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# CBiOS Science Sessions - 2018 -

## Redox modulation by MnTnHex-2-PyP in renal cancer: from etiology to progression

*Modulação redox pelo MnTnHex-2-PyP no cancro renal: da etiologia à progressão*

**João Guilherme Costa**

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**Abstract**

Cancer is a multistep process and oxidative stress has been pointed out to have critical roles on its initiation, promotion and progression. This work addresses the redox modulation afforded by the superoxide dismutase mimic (SODm) MnTnHex-2-PyP (MnP), a Manganese(III) porphyrin (MnPs). Two different renal cell models were used to address initiation and progression cellular events. Firstly, the role of MnP on the toxicity of non-tumor renal cells exposed to the ochratoxin A (OTA) was evaluated. Different endpoints of cytotoxicity and genotoxicity were evaluated in Vero cells exposed to OTA. The MnP protected cells from the OTA-induced cytotoxicity. In addition, it modulated the intracellular reactive oxygen species (ROS) levels and decreased the percentage of cells in apoptosis when compared with cells exposed only to OTA. The role of the MnP in renal cancer progression was subsequently studied in a human renal cancer cell model. MnP decreased the cell viability of human 786-O cells. The MnP exposure also induced an increase in intracellular ROS and significantly decreased the migration of the human renal cancer cells.

ROS partially contributed to the cytotoxicity and genotoxicity of OTA in kidney cells, although other mechanisms may be relevant for OTA-induced deleterious effects. In addition, this work revealed the potential of MnTnHex-2-PyP in renal cancer treatment, by decreasing cancer cells viability and migration. Overall, this MnP protected non-tumor cells from the toxic effects induced by OTA, while it had a beneficial effect against renal cancer cells.

**Lecturer's resumé**

João G. Costa is an Assistant Professor at Escola de Ciências e Tecnologias da Saúde of Universidade Lusófona, in Pharmacology and Toxicology areas. He is also a researcher at Center for Biosciences & Health Technologies (CBIOS), Lisbon, Portugal and a collaborator of the Research Institute for Medicines (iMed.ULisboa), Faculty of Pharmacy, Lisbon, Portugal.
He graduated in Pharmaceutical Sciences, MSc in Pharmacy (Faculty of Pharmacy, University of Lisbon – FFUL, 2008). He also obtained a Post-graduation in Quality Control and Food Toxicology (FFUL, 2013). He is presently a PhD student in Health Sciences – Pharmacy at Universidad de Alcalá-Henares, Spain and Universidade Lusófona de Humanidades e Tecnologias (ULHT), Portugal.
He published sixteen papers and abstracts in international peer-reviewed journals. He is also author/co-author of several oral and panel communications in national and international meetings. In the last year he received an Honorable mention (II Jornadas CBIOS) and in 2014 he received an international award (II Jornadas Ibéricas de Toxicologia).
His research interests focus on cancer (renal and breast) and oxidative stress areas, particularly on the redox modulation by superoxide dismutase mimics.

## Lamiaceae extracts and compounds for topical application through nano delivery systems

*Extratos e compostos de Lamiaceae para aplicação tópica através de nano sistemas de veiculação*

**Filipe Pereira**

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**Abstract**

Antibiotic resistance is one of the major health problem affecting every continent, whether developed or developing countries. This problem is responsible of a high number of patients and a leading cause of deaths worldwide, without an effective form of therapy. The developments in the nanotechnology field has led to more efficient delivery systems, while new structures unveiled through natural resources showed high biological activity never studied before. The combination of a new drug delivery strategy with new bioactive molecules can lead to new therapeutic forms against this type of infections.
In his PhD work, it was analyzed the potential and ability of 7α-acetoxy-6β-hydroxyroyleanone as a novel compound for the treatment of infections associated with resistant bacteria's. In the same way, it was proposing that the combination of a therapeutic form of natural source (extract or isolated compound) with a new technique of delivery using different types of nanoparticles for the treatment of topical infections

**Lecturer's resumé**

Filipe Pereira está a concluir o seu doutoramento na Universidade Lusófona em ciências da saúde. Durante o seu percurso académico licenciou-se em química aplicada pela Faculdade de Ciências da Universidade Nova de Lisboa e mestrado na faculdade de farmácia da Universidade de Lisboa, onde realizou estudos de propriedades químicas de conjugados de nanopartículas metálicas com biomoléculas e estudos fitoquímicos na descoberta de novos compostos antibacterianos. Durante o seu percurso conta já com algumas apresentações e artigos em revistas importantes em Fitoquímica.

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# CBiOS Science Sessions - 2018 -

## Biological activity sreening of a wild asparagus: *Asparagus stipularis* Forssk

*Pesquisa de atividade biológica de um asparagus selvagem*: *Asparagus stipularis Forssk*

**Kwala Adouni**

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**Abstract**

Nutritional values and phytochemical composition of wild Asparagus stipularis Forssk.from Tunisia were determined in this study. Different parts of A. stipularis (spears, leaves, stems, roots and rhizomes) were consecutively extracted by supercritical CO2 (SFE-CO2) and pressurised solvents (PLE). The antimicrobial and antioxidant capacities of extracted fractions were assessed by using several assays. Furthermore, the nanoencapssulation of most active extracts were determined using the solvent-evaporation double emulsion method. In addition, in vitro α-glucosidase inhibitory potential as well as the in vivo protective effect of A. stipularis aqueous extract against high-fructose diet (HFD) induced metabolic syndrome (Met S) in rats were carried out.

**Lecturer's resumé**

Education
2014-Present PhD student Higher institute of biotechnology Monastir, Tunisia, Major: Biological sciences and biotechnology.
2011-2013 Master of Science Higher institute of biotechnology Monastir, Tunisia, Major: Cellular biology and physiology.
2008-2011 Bachelor of biological Sciences Higher institute of biotechnology Monastir, Tunisia, Major: Cellular biology, microbiology and biotechnology.
2008 Baccalaureate in experimental Sciences Taher ELhadded Secondary College, Tunisia.
Internships
2017 Faculty of pharmacy, Salamanca Spain Internship in department of Analytical chemistry, Nutrition and Bromotology.
2017 Faculty of pharmacy, Madrid Spain Internship in department of Nutrition and Bromotology.
2015 Kaunas university of technology, Lithuania Internship in department of food sciences and technology



## Molecular classification of feline mammary tumors

*Classificação molecular dos tumores mamários felinos*

**Maria João Soares**

Faculdade de Medicina Veterinária - U. Lusófona, Campo Grande 376, 1749-024 Lisboa, Portugal

**Abstract**

Os tumores mamários felinos (TMF) são umas das neoplasias mais comuns em Oncologia Felina, com uma incidência que pode atingir os 40%, pelo que assumem um papel relevante na prática clínica veterinária e também na medicina translacional. Estes tumores apresentam habitualmente uma etiologia maligna (carcinomas) e um comportamento agressivo, estando associados a um prognóstico reservado, pelo que o objectivo deste estudo foi caracterizar uma população de TMF de acordo com a classificação molecular, dividindo-a em 6 subtipos moleculares.
Neste estudo, foi observado que os TMF de subtipo luminal B eram os mais frequentes, sendo seguidos pelo triplo negativo do tipo basal. O estudo demonstrou ainda que, à semelhança da Mulher, o subtipo luminal A encontrou-se associado a características mais benignas, em oposição ao subtipo triplo negativo do tipo basal, que foi associado às características tumorais mais agressivas, incluíndo um menor tempo de sobrevida.
Foram ainda avaliadas e classificadas as lesões primárias e metastáticas de 25 animais que morreram no decurso do estudo, em consequência da progressão da doença oncológica, onde se observou uma elevada heterogeneidade entre o perfil molecular dos tumores primários e das lesões metastáticas, com uma clara tendência para a perda da expressão dos biomarcadores estudados (fHER2, recetor do estrogénio e recetor da progesterona) e um consequente aumento do subtipo triplo negativo do tipo basal nas metástases dos animais avaliados.
Este estudo sugere que os TMF tenham um comportamento biológico semelhante ao Cancro da Mama na Mulher, o que pode abrir novas oportunidades para novas metodologias de tratamento e diagnóstico em Medicina Veterinária, bem como utilizar a Gata como potencial modelo biológico para o estudo do Cancro da Mama.

**Lecturer's resumé**

Maria João Soares terminou o mestrado integrado em medicina veterinária em 2009, na Faculdade De Medicina Veterinária Da Universidade De Lisboa (fmv-ul) e o doutoramento em ciências veterinárias, com especialidade em ciências biomédicas, na FMV-UL em 2016.
Actualmente exerce clínica de pequenos animais e é professora na faculdade de medicina veterinária, na universidade lusofona. Desenvolve trabalhos na área da oncobiologia nos tumores de mama, na gata e também na cadela, no sentido de investigar potenciais marcadores proteicos que possam contribuir para uma melhor compreensão da doença, para um diagnóstico mais acertivo e que possam fornecer bases para o desenvolvimento de tratamentos mais direccionados. Para além desta vertente para o desenvolvimento da medicina veterinária, os estudos tem também o objectivo de estudar a possibilidade dos animais de companhia poderem constituir bons modelos de estudo para o cancro da mama na mulher, através da medicina translaccional.

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# CBiOS Science Sessions - 2018 -

## Histopathology and immunohistochemestry characterization of mammary lesions chemically-induced by 7,12-dimethylbenz(a)anthracene and 1-methyl-1-nitrosourea in female sprague-dawley rats

*Caracterização fisiopatológica e imunoquímica de lesões mamárias induzidas quimicamente por 7,12-dimetil benzeno (A) antracenoe 1-metil-nitro-ureia em ratos femininos d sprague-dawley*

**Antonieta Muños**

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**Abstract**

As neoplasias de mama quimicamente induzidas pelos agentes carcinogénicos 7,12-dimetilbenz (a) antraceno (DMBA) e 1-metil-1-nitrosureia (MNU) em ratos têm sido frequentemente utilizadas como modelo para o estudo do cancro de mama humano, devido às semelhanças em termos da sua histopatologia e dependência hormonal. O receptor de estrogénio α (ERα), o receptor de progesterona (PR) e a proteína Ki-67 são considerados bons marcadores de prognóstico e fatores preditivos no cancro da mama. Este estudo teve como objetivo avaliar o comportamento biológico das lesões da mama induzidas pela MNU e pelo DMBA em ratos do sexo feminino da estirpe Sprague-Dawley, através da imunoexpressão dos marcadores de prognóstico ERα, PR e Ki-67, de modo a identificar o modelo mais adequado para o estudo do cancro da mama na mulher. Neste estudo também foram avaliados os efeitos da prática de exercício físico durante 35 semanas na imunoexpressão dos fatores de prognóstico ERα e Ki-67, no índice de atividade mitótica (MAI), e no desenvolvimento de metástases em neoplasias mamárias induzidas pela MNU em ratos do sexo feminino da estirpe Sprague-Dawley. Os elevados valores do KI-67 PI e do MAI em carcinomas mamários induzidos pela MNU são indicadores de uma maior agressividade destes carcinomas quando comparados com os induzidos pelo DMBA, sugerindo uma pior resposta à terapia e um pior prognóstico. Finalmente, foi possível concluir que a prática de exercício físico durante um longo período de tempo diminuíu o risco de formação de metástases do cancro da mama, este fenómeno ocorreu na presença de níveis de estrogénio aumentados, com lesões primárias e metastáticas sensíveis a hormonas esteróides, indicando que este efeito foi independente da estimulação hormonal.

Palavras-chave: receptor de estrogénio, receptor de progesterona, Ki-67, índice de atividade mitótica, rato, MNU, DMBA, neoplasia da mama, carcinogénese química, tapete rolante.

**Lecturer's resumé**

2001 – Licenciatura em Medicina Veterinária, Universidade Nacional Experimental "Francisco de Miranda", Coro, Venezuela
2007 – Mestrado em Medicina y Cirurgia de Pequenos Animais, Universidade Centroccidental "Lisandro Alvarado", Tarabana, Venezuela
2017 – Doutorado em Ciências Veterinárias, Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal
2007 -2014 - Professora de Anatomía Patológica em Universidade Centroccidental "Lisandro Alvarado" Cabudare, Venezuela.
Desde 2017- Professor Auxiliar na Unidade curricular Anatomia Patológica II e III em Ciências Veterinárias da Universidade Lusófona de Humanidades e Arte, Lisboa.

## Human golgi anti-apoptotic protein (hGAAP): a potential novel therapeutic target against cancer metastases?

*Proteína anti-apopótica de Golgi humano (hGAAP): um potencial objetivo terapêutico contra met´stases de cancro?*

**Nuno Almeida**

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**Abstract**

Cancer is the second leading cause of death worldwide, accounting for one in six deaths. The severity of most cancer types is frequently related to their ability to spread and invade to other parts of the organism. The pharmacological approaches for oncological diseases rely mainly in anti-proliferative drugs and only few and poorly effective strategies are available to control cancer spread. Therefore, novel therapeutic approaches to hamper cancer metastases are needed. This study aims at exploring the mechanisms by which the Human Golgi anti-apoptotic protein (hGAAP) influences cell migration and invasion, in an attempt to uncover potential therapeutic targets to inhibit cancer metastases.
Bioinformatics analyses suggest a link between dysregulation of hGAAP expression at the mRNA level and several human cancers. Significant upregulation of hGAAP has been detected in brain, lung, breast and prostate tumours. Human GAAP is a novel conserved Golgi cation channel that modulates $Ca^{2+}$ fluxes and inhibits apoptosis. It is expressed in all human tissues and was proposed to be a housekeeping protein. This protein regulates the $Ca^{2+}$ content and fluxes from intracellular $Ca^{2+}$ stores and promotes cell migration via the activation of store-operated $Ca^{2+}$ entry, calpain 2 activation and focal adhesions turnover.
Unpublished data shows that hGAAP overexpression in U2-OS cells highly increases cell invasion by 70% ($p<0.01$), augments MMP2 activity and gelatine degradation while hGAAP KD reduced cell invasion by 80% ($p<0.0001$). Overexpression of hGAAP leads to a reduction in extracellular pH and to an increase in mitochondrial ATP levels without affecting total ATP production, suggesting that hGAAP expression can affect the cellular metabolic status.
cells overexpressing hGAAP showed a 2.5-fold increase in overall intracellular reactive oxygen species ($p<0.01$; CellROX), and a 2-fold increase in $H_2O_2$ levels ($p<0.001$; HyPer). Ongoing work is aimed at exploring the existence of causal links between all these observations. This will be essential to determine the mechanism underlying hGAAP-induced cell invasion.
Aimimg at decreasing cancer cells migration and invasion, hGAAP or hGAAP-regulated pathways may constitute novel druggable targets to be explored for anti-metastization therapeutic strategies.

**Lecturer's resumé**

Nuno Almeida is a research fellow in the Pharmacology and Therapeutics group at Center for Biosciences & Health Technologies (CBIOS), Lisbon, Portugal.

He has a BSc (2014) and an MSc (2016) in Biochemistry, both obtained at Faculty of Sciences and Technology, University of Coimbra (FCTUC), Coimbra, Portugal.

He published five abstracts in nacional and international peer-reviewed journals and he is also author/co-author of several oral and panel communications in national and international meetings, having won the award of best oral presentation in basic research at XXXVI Congresso Nacional de Cirurgia. His research interests are focused in the field of oncology, covering several areas in oncobiology and cancer therapeutics.

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## Halimane diterpenes from *Plectranthus ornatus* Codd. against *Mycobacterium tuberculosis* H37Rv

*Diterpenos de esqueleto de halimano de Plectranthus ornatus Codd. contra Mycrobacterium tuberculosis H37Rv*

**Joana M. Andrade**

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**Abstract**

Natural products are a unique source of lead compounds for medicinal chemistry drug development. The *Plectranthus ornatus* Codd. plant is often used in traditional medicine, particularly in some regions of Brazil for antimicrobial purposes. Several diterpene compounds have been successfully isolated from some *Plectranthus* spp. and studied for their anti-tubercular activity against the non-virulent *Mycobacterium smegmatis* [1,2].

In previous works, a new halimane diterpene from *P. ornatus* was isolated in large quantities [1,3]. The halimane isolated has a structural similarity with the Rv3377c/Rv3378c targets, which have an important role to the bacterial survival and to its virulence [4]. Therefore, we assessed the anti-tubercular activity of this halimane and some of its hemi-synthetic derivatives, previously prepared, against *M. tuberculosis* H37Rv (Mtb).

The compounds cytotoxicity was tested measuring LDH release and no considerable cytotoxic effects were found up to 25 µg/mL. On a preliminary assay with the non-virulent strain *Mycobacterium smegmatis*, the minimum concentration that inhibited the growth of the mycobacteria by ≥99% for the original halimane compound was 100 µg/ml, in comparison with the positive control rifampicin (MIC 3.75 ng/ml).

**Lecturer's resumé**

Currently a PhD student at the PhD Program of Health Sciences in a partnership established between the University of Alcalá Henares (Spain) and the University Lusófona (ECTS). BSc in Biochemistry by the Faculty of Sciences (University of Lisbon), has recently accomplished the MSc in Biopharmaceutical Sciences from the Faculty of Pharmacy with First Class classification. Her thesis project entitled "Unravelling new ethnopharmacological roles for Plectranthus species: Biological activity screening" developed at the Research Center for Biosciences & Health Technologies (CBIOS), founding body of the Universidade Lusófona de Humanidades e Tecnologias (ULHT), and iMed.ULisboa, Research Institute for Medicines and Pharmaceutical. Under supervision of Prof. Dr. Patrícia Dias Mendonça Rijo (PhD) and Prof. Dr. Célia Maria Cardona Faustino (PhD). To accomplish some thesis research milestones has also developed investigation at the Center for Marine Sciences CCMAR, University of Algarve for evaluation of anti-inflammatory properties of Plectranthus isolated compounds on RAW 264.7 macrophage cells stimulated with LPS (Biosafety Laboratory Level 2). Also, this year was awarded for a Short Term Scientific Mission: "Natural diterpenoids as potential anti-tubercular drugs" at the National Institute for the Infectious Disease Lazzaro Spallanzani – Istituto di Ricovero e Cura a Carattere Scientifico, Rome, Italy.

April | Abril 2018
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## .....Molecular classification of feline mammary tumors

*Carcinogénese mamária em ratos fêmea: contribuição para a monitorização e tratamento*

**Ana Faustino**

Faculdade de Medicina Veterinária - U. Lusófona, Campo Grande 376, 1749-024 Lisboa, Portugal

**Abstract**

O cancro é um importante problema de saúde pública. Neste trabalho foram avaliadas duas abordagens terapêuticas no cancro da mama: o efeito do estilo de vida (prática de exercício físico) e a ação do fármaco anti-histamínico cetotifeno.

As neoplasias mamárias foram induzidas em ratos do sexo feminino através de uma injeção intraperitoneal do agente carcinogénico N-metil-N-nitrosureia (MNU). No primeiro protocolo experimental, os animais foram exercitados num tapete, durante 35 semanas. No segundo protocolo experimental, os animais receberam o fármaco inibidor da desgranulação dos mastócitos cetotifeno por via oral, durante 18 semanas. No final dos ensaios, os animais foram sacrificados e foi realizada uma necrópsia completa.

A prática de exercício físico inibiu a carcinogénese mamária, reduzindo a inflamação, o número total de neoplasias, o número de neoplasias por animal e a sua malignidade. As neoplasias mamárias dos animas exercitados exibiram maior imunoexpressão dos recetores de estrogénios α e maior vascularização, quando comparadas com as neoplasias dos animais sedentários. A administração do cetotifeno após o desenvolvimento das neoplasias mamárias reduziu a proliferação das neoplasias.

De acordo com os nossos resultados, a prática de exercício físico moderado durante um longo período de tempo e a administração do cetotifeno são recomendadas para a prevenção e tratamento do cancro da mama.

Palavras-chave: cancro da mama, carcinogénese química, cetotifeno, exercício físico, mastócitos, N-metil-N-nitrosureia, rato, termografia, ultrassonografia, vascularização

**Lecturer's resumé**

Ana Faustino é Mestre em Medicina Veterinária pela Universidade de Trás-os-Montes e Alto Douro (UTAD) e Doutorada em Ciências Veterinárias na mesma instituição. O seu interesse de investigação centra-se na utilização de modelos animais de cancro, angiogénese e linfangiogénese tumoral, e monitorização imagiológica das neoplasias. Os resultados dos trabalhos desenvolvidos foram divulgados em publicações em diversos formatos: 2 capítulos de livros; 39 artigos em revistas científicas internacionais do ISI; 7 artigos em revistas científicas internacionais com referee; 35 abstracts em revistas científicas do ISI; 4 abstracts em revistas internacionais com referee; 63 publicações em proceedings de congressos científicos, 23 das quais em encontros internacionais. Participou em dois projetos de investigação financiados pela Fundação para a Ciência e Tecnologia. Recebeu vários prémios de mérito científico, e destaques e distinções da imprensa. Tem experiência pedagógica ao nível do ensino superior universitário e experiência na orientação de alunos. Publicou 2 livros de texto com ISBN; 1 tese; 1 dissertação; realizou 34 comunicações orais, 14 das quais em encontros internacionais; e 66 comunicações por painel, 39 das quais em encontros internacionais. Participou em diversos cursos, workshops, congressos internacionais e nacionais. Pertence ao corpo editorial de diversas revistas científicas e tem participado como revisora de 140 artigos científicos. Tem experiência na organização de congressos e conferências.

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# CBiOS Science Sessions - 2018 -

## Molecular consequences of Oxidative Stress: Methionine oxidation in calmodulin

*Consequências moleculares do stresse oxidativo: oxidação de metionina em calmodulina*

**Jeff Urbauer**
University of Georgia

**Abstract**

Reactive oxygen species in cells readily oxidize methionine in proteins to methionine sulfoxide. Although mechanisms for repair and removal of oxidized proteins operate in cells, under some conditions (aging, cancers) accumulation of oxidized species occurs. When methionine is oxidized to methionine sulfoxide, steric and polarity differences impact protein structure and function. This is particularly relevant for calcium signaling via the critical calcium signal transducer protein calmodulin (CaM). CaM activates hundreds of cellular target proteins in response to intracellular calcium spikes. Interactions of CaM with target proteins rely on hydrophobic pockets in its globular domains, lined with methionine residues, which anchor hydrophobic groups of target protein side chains. It has been shown that oxidized CaM can accumulate under conditions of oxidative stress, presenting the potential for singular biological repercussions, given the centrality of CaM to cellular calcium signaling. Accordingly, it is important to define the structural and functional consequences of methionine oxidation in CaM and their physical origins. This lecture will focus on the molecular details of how target protein activation and drug binding are altered by methionine oxidation in CaM.

**Lecturer's resumé**

Dr. Urbauer earned bachelor's and doctoral degrees in chemistry from the University of Nebraska. He pursued postdoctoral studies in enzyme mechanisms at the University of Wisconsin as a National Institutes of Health fellow, and subsequently physical studies of protein structure and function at the University of Illinois. He held faculty appointments at the State University of New York at Buffalo, the University of Pennsylvania and the University of Kansas before joining the faculty in the department of chemistry and the department of biochemistry and molecular biology at the University of Georgia. His research interests are in molecular biophysics, protein structure and function and nuclear magnetic resonance spectroscopy of proteins. At the University of Kansas he was awarded the Outstanding Educator award by the Mortar Board National College Senior Honor Society.

-B.A., Chemistry (magna cum laude) University of Nebraska-Lincoln, Lincoln, Nebraska, 1981
-Ph.D., Chemistry, University of Nebraska-Lincoln, Lincoln, Nebraska, 1987
-National Institutes of Health Postdoctoral Fellow, University of Wisconsin-Madison, 1987
-Postdoctoral Associate, University of Illinois Champaign-Urbana, 1992
-Assistant Professor (non-tenure track), State University of New York at Buffalo, 1995
-Assistant Professor (non-tenure track), University of Pennsylvania, 1998
-Assistant Professor, University of Kansas, 1999
-Currently Associate Professor of Chemistry, Associate Professor of Biochemistry and Molecular Biology, the University of Georgia
-Research interests: molecular biophysics, protein structure and function, biomolecular nuclear magnetic resonance

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## Application of ionic liquids in delivery systems

*Aplicação de líquidos iónicos em sistemas de entrega*

**Ana Júlio**
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**Abstract**

The Pharmaceutical and Cosmetic Industries come across several challenges, such as low solubility and/or permeation of some drugs. This problematic results in lower therapeutic efficiency and bioavailability, which may lead to the need to incorporate higher drug doses to reach the therapeutic effect. Thus, it is crucial to find new functional ingredients that may useful to overcome these challenges.
Ionic Liquids (ILs), are salts, weakly coordinated, that are liquid below 100 ºC and due to their characteristics, have been studied as functional ingredients in delivery systems. In this context, herein, the solubility of poorly soluble drugs was evaluated in the presence of the ILs, at non-toxic concentrations. Furthermore, the incorporation of these drugs in different delivery systems, such as, O/W emulsions, gels, lipidic implants and nanosystems was also investigated in the presence and absence of the ILs. The incorporation of ILs, at concentrations where cell viability is maintained, allowed a higher drug loading and the development of more efficient drug delivery systems, thus showing that these salts may be valuable as functional ingredients.

**Lecturer's resumé**

Ana Júlio is a research fellow in the Development of Delivery Systems Group at Research Center for Biosciences and Health Technologies (CBIOS), Lisbon, Portugal.
She has a MSc (2017) in Pharmaceutical Sciences, obtained at School of Sciences and Health Technologies (ECTS), U. Lusófona, Lisbon, Portugal.
She has published several articles in national and international peer-reviewed journals and she is also author/co-author of various oral and poster communications, in national and international meetings, having won the award of best poster presentation at I Jornadas CBIOS. Her research interests are focused on the synthesis of ionic liquids and their applicability in health sciences, covering several areas in chemistry and pharmaceutical technology.

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## Isolation, synthesis and nanoencapsulation of cytotoxic compounds from *Plectranthus spp*

*Isolamento, síntese e nanoencapsulação de compostos citotóxicos de Plectranthus spp.*

**Catarina Garcia**

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**Abstract**

Isolation, synthesis and nanoencapsulation of cytotoxic compounds from Plectranthus spp.
Cancer is one of the major causes of death worldwide. New attempts to find new anticancer compounds have been investigated, and plants are a valuable source for the discovery of bioactive compounds. Plectranthus is a large and widespread genus with a diversity of ethnobotanical uses. Firstly, this work reviews the Plectranthusderived-abietanes that are described for antiproliferative activity. Also, the study of extracts of some of these plants was also carried out. After the extractions were completed, the antiproliferative properties of those were assessed, namely their anticancer properties were assessed in an Artemia salina L. brine shrimp model and different cell lines. One of the cytotoxic spp. previously evaluated - P. madagascariensis – was phytochemically studied and a cytotoxic diterpene was isolated from its essential oil in high amounts. The anticancer properties of this compound, 6,7-dehydroroyleanone, were assessed in different cell lines, and the mechanism responsible for cell death was enlighten for the first time. This diterpene was also structurally characterized and its reactivity explored.

**Lecturer's resumé**

Catarina Garcia is a Health Sciences PhD student in Universidade Lusófona de Humanidades e Tecnologias (Lisbon, Portugal) in partnership with Universidad de Alcalá (Madrid, Spain).
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During the course of her PhD, she has attended to international training schools as well as practical courses on in vitro evaluation of anticancer compounds and NMR assignment. She's has participated in several workshops and symposiums, where she was able to present her work through 35 panel communications, some of those international, and 9 oral communications. She features in 7 published articles in nternational peer-reviewed journals.



## Cytotoxic lead molecule search: screening and isolation of compounds from Plectranthus spp

*Pesquisa de moléculas de chumbo citotóxicas: triagem e isolamento de compostos de Plectranthus spp*

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**Abstract**

Plants of Plectranthus genus (Lamiaceae) have demonstrated several uses, including the treatment of various infections. They are known to be a good source of bioactive compounds and produce the abietane-type diterpenoids as common secondary metabolites with reported biological activities. The objective of this study was to evaluate the biological activity of sixteen Plectranthus species acetonic extracts and identify the bioactive compound in the most active extract. The acetonic extraction was done and the percentage yield % w/w was determined. All extracts were screened for their antimicrobial activity using the well diffusion method and MIC and MBC of the active extracts determined. Their antioxidant activity was also assessed using the DPPH assay. The general toxicity was done and the antitumor potential of five of the most toxic extracts was explored in different cancer cell lines: HCT116, MCF-7 and NCI-H460. The cytotoxic P. ramosiorextract was purified by preparative TLC (silica gel; n-hexane/AcOEt; 8:2) to afford 7α-acetoxy-6β-hydroxyroyleanone. The structure was elucidated by spectroscopic data (1D- and 2D-NMR experiments) and comparison with bibliographic data. 7α-Acetoxy-6β-hydroxyroyleanone could be the responsible for the cytotoxicity of the extract, however other compounds or its synergetic effect could account for the extract cytotoxicity. More studies are ongoing to unveil the cytotoxicity of this extract.

**Lecturer's resumé**

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