 61.8% of patients would benefit from a type II medication review 10.9% of which would need priority. This study was a first step to develop an algorithm that automatically screens pharmacy database and suggests pharmaceutical services tailored and schedule according to patient's health needs.

Lecture's resumé

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The pH-dependent mechanism underlying membrane crossing of Lewis base drugs

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Abstract

Targeted cancer therapeutics remains a central goal of cancer research. The tumor microenvironment (TME) is an important component of tumor development that influences several key processes such as tumor cell phenotype, proliferation, immune evasion, and drug resistance [1]. An important feature of the TME is the increased acidity of the extracellular milieu (pH 6.0-6.8), generated by enhanced anaerobic glycolysis coupled with higher levels of proton extrusion via upregulated proton pumps. This process creates a pH gradient between the extracellular and intracellular environments, potentially creating a barrier for hydrophobic Lewis base drugs to enter the cells. The high pKa values (7.5-10) of these compounds including for example some tyrosine kinase inhibitors like sunitinib and nintedanib, require them to first undergo deprotonation before passively diffusing through the plasma membrane into the cells, which becomes more difficult in acidic microenvironments like the TME. This study aims at investigating the pH-dependent membrane insertion mechanism of several Lewis base drugs. We performed pH replica-exchange (pHRE) [2] simulations of sunitinib and nintedanib and a few other compounds, interacting with a phosphatidylcholine lipid membrane. We calculated pKa profiles for all these systems, which capture the desolvation effect along the membrane normal [3]. Based on our data, we can also follow the average protonation and relative distribution between water and lipid phases at a given pH value. The obtained pKa and protonation profiles along the membrane insertion pathway can help us interpret the available experimental data on how some of these compounds struggle to insert into tumor cells whereas other hydrophobic weak base drugs are highly sequestered within lysosomes [4,5].

References

[1] Assaraf, Y. G., Brozovic, A., Gonçalves, A. G., Jurkovicova, D., Linē, A., Machuqueiro, M., Saponara, S., Sarmento-Ribeiro, A. B., Xavier, C. P. R., Vasconcelos, M. H. (2019) Drug Resist. Updat., 46:100645.
[2] Vila-Viçosa, D., Reis, P. B. P. S., Baptista, A. M., Oostenbrink, C., Machuqueiro, M., (2019) J.Chem. Theory Comput. , 15:3108-3116.
[3] Teixeira, V. H., Vila-Viçosa, D., Reis, P. B. P. S., Machuqueiro, M., (2016) J. Chem. Theory Comput., 12:930-934
[4] Zhitomirsky B, Assaraf YG. (2015) Oncotarget., 6(2):1143-56
[5] Zhitomirsky B, Assaraf YG. (2016) Drug Resist Updat., 24:23-33

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Lecture's resumé

Since my PhD in 2003, I have been working on molecular modeling, in particular, on the development of new in silico methods to deal with pH effects in biomolecules. During my post-doc, in António Baptista's group (ITQB), I did a new implementation of the stochastic constant-pH MD (CpHMD) method, which was then applied to several biomolecules in the following years. Since I started my own group at FCUL (2009), I extended the CpHMD methodology to lipid bilayers to allow the correct modeling of the pH effects in membranes. As expected, the following step focused on the study of pH dependent processes involving peptides interacting with lipid bilayers, which my group has explored using our state-of-the-art methodology. Currently, we are one of the very few groups in the world who can apply CpHMD methodologies to complex systems involving peptides, proteins, and drugs interacting with lipid bilayers coupled with protonation changes. pH is a key factor and regulator of most biological processes in cells, therefore, our methodologies provide better models and put us closer to what experimentalists are actually measuring.

2020 CBIOS Internal Research Briefings

These briefings are designed to introduce new researchers (Master and PhD, post-doc students, and others) to the activities of the research unit and its operational teams/domains.

Date	Subject	Attendee(s)	Presenter(s)	Comments
6 January	Conclusion of the training period of the master students from JUTCM – China	Ye Xianwen Zhu Lin Chen Kang Xiao Falin, Cheng Yuyao	Luis Monteiro Rodrigues Ana Fernandes Catarina Fialho Rosado Patricia Rijo João Gregório Cíntia Pêgo	
2 March	Presentation of the R&D activities of CBIOS to new members	Sergio Faloni de Andrade	Luis Monteiro Rodrigues Ana Fernandes Catarina Fialho Rosado Patricia Rijo	This new member was recently contracted as a Junior Researcher under the CECC program (supported by FCT); this meeting was followed by another meeting with the ModSys team members that will subsequently include SA
7 October	Introductory session from the Microcirculatory Physiology Fellowship 2020	Maria Teresa Silva	Luis Monteiro Rodrigues Sérgio Andrade	