IX CLINICAL BIOCHEMISTRY WORKSHOP

LIFESPAN, HEALTH & METABOLIC DISEASES

BOOK OF ABSTRACTS

26th JANUARY 2024

UNIVERSIDADE DO ALGARVE

Campus de Gambelas-Faro

Title

Lifespan, Health and Metabolic diseases: Book of abstracts, IX-SPB Clinical Biochemistry Workshop

Editors
Manuel Aureliano, Márcio Simão, Bibiana I. Ferreira, Ana Luísa Coelho, Sónia Simão, Ana Costa, Célia Antunes, Leonor Cancela

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ORGANIZING/SCIENTIFIC COMMITTEE

Manuel Aureliano, FCT, CCMar, University of Algarve
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Bibiana I. Ferreira, FMCB, ABC-Ri, University of Algarve

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TRAIL

Index

WELCOME MESSAGE

The IX Clinical Biochemistry Workshop (IX-CBW) was held on January 26, 2024, at the University of Algarve (UAlg), Faro, within the scope of the Clinical Biochemistry thematic group of the Portuguese Society of Biochemistry (SPB). It was the second time in 14 years that this important Workshop on Clinical Biochemistry will be held in Faro, after the IV edition (2010), chaired by Professor Aureliano Alves. The IX Clinical Biochemistry Workshop follows previous successful Clinical Biochemistry symposia held in Porto (2003, 2006, 2008, 2016), Faro (2010), Coimbra (2012), Lisbon (2014), and Évora (2018).

This interdisciplinary event aims to bring together researchers from the scientific community who enhance the interaction between Biochemistry and Clinics to present their most recent discoveries on topics such as aging, health and metabolic diseases with an emphasis on neurological, cardiovascular diseases and diabetes, among other pathologies. However, historically, this Workshop has had a high percentage of undergraduate, master's and doctoral students as participants, reflecting the interest that the event has had in scientists of the future.

Students from various degrees, masters and doctorates, as well as researchers and teachers, are therefore invited to participate in the IX Clinical Biochemistry Workshop, in the simple city of Faro, where it is good to live, study and to do research! Share with us your latest research to a committed scientific community, which has shared and promoted these Workshops in this 21st century. The excellent quality expected from the presenters and their research will certainly serve as an innovative reference for the coming decades, allowing for a broader application of Clinical Biochemistry in various fields as well as promoting the quality of life of future generations.

We hope to welcome you all to Faro, for the IX Clinical Biochemistry Workshop, which will be mixed, in person and online, to allow greater participation at a national level, with oral and poster presentations.

Thank you for being a part of the IX-SPB Clinical Biochemistry Workshop 2024 and we look forward for inspiring discussions and new insights!

Warm regards,

On behalf of the Organizing/Scientific Committee

Aureliano Alves

UAlg Library for all

The Library of the University of Algarve team expresses its appreciation for being invited to be present at the IX Clinical Biochemistry Workshop, to present to the participants current and selected information of interest to the scientific areas developed or studied in the Biochemistry course.

The modern Library is not just a workspace and a supplier of reference bibliography in several scientific areas. The current Library is a mediator for easy research and access to scientific and bibliographic information, whatever the format and support in which it might be available: paper books and journals, which contain fundamental chapters and articles to the study of sciences and knowledge either consolidated or in permanent evolution; but, increasingly, e-books and e-journals, in various electronic formats, databases, indexes, repositories, which provide scientific texts, images, sounds or videos, covering all areas of knowledge.

The Library of the University of Algarve has followed the transformation of the teaching and learning processes and the life cycle of different courses, aware of its mediating and training role about literacies and specifically information literacy. In this domain, the UAlg´s Library has been promoting training practices, related to new forms of reading, searching and retrieving information, associated with technological and digital resources and different audiences. The UAlg Library's intervention in *digital reading* aims to provide users with skills to identify their information needs, seek, search for, extract, organize and use information in a rigorous and ethical way, in the current context of increasingly easy access to content, more and more diverse and automated.

In addition to the general promotion of the Library, one of the components of user training is initial training for newly arrived students; another one is a more advanced or specific training, intended to advanced users or focused on specific bibliographic resources, appropriate to each curricular or scientific area. Over the last few years, the UAlg Library has collaborated with teachers from the Biochemistry course, to bring this training to their students, at the different levels of graduation (undergraduate, master and doctoral studies).

In this context, for the participants in the IX Clinical Biochemistry Workshop, the UAlg Library highlights the bibliography that is available to students, teachers and researchers, either from the paper collection (which records and references are available through the online public access catalogue), but also all the electronic resources, with digital collections of scientific articles and videos, focused on the chemistry and related scientific areas.

Just as Clinical Biochemistry "applies to various fields and promotes quality of life", libraries serve past, present and future generations of students, teachers and researchers, from all scientific areas, and must remain up to date with contemporary and specific content, to continue serving and making life easier for all readers who seek them.

Salomé Martins d'Horta

Nélia Brito Sequeira

Biblioteca da Universidade do Algarve

Gabinete de Psicologia dos Serviços de Saúde SAS - UAlg

O ***Gabinete de Psicologia SS-SAS***, desde 2001 parte dos Serviços de Saúde SAS da Universidade do Algarve (GP-SS/SAS-UAlg), elegeu como objectivo principal a promoção da Saúde Psicológica e do Bem-estar global da população universitária. Em estreita colaboração com outras valências dos Serviços de Saúde (Clínica Geral ou Nutrição e, em breve, Psiquiatria) e em cooperação com outros parceiros institucionais, o GP-SS/SAS-UAlg tem disponibilizado desde 2001 o atendimento psicológico especializado e individualizado, tanto seja na especialidade de psicologia clínica, como tem promovido e participado em múltiplas parcerias por via de intervenções de cariz (in)formativo e preventivo no âmbito da Saúde comunitária. Suportado na premissa de que a saúde psíquica e sócio-relacional dos estudantes do ensino superior é deveras importante para o seu desenvolvimento e sucesso académico, a intervenção do GP-SS/SAS-UAlg constituiu-se como um contributo para a promoção da saúde mental e do sucesso académico, da qual se espera um impacto positivo no bem-estar da população universitária.

As transições naturais no desenvolvimento dos estudantes universitários constituem-se como experiências significativas uma vez que englobam a evolução a nível biológico, psicológico, social e cultural. Dados recentes indicam que cerca de 86% dos estudantes universitários relatam sentimentos avassaladores sobre as suas responsabilidades, 57% experienciam ansiedade substancial, 35% descrevem sentimentos de depressão que causam dificuldades no funcionamento normal e 66% sofrem academicamente dado à depressão, à ansiedade ou ao stress, a que acrescem outras problemáticas ao nível da concentração, desregulação emocional e insónia. Verifica-se ainda que os problemas mentais são mais elevados dentro dos jovens adultos. Entendemos que a saúde mental é fundamental para o bem-estar geral e que a sua promoção

precoce pode prevenir complicações futuras e facilitar a recuperação e a reinserção social. Assim, parece-nos fundamental a intervenção psicológica implementada pelo GP-SS/SAS-UAlg.

No que concerne à intervenção psicoterapêutica, o principal foco do GP-SS/SAS-UAlg consiste na prática preventiva, promocional e de tratamento, quer sejam no âmbito das patologias em saúde mental e/ou no desenvolvimento pessoal, relacional e de proficiência académica, ambas problemáticas referentes aos estudantes universitários. Relativamente ao apoio psicopedagógico aos estudantes, o GP-SS/SAS-UAlg intenta solucionar problemáticas individuais no âmbito da saúde mental e promover o desenvolvimento de competências pessoais específicas tais como a assertividade, a proatividade e o incremento de capacidades focadas na gestão equilibrada dos processos conducentes ao cumprimento bem-sucedido de objectivos, assim como promove estratégias personalizadas que conduzem ao aumento da produtividade académica e das competências sócio relacionais. Neste sentido, o campo da ação psicopedagógica tem como objectivo dotar os utentes com técnicas e estratégias personalizáveis as quais podem potenciar o sucesso académico e profissional, assim como promover o bem-estar global.

Neste contexto, o GP-SS/SAS-UAlg tem como principal objectivo não somente a promoção e tratamento da saúde psicológica, como a promoção do bem-estar geral da população académica, a qual prioriza três principais vertentes de acção: **psicoterapêutica, psicopedagógica e promoção da saúde comunitária.**

Por via dos Serviços de Saúde/SAS-UAlg, o GP-SS/SAS-UAlg disponibiliza espaços de atendimento à comunidade académica, nos quais se efetuam avaliações, intervenções e tratamentos individualizados. Para tal, a intervenção psicoterapêutica incide na vertente da psicologia clínica e compreende técnicas cognitivo-comportamentais, entre outras abordagens conformes à casuística em presença. Os atendimentos clínicos são realizados individualmente, sendo a frequência destes realizada conforme a avaliação da necessidade de cada utente.

Mais recentemente, no período agudo pandémico iniciado a 18 de Março de 2020, a tais atendimentos presenciais foi dada continuidade na vertente *online*, dadas as condicionantes da pandemia Covid-19 (Figura 1).

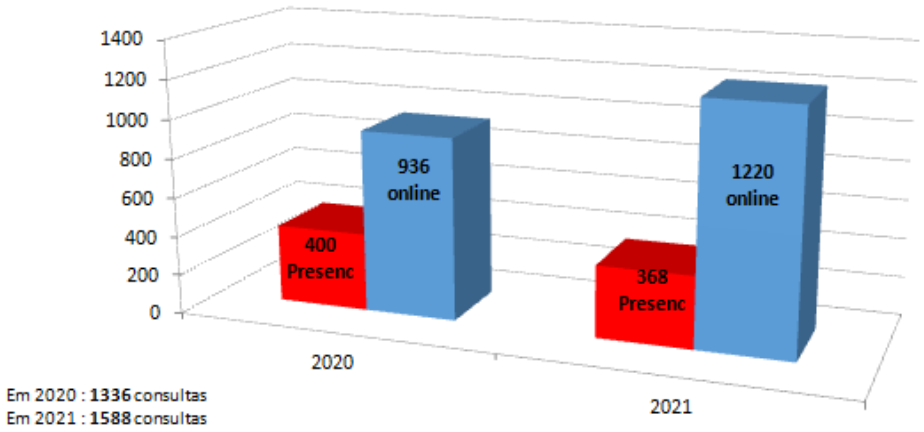

Figura 1. Valência Psicoterapêutica GP. Período de confinamento COVID - Segmentação Psicologia Clínica: 2020 - 2021.

A abrangência e flexibilidade no apoio psicológico e psicopedagógico à comunidade académica constituem-se como um recurso fundamental para o melhoramento do bem-estar geral de toda a academia (alunos, docentes e não docentes), não só no que se refere à potenciação do bom desempenho académico e do desenvolvimento de carreiras bem-sucedidas, como o desenvolvimento e consolidação do bem-estar de alunos, docentes e não docentes nesta instituição. Nesse propósito incluímos a inovação e adaptabilidade, tal como podemos exemplificar pela prática de atendimento *online* implementada com sucesso no período excecional da pandemia COVID-19, nomeadamente 936 vídeo-consultas no ano de 2020 e as 1.220 vídeo-consultas efectuadas no ano de 2021 (Figura 1). Tal modelo misto permitiu uma resposta adequada e eficaz face ao incremento de pedidos de ajuda, sucessivos *record* de consultas de psicologia clínica presenciais e online (um total de **1.588** no ano de 2021, **1.747** no ano de 2022 e **1.741** em 2023) (Figura 2).

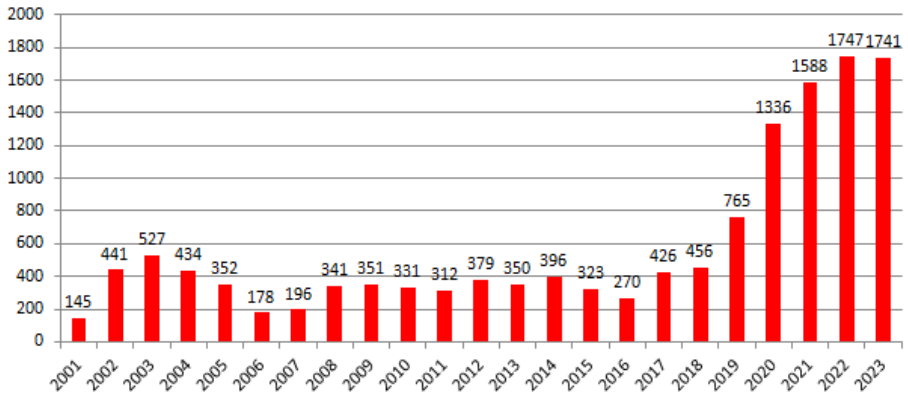

Figura 2. Valência Psicoterapêutica GP. Progressão das Consultas em Psicologia Clínica: 2001 - 2023

Nota - É de salientar que em 2023 a equipa clínica contou com menos um elemento do que é habitual e, além disso, um dos técnicos esteve impedido de exercer durante 4 meses. Doutro modo, é de supor que o quantitativo final desse ano teria sido superior.

De referir que essa modalidade de tratamento/acompanhamento *online* permanece como possibilidade complementar à modalidade de atendimento prevalecente (e preferível), *i.e.,* a consulta presencial.

No que concerne ao apoio psicopedagógico aos estudantes, o GP-SS/SAS-UAlg definiu uma estratégia planeada e intenta promover o desenvolvimento de competências transversais. Neste sentido, salienta-se a formação geral intitulada "Metodologias de Estudo e Proficiência na Gestão de Tempo" realizadas anualmente nos *campi* da UAlg a todos os estudantes, assim como a implementação do Plano para a Promoção do Sucesso Académico e Prevenção do Abandono Escolar (PPSAPAE, em parceria com dezenas de cursos) ou mais recentemente o SoUAlg.

Inserido nos Serviços de Saúde dos Serviços de Ação Social da Universidade do Algarve, o GP-SS/SAS-UAlg está receptivo a toda a comunidade académica (alunos, docentes e não docentes). A colaboração entre o GP-SS/SAS-UAlg e as diversas estruturas internas tem sido enriquecedora e gratificante tendo vindo a apresentar resultados positivos. De entre estas estruturas, destacam-se os Serviços de Ação social, os Serviços Académicos, o Gabinete de Comunicação de Protocolo (GCP), a Rádio Universitária do Algarve (RUA), a Associação Académica da UAlg (AAUAlg), o Gabinete de Relações Internacionais e Mobilidade (GRIM), o Gabinete de Apoio à Inovação Pedagógica (GAIP), o sosabandono@ualg.pt, as Faculdades, o Gabinete de Desporto da UAlg, o Núcleo de Estudantes Brasileiros AAUAlg, a Secção Autónoma de Estudantes Africanos e os Núcleos de Estudantes dos cursos, entre outras.

Resultados e impactos

Desde a sua implementação em Outubro de 2001, o GP-SS/SAS-UAlg tem vindo a identificar e a tratar a prevalência de patologias em saúde mental e do desenvolvimento pessoal e relacional presentes na comunidade académica. Desde a sua fundação foram efectuadas mais de **10.000** consultas em Psicologia Clínica.

Neste contexto, num estudo interno realizado em 2019, a partir de uma amostra de 1.247 utentes, que perfez um total de 6.225 consultas, observou-se que os diagnósticos mais prevalentes foram as Perturbações da Ansiedade (n **=** 403; 32,2%) e as Perturbações Depressivas (n = 309; 24,8%), seguido de Problema Académico (n = 118; 9,5%) e dos Problemas relacionais (n = 103; 8,3%). De acordo com a análise descritiva da totalidade da amostra (N = 1 247), 64,8% dos casos (n = 808) apresentam mais do que um diagnóstico. Desta amostra, cerca de 86,7% dos utentes aderiram ao acompanhamento psicoterapêutico.

Sustentabilidade e transferibilidade

A sustentabilidade do GP-SS/SAS-UAlg fundamenta-se nas parcerias estabelecidas ao longo do tempo, assim como na sua metodologia organizacional.

Neste contexto, os Serviços de Saúde SAS não visam o propósito da obtenção de lucro, aplicando um princípio de solidariedade e apoio social, através da cobrança de um valor meramente simbólico por consulta (1€), com isenção aos bolseiros que a requeiram. Assim sendo, o custo-efetividade traduz-se clara vantagem para os utentes, patenteada pela diversidade das áreas de intervenção a uma ampla população beneficiária e na qualidade dos cuidados prestados, assim como dos resultados obtidos, a custos simbólicos.

Apesar do crescente aumento de solicitações neste tempo desafiante, tem sido possível dar resposta atempada sem colocar em causa a qualidade da prestação dos cuidados àqueles que nos procuram, o que contribuirá não só no plano da saúde mental e sócio-relacional mas também na potenciação do desempenho académico.

A estruturação teórica e metodológica da nossa *praxis multitask* tem vindo a ser implementada com sucesso na UAlg desde 2001; pensamos que tal *modus operandi* é replicável em qualquer outra Instituição de Ensino Superior.

Contributos para a melhoria contínua da qualidade da Saúde Mental na UAlg

Estudos indicam que os problemas piscoemocionais e mentais de natureza pessoal, quer os relacionados com os processos desenvolvimentais, quer os de natureza patológica, interferem no sucesso académico e/ou prestação laboral, pelo que se torna prioritário que se intervenha ao nível da saúde da comunidade académica. As intervenções psicológicas e/ou psicopedagógicas constituem uma área essencial na identificação e na intervenção, sejam no âmbito das patologias em saúde mental e/ou no desenvolvimento pessoal, relacional e/ou académico.

A diversidade de problemas identificados por via das consultas de psicologia e/ou apoio psicopedagógico clarificam a evidente necessidade desta valência especializada na Universidade do Algarve. Verificamos que a prestação de cuidados de saúde mental e a abordagem psicopedagógica que temos vindo a implementar permitem a promoção, prevenção e o tratamento no âmbito da saúde mental e parecem influir positivamente no bem-estar geral da comunidade académica (alunos e funcionários, inclusive os docentes).

Doutor Jorge Andrez Malveiro
Mestre Kátia Tavares
Mestre Lorenzo Anflor
Mestre Gabriela Alfares
Licenciada Francisca Santos
Licenciada Maria Eduarda Pereira
Licenciada Rita Serra

PROGRAM

8:00-9:00	Registration
9:00-9:15	Welcome Message
9:15-10:00	**Maria João Pereira, Uppssala University *(on-line)***
	Title: Glucocorticoids- old hormones, new targets
10:00-10:20	**Ana Luísa Coelho, ABC-Ri, ESSUAlg, UAlg**
	Title: Diabetes remission after obesity treatment - is this a long term story?
10:20-10:35	**Neusa Oliveira, Siemens Healthineers**
	Title: Test in the clinical assessment of Liver Fibrosis
10:35-10:45	**Vânia Roberto, ABC CoLAB**
	Ageing Better CoLAB: A collaborative solution to tackle the ageing challenge
10:45-11:15	**Coffee-Break & Poster Session**
11:15-11:35	**Rui Dinis, HESE, EPE, Universidade de Évora**
	Title: Pathogenic Germline mutations on Hereditary Breast Cancer in Alentejo: is testing worth?
11:35-11:55	**Jacinta Serpa, NOVA Medical School**
	Title: Metabolic remodeling has a key role in cancer
11:55-12:10	IZASA - *Clinical Biochemistry: needs and trends*
12:10-12:50	**Pitch I - Selected Oral Communications***

12:50-14:00 **Lunch**

14:00-14:30 Dixie Fare Band

14:30-14:50 **Álvaro Tavares, Universidade do Algarve**

Title: Polo Kinase Inhibitors in Human Cancer Therapy

14:50-15:10 **Marco Alves, Universidade de Aveiro**

Title: Effects of aging and metabolic diseases on male reproductive health and their offspring

15:10-15:30 **José Bragança, ABC-Ri, Universidade do Algarve**

Title: Stem cells and bio-alchemy

15:30-16:10 **Pitch II - Selected Oral Communications****

16:10-16:40 **Coffee-Break & Poster Session**

16:40-17:00 **Hipólito NZwalo, CHUA, Universidade do Algarve**

Title: Disentangling the association of chemical pollutants and neurological disorders

17:00-17:20 **António Camacho, Hospital de São José**

Title: Ageing, lifestyle and bone health

17:20-18:05 **Olivier Vanakker, Ghent University**

Title: Ectopic calcification, a prevalent multifaceted condition influencing healthy aging

18:05-18:15 **Awards & Closing Session**

* Pitch I - Selected Oral Communications

Raquel G. D. Andrade

Alexandra Marchã Penha

Bárbara Vieira

Catarina Marreiros

Célia M. Antunes

Cláudia Viegas

Daniela F. Santos

** Pitch II- Selected Oral Communications

Ana Tellechea

Sofia Duarte

Manuel Aureliano

Max Domingues

Nísia Borralho-Martins

Inês T. Afonso

Tuane C R G Vieira

Mariana Teixeira

Working program

Lifespan, Health and Metabolic diseases: IX-SPB Clinical Biochemistry Workshop

26/1/2024, Anf. Verde, Gambelas Faro

PROGRAM (Color code for Chairs: Blue, Aureliano; Red, Célia; Green, Leonor)

8:00-9:00	Registration
9:00-9:15	Welcome Session (Aureliano, Leonor, Vítor, Paulo Águas (Reitor))
9:15-10:00	Maria João Pereira, Uppssala University *(on-line)*, (Diana Nóias) *Title: Glucocorticoids- old hormones, new targets*
10:00-10:20	Ana Luísa Coelho, ABC-Ri, ESSUAlg, UAlg, (Diana Martins) *Title: Diabetes remission after obesity treatment - is this a long term story?*
10:20-10:35	Siemens ELF, (Caio Silva)
10:35-10:45	Vânia Roberto, ABC CoLAB (Nelson Colaço) *Title: Ageing Better CoLAB: A collaborative solution to tackle the ageing challenge*
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11:35-11:55	Jacinta Serpa, NOVA Medical School (Mariana Custódio) *Title: Metabolic remodeling has a key role in cancer*
11:55-12:10	IZASA - *Clinical Biochemistry: needs and trends* (Ana Galveias)
12:10-12:50	Pitch I - Selected Oral Communications* Raquel G. D. Andrade; Alexandra Marchã Penha; Bárbara Vieira; Catarina Marreiros; Célia M. Antunes; Cláudia Viegas; Daniela F. Santos
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14:00-14:30	**Dixie Fare Band**
14:30-14:50	Álvaro Tavares, Universidade do Algarve (Raquel Cavaco) *Title: Polo Kinase Inhibitors in Human Cancer Therapy*
14:50-15:10	Marco Alves, Universidade de Aveiro (Carina Dias) *Title: Effects of aging and metabolic diseases on male reproductive health and their offspring*
15:10-15:30	José Bragança, ABC-Ri, Universidade do Algarve (Joana Dias) *Title: Stem cells and bio-alchemy*
15:30-16:10	Pitch II - Selected Oral Communications Ana Tellechea, Sofia Duarte, Manuel Aureliano, Max Domingues, Nísia Borralho-Martins, Inês T. Afonso, Tuane C R G Vieira, Mariana Teixeira
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16:40-17:00	Hipólito NZwalo, CHUA, Universidade do Algarve (Mariana Marques) *Title: Disentangling the association of chemical pollutants and neurological disorders*
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17:20-18:05	Olivier Vanakker, Ghent University (Ana Galveias) *Title: Ectopic calcification, a prevalent multifaceted condition influencing healthy aging*
18:05-18:15	**Awards & Closing Session (Carlos Guerrero, Inês Araújo, Leonor, Aureliano)**

INVITED LECTURES

IL1

Glucocorticoids - old hormones, new targets

Maria João Pereira, Uppssala University

Type 2 Diabetes (T2D) and obesity pose escalating global health challenges, necessitating innovative research to identify novel therapeutic targets. Glucocorticoids, traditionally recognized for their role in stress response and metabolism, have been extensively studied and applied in various medical interventions. Elevated levels of glucocorticoids are linked to insulin resistance and the phenotypes of type 2 diabetes. This cortisol-induced insulin resistance is closely tied to the pathogenesis of T2D, resulting in a phenotype characterized by abdominal obesity and metabolic dysfunction.

Our research focuses on using glucocorticoid exposure in adipose tissue as a model to induce insulin resistance, with the goal of identifying potential pharmacological targets. A pivotal player in this context is FK506 binding protein 5 (FKBP5), whose expression significantly increases following glucocorticoid incubation in human adipose tissue. As a molecular chaperone, FKBP5 regulates the stress response by inhibiting glucocorticoid receptor activity. Our investigations into FKBP5 gene single nucleotide polymorphisms (SNPs) have uncovered associations with T2D and diabetes-related phenotypes, including circulating lipids.

Moreover, our exploration of FKBP5 expression in adipose tissue has revealed correlations with markers of insulin resistance, indicating its potential as a therapeutic target. Our latest findings suggest that knocking down FKBP5 with CRISPR-Cas9 gene editing in human pre-adipocytes prevents the negative effects of glucocorticoids on adipocyte insulin sensitivity and the insulin signaling pathway. These results underscore the potential key role of FKBP5 in glucocorticoid-induced insulin resistance, with significant implications for metabolic health.

Biography

Maria João Pereira, born in Loulé, Portugal, is a researcher and Associate Professor in Experimental Endocrinology at Uppsala University, Sweden. After obtaining her biochemistry degree in 2002 from the University of Algarve, she gained practical experience as a laboratory technician in clinical analysis in Portimão. In 2008, she embarked on an international Ph.D. program spanning the University of Algarve, Coimbra, and the University of Göteborg in Sweden, successfully defending her thesis on immunosuppressive agents' effects on adipose tissue metabolism in 2012. Since 2013, she has been working with translational and interdisciplinary research at the Clinical Diabetology and Metabolism at the Department of Medical Sciences at Uppsala University in Sweden. Her work focusing on mechanisms in type 2 diabetes and obesity. Her work, which combines multi-omic sciences in clinical studies, explores drug-related mechanisms, and aims to uncover new knowledge, biomarkers, and drug development targets for these prevalent diseases.

IL2

Ectopic calcification, a prevalent multifaceted condition influencing healthy aging

O.M. Vanakker[1,2,3]

[1]Center for Medical Genetics, Ghent University Hospital, Ghent, Belgium
[2]Ectopic Mineralization Research Group Ghent (EMRg)
[3]International Network on Ectopic Calcification (INTEC)

Ectopic calcification (EC) is defined as inappropriate biomineralization occurring in soft tissues. Affecting a wide variety of tissues such as arteries, valves, brain and connective tissues (e.g. skin, joints), EC is highly accelerated in aging, in a wide number of rare hereditary diseases as well as in acquired chronic diseases such as diabetes mellitus, chronic kidney disease (CKD) and rheumatic diseases.

Demographic changes towards an increasingly elderly population result in novel medical challenges, which do not only include improved medical care but also preventive measures and efficacious risk stratification to attain what is referred to as healthy aging. Eighty percent of the +65 population has at least one chronic condition, and among the 10 most prevalent ones, EC was shown to be directly associated to (multi-)morbidity, frailty and mortality.

Taking everything into account, EC has a significant impact on society; CV disease by itself - the major cause of mortality and morbidity in EU - accounts for 1.9 million deaths and a cost of 210 billion Euro per year. While this highlights the promise of EC as a hitherto overlooked target for risk stratification, diagnosis and preventive intervention, awareness of the impact of EC as a disease is still relatively limited.

Hereditary diseases provide a unique opportunity to identify genetic background, pro-and anti-calcifying molecules, metabolic and epigenetic factors that contribute to the development, phenotypic consequences and severity of EC which are translatable to common disorders and natural aging. In this presentation, an overview of the relevance of EC - both in rare and common disorders - will be given, highlighting disease mechanisms and possibilities to monitor and treat EC.

Biography

Prof. Dr. Olivier Vanakker is a paediatrician and clinical geneticist affiliated with the Connective Tissue Disorders team and the Dysmorphology team of the Center for Medical Genetics of the Ghent University Hospital and affiliated with the Ghent University as Full Professor in Human and Medical Genetics.

He graduated Medical School in 2003 with great distinction. In 2009, he received the title of Doctor in Medical Sciences for his thesis “Novel Clinical and Etiopathogenetic Findings in Pseudoxanthoma Elasticum”. Since 2010, he is working at the Center for Medical Genetics of the Ghent University Hospital; since 2011, he is working as a consulent at the Zorgsaam Ziekenhuis Terneuzen (The Netherlands) with monthly consultations. His clinical work focusses on ectopic mineralization disorders, pediatric genetics and dysmorphology as well as general genetics and neurogenetics. He

is the coordinator of the multidisciplinary Clinic for Pseudoxanthoma Elasticum (PXE), a unique center of expertise for this hereditary ectopic mineralization disease.
Prof. Vanakker is the PI of the Ghent Ectopic Mineralization Research Group (EMRg), with a main interest in the clinical, molecular and pathophysiological characteristics of ectopic mineralization disorders. The focus lies in the translation of basic and molecular science to the clinic, in order to improve management of patients and their families with both rare and common diseases that feature ectopic calcification. Among mineralization disorders, we have a longstanding research interest in PXE, with several important contributions to this field including among others the characterization of novel PXE-related phenotypes, identification of genes which modify the phenotype of PXE, delineation of potential therapeutic targets in the cellular signaling pathways of PXE, creation of a PXE zebrafish model and the search for practical biomarkers for this disease. Since 2022, he is the coordinator of the International Network on Ectopic Calcification (INTEC), a robust network to contribute to the advancement of scientific knowledge and unite international institutions 'expertise around ectopic calcification. He is also a founding member and member of the Executive Board of the International Scientific Society of Ectopic Calcification (ISSEC), where he holds the function of Dissemination Director.

(Social) Media: EMRg instagram page: Ectopicmineralizationresearch;
INTEC: www.itnintec.com;
ISSEC: www.issec.org

Invited oral communications

IOC1

Diabetes remission after obesity treatment - *a long story short?*

Ana Luísa De Sousa-Coelho, Universidade do Algarve

Obesity is a chronic disease, defined as the accumulation of abnormal or excessive fat in adipose tissue, and a risk factor for several non-communicable diseases. There is a great health and economic impact associated with obesity, mainly due to increased comorbidities, such as hypertension, hyperlipidemia, and type 2 diabetes *mellitus*.

Bariatric (or metabolic) surgery (BS) is currently one of the most effective interventions for obesity and associated conditions. When compared with intensive medical and lifestyle interventions, several clinical trials demonstrated a greater efficacy, as well sustainability of the weight loss achieved, along with the resolution of obesity-related comorbidities following BS, such as improvements in cardiovascular disorders or diabetes remission. However, not all patients fully benefit from these surgical procedures, and some may even regain weight and comorbidities, indicating a need for more tailored approaches.

Biography

Pharmacist (U. Coimbra 1999), Master in Molecular Biotechnology (U. Barcelona, 2007) and PhD in Biomedicine (U. Barcelona, 2012). After three years in Boston (Joslin Diabetes Centre, Harvard Medical School), where she investigated the molecular mechanisms of insulin resistance in skeletal muscle and new therapeutic targets for diabetes, she returned to Faro in 2016 to join the Department of Pharmacy at the University of the Algarve's School of Health (ESSUAlg). She currently teaches Pharmaceutical Biotechnology, Pharmaceutical Toxicology, Molecular Biology and Biochemistry to Pharmacy undergraduates. She is also a researcher at the Algarve Biomedical Centre Research Institute (ABC-RI), where she divides her scientific interests between metabolism, cancer, diabetes, obesity and ageing.

IOC2

Usefulness of the ELF™ Test in the clinical assessment of Liver Fibrosis

Neusa Oliveira, Siemens Healthineers

The ELF™ Test (Enhanced Liver Fibrosis) could be a simple solution to a complex problem, improving clinical outcomes for millions of patients. Often asymptomatic and difficult to identify, non-alcoholic fatty liver disease (NAFLD) is known as the "silent killer", as it can progress unnoticed until an emergency occurs. If left untreated, NAFLD can progress to non-alcoholic steatohepatitis (NASH), an inflammation of the liver, which can lead to advanced fibrosis or more serious liver cirrhosis. Direct measurements of liver fibrosis have proven useful for identifying patients at risk of progression to cirrhosis and/or liver-related events (LRA). Non-invasive tests are an important tool to help identify patients at risk of developing cirrhosis and liver-related clinical events. The most frequently studied direct marker is the ELF™ Test, which can assess active fibrosis rather than the damage it has caused.

IOC3

Ageing Better CoLAB: A collaborative solution to tackle the ageing challenge

Vânia Roberto, ABC CoLAB

Demographic changes associated with ageing populations is a worldwide problem with direct impact on societies, and increased pressure in both health and care systems and social security benefits. Therefore, a huge effort and investment should be directed to the development of new strategies to promote active and healthy living, focusing on decreasing the Burden of health-related diseases, but also on better understand the mechanisms of ageing and associated diseases, loss of function and autonomy, to develop new treatments and services for increased equity to health and social care and improved quality of life.

ABC Collaborative Laboratory, Integrated Ageing and Rejuvenation Solutions (Ageing Better CoLAB) is a non-profit private association composed by an ecosystem of 12 partners from academia to business and government: Algarve Biomedical Center and its Research Institute (ABC-RI), ISCTE (DINÂMIA'CET-Iscte and the Associate Laboratory SocioDigital Lab for Public Policy), University of Algarve, ICNAS-Pharma, Sea4Us, Vodafone, Algardata, Garvetur, PremiValor Consulting, Municipality of Albufeira, Municipality of Loulé and IPST.The main goal of Ageing Better CoLAB is to address and integrate the different dimensions of ageing through a holistic approach while fostering knowledge and technology transfer to society and target markets.

Our 4 main pillars and research agendas are: Health and Biomedicine (ageing and/or rejuvenation, improve knowledge and test new forms of treatment in ageing-related diseases (osteoarthritis, diabetes and cardiocascular, among others), chronic pain and frailty, study ageing hallmarks, improve health care in high burden diseases associated with age); Social Sciences (social innovation projects namely to promote social integration of frail and pre-frail people through life, improve social care, develop new ways of evaluating and monitor through time functional capacity according to the WHO recommendations, develop new integrated care service to improve communication between health and social care systems and help to educate the communities for a better longevity through health literacy); Technology (digitalization and big data analysis, machine learning, artificial intelligence, ICT and digital interfaces solutions for both health and social care services); Tourism (health and wellness tourism, senior tourism, tourism digitalization, and other).

Ageing Better CoLAB activities are in line with the Regional Research and Innovation Strategies for Smart Specialization (RIS3 Algarve) for 2030, addressing 3 of the main domains (Health, TIC & ICC and Tourism) and 3 of RiS3 the social challenges (Active Ageing, Mediterranean Diet and Digitalization/Economy 4.0) all activities are additionnally aligned with 4 of the priority objectives of RIS3 Algarve: more intelligence, more connectivity, more health and more proximity to people. Ageing Better CoLAB strategy for the upcoming years is focused on priority areas with high societal impact and will contribute to diversify both regional and national economies by delivering innovative products and services, while creating a unique HUB for research and innovation in the ageing field. Finally, by ensuring that research and business actors work together during the entire research and innovation process and by following the Responsible Research and Innovation (RRI) principles, Ageing Better CoLAB align both the process and its outcomes with the values, needs and expectations of society, contributing to the ongoing implementation of national and EU policies and initiatives in the field of Ageing and Silver Economy.

Biography

With a PhD in Biomedicine and more than 20 years' experience in molecular biology, her research focused on the mechanisms underlying gene "switch on and off" in biomedical settings. Such research has been tuned towards the disease phenomena and the discovery of innovative biomarkers and therapeutical strategies. Now, as CEO and CSO of the Ageing Better CoLAB (ABC CoLAB), the aim is to contribute for extended human healthspan and longevity.

IOC4

Pathogenic Germline mutations on Hereditary Breast Cancer in Alentejo: is testing worth?

Rui Dinis, HESE, EPE, Universidade de Évora

Cancer is the main preventable cause of death in Portugal. Hereditary cancers are responsible for 9% of breast cancers and 3% of gastric cancers. A number of genes with high and moderate penetrance for cancer susceptibility have been identified and are currently being tested in clinical practice, including BRCA1 and BRCA2, whose carriers have a risk at age 80 of 69-72% of breast cancer and CDH1 which offers a 70% risk of gastric cancer.
The objectives of this study were to identify the population carrying pathogenic germline mutations (PGM) of genes of high and moderate penetrance for breast cancer and the CDH1 mutation in diffuse gastric cancer in the oncology service of HESE, based on clinical criteria and family history, and to determine the relationship between the presence of mutations and age, family history, histology intrinsic subtype, and staging.
Among the women with breast cancer studied, 13.3% (15/113) were identified as carriers of PGM in the BRCA, PALB2, ATM, PTEN, MUTHY, MSH2, and PTEN genes. There was a statistically significant association between the presence of PGM (as a whole and in BRCA1/2 alone) and advanced cancer staging and family history, but not age or other clinical and molecular variables.
The results obtained demonstrate the need to review the set of criteria currently in force that guide the clinical research of PGM in breast cancer, whose identification allows the implementation of personalized treatment and risk reduction strategies.

Biography

Graduated in Medicine from the Faculty of Medicine of the University of Coimbra in September 2002. Medical licence 42378. On 6 February 2023 he completed his PhD at the University of Évora, in the area of Biochemistry and Medical Genetics in Oncology, approved with Distinction and Praise. He has been a Visiting Assistant Professor in the Department of Medical and Health Sciences at the School of Health and Human Development at the University of Évora since 7 February 2023. Postgraduate in Clinical Genetics in 2021 from Universidade Nova de Lisboa. Postgraduate in Executive Master in Health Services Management from ISCTE Instituto Superior de Ciências do Trabalho e da Empresa - Instituto Universitário de Lisboa in June 2022, which confers Competence in Management by the Portuguese Medical Association. Postgraduate in Acquired Immunodeficiency Syndrome - From Prevention to Therapy from the University of Coimbra in 2004 (part of the Master's programme). Specialised in Medical Oncology by the Portuguese Medical Association since 2010. Obtained the Degree of Consultant (Graduate Assistant) in Medical Oncology after the national competitive procedure for Qualification for the Degree of Consultant in the Medical Career, in 2017.Regional Coordinator for Oncological Diseases for the Alentejo Regional Health Administration (ARSA) since 2016. Director of the Medical Oncology Service at the Espírito Santo Hospital in Évora since 2015.

IOC5

Metabolic remodeling has a key role in cancer

Jacinta Serpa, NOVA Medical School

Cancer metabolism is essential to sustain cancer cell energetics and biomass demands, therefore supporting cell proliferation, tumor growth and disease progression. Despite glucose and glutamine dependence being the most explored metabolic adaptation, cysteine reliance rises as fundamental in the control of oxidative stress, biosynthesis and bioenergetics. Furthermore, cysteine metabolic fitness contributes for chemoresistance, which is a main hurdle in oncology.

Using ovarian cancer as a model, we demonstrated the crucial role of cysteine in cancer metabolic adaptation and chemoresistance. Also, we explored the usefulness of the metabolic profile of cysteine-related organic compounds in screening, diagnosis and follow-up. Cysteine is a pivotal player ensuring the metabolic adaptation of cancer cells to stressful conditions, as hypoxia and cytotoxic drugs. Homocysteine and cysteine can be useful biomarkers of ovarian cancer. Therefore, our data support the use of metabolomic analysis as a screening method for ovarian cancer detection and might be useful for predicting the malignant potential of borderline tumors.

Biography

Jacinta Serpa has a PhD in Human Biology by The Medical Faculty of Porto University (2005) and Graduation in Applied Biology by The Azores University (1997).

Since, 2015 she is the head of Cancer Metabolism and Microenvironment Lab in NOVA Medical School|NMS (https://www.nms.unl.pt/pt-pt/investigacao/grupos-de-investigacao/detalhe/n/cancro-metabolismo-e-microambiente). She participated in more than 15 research projects, published 52 scientific papers, and has supervised 20 Master thesis and 11 PhD thesis (5 ongoing). J Serpa scientific publications receive attention from the scientific community, seen by the track records of 2109 citations, h index 25, and i10 index 42. J Serpa is the editor of a book from Advances in Experimental Medicine and Biology series of Springer Nature Tumor Microenvironment - The main driver of metabolic adaptation (ISBN 978-3-030-34024-7).

J Serpa considers that cancer therapy must ponder the metabolic drift through which cancer cells undergo; not only for first line treatment at diagnosis but also in follow-up therapy response and upon recurrence. Cancer recurrence is supported by cells that were not deadly affected by the therapeutic regime to which the patients was subjected. Thus, the overtreatment with the same protocol can be counter-productive, since it will contribute for the increment of chemoresistance, underlined by specific metabolic adaptive processes. Knowing better metabolic adaptation in cancer, allows us to take advantage of disease features to fight cancer.

IOC6

Clinical Biochemistry: needs and trends

Carlos Pitães, IZASA

A progressive change in Clinical Biochemistry and laboratory diagnosis is currently happening worldwide. The advance in modern analytical techniques, the way how we process, analyse, and store the data as well as the new findings in molecular biology are trilling the path.
In this presentation, we will analyse the current state of the market, as well as trends and latest advances in terms of technologies and regulations involved.

IOC7

Polo Kinase Inhibitors in Human Cancer Therapy

Álvaro Tavares, Universidade do Algarve

Drugs that disrupt mitotic progression, commonly referred to as ‘anti-mitotics’, are used extensively for the treatment of cancer. Currently, all such drugs that have been approved for clinical use target microtubules, with the taxanes and vinca alkaloids showing much success against a number of cancers. Although microtubule toxins have shown great success in the clinic, two factors – namely resistance and toxicity – have limited their effectiveness. Therefore, new agents are being developed that disrupt mitosis without interfering with microtubule dynamics. Frontrunners in this new class of therapeutics are inhibitors of the Polo kinase, a protein that is required for the maturation and separation of spindle poles during mitosis. Polo protein kinase was originally identified in a screening for mitotic mutants in Drosophila. Those studies have shown that the kinase plays an important role in a variety of cellular functions, including the regulation of mitosis, DNA replication, autophagy, and the epithelial–mesenchymal transition. The gene and its functions are highly conserved in evolution, and the human orthologue, named Polo-like kinase 1 (PLK1), when overexpressed is associated with disregulated cell proliferation and poor prognosis in cancer patients, making it a promising antitumor target. To date, at least 10 PLK1 inhibitors have been entered into clinical trials, among which the typical kinase domain inhibitor BI 6727 was granted “breakthrough therapy designation” by the FDA in 2013. Unfortunately, many inhibitors showed poor specificity, resulting in dose-limiting toxicity, which has greatly impeded their development. Nevertheless, other PLK1i have since been described, and I will outine recent advances in our understanding of how cancer cells respond to anti-PLK1 drugs, and discuss the relevance of these studies to their use in the clinic. "

Biography

Álvaro Augusto Marques Tavares, BSc Biochemistry at Universidade de Lisboa, MSC in Biotechnology by Universidade Nova de Lisboa, and PhD in Biomedical Sciences by Univ. Porto, has been studying the molecular mechanisms ruling cell division and proliferation for the past 30 years. Ever since having identified Polo as a kinase (during his MSc studies) he continued to work on mitosis at the University of Dundee (Scotland) and University of Cambridge (UK) before returning to Portugal. He started is own research group in 1999 at the Gulbenkian Science Institute in Lisbon while simultaneously joining Instituto Superior Técnico (Lisboa) as an assistant Professor. In 2010, we moved with his family to Faro, joining the University of Algarve, where he continues to identify and isolate new genes responsible for the control and execution of mitosis, both in human cells and in Drosophila.

IOC8

Effects of aging and metabolic diseases on male reproductive health and their offspring

Marco G. Alves, Universidade de Aveiro

Over recent decades, technological, economic, and societal advancements have reshaped lifestyle, contributing to increased lifespan. However, the fast-paced urban lifestyle has led to a shift in dietary patterns, with traditional carbohydrate and fiber-rich diets being replaced by foods rich in refined sugars and fats, contributing to a rise in metabolic disorders, especially among the elderly. Aging and metabolic diseases have been shown to adversely affect sperm parameters, hormonal levels, testicular function, and increase the risk of chromosome defects and DNA damage, potentially influencing the health of offspring. Advanced paternal age is associated with a higher risk of genetic disorders, such as achondroplasia, schizophrenia, bipolar disorder, leukemia, Down syndrome, miscarriage, and stillbirth. Our group uses an integrated approach encompassing molecular, metabolic, proteomic, and epigenomic investigations in animal and human studies, to explore how aging and metabolic diseases affect male reproductive health and impact offspring. We identified metabolites associated with reproductive maturity and described a "testicular metabolic memory" in response to a fat-rich diet that can affect subsequent generations. Notably, we also showed the expression of obesity-related genes (ORG) in human testicular cells and spermatozoa. The expression of these genes in spermatozoa was found to be associated with sperm and embryo quality, as well as pregnancy rates, underscoring their influence on reproductive outcomes. Through characterizing and manipulating the metabolome and epigenome of spermatozoa, we aim to develop advanced assisted reproductive techniques that can selectively choose the most suitable spermatozoa for fertilization. Despite the challenges, this research holds promise for understanding the impact of aging and metabolic diseases on individuals and their offspring, offering the potential for significant improvements in human health through targeted interventions in assisted reproduction.

Biography

Marco G. Alves holds a Ph.D. in Biochemistry, branch of bioenergetics, currently is Principal Investigator at the Department of Medical Sciences, University of Aveiro. Marco G. Alves is author of over 200 peer-reviewed publications in international journals. His contributions have earned him a place in the top 2% of Scientists, as recognized by a comprehensive study conducted at Stanford University. His lines of research focus on Metabolism, mitochondria, metabolic-related diseases, and Andrology. His team's groundbreaking work has unveiled molecular mechanisms elucidating the impact of lifestyle, aging and metabolic diseases on male fertility, including potential transgenerational effects of metabolic diseases. Marco G. Alves is not only a prolific researcher but also an inventor, holding 2 patents. Furthermore, he actively contributes to the academic community as an editorial board member for more than 15 international peer-reviewed journals, solidifying his commitment to advancing scientific knowledge and dissemination.
Link: https://sites.google.com/view/sertolicellgametebiology/home?authuser=0

IOC9

Stem cells and bio-alchemy

José Bragança, Universidade do Algarve

Our research group investigates the mechanisms involved in mammalian heart development, and how the failure of these mechanisms can cause congenital heart diseases. Pluripotent stem cells are often used by our group, because they are extremely versatile as they can differentiate into any cell type of adult organisms. Using embryonic stem cells, we clarified the contribution of the CITED2 gene to the initial processes of cardiogenesis. We also identified molecules secreted by embryonic stem cells, capable of compensating for CITED2 dysfunction. Supplementation of these molecules significantly limited mortality and heart defects caused by CITED2 depletion in zebrafish embryos. We will present these results that could lead to the development of new strategies to mitigate congenital heart defects.

Biography

José Bragança is an Associate Professor with Habilitation at the Faculty of Medicine and Biomedical Sciences of the University of Algarve. He leads the Stem Cell Biology laboratory at the ABC-RI Research Centre. The main objectives of his research are to understand the mechanisms: i) involved in the maintenance of pluripotency and cardiac differentiation of pluripotent stem cells; ii) reprogramming somatic cells into induced pluripotent stem cells (iPSC); and iii) early normal or defective embryonic development that can lead to congenital heart diseases, through the study of cellular structures derived from embryonic stem cells or iPSC, such as cardiac organoids. In line with the research carried out to date, future interests of the group include the development of strategies to limit or prevent cardiac pathologies. We have also collaborated with several groups to develop iPSC to study human diseases such as Left Ventricular Noncompaction Cardiomyopathy, Down Syndrome, Hutchinson-Gilford Progeria Syndrome, Gaucher Disease and Fabry Disease. We are also involved in collaborations to study other diseases, such as cancer and nervous system injuries. Additionally, we generated iPSC from elderly individuals from the Algarve region (>75 years) showing "healthy" or "unhealthy" aging, and from younger individuals (<35 years) to serve as controls in a study on aging.

IOC10

Disentangling the association of chemical pollutants and neurological disorders

Hipólito NZwalo, CHUA, Universidade do Algarve

Epidemiological and toxicological studies have established the association between air pollution and different acute and chronic neurological diseases. Oxidative stress, inflammation, and autonomic nervous system dysfunction are among the possible intermediators of air pollution and neurological lesions. In this presentation we integrate the current knowledge from mechanisms to the clinico-epidemiological data that links air pollution with neurological disease.

Biography

Hipólito NZwalo is a neurologist with a PhD in clinical neuroepidemiology, a researcher at the Faculty of Medicine and Biomedical Sciences at UAlg, and leader of the Aging and Cerebrovascular Research Group at the ABC Research Institute. The focus of his work is research into the prognosis and impact of cerebrovascular pathology in the elderly and the biopsychosocial and environmental determinants of ageing.

IOC11

Ageing, lifestyle and bone health

António Camacho, Hospital de São José

The advances in science, education, and social wellbeing allowed for an expressive increase in longevity. But for most, this increase is not free from diseases or morbidity, making these apparent gains in lifespan detached from the gains in healthspan. The musculoskeletal system is affected since the loss of strength and bone mass mean that even if the person is “healthy” it may not have the strength or endurance to perform basic daily activities or it can break a bone from a simple fall. In this presentation we will discuss the mechanisms of ageing of the musculoskeletal system and what lifestyle choices can be made to improve muscle strength and bone mass so that the increase in longevity does not equal immobility and frequent falls or fractures.

Biography
António Camacho, M.D. since 2006, specialist in Orthopedic surgery since 2015, PhD in Medicine since 2016. Collaborating with UAlg in research and teaching since 2009. At the time working in Hospital São José in Lisbon, main areas of interest are bone metabolism and fracture related treatment.

Short oral communications

SOC1

Citrate-coated manganese and calcium ferrite nanoparticles as potential magnetic hyperthermia agents

Raquel G. D. Andrade[1,2,3], Débora Ferreira[3,4], Sérgio R. S. Veloso[1,2], Cátia Santos-Pereira[3,4], Elisabete M. S. Castanheira[1,2], Manuela Côrte-Real[5] and Lígia R. Rodrigues[3,4]

[1]Physics Centre of Minho and Porto Universities (CF-UM-UP), University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal [2]LaPMET (Laboratory of Physics for Materials and Emergent Technologies), Associate Laboratory, 4710-057 Braga, Portugal [3]CEB—Centre of Biological Engineering, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal [4]LABBELS—Associate Laboratory, 4710-057 Braga, Portugal [5]Centre of Molecular and Environmental Biology (CBMA), Department of Biology, University of Minho, 4710-057 Braga, Portugal

Cancer is still one of the major burdens of contemporary society. Despite all the efforts to control this disease, current treatments fail to provide a long-term survival rate while improving patient compliance, mostly due to tumors' heterogeneity and acquired resistance. Nanoparticle-based drug delivery systems can afford an alternative treatment that overcome these limitations. Calcium-doped manganese ferrite nanoparticles (NPs) are gaining special interest in the biomedical field due to their lower cytotoxicity compared with other ferrites, and the fact that they have improved magnetic properties. Magnetic hyperthermia (MH) is an alternative cancer treatment, in which magnetic nanoparticles promote local heating that can lead to the apoptosis of cancer cells. In this work, manganese/calcium ferrite NPs coated with citrate, were synthesized by the sol-gel method, followed by calcination, and then characterized regarding their crystalline structure (by X-ray diffraction, XRD), size and shape (by Transmission Electron Microscopy, TEM), hydrodynamic size and zeta potential (by Dynamic Light Scattering, DLS), and heating efficiency (measuring the Specific Absorption Rate, SAR, and Intrinsic Loss Power, ILP) under an alternating magnetic field. The obtained NPs showed a particle size within the range of 10 nm to 20 nm (by TEM) with a spherical or cubic shape. $Ca_{0.2}Mn_{0.8}Fe_2O_4$ NPs exhibited the highest SAR value of 36.3 W/g at the lowest field frequency tested, and achieved a temperature variation of about 7 °C in 120 s, meaning that these NPs are suitable magnetic hyperthermia agents. In vitro cellular internalization and cytotoxicity experiments, performed using the human cell line HEK 293T, confirmed cytocompatibility over 0–250 µg/mL range and successful internalization after 24 h. Based on these studies, our data suggest that these manganese-calcium ferrite NPs have potential for MH application and further use in in vivo systems.

SOC2

Screening for environmental allergens in indoor environment using molecular methods

Alexandra Marchã Penha[1,2], Ana Galveias[1,2], Ana R. Costa[1,2,3], Célia M. Antunes[1,2,3]

[1]Institute of Earth Sciences, University of Évora, Portugal [2]Department of Medical and Health Sciences, School of Health, and Human Development, University of Évora, Portugal [3]Centro Académico Clínico do Alentejo – C-TRAIL, Évora, Portugal

The health problems associated with indoor air quality have acquired high importance in recent years. Biological particles in the indoor environment include viruses, bacteria, fungal spores, and house dust mites (HDM). These may cause a set of different respiratory dysfunctions including infection and allergic and/or other inflammatory manifestations. There is no established methodology to identify all bioaerosols and the existing ones are time-consuming and need experienced taxonomists. The aim of this work was to detect the presence of HDM, bacteria, and fungal genes in indoor environments, using molecular methods. Electrostatic dust-fall collectors (EDC) were used for indoor sample collection and placed in 15 selected rooms at the University of Évora, regularly frequented by students and staff, on the 23rd-30th of November 2023, following a protocol developed in the COST Action ADOPT CA-18226. For Real-Time PCR, two species of HDM were considered, Dermatophagoides pteronyssinus (DP) and Dermatophagoides farinae (DF); for fungal and bacterial detection the ITS1-ITS2 and the v3-v4 regions, respectively, were selected. The PCR and electrophoresis results showed that DP was detected in 5 samples (33%) (1 canteen, 1 classroom, 1 laboratory and 2 outdoor samples). DF was detected in 13% (1 canteen and 1 classroom). The 16S rRNA gene was detected in 20% of the samples (1 classroom, 1 laboratory and 1 outdoor sample). Sixty percent of the samples tested positive for the fungal genes, namely 2 libraries, 2 classrooms, 1 canteen, 1 laboratory, 1 toilet, 1 animal reception room and 1 outdoor sample. In conclusion, molecular methods are potent tools to identify different components of the bioaerosol using affordable collection devices, in the indoor environment. This approach establishes the bases for the development monitoring strategies, thus useful in disease prevention.

This work was supported by FCT—Fundação para a Ciência e Tecnologia, I.P. (projects UIDB/04683/2020 and UIDP/04683/2020).

SOC3

Vitamin K potential as an anti-aging supplement with antioxidant and anti-inflammatory activity

Bárbara Vieira[1], Inês Baía[1], Joana Carreira[1], Carla Viegas[1,2], Dina Simes[1,2]

[1]Centre of Marine Sciences (CCMAR), Universidade do Algarve, Faro, Portugal [2]GenoGla Diagnostics, Centre of Marine Sciences (CCMAR), Universidade do Algarve, Faro, Portugal

In our current society, with the increase in life expectancy, age-related diseases pose a major challenge worldwide. Most of these diseases, are associated with a chronic inflammatory state allied to oxidative stress. Given the impact of these health challenges, exploring new formulations, such as for diet supplements, with antioxidant and anti-inflammatory properties is pressing. Vitamin K has a known protective role in many age-related diseases, as cardiovascular diseases, osteoarthritis and osteoporosis. VK has recently been suggested to have an anti-inflammatory and antioxidant role, however, information is limited regarding its anti-inflammatory potential in different cell systems and its antioxidant properties require deeper study. In this work we used different VK forms (K1, MK4 and MK7) and evaluated their anti-inflammatory and anti-osteoarthritic potential using different human cell model systems. The VK forms studied showed anti-inflammatory activity depending on the vitamer concentration and cell model tested. Additionally, our results shown that the reduced form of vitamin K1 and MK4 have lipid peroxidation antioxidant activity in the human keratinocyte cell line HaCaT. In conclusion this study indicates that vitamin K can be a powerful anti-aging supplement, helping prevent inflammation and oxidative stress, contributing to prevent the burden of age-related diseases.

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SOC4

Gla rich protein as a potential biochemical marker for cardiovascular risk assessment in peritoneal dialysis patients

Catarina Marreiros[1], Carla Viegas[1,2], Anabela Malho Guedes[3,4], Ana Paula Silva[3,4], Ana Catarina Àguas[5], Marília Faísca[6], Leon Schurgers[7], Dina Costa Simes[1,2,*]

[1]Centre of Marine Sciences, University of Algarve, Portugal [2]GenoGla Diagnostics, CCMAR, Universidade do Algarve, Portugal [3]Serviço Nefrologia, Centro Hospitalar Universitário do Algarve (CHUA), Portugal [4]Faculdade de Medicina e Ciências Biomédicas, Universidade do Algarve, Portugal [5]Serviço Radiologia, Centro Hospitalar Universitário do Algarve (CHUA), Portugal [6]SYNLAB Algarve, Portugal [7]Department of Biochemistry and Cardiovascular, Maastricht University, The Netherlands

Cardiovascular disease (CVD) is the leading cause of death in chronic kidney disease (CKD) patients, particularly in dialysis populations. However, diagnostic and risk stratification for accurate CVD risk prediction represents a tremendous clinical challenge. The use of circulating biomarkers is emerging as a complement for CVD clinical diagnostic improvement. Gla rich protein (GRP) is a circulating vitamin K-dependent protein with vascular calcification inhibitory and anti-inflammatory properties, suggested as a marker of cardiovascular damage in CKD patients. For this observational study, we enrolled 102 patients at stage 5 CKD population undergoing peritoneal dialysis (PD) and 165 apparently healthy subjects. Serum total GRP (tGRP), high sensitivity C-reactive protein (hsCRP), calcium (Ca), magnesium (Mg) and phosphate (P) were assessed in both groups. CVD risk parameters, such as pulse pressure (PP), Adragão score (VCS) and echocardiogram determinations of relative wall thickness (RTW) and left ventricle mass index (LVMI) were obtained for the PD group. In the PD group, circulating tGRP was decreased (median=454.3 pg/mL vs median=852.7 pg/mL) and hsCRP was increased (mean=9.25±1.26 mg/L vs mean=0.78±0.06 mg/L compared to healthy individuals. Moreover, CalciumxPhosphate product (CaxP) was superior, while Mg was lowered in PD group. In dialysis patients, correlation analysis revealed that tGRP levels negatively correlated with Ca, P and CaxP (r= -0.876; r= -0.766; r = -0.902, respectively), while positively associated with Mg (r= 0.375). Among all serum variables Ca was the strongest independent predictor of tGRP variability. tGRP was also negatively correlated with PP, VCS, LVMI and RTW (r= -0.375; r= -0.343; r= -0,691; r= -0,418, respectively). All results were statistically significant ($p<0.05$). Our results show that lower tGRP serum levels are associated with increased cardiovascular risk parameters, suggesting tGRP as a potential circulating marker for CVD risk assessment in CKD populations.

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SOC5

Establishing a methodology for airborne corona viruses detection in outdoor air

Célia M. Antunes[1,2,4], Alexandra Penha[1], Ana Galveias[1], Mariana Marques[1], Maria M. Morais[1,3], Ana R. Costa[1,2,4]

[1]Institute of Earth Sciences, ICT, Polo de Évora, University of Évora, Évora, Portugal [2]Department of Health and Medical Sciences, School of Health and Human Development, University of Évora, Évora, Portugal [3]Department of Biology, School of Science and Technology, University of Évora, Évora, Portugal [4]Centro Académico Clínico do Alentejo, C-TRAIL, Évora, Portugal

Airborne viruses, such as influenza, corona, and rhinovirus, are responsible for many respiratory infections, some causing the spread of severe acute respiratory diseases like the recent pandemic of severe respiratory syndrome coronavirus 2 (SARS-CoV-2). The establishment of monitoring method could determinately contribute for the early detection of respiratory viruses in the air and to anticipate mitigation strategies. It was aimed at developing a methodology to detect viruses in outdoor air.

The sampling was performed using a high-volume cascade impactor (CHEMVOL, Butraco) with 2 stages (PM>10 & PM10). Filters were preserved at -80ºC. Total RNA extraction was performed with the Phenol-Chloroform method using TRItidy GTM reagent according to the manufacturer's instructions. The commercial E.Z.N.A.® Total RNA Kit-I was used to RNA purification. Real-Time Reverse Transcription PCR was executed to detect the N-gene from the Sarbecovirus family and RdRp gene from SARS-CoV-2 using the ViroReal® Kit SARS-CoV-2 Multiplex. A protein-rich fraction was obtained with ammonium bicarbonate buffer extraction followed by lyophilization. Spike protein was assessed by specific SARS-CoV-2 Antigen Test Kit.

The samples from the last week of December 2020, first and second weeks of January 2021, from both PM>10 and PM10, were positive for the N-gene and Cq>33, identifying Sarbecovirus family. The RdRp gene was undetectable, probably due to low virus concentration. The protein extracts from the same periods tested positive for the specific antigen spike protein.

In conclusion, all results combined confirm the detection of airborne corona virus and establish the bases for a molecular-based method for virus monitoring in ambient air thus eventually providing the base for early alert systems allowing the implementation of preventive measures to control outbreaks and mitigate future pandemics.

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SOC6

Microparticles containing antibody encapsulated in mPEG-PLGA nanoparticles intended for lung cancer treatment by inhalation

Cláudia Viegas[1,2,3], Sofia Duarte[3,4], Ana Grenha[2,5], Pedro Fonte[2,3,5]

[1]Faculty of Medicine and Biomedical Sciences (FMCB), Universidade do Algarve, Faro, Portugal [2]Center for Marine Sciences (CCMar), Universidade do Algarve, Faro, Portugal [3]iBB—Institute for Bioengineering and Biosciences, Instituto Superior Técnico, University of Lisbon, Lisboa, Portugal [4]Associate Laboratory i4HB—Institute for Health and Bioeconomy at Instituto Superior Técnico, University of Lisbon, Lisboa, Portugal [5]Department of Chemistry and Pharmacy, Faculty of Sciences and Technology, Universidade do Algarve, Faro, Portugal

Conventional lung cancer therapies, usually intravenously administered, lack tumor cell selectivity and result in side effects. On the other side, therapeutic antibodies show higher specificity, and lower toxicity. Antibody encapsulation into nanoparticles for pulmonary delivery is a promising strategy, which combines targeted and controlled drug delivery with the ability to protect antibody structure. Thus, this work aimed to characterize spray-dried antibody loaded mPEG-PLGA nanoparticles and study the antibody structure maintenance. Nanoparticles produced with 150 mg mPEG-PLGA, 1% Tween® 80 (w/v), and 2 mg bevacizumab were included in a D-mannitol/L-leucine matrix (14/57/29 w/w), and converted into microparticles by spray-drying. Nanoparticles were characterized regarding particle size and polydispersity index (PdI), and zeta potential, before and after antibody loading. Antibody association efficiency (%AE), nanoparticle drug loading (%DL) and antibody retention efficiency in the nanoparticles (%RE) were also evaluated. Finally, the structure of the antibody encapsulated in spray-dried nanoparticles was evaluated using Fourier transform infrared (FTIR) spectroscopy and fluorescence spectroscopy. Spray-dried nanoparticles after antibody loading showed an increase in particle size to ≈450 nm and PdI to ≈0.50, and a decrease in the zeta potential to -18 mV. In addition, %AE and %DL of ≈70 and ≈0.93 were obtained, respectively. Microencapsulation by spray-drying yields up to ≈50%, a spray-drying ratio of ≈1, and a %RE of ≈80 after spray-drying. Successful antibody incorporation was observed. Spray-drying process revealed the preservation of nanoparticle integrity. Lastly, structural analysis showed no significant conformational changes in the microencapsulated antibodies. Further studies will focus on antibody bioactivity maintenance, as well as particle characteristics, aimed at establishing an inhalable lung cancer therapy based on spray-dried nanoparticles.

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SOC7

Redox profiling of a cohort of young versus medically assisted aged individuals in the Algarve region

Daniela F. Santos[1], Sónia Simão[1,2], Nádia Silva[1,2], Ana Teresa Rajado[1,2], David Brito[1,2], ALFA Score Consortium, Pedro Castelo-Branco[1,2,3], Inês Araújo[1,2,3]

[1]Algarve Biomedical Center Research Institute (ABC-RI), Faro, Portugal [2]Faculty of Medicine and Biomedical Sciences, University of Algarve, Faro, Portugal [3]Champalimaud centre for the unknown, Lisbon, Portugal

Introduction The latest UN World Population Ageing report states that the aging population (over 65 years old) worldwide has reached 727 million in 2020, and it is expected to double by 2050. These numbers represent a worldwide concern with great social and economic impact. Aging is a dynamic and gradual process characterized by several molecular changes in cells, with the recognized influence of oxidative stress. Therefore, there is an increased interest in characterizing the redox profile of patients to design preventive and therapeutic approaches. The Algarve Fit Ageing Score project (ALFA Score) aims to develop a tool that allows a precise assessment of an individual's aging status and predisposition to disease development, based on its biological profile. Here we aim to establish a redox profile associated with healthy and unhealthy aging, by analyzing different oxidative stress-relevant biomarkers in human plasma. Materials and Methods Two cohorts were selected: healthy individuals (18-30 years old) versus elderly (over 75 years old). ELISA or colorimetric kits were used to analyze the levels of oxidative stress marker 8-epi-PGF2α, lipid peroxidation marker malondialdehyde (MDA), protein carbonyl content, DNA damage marker 8-hydroxy-2'-deoxyguanosine (8-OHdG), 3-nitrotyrosine (3-NT) and antioxidant capacity. Results Our results shown a significant increase in DNA damage marker 8-OHdG, lipid peroxidation and antioxidant capacity between young and old individuals but no differences in oxidative stress marker 8-epi-PGF2α, 3-Nytrotyrosin and protein carbonyl content. Further analysis will be done, based on the functionality tests of the old cohort. Conclusions Up to date, these results point to DNA and lipids of old individuals being more sensitive to endogenous oxidative damage, compared to young. However, the old cohort presents a significantly increase in antioxidant capacity. This differentiated redox profile may help to define an early oxidative alteration in aging.

SOC8

Novel antibiotic-free biomimetic wound matrix provides antimicrobial protection and superior healing

Brunno Caetano, Trudy-Ann Grant, Bishnu Joshi, Adam Finzen, Tarak Bhakda, Rebecca Salamone, Manav Mehta, Ana Tellechea

Gel4Med Inc., Lowell, MA, USA

Introduction: Pathogenic colonization constitutes a major risk factor for wound complications. Current approaches have serious limitations and the rise of multidrug-resistant organisms (MDROs) and biofilms further complicates treatment. To address this issue, we engineered a biomimetic wound matrix (BWM) that prevents infection while promoting healing.

Methods: Efficacy against Gram-positive and Gram-negative bacteria, as well as relevant fungi was tested in vitro. Efficacy against 72 hour-aged biofilms was evaluated in vitro and ex vivo. MRSA-inoculated murine wounds were treated with BWM and assessed by microbiology at 24 h. BWM mechanical properties were confirmed by rheology. In a swine model of full-thickness excisional wounds, BWM healing efficacy was tested vs. silver or collagen gels using the Tissue Analytics platform and histopathology.

Results: In vitro, BWM demonstrated bactericidal efficacy against ≥6 log10 CFU of PaO1 and MRSA at 5, 10, 15, 30, 60 min, and 24 h ($p<0.0001$, $n=3$). Within 24 h, BWM eliminated ≥6 log10 CFU of Gram-positive and Gram-negative clinical isolates, as well as sporulating and non-sporulating fungal pathogens. Notably, BWM showed superior efficacy against PaO1 and MRSA biofilms when compared to marketed antimicrobial gels ($p<0.0001$, $n=6$), while a single application eradicated mature PaO1 biofilms in pig skin explants ($n=3$). Rapid bioburden reduction was confirmed in MRSA-inoculated murine wounds ($p=0.02$, $n=10$). BWM-treated swine full-thickness excisional wounds showed superior closure rates (96%, $n=5$) vs. collagen gel or silver gel ($p=0.01$) and reduced inflammation. BWM singularly achieved complete re-epithelialization with healthy granulation tissue repletion by day 14.

Conclusions: BWM demonstrates potent broad-spectrum antimicrobial activity against MDROs and biofilms. With controlled biodegradation, BWM shows superior healing profile compared to commercial silver and collagen dressings, including greater wound closure, increased re-epithelialization, better granulation tissue formation, and reduced inflammation. Together, the data supports BWM potential to overcome the current challenges in managing complex and infected wounds.

SOC9

Optimizing nanostructured lipid carriers as therapeutic protein delivery systems

Sofia Duarte[1,2], João Prata[1,2], Rui Borges[3,4], Pedro Fonte[1,3,4*]

[1]iBB – Institute for Bioengineering and Biosciences, Department of Bioengineering, Instituto Superior Técnico, Universidade de Lisboa, Lisboa, Portugal [2]Associate Laboratory i4HB—Institute for Health and Bioeconomy at Instituto Superior Técnico, Universidade de Lisboa, Lisboa, Portugal [3]Department of Chemistry and Pharmacy, Faculty of Sciences and Technology, University of Algarve, Faro, Portugal [4]Center for Marine Sciences (CCMar), University of Algarve, Faro, Portugal [*]Corresponding author: prfonte@ualg.pt

In this study, we propose a novel method for improving the delivery of therapeutic proteins through the use of nanostructured lipid carriers (NLCs). These NLCs outperform traditional delivery systems, offering enhanced efficiency in encapsulating proteins and providing a more sustained release, which makes them a more economically viable option compared to solid lipid nanoparticles (SLNs). However, the use of NLCs for delivering key therapeutic agents like insulin has been somewhat restricted, primarily due to concerns about possible structural damage during production and a noted absence of detailed structural analysis in existing research. Our research focused on creating an ideal NLC formulation. This formulation was comprised of Suppocire as the solid lipid component, Oleic Acid as the liquid lipid (in a ratio of 70/30%), and 1% Pluronic (w/v) serving as the emulsifier. This combination resulted in NLCs with a particle size of approximately 200 nm, a polydispersity index (PdI) of about 0.200, and a zeta potential near -35 mV, contributing to their overall stability. Notably, this formulation achieved an impressive insulin association efficiency of over 95% and a loading capacity of 15%. Post-lyophilization, these NLCs successfully preserved their structural integrity without substantial aggregation. Importantly, insulin maintained its structural and functional integrity within the NLCs, as verified through various stability assessments. Our in vitro studies showed that these NLCs could continuously release insulin for up to 72 hours, indicating their capability to prolong the therapeutic effects of the protein. Moreover, the performance of NLCs was tested following lyophilization with different cryoprotectants, and it was found that 5% trehalose (w/v) was most effective in maintaining the structural stability of the carriers. The secondary structure of insulin was also preserved within the NLCs throughout the production process and after lyophilization with various cryoprotectants. Overall, our research successfully developed a heat-free optimal NLC formulation, showcasing its potential for effective, stable, and prolonged delivery of therapeutic proteins, surpassing the capabilities of SLNs.

SOC10

Reversal of diabetes-induced lipid peroxidation by vanadium compounds

Manuel Aureliano[1,2], Ana Luísa De Sousa-Coelho[3,4,5]

[1]Faculdade de Ciências e Tecnologia, Universidade do Algarve, 8005-139 Faro, Portugal [2]CCMar, Universidade do Algarve, 8005-139 Faro, Portugal [3]Escola Superior de Saúde, Universidade do Algarve (ESSUAlg), 8005-139 Faro, Portugal [4]Algarve Biomedical Center Research Institute (ABC-RI), 8005-139 Faro, Portugal [5]Algarve Biomedical Center (ABC), 8005-139 Faro, Portugal

Diabetes mellitus is a metabolic disease characterized by a chronic state of hyperglycemia. Diabetes can be generally classified into different categories with distinct clinical features: Type 1 diabetes (T1D) is an autoimmune disease in which pancreatic beta cells are unable to produce the hormone insulin, while in type 2 diabetes (T2D), the most common form of diabetes, the body is either resistant to insulin or incapable of producing enough insulin. In patients with T2D, hyperglycemia was associated with increased oxidative stress and increased levels of lipid peroxidation (LPO). Vanadium compounds, besides interfering with oxidative stress, are well-known to exhibited insulin-mimetic effects which led to an interest in vanadium chemistry for the treatment of diabetes, among other biomedical applications. Herein, we analyzed several reports since 1990, showing the effects of several vanadium compounds such as sodium orthovanadate, bismaltol oxidovanadium(IV), vanadyl sulphate and metformin-decavanadate, on the activity of antioxidant enzymes and the levels of LPO, in different tissues of animal models of diabetes. These studies showed that the treatment with vanadium compounds reversed the increased levels of LPO in response to diabetes [1]. Taken together, these data suggests that treatment with vanadium compounds may contribute to alleviating oxidative stress in diabetes contributing to an overall improvement in metabolic function.

[1] Aureliano, M.; De Sousa-Coelho, A.L.; Dolan, C.C.; Roess, D.A.; Crans, D.C. Int. J. Mol. Sci. 2023, 24, 5382. 10.3390/ijms24065382

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SOC11

Zebrafish as a model to study the development of ankylosing spondylitis

Max Domingues[1], Gil Martins[1,3], Paulo Gavaia[1,2]

[1]Centre of Marine Sciences (CCMAR), University of Algarve, Campus de Gambelas, 8005-139 Faro [2]Faculty of Medicine and Biomedical Sciences, University of Algarve, Campus de Gambelas, 8005-139 Faro [3]PhD program in Biomedical Sciences, Faculty of Medicine and Biomedical Sciences, University of Algarve, Campus de Gambelas, 8005-139 Faro

Ankylosing spondylitis (AS) is an autoimmune bone disease lacking a cure, characterized by inflammation in the vertebrae and sacroiliac joints, leading to vertebral fusions, loss of mobility, localized pain and hyperkyphosis. To comprehensively study this multifactorial condition, appropriate models are essential. In this regard, the zebrafish has been suggested as an appropriate model for the study of bone pathologies, due to its axial skeleton that show analogy to humans and substantial genomic and signaling pathway conservation. In addition, it is known that treatment with retinoic acid (RA) during the larval stages of zebrafish results in vertebral fusion, inducing a phenotype similar to AS. This study aims to use zebrafish as a potential model to study this pathology through RA treatment. By inducing this phenotype, our aim was to compare zebrafish spinal fusion phenotype with the human pathology, and to verify whether the expression patterns of genes involved in the development of the inflammatory process of AS are altered. Analysis of the results at 30 dpf revealed several anomalies in the development of the axial skeleton in the groups treated with RA, including vertebral fusions and increased amplitude of kyphotic curvature. In addition, we observed an upregulation on the expression levels of genes involved in the inflammatory process of AS, such as STAT3, IL17A, IL23R, IL6, PTGER4 and TNFα. The results have shown a high degree of similarity between the phenotype of RA exposed zebrafish and the human pathology. It is therefore proposed that the RA exposed zebrafish can be used as a model for understanding the inflammatory processes and spinal fusion associated with AS.

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Keywords: Ankylosing spondylitis; Retinoic acid; Spinal fusion; Inflammation; Zebrafish.

SOC12

Manipulating the clock: functional relevance of molecular clock oscillations in early embryo development

Nísia Borralho-Martins[1,2], Ana Cristina Maia-Fernandes[1,2], Raquel P. Andrade[1,2,3]

[1]ABC-RI, Algarve Biomedical Center Research Institute, Faro, Portugal [2]Faculdade de Medicina e Ciências Biomédicas (FMCB), Universidade do Algarve, Campus de Gambelas, 8005-139 Faro, Portugal [3]Champalimaud Research Program, Champalimaud Center for the Unknown, Lisbon, Portugal

The precursors of the vertebrate axial skeleton are formed during early stages of embryo development and somite formation takes place in a strict temporal sequence along the anterior-posterior body axis. This is accompanied by temporally controlled activation of Hox genes, which will specify the identity of each vertebra. An embryo clock (EC) underlies the periodicity of somite formation and was first described as gene expression oscillations of the hairy-enhancer-of-split (HES) hairy1 gene in the chicken embryo (Palmeirim et al, Cell 1997). Despite the wealth of knowledge gained on the identity and regulation of EC genes, the functional relevance of this oscillator remains elusive. In this work, we characterized molecular clock gene expression in the stem-cell rich epiblast, containing the early somite precursors. After, to assess if the EC participates in timely Hox gene activation, the EC was perturbed by over-expressing hairy1 in gastrulating chick embryos using ex ovo electroporation. Alterations to Hox gene expression were assessed and a novel morphometric tool was used to evaluate embryo morphology upon experimental manipulation. We found the over-expression of hairy1 delayed embryo trunk development, as well as HoxB expression. Our work suggests that the embryo molecular clock is regulating timely HoxB cluster expression through Hairy1, thus coupling temporal and positional information in the early embryo.

SOC13

Uncovering Altered Activity-induced gene expression in Machado-Joseph Disease

Inês T. Afonso[1,2,3,4], David V. C. Brito[2], Hilmar Bading[4], Clévio Nóbrega[1,2]

[1]Faculdade de Medicina e Ciências Biomédicas, Universidade do Algarve, Faro, Portugal [2]Algarve Biomedical Center – Research Institute, Faro, Portugal [3]PhD Program in Biomedical Sciences, Faculdade de Medicina e Ciências Biomédicas, Universidade do Algarve, Faro, Portugal [4]Interdisciplinar Center for Neuroscience, Heidelberg, Germany

Introduction: Polyglutamine Spinocerebellar ataxias (SCAs) are a group of six incurable genetic disorders caused by an expansion of the trinucleotide cytosine-adenine-guanine in their causative genes, which produces a protein with an expanded glutamine region. This project focuses on the study of Machado Joseph disease (MJD), also known as spinal ataxia type 3 (SCA3), which is a rare, dominantly inherited disorder that primarily impairs the cerebellum, therefore leading to motor ataxia. Activity-induced inhibitors of death (AID) are a group of nine pro-survival genes that were found to be neuroprotectors in several neurological disorders, including stroke, glaucoma, Alzheimer's disease, Huntington disease, and Amyotrophic Lateral Sclerosis. In this project, we aim to investigate the relevance of the expression of AID genes for cerebellum function and whether their expression levels are impaired in SCA3/MJD. Methodology: Wildtype (WT) and SCA3 transgenic animals were divided into 2 groups: unstimulated and motor-stimulated groups. The cerebellum was collected to analyze transcription and translation levels of the AID, and the whole brain was collected to detect the cell type expressing the proteins. Results: We found that the phosphorylation of the main transcription required for AID gene expression was decreased in transgenic animals in comparison with age-matched WT animals. Accordingly, transcriptional analysis of AID genes showed that AID1 and AID2 had their expression 6.3 and 3.3-fold increased, respectively, and 4.4 and 3.1-fold increased, respectively. However, this induction was impaired in SCA3 mouse models. Moreover, immunostaining showed which neuron type was expressing AID genes. Conclusion: AID1 and AID2 are differentially expressed upon stimulation in WT mice, whereas there is a decrease in SCA3 disease models. As well as the translation and transcription factors that regulate the transcription of these genes in impaired models of both disorders. Finally, we found that these genes are expressed in a cell-type-specific manner.

SOC14

Diagnostic Precision in Neurodegeneration: The RT-QuIC Revolution

Tuane C R G Vieira

Federal University of Rio de Janeiro, Brazil

Neurodegenerative diseases pose a significant global health challenge, necessitating innovative diagnostic approaches to enhance early detection and intervention. These diseases, characterized by misfolded proteins, present a formidable diagnostic challenge, often requiring invasive procedures or post-mortem analysis. Real-time quaking-induced conversion (RT-QuIC) based on the seeded conversion of normal proteins to their pathogenic conformations, offers a non-invasive and highly sensitive method for early detection. The assay's molecular foundation lies in amplifying misfolded proteins, inducing a characteristic quaking reaction that can be monitored in real-time. Firstly, the assay was developed to diagnose prion diseases and tested in big cohorts around many countries. In Brazil, our group established this technology at the Federal University of Rio de Janeiro and has been testing and assisting many hospitals from various States. RT-QuIC holds promise for broader applications in the neurodegenerative disease spectrum. Its utility extends to other protein misfolding disorders, providing a versatile platform for identifying biomarkers associated with diseases like Alzheimer's and Parkinson's. However, the broader implementation of this technology remains a challenge, emphasizing the need for specialized diagnostic centers. Establishing such centers facilitates accurate and timely diagnoses and fosters a comprehensive understanding of the prevalence and diversity of neurodegenerative diseases in diverse populations. The collaborative efforts of researchers, healthcare professionals, and policymakers are essential to making this vision a reality, ultimately advancing our capabilities in managing neurodegenerative diseases worldwide.

SOC15

Contribution of S-nitrosylation of PDI to the aggregation and toxicity of alpha-synuclein in SH-SY5Y cells

Mariana Teixeira[1,2,4], Sónia Simão[2,3,4], Rafaela R. Agostinho[2,3,4], Tiago F. Outeiro[2,3,4,5], Inês Araújo[2,3,4]

[1]Faculty of Science and Technology, University of Algarve, 8005-139, Faro, Portugal [2]Algarve Biomedical Center Research Institute (ABC-RI), University of Algarve, 8005-139, Faro, Portugal [3]Faculty of Medicine and Biomedical Sciences, University of Algarve, 8005-139, Faro, Portugal [4]Algarve Biomedical Center (ABC), University of Algarve, 8005-139, Faro, Portugal [5]University Medical Center Göttingen, Göttingen, Germany

Parkinson's disease (PD) is the second most prevalent neurological disease worldwide. PD is a synucleinopathy, meaning that is a disease characterized by abnormal accumulation of alpha-synuclein (α-Syn) aggregates. This protein accumulates in neural tissue, causing Lewy bodies to develop which ultimately leads to neuronal cell death. An increase in reactive nitrogen species in PD has been described, which can lead to S-nitrosylation, a post-translational modification defined by the formation of a nitrosothiol group in cysteine residues. Because α-Syn does not have cysteine residues in its primary structure, this protein is not a direct target of S-nitrosylation. Nevertheless, protein disulfide isomerase (PDI) and serine racemase (SR), two enzymes with a role upon the aggregation of misfolded proteins, may be targeted by S-nitrosylation. The aim of the present study is to investigate how S-nitrosylation of PDI and SR affects α-Syn aggregation in SH-SY5Y cells. SH-SY5Y cells were exposed to CysNO and S-nitrosylation of PDI and SR was assessed by a biotin switch assay. Additionally, it was also evaluated how CysNO treatment affected α-Syn aggregation and cell survival. These experiments were performed in SH-SY5Y cells expressing wild-type or α-Syn mutants. Our data reveal that PDI is S-nitrosylated, but SR appear not to be modified by NO. Additionally, S-nitrosylation of PDI, but not of SR, appears to contribute to the aggregation of α-Syn. It was also observed that S-nitrosylation was enhanced when cells were transfected with the α-Syn mutants. The treatment with CysNO did not affect the viability of cells. Overall, our data show that S-nitrosylation might accelerate the aggregation of α-Syn and PDI appears to be a protein candidate underlying this process. Further studies are needed to clarify the role of NO upon the mechanism of α-Syn aggregation, so innovative therapies can be defined for PD patients.

Poster communications

P1

Respiratory Allergy Risk Induced by Quercus Pollen in Alentejo in a climate change scenario

Ana Galveias[1*], Mauro Raposo[1,4,5], Maria João Costa[1,2], Ana Rodrigues Costa[1,3,6], Ediclê Duarte[1], Célia M. Antunes[1,3,6]

[1]ICT, Institute of Earth Sciences, University of Évora, Évora, Portugal [2]Department of Physics, School of Sciences and Technology, University of Évora, Évora, Portugal [3]Department of Medical and Health Sciences, School of Health and Human Development, University of Évora, Évora, Portugal [4]Department of Landscape, Environmental and Planning, School of Sciences and Technology University of Évora, Évora, Portugal [5]MED- Mediterranean Institute for Agriculture, Environmental and Development, University of Évora, Évora, Portugal [6]Centro Académico Clínico do Alentejo, C-TRAIL, Évora, Portugal

The Quercus genus, representing an important natural resource, is also described as a high sensitizing pollen type. As the most prevalent pollen type in Alentejo, it potentially impacting respiratory health of susceptible individuals. The aim of this study was to evaluate the impact of Quercus pollen on respiratory allergic disease in Alentejo, in a climate change scenario.
Data on antihistamines sales (group-1 histamines antagonists - G1); group-2 SOS drugs - G2) were obtained from the National Pharmacy Association (ANF) (2004-2021). The pollen was monitored (2002-2021) using standard Hirst-type traps and identified by optical microscopy, according to the standard methodology (REA.com). The meteorological variables were obtained from ICT/CGE platform (Portugal) and their impact on the Seasonal Pollen Index (SPIn), Pollen Season Duration (PSD) and Daily Pollen Concentrations (DPC) was investigated by statistical methods.
The results evidenced an impact on allergic disease, by positive associations of the April's SPIn with April's antihistamines sales, both G1 and G1+G2 (R: 0.656*; p=0.028 and R: 0.642*; p=0.033, respectively). Meteorology strongly influenced the SPIn but not the PSD. The meteorological factors on SPIn, a negative correlation with precipitation (P) (R:-0.549*; p=0.022), relative humidity (RH) (R:-0.506*; p=0.045) was observed, while the wind speed (WS) was positively correlated (R: 0.689**; p=0.002). Meteorology also influenced the DPC. Positive correlations between the temperature, global solar radiation and WS and direction and DPC were observed. On the contrary, P and RH were negatively correlated with DPC.
The results suggest that Quercus pollen contributes to the worsening allergy symptoms in Alentejo evidenced by the increase in the antihistamines sales. Moreover, it suggests that by influencing the pollen loads, climate affects the risk of exposure to this sensitizing agent thus changing allergic respiratory outcomes over the years.

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P2

The impact of metabolic and bariatric surgery on the levels of circulating Growth Differentiation Factor 15

Beatriz Sequeira[1], Victor Yassuda[2], Ana Luísa De Sousa-Coelho[1,3]

[1]Escola Superior de Saúde, Universidade do Algarve, Faro, Portugal [2]Faculdade de Medicina e Ciências Biomédicas, Universidade do Algarve, Faro, Portugal [3]Algarve Biomedical Center Research Institute, Universidade do Algarve, Faro, Portugal

Obesity is an emerging disease affecting adults and children worldwide. Due to this increase, new pharmacological targets are being investigated. In this context, Growth Differentiation Factor 15 (GDF-15), a cytokine produced and secreted by various organs and tissues, has been associated with weight changes, sarcopenia, metabolism, food intake, and possibly also gastric emptying. Metabolic and bariatric surgery (BS) is the most effective procedure to lose weight, improving obesity related diseases, such as type 2 diabetes. However, not all patients will fully benefit, meaning more personalized approaches are needed. For these reasons, understanding changes in GDF-15 levels after surgery-induced weight loss might have an important clinical value, as it could have a role in the successful response to BS. The main goal of this work was to evaluate the impact of BS on the levels of circulating GDF-15 in humans with obesity. For the development of the scoping review, a search strategy with the keywords “GDF-15” or “Growth Differentiation Factor”, and “Bariatric Surgery” was used in Web of Science, Scopus, and PubMed. Eligible articles were selected after applying the inclusion and exclusion criteria. After a thorough screening of the results, 6 articles were included. Most studies referred using fasting blood (either serum or plasma) to perform the ELISA assays for GDF-15 determination. While in 2 articles the levels of GDF15 showed a decrease, in the other 4 studies, increased levels of GDF-15 at the 12-month postoperative evaluation, compared to preoperative, were observed. From the studies available, we found that there is no consensus on the directionality of changes in circulating levels of GDF-15 after BS. These discrepancies can be related with baseline characteristics of the participants, type of surgery performed, or even particular methods used in each study, which highlights the need for additional studies to be performed

P3

Ready, steady, go! Biochemical characterization of patients with obesity candidates to metabolic surgery

Carina Dias[1], Paulo Cardoso[2,3], Mercedes Sanchez[3], João Maia-Teixeira[3], Ana Luísa De Sousa-Coelho[1,4]

[1]Escola Superior de Saúde Universidade do Algarve (ESSUAlg), Faro, Portugal [2]Faculdade de Medicina e Ciências Biomédicas Universidade do Algarve (FMCB-UAlg), Faro, Portugal [3]Centro Hospitalar Universitário do Algarve (CHUA), Faro, Portugal [4]Algarve Biomedical Center Research Institute (ABC-RI) Universidade do Algarve, Faro, Portugal

Obesity is a multifactorial disease defined as an excess of body fat causing serious health problems. Related comorbidities include type 2 diabetes (T2D), defined as a chronic hyperglycaemic state, and dyslipidaemia, a disproportion of lipids namely total cholesterol (Total-C), low-density lipoproteins (LDL), high-density lipoproteins (HDL) and triglycerides (TG). Metabolic and bariatric surgery is considered the most effective treatment of obesity and associated comorbidities. Main goal of this study was to characterize the biochemical profiles of patients with obesity candidates to the surgical treatment of obesity. From retrospective clinical data collection, age, sex, body weight (BW), body mass index (BMI), and biochemical parameters related to T2D and dyslipidaemia, were analysed from patients (candidates to metabolic and bariatric surgery). The 10-year risk of cardiovascular events was calculated, considering age, sex, smoking habits, non-HDL cholesterol and systolic blood pressure values, using the "ESC CVD Risk Calculation App". From a total of 298 patients aged 46.26±10.84 years (86.9% female), mean BW was 109.97±18.11kg and mean BMI was 41.51 ± 4.93kg/m2. Regarding glycaemic control, HbA1c was 6.05±1.05% and fasting plasma glucose (FPG) was 104.92±33.03mg/dL. Considering lipid disorders, mean total-C was 196.60±35.34mg/dL, LDL was 124.60±35.34mg/dL and HDL was 48.32±12.26mg/dL, while TG values were 118.07±48.30mg/dL. CVD risk was 3.85±4.16%, which is considered a moderate risk for people with <50 years and low risk to people ≥50 years old. Interestingly, FPG, HbA1c and CVD risk correlated with age, while HDL negatively correlated with BW. We conclude that when considering the average values, the biochemical profiles of patients with obesity are relatively normal, which might be related with the use of appropriate medication for the control of metabolic diseases. The worse glycaemic control and higher CVD risk in older individuals, reflects age as an important contributing factor for diabetes prevalence and CVD risk in patients with obesity.

P4

The impact of metabolic and bariatric surgery on hepatic fibrosis and liver function of patients with obesity

Carolina Lopes[1], Joana Dias[2], Carina Dias[2], Paulo Cardoso[1,3], Mercedes Sanchez[3], João Maia-Teixeira[3], Ana Luísa De Sousa-Coelho[2,4]

[1]Faculdade de Medicina e Ciências Biomédicas, Universidade do Algarve (FMCB-UAlg), Faro, Portugal [2]Escola Superior de Saúde, Universidade do Algarve (ESSUAlg), Faro, Portugal [3]Centro Hospitalar Universitário do Algarve (CHUA), Faro, Portugal [4]Algarve Biomedical Center Research Institute (ABC-RI), Universidade do Algarve, Faro, Portugal

Non-alcoholic fatty liver disease (NAFLD) or steatohepatitis (NASH) affect more than half of patients with obesity. If not managed properly, it can lead to serious liver damage, including fibrosis, and eventually cirrhosis. Obesity and NAFLD/NASH are linked to an increased prevalence of hepatocellular carcinoma (HCC), while the risk of HCC is also increased in the presence of type 2 diabetes (T2D). Supervised loss of excess body weight, achieved through surgical treatment of obesity (metabolic and bariatric surgery), has a positive impact on the liver function of these patients. However, patients with advanced fibrosis might not all benefit, and on rare occasions, serious liver complications can occur postoperatively. Improvement in NAFLD/NASH can be estimated by monitoring biochemical parameters such as the reduction in circulating levels of liver enzymes ALT (alanine aminotransferase), AST (aspartate aminotransferase), and GGT (gamma glutamyltransferase). Additional noninvasive imaging examinations include transient elastography, while invasive methods include liver biopsy for histological analysis. For this study, sociodemographic, clinical, and biochemical data will be collected from individuals with obesity undergoing a primary bariatric procedure, both before the surgical procedure (m0) and at early follow-ups up to 6 months (m6). The evaluation of hepatic fibrosis will be obtained using the noninvasive tests, namely the Enhanced Liver Fibrosis (ELF) test, one of the most-validated specialized blood test. The aim of this study is to characterize patients undergoing metabolic and bariatric surgery in terms of their liver function and its association with other metabolic comorbidities. Moreover, clinical, and biochemical parameters achieved over time after surgery, such as the loss of excess body weight, the reversal of comorbidities (dyslipidaemia, T2D), and other metabolic improvements, will be evaluated.

P5

Female FGF21 liver knockout mice aged in better metabolic condition

Torres-Oteros D[1,2], Nicola Llorente M[1,2], Sanz-Lamora H[1,2], Pérez-Martí A[1], Marrero PF[1,3,4], Haro D[1,3,4], Canudas S[1,2], Relat J[1,2,4]

[1]Department of Nutrition, Food Science and Gastronomy, Faculty of Pharmacy and Food Science, Torribera Campus. University of Barcelona. Barcelona, Spain [2]Institute of Nutrition and Food Safety of University of Barcelona (INSA-UB) Maria de Maeztu Unit of Excellence (Grant CEX2021-0012340M) funded by MICIN/AEI/FEDER, UE. Barcelona, Spain. [3]Institute of Biomedicine of the University of Barcelona (IBUB). Barcelona, Spain [4]CIBER Physiopathology of Obesity and Nutrition (CIBER-OBN), Instituto de Salud Carlos III, E-28029 Madrid, Spain

Fibroblast growth factor 21 (FGF21) is an important hormone that exhibits a homeostatic function during metabolic dysregulation such as obesity, aging, or diabetes. The metabolic impact of FGF21 has been mostly evaluated in males and low studies in elder female mice were performed. The aim of this work was to analyse the role of FGF21 on 12-month-old female mice with free access to food and beverage. LoxP and FKO (liver specific FGF21 knockout) mice were used. Our data showed that the absence of hepatic FGF21 diminished the body weight and improved the glucose response. Related with lipid metabolism a reduction in the expression of several genes related to de novo lipogenesis were detected in the liver of FKO mice. On the other hand, an upregulation of Cd36 without changes in the triglyceride content were seen in these animals. In scWAT FgfR1, Adiponectin and Sirt1 expression levels were higher in FKO group. Furthermore, some genes related to lipogenesis and lipolysis were also upregulated. Looking for another ageing marker we observed that the telomeres of FKO mice were longer than those in Loxp group. These results suggest that the lack of hepatic FGF21 maintains longer telomeres at old ages and improves the metabolic condition of elder female mice probably through the action of adiponectin.

P6

MicroRNAs regulate *ZNF687* during MC3T3-E1 osteoblast differentiation

Débora Varela (1,2); Tatiana Varela (1,2); Natércia Conceição (1,2,3); M. Leonor Cancela (1,2,3)

[1]Centre of Marine Sciences (CCMAR), University of Algarve, Faro, Portugal
[2]Faculty of Medicine and Biomedical Sciences, University of Algarve, Faro, Portugal
[3]Algarve Biomedical Center, University of Algarve, Faro, Portugal

One transcription factor that came to light as a critical regulator of osteoblast/osteoclast differentiation is Zinc Finger Protein 687 (ZNF687). Recent studies have investigated its involvement in the etiology of Paget's disease of the bone (PDB), even though the mechanisms of action in bone metabolism are still not well known. Abnormal bone remodeling leading to structurally disorganized/weakened bone is the hallmark of PDB and overexpression of *ZNF687* in PBMCs was reported in PDB patients. Previous studies suggest that post-transcriptional processes have a role in influencing the expression of ZNF members, therefore this study aims to clarify the regulatory role of microRNAs in *ZNF687* expression during osteoblastogenesis. To do this, MC3T3-E1 cells were cultured for 28 days using an osteogenic cocktail to produce mature osteoblasts. Alizarin red staining revealed calcium nodules in cells treated with the osteogenic cocktail and qPCR revealed increased expression of bone marker genes, indicating that osteoblast differentiation was successful. *ZNF687* expression was downregulated during the osteoblast differentiation.

Bioinformatic analysis identified potential binding sites for three specific microRNAs, and quantitative PCR analysis indicated higher expression levels of these microRNAs in mature osteoblasts. Transfection experiments involved introducing a mimic of one of the microRNAs into cells with either the normal or altered 3' untranslated region (3'UTR) of the target gene. This was done to validate the regulatory interaction between the microRNA and the gene. The luciferase activity associated with the normal 3'UTR decreased upon microRNA mimic introduction, while the altered 3'UTR showed no change. Furthermore, both gene and protein expression of the target were reduced by the microRNA mimic. In summary, this study revealed the involvement of the target gene in a specific biological process and demonstrated its post-transcriptional regulation by the corresponding microRNA, providing insights into the regulatory mechanisms at play during the relevant cellular differentiation process.

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P7

Characterization of TbxT expression in early stages of chickn brain development

Inês Torradinhas-Militão[1,2], Raquel P. Andrade[1,2,3]

[1]ABC-RI, Algarve Biomedical Center Research Institute, Faro, Portugal [2]Faculdade de Medicina e Ciências Biomédicas (FMCB), Universidade do Algarve, Campus de Gambelas, 8005-139 Faro, Portugal [3]Champalimaud Research Program, Champalimaud Center for the Unknown, Lisbon, Portugal

During embryo gastrulation, complex gene regulatory networks operate to ensure differentiation of distinct cell lineages. The T-box transcription factor Brachyury (TbxT) plays a pivotal role in mesoderm specification during gastrulation. TbxT expression is maintained in mesoderm-derived undifferentiated tissues and is lost in the adult. On the contrary, TbxT is absent in early embryonic neural precursors, but was recently described to be expressed in the adult brain, where it acts as a tumour suppressor gene (Pinto et al., J Pathol 2020). This strongly suggests that TbxT may have a functional role in the developing brain. However, little is known about when TbxT is first expressed in the developing brain, as well as the embryonic regions where it is activated. We have performed a characterization of TbxT expression in different stages of chicken embryo brain development using in situ hybridization and immunohistochemistry. Co-localization with brain region-specific molecular markers suggests a role for TbxT in the developing forebrain.

P8

Changes in indices of insulin resistance and secretion after surgical treatment of obesity

Joana Dias[1], Paulo Cardoso[2,3], Mercedes Sanchez[3], João Maia-Teixeira[3], Ana Luísa De Sousa-Coelho[1,4]

[1]Escola Superior de Saúde, Universidade do Algarve (ESSUAlg), Faro, Portugal [2]Faculdade de Medicina e Ciências Biomédicas, Universidade do Algarve (FMCB-UAlg), Faro, Portugal [3]Centro Hospitalar Universitário do Algarve (CHUA), Faro, Portugal [4]Algarve Biomedical Center Research Institute (ABC-RI), Universidade do Algarve, Faro, Portugal

Obesity contributes to an increased risk of developing other comorbidities, namely type 2 diabetes (T2D). T2D is characterized by insulin resistance (IR), which leads to a progressive decrease in the adequate secretion of insulin by pancreatic β cells, resulting in a state of hyperglycemia. Among the various indirect methods for measuring insulin secretion and IR, the most common is the homeostasis model assessment for insulin resistance (HOMA-IR). HOMA-IR can be used to assess longitudinal changes in β cells function and IR in patients with T2D to examine the course of the disease and to assess the effectiveness of treatments. Additional formulas include the quantitative insulin sensitivity check index (QUICKI). Main goal was to evaluate changes in IR in patients submitted to metabolic and bariatric surgery (BS). Clinical and biochemical data were collected retrospectively from patients with obesity and T2D, and HOMA-IR [G0(mg/dL) ×I0]/[405] and QUICKI [1]/[log(I0)+log(G0)] were calculated (I0, fasting insulin; G0, fasting glycemia). A total of 61 patients were included (83.6% female; 52.5±9.6 years old). At m0, mean body weight (BW) was 107.4±17.8Kg and BMI 41.9±5.6Kg/m2. Average HbA1c was 6.8±1.4%, G0 was 131.4±57.1mg/dL, I0 was 21.0±23.5µUI/mL, and C-peptide was 3.5±1.7ng/mL. HOMA-IR (n=42) was 6.43±8.92 and QUICKI (n=47) was 0.310±0.034 . One year after BS (m12), mean BW was 74.2±13.0Kg, BMI was 29.2±3.9Kg/m2, HbA1c was 5.8±0.8%, G0 was 93.8±21.3mg/dL, I0 was 6.2±2.6µUI/mL and C-peptide was 1.7±0.3ng/mL. Accordingly, a decrease in HOMA-IR (n=20, 1.49±0.70, p<0.0001) was verified. Regarding QUICKI (n=22, 0.366±0.028, p<0.0001), there was an increase relative to m0. These changes were maintained 3 years after BS (m36), where HOMA-IR (n=26) was 1.64±1.16 (p<0.0001) and QUICKI (n=28) was 0.362±0.033 (p<0.0001). The decrease in HOMA-IR, along an increase in QUICKI, reflects lower insulin resistance. The observed change in these indices suggests that BS-induced weight loss sustains the improvements in insulin secretion and sensitivity.

P9

Characterization of Adult Neurogenesis in Acomys cahirinus by Lineage Tracing Analysis

Joana Nobre Rodrigues[1,2,3], David Brito[1,2,3], Clévio Nóbrega[1,2,3], Gustavo Tiscornia[4,5], Sónia Simão[1,2,3], Marta Vitorino[1,2,3], Inês Araújo[1,2,3]

[1]Algarve Biomedical Center Research Institute (ABC-RI), University of Algarve, 8005-139, Faro, Portugal [2]Faculty of Medicine and Biomedical Sciences, University of Algarve, 8005-139, Faro, Portugal [3]Algarve Biomedical Center (ABC), University of Algarve, 8005-139, Faro, Portugal [4]Center for Marine Sciences (CCMAR), University of Algarve, Faro, Portugal [5]Clínica Eugin, Barcelona, Spain

Adult neurogenesis, the process by which new neurons are generated in the adult brain, is a complex phenomenon with implications for brain development and plasticity throughout life. Biochemical processes play a role in regulating the stages of adult neurogenesis, from the activation of neural stem cells to the integration of newly formed neurons into existing neural circuits. Adult mice and rats present neurogenic niches in the dentate gyrus of the hippocampus, which produce new granular neurons, and in the subventricular zone, which produce new neurons in the olfactory bulbs. Acomys cahirinus is a new mammalian regeneration model that features extraordinary regenerative abilities, including full section of spinal cord injury. Adult neurogenesis and how it potentially contributes to brain repair in A. cahirinus has not been addressed. Transgenic Cre recombinase-expressing A. cahirinus have not been developed and are not available to date, thus making lineage tracing of newborn neurons challenging. To characterize the adult neurogenic niches in A. cahirinus and develop a strategy to lineage-trace newborn neurons, 12-week-old A. cahirinus and 8-10-week-old Mus musculus were injected with a dual vector strategy combining Cre recombinase (AAV.PHP.eB.GFAP.CRE) and a reporter (AAV5.Synapsin-FLEX-EGFP). The viral vectors were delivered via intracerebral injection by stereotaxic surgery in the subgranular zone of the hippocampus. 8 weeks after viral transduction, the brains were collected and processed for immunohistochemistry. Our data shows that both A. cahirinus and M. musculus present EGFP+ new neurons, 8 weeks after viral injection. Together with cell markers for different neurogenic stages (Prox1, DCX, NeuN), we observed that young adult A. cahirinus and M. musculus have neurogenic maturation compartments with different weights and dynamics. Our study underscores the potential of AAV virus delivery in A. cahirinus as a strategy for lineage tracing for investigating neurogenesis and brain repair in vivo.

P10

Histological characterization of zebrafish *mgp* mutant (MGP_Δ18)

Larissa Miguel[1], Márcio Simão[1,2], Natércia Conceição[1,2,3], M. Leonor Cancela[1,2,3]

[1]Comparative, Adaptive and Functional Skeletal Biology (BIOSKEL) lab, Centre of Marine Sciences (CCMAR), Universidade do Algarve, Faro, Portugal [2]Faculty of Medicine and Biomedical Sciences, Universidade do Algarve, Faro, Portugal [3]Algarve Biomedical Center (ABC), University of Algarve, Faro, Portugal

The Matrix Gla protein (MGP) belongs to a family of Gla-containing, vitamin K dependent proteins present in all vertebrates. Like other proteins containing Gla, MGP binds to calcium ions with a high affinity which contributes to bone structure and inhibits vascular calcification. Mutations in human MGP gene that lead to loss of its function can originate a rare autosomal recessive disease known as Keutel syndrome (KS). It is common in patients with KS the development of ectopic calcifications in multiple organs and tissues and it has been associated with respiratory, cardiovascular, and craniofacial abnormalities. The zebrafish has been validated for use in molecular research related to several human diseases in which a mutant line was obtained by using the crispr/cas9 method. The MGP_ Δ18 mutant line resulted in the loss of six residues at the end of the GLA domain due to an 18 nucleotide deletion without a frame change. This study aimed to perform a histological characterization of old MGP_Δ18 mutant fish (18 months) to observe the presence of ectopic calcifications and evaluate MGP expression pattern in zebrafish. The experimental setup consisted in two groups with 5 animals each, Wt and MGP_ Δ18 mutants. Fish samples were fixed and prepared for inclusion either in paraffin or glycolmethacrylate where transverse and sagittal sections were performed. For mineralized structures for detection silver nitrate was use by the von Kossa's method. Adjacent sections were stained with toluidine blue to identify physiological structures. In paraffin sections immunohistochemistry was carried out to verify the presence or absence of the mutated protein and determine the pattern of MGP expression in adult zebrafish, using anti-MGP antibody counterstained with haematoxylin. Results showed for the first time the main tissues where MGP expression occurs but when compared to WT, MGP_Δ18 genotype fishes may not have significant changes in protein function. Further studies need to be done.

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P11

Assessing the importance of deltac mRNA 3'UTR for zebrafish somitogenesis

Leonardo Rodrigues*, Gil Carraco*, Marco Campinho¥ and Raquel P. Andrade¥ *, ¥: Equal contribution.

Faculdade de Medicina e Ciências Biomédicas (FMCB), Universidade do Algarve, Campus de Gambelas

Segmentation of the main body axis is characteristic of vertebrate organisms and takes place during early embryo development. Somites are the embryonic precursors of the axial skeleton and are formed periodically along the rostral-caudal body axis. The periodicity of somite formation is species-specific and relies on gene expression oscillations of the so-called Embryo Clock (EC). EC oscillations are generated by negative feedback regulation, which requires short-lived transcripts and proteins. Notch-delta justacrine signaling ensures synchronized EC oscillations in the presomitic mesoderm, prior to somite formation. In zebrafish, deltaC expression oscillates with the same periodicity as somite formation. However, little is known about the regulation of deltaC expression. To determine which mRNA regulatory regions are required for deltaC oscillations, we generated several mutants containing deletions in the 3'UTR. Time-lapse imaging, morphological and gene expression analyses were performed in different developmental stages to determine the impact of the deletions in somitogenesis and EC gene expression. The results obtained unveiled differences in deltaC-dependence for the formation of rostral and caudal somites in the zebrafish embryo, and further supported the importance of Notch-delta signaling for EC operation.

P12

rAAV-mediated overexpression of Gla-deficient mutant Matrix Gla Protein limits its potential to inhibit mineralization in SaOS2 cells

Linda Geraldo[1], Larissa Miguel[1], Natércia Conceição[1,2,3], João Santos[1], Jagadeesh K. Venkatesan[4], Magali Cucchiarini[4], Márcio Simão[1,2], M. Leonor Cancela[1,2,3]

[1]Comparative, Adaptive and Functional Skeletal Biology (BIOSKEL) lab, Centre of Marine Sciences (CCMAR), Universidade do Algarve, Faro, Portugal [2]Faculty of Medicine and Biomedical Sciences, Universidade do Algarve, Faro, Portugal [3]Algarve Biomedical Center (ABC), University of Algarve, Faro, Portugal [4]Center of Experimental Orthopaedics, Saarland University and Saarland University Medical Center, Homburg/Saar, Germany

The Matrix Gla protein gene (MGP) encodes a member of the family of Gla proteins, that is mainly secreted by chondrocytes and vascular smooth muscle cells, and functions as a physiological inhibitor of mineralization. Loss of function mutations in the MGP gene can promote the Keutel syndrome in human patients, characterized by abnormal cartilage calcification, peripheral pulmonary stenosis, and facial hypoplasia. In addition, previous data have shown that MGP downregulation can lead to ectopic calcifications. With this study we aimed to transduce the osteoblast like SaOS2 cells, which can mineralize their extracellular matrix, with genetically engineered recombinant adeno-associated viral (rAAV) vector encoding either a WT or a Gla-deficient mutant MGP cDNA. The results showed that over expression of Gla-deficient mutant MGP promote a significant increase in mineralization when compared with MGP_WT overexpression.

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P13

Seasonality of protein and lipid content of particulate matter: relevance to respiratory health, a preliminary approach

Mariana Custódio[1], Ana Galveias[1], Ana R. Costa[1,2,4], Maria João Costa[1,3], Célia M. Antunes[1,2,4]

1Institute of Earth Sciences, ICT, Polo de Évora, University of Évora, Évora, Portugal [2]Department of Health and Medical Sciences, School of Health and Human Development, University of Évora, Évora, Portugal [3]Department of Physics, School of Science and Technology, University of Évora, Évora, Portugal [4]Centro Académico Clínico do Alentejo, C-TRAIL, Évora, Portugal

The exposure to PM by inhalation, depending on its biochemical composition, can cause several inflammatory responses. It is accepted that increased exposure to allergens aggravates respiratory allergy, however, the lipid content is less investigated. The aim of this study was assessing the seasonal variation of PM protein and lipid content over 12 months.

Samplers were placed at the Évora Atmospheric Sciences Observatory. For pollen and spore assessment, a Hirst-type trap was used following the standardized methodology by the Spanish Aerobiology Network. For lipid and protein assessment, a high-volume cascade impactor (ChemVol2400) with PM>10 and PM10 stations was used. The protein was measured using the micro-BCA method. Lipids were assessed by the Folch method followed by a thin layer chromatography. Correlation analysis of protein with pollen and spores was performed.

Seasonality was observed; pollen and fungal spores presented their main seasons in March-June and May-December, respectively. The highest concentration of protein (0.510µg/m3) and lipids (0.645µg/m3) were recorded during May, coinciding with the pollen peak. The PM>10 protein content was associated with pollen ($R=0.746$; $p<0.01$) and fungal spores ($R=0.689$; $p<0,01$), suggesting that these bioaerosols are their main source. The lipids identified were fatty acids, triglycerides, and phospholipids, in line with the lipids described in pollen grains and fungal spores. The PM>10 protein content was higher compared to PM10, suggesting that might be retained at the upper respiratory system.

In conclusion, these results suggest seasonality in type, size and biochemical composition of inhalable PM throughout the year. Both the protein, marker for allergens, and lipids were correlated with pollen and fungal spores, the main source of allergens and pro-inflammatory lipids. Future identification of the lipid component will contribute to unravel their role in air way inflammation.

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P14

Trends in allergic sensitization and exposure to olive pollen: a case study in Évora, Alentejo

Mariana Marques[1], Ana Dordio[1], José L. Grañeda[2,3], Ana R. Costa[1,3,4], Ana Galveias[1], Célia M. Antunes[1,3,4]

[1]Institute of Earth Sciences, ICT, Polo de Évora, University of Évora, Évora, Portugal [2]Hospital do Hospital Espírito Santo de Évora, HESE, EPE, Évora, Portugal [3]Centro Académico Clínico do Alentejo, C-TRAIL, Évora, Portugal [4]Department of Health and Medical Sciences, School of Health and Human Development, University of Évora, Évora, Portugal

Olive pollen is among the most allergenic species in Mediterranean and the second cause of pollen allergy. The growing increase in the cultivation of olive groves as well as its use as an ornamental plant in Alentejo may have an impact on exposure to allergens, potentially increasing the risk of allergic sensitization. The aim of this study was to characterize the prevalence of allergic sensitization in relation to the pollen levels in, Évora, Alentejo. A retrospective analysis (2006-2021) of the population sensitization data found at Clinidata®XXI at HESE was performed; the levels and type of specific IgE for the different allergen groups, with a special focus on olive tree pollen were collected. The pollen levels were collected from https://lince.di.uevora.pt/polen/index.jsp, University of Évora. Analysis of the association between the two variables was performed. Sensitization data of 1027 individuals (ages 1 to 96 years) were found. Among the sensitized population 35.5% corresponded to the 4-12 age group. The highest prevalence was found in the 13-20 age group (47.4%). The IgE levels were also higher in the groups 4-12 and 13-20 years old. The highest mean levels of sIgE were registered in 2013, 2018 and 2019 and the lowest in 2014 and 2020 seasons. The annual pollen index varied between 1,441-10,403 pollen/m3, the highest being 2021 season. When taken together, the profile of sIgE followed the profile of pollen index with the annual pollen index, evidencing an association between these variables. In conclusion, these results suggest that the exposure to highest concentration of olive pollen favours the increase of sensitization of the population, particularly children. Other data should be analysed to validate the observations in this case study.

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P15

Exploring PPARγ antagonist ligands in Rosa canina pulp

Nicola Llorente, M[1,2*], Sanz-Lamora, H[1,2], Torres-Oteros D[1,2], Lozano-Castellón, J[1,2,3], Vallverdú-Queralt, A[1,2,3], Canudas, S[1,2,3], Marrero, PF[1,3,4], Haro, D[1,3,4], Relat, J[1,2,3]

[1]Department of Nutrition, Food Science and Gastronomy, Faculty of Pharmacy and Food Science, Torribera Campus. University of Barcelona. Barcelona, Spain [2]Insitute of Nutrition and Food Safety of the University of Barcelona (INSA-UB). Barcelona, Spain [3]CIBER Physiopathology of Obesity and Nutrition (CIBER-OBN), Instituto de Salud Carlos III, E-28029 Madrid, Spain. [4]Institute of Biomedicine of the University of Barcelona (IBUB). Barcelona, Spain. Author mail: marianonicolallorente@gmail.com

Rosehip (Rosa canina) has demonstrated antiobesity effects. Published data suggest that part of the molecular mechanisms underlying these effects are through the regulation of PPARs. The principal constituent of the rosehip extract, trans-tiliroside, potently inhibited the body weight gain by increasing the expression of pparα in mice. Also, a downregulation of pparγ expression is involved in the suppressive effect of rosehip extract on lipid accumulation in white adipose tissue. Our aims were I) to characterize phytochemically the rosehip pulp; II) to evaluate the potential of the pulp to antagonize PPARγ activity; III) to identify the fraction of the pulp that may contain the antagonist compound; IV) to elucidate the compounds that play the key role in PPARγ antagonization; V) to determine the effect of the pulp and the isolated compounds on adipogenesis. To evaluate the capacity of rosehip flesh and fractions to antagonize PPARγ activity, a luciferase reporter assay in HepG2 cells was performed with a 3xPPRE reporter plasmid and expression plasmids for PPARγ and RXRα. Post-transfected cells were treated with rosiglitazone to activate PPARγ and different concentrations of rosehip flesh, fractions, or isolated compounds. To evaluate the impact of rosehip flesh in adipogenesis, 3T3-L1 preadipocytes were differentiated and treated with rosehip flesh. Adipogenesis was evaluated by oil red staining, BODIPY/DAPI staining and RT-qPCR. Our results demonstrate that rosehip flesh and some of its fractions are capable to abrogate the rosiglitazone-dependent activation of PPARγ in HepG2 and inhibit 3T3-L1 preadipocyte differentiation and lipid accumulation. Additionally, two of the majority compounds in the lipophilic fractions showed similar results. A dose-response effect was observed in both cell experiments, due to the blockade of PPARγ signaling.

P16

Trends in allergic sensitization and exposure to olive pollen on Beja, Alentejo: a case study

Marisa Belchior[1,4], Ana Galveias[2], Ana R. Costa[2,3,4], Célia M. Antunes[2,3,4]

[1]Unidade Local de Saúde do Baixo Alentejo, ULSBA, Beja, Portugal [2]Institute of Earth Sciences, ICT, Polo de Évora, University of Évora, Évora, Portugal [3]Centro Académico Clínico do Alentejo, C-TRAIL, Évora, Portugal [4]Department of Health and Medical Sciences, School of Health and Human Development, University of Évora, Évora, Portugal

Olive pollen is among the most allergenic species in Mediterranean and the second cause of pollen allergy. The growing increase in the cultivation of olive groves as well as its use as an ornamental plant in Alentejo may have an impact on exposure to allergens, potentially increasing the risk of allergic sensitization. The aim of this study was to characterize the prevalence of allergic sensitization in relation to the pollen levels in, Beja, Alentejo.

A retrospective analysis (2011-2021) of the population sensitization data found at Clinidata®XXI at ULSBA was performed; the levels and type of specific IgE for the different allergen groups, with a special focus on olive tree pollen were collected. The pollen levels were collected from https://lince.di.uevora.pt/polen/index.jsp, University of Évora. Analysis of the association between the two variable was be performed.

The prevalence of positive olive sIgE also followed a biphasic pattern, reaching a nadir in 2017 – 2018, the years with the lower levels of olive pollen, followed by an increase between 2019 and 2021. When the mean levels of sIgE is considered, a 5-fold and a 2-fold increase were observed in 2021 compared to 2018 and to 2011, respectively, in keeping with the high pollen levels. The annual pollen index presents a tendency to increase in the last year. Interestingly a tendency to diminish between 2011 (~10,500 pollen/m3) and 2018 (~4000 pollen/m3) while it tended to increase between 2018 and 2021 (>15,000 pollen/m3).

In conclusion, these results suggest that the exposure to highest concentration of olive pollen favours the increase of sensitization of the population, particularly children. Other data should be analised to validate the observations in this case study.

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P17

Associations between a DNA methylation-based telomere length estimator, the redox state, diet and aging in the Algarve population

Mónica Ramos[1*], Daniela Santos[1*], A. T. Rajado[1], ALFA score Consortium[#], N. Silva[1], I. Araújo[1,2], P. Castelo-Branco[1,2]

[1]Algarve Biomedical Center, Research Institute (ABC-RI), Faro, Portugal [2]Faculty of Medicine and Biomedical Sciences (FMCB), Portugal

Introduction During aging an imbalance between pro-oxidant production and antioxidant defence develops, leading to redox homeostasis disturbance. Oxidative stress might cause DNA damage, originating telomere shortening. 8-hydroxy-2'-deoxyguanosine (8-OHdG) is a by-product of DNA damage, detected in plasma is used as a biomarker of oxidative stress. Adherence to the mediterranean diet has been linked with greater longevity and a lower mortality from all causes and specific causes. We tested the effect of the factors age, diet and sex on oxidative stress and their association with telomere length by DNA methylation-based estimation. – Materials and Methods This study included 48 elderly (>75y) and 26 young individuals (<30) living in Algarve, which responded to the Predimed questionnaire. The content of 8-OHdG (Enzo Lifesciences) in plasma was analysed. Telomere length estimation was performed using DNA extracted from whole blood, followed by methylation analysis by Infinium Methylation EPIC Array. Methylation data was processed using the DNAmTL algorithm in R (dnaMethyage). – Results As expected, the old age group had shorter DNAmTL ($p<0.001$) and presented higher 8-OHdG levels ($p<0.01$) than the young age group. Within the old age group, higher adherence to the Mediterranean diet, was associated with lower levels of DNA damage ($p<0.05$). Women in the old age group have longer DNAmTL and lower levels of 8-OHdG. Adherence to mediterranean diet did not impact DNAmTL in the present dataset. – Conclusions. Here, preliminary data analysis shows the potential of using the DNAmTL algorithm to evaluate telomere length in a Portuguese population. This data confirms that mediterranean diet contributes to decreased DNA damage and highlights the need to incorporate sex-specific analyses in aging studies. Additional research with a larger sample size is necessary to replicate and validate the current results.

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P18

Bioinformatic analysis identifies Oryzias latipes as a valid new model for analysis of MGP gene function

M. Chaves[1,◊], B. Ferreira[1,◊], J. Galhardas[1,◊], S. Guerreiro[1,◊], E. Houghton-Larsen[1,◊], T. Nehring[1,◊], E. Ninou[1,◊], T. Vajnarová[1,◊], M.L. Cancela[2,3], N. Conceição[2,3]

[1]Master in Molecular and Microbial Biology, University of Algarve, Faro, Portugal [2]Centre of Marine Sciences (CCMAR), University of Algarve, Faro, Portugal [3]Faculty of Medicine and Biomedical Sciences (FMCB), University of Algarve, Faro, Portugal [◊]All authors contributed equally to this work

Matrix Gla protein (MGP) is a γ-carboxylated (vitamin K-dependent, VKD) protein initially identified as a physiological inhibitor of calcification. Human mutations in the MGP gene cause Keutel syndrome, that has been generally associated with abnormal calcifications in cartilage, lungs, brain and vascular system. Lately, these phenotypes have been progressively extended to more systems/pathological processes, including nephrolithiasis, osteoarthritis, atherosclerosis, skin lesions and thyroid malignancies associated with signs of premature ageing, among others.

Recently, there have been huge advances made in the field of bone diseases using small laboratory fish, focusing on zebrafish and medaka. The objective of the present work is to evaluate if medaka could be a good model to study the signaling pathways regulating MGP function and thus be used to further investigate the mechanisms associated to MGP related human pathologies. Through bioinformatics analysis, we analyzed the neighbor genes, chromosomal localization, genomic organization, and the possible occurrence of alternative splicing in medaka and compared it to data from human and from available model species including zebrafish. In addition, we also compared the structure and functional motifs of MGP protein between medaka and the other selected species and concluded that they are all conserved. In conclusion, this study demonstrates that since MGP has been well conserved throughout evolution, both medaka and zebrafish, which have been previously validated as biomedical models to study bone-related pathologies, could be used as models to study the biological role of MGP in human diseases.

Acknowledgments:

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P19

Dysregulation of H2S levels in a cellular model of Down Syndrome

Rafaela Agostinho[1,2,3,4], Vera Marques[1,2,3], Sofia Calado[1,2,3], José Bragança[1,2,3,5], Hipólito Nzwalo[1,2,3], Mónica Bota[6], Raquel Melo Medeiros[6], Carla Mendonça[6], Sónia Simão[1,2,3], Inês Araújo[1,2,3,4,5]

[1]Algarve Biomedical Center Research Institute (ABC-RI), University of Algarve, 8005-139, Faro, Portugal [2]Faculty of Medicine and Biomedical Sciences, University of Algarve, 8005-139, Faro, Portugal [3]Algarve Biomedical Center (ABC), University of Algarve, 8005-139, Faro, Portugal [4]PhD program in Biomedical Sciences, Faculty of Medicine and Biomedical Sciences, University of Algarve, 8005-139 Faro, Portugal [5]Champalimaud Research Program, Champalimaud Foundation, 1400-038, Lisboa, Portugal [6]Centro de Desenvolvimento Pediátrico (CDP) do Centro Hospitalar Universitário do Algarve (CHUA)

Dysregulation of hydrogen sulfide (H2S) signalling has been linked to pathologies such as Alzheimer's disease and Down syndrome (DS), but the precise underlying cellular mechanisms are not completely understood. One of the genes present in chromosome 21 codes for the enzyme cystathionine beta-synthase (CBS), responsible for the synthesis of H2S, which is present with an extra copy in DS individuals. H2S is able to post-translationally modify proteins in neurogenic signalling pathways, thus potentially interfering with neurogenesis during neurodevelopment. The aim of the present study is to establish and characterize induced pluripotent stem cell (iPSC) lines reprogrammed from peripheral blood mononuclear cells (PBMC) collected from a blood sample of a Down Syndrome patient (T21) and an apparently healthy donor (Eup). These cellular models will be used to measure the intracellular production of H2S and the levels of CBS protein. PBMC were reprogrammed into iPSC using Sendai virus and both cell lines were successfully established by confirming the presence of a panel of specific pluripotency markers. The measurement of the intracellular production of H2S was performed in both cell lines using a commercial cell trappable H2S fluorogenic probe, sulfidefluor-7 acetoxymethyl ester (SF7-AM, 1μM, 30 min) by means of cytometry. We found that T21 iPSC line presented higher levels of H2S in comparison to the Eup line. Additionally, T21 iPSC line showed a 2-fold change increase regarding the levels of CBS protein.

P20

Identification of therapeutic molecules for CDKL5 deficiency disorder using zebrafish-based drug screening

Tatiana Varela[1,2], João Santos[1], Ana Hernández-Rodríguez[1], Vanessa Pinto[1], Débora Varela[1,2], Natércia Conceição[1,2,3], M. Leonor Cancela[1,2,3]

[1]Centre of Marine Sciences (CCMAR), University of Algarve, Faro, Portugal [2]Faculty of Medicine and Biomedical Sciences, University of Algarve, Faro, Portugal; [3]Algarve Biomedical Center, University of Algarve, Faro, Portugal

CDKL5 (cyclin-dependent kinase-like 5) deficiency disorder (CDD) is a severe X-linked neurodevelopmental disease. Mutations in the CDKL5 gene lead to a lack of CDKL5 protein expression/function causing numerous clinical features, including early-onset seizures, hypotonia, and neurodevelopmental impairment. CDD mouse models recapitulate several aspects of symptomology however, our current knowledge of CDKL5 function in other organs/tissues besides the brain is still limited. Here we report the use of zebrafish as a valuable biomedical model for the investigation of CDD. Its relevance is particularly significant in high-throughput drug screening, which greatly accelerates the development of potential therapies. We have characterized and validated a cdkl5 zebrafish mutant (sa21938) as a model to explore the underlying mechanisms of CDD, that exhibits compromised swimming abilities. We conducted an initial screening to identify small molecules capable of restoring the locomotion behavior observed in cdkl5 mutant zebrafish. Homozygous cdkl5 (cdkl5-/-) mutant larvae were treated for two days with different drugs (10µM) from a MAPK Inhibitor Library at three days post-fertilization. We have identified several molecules that demonstrated a substantial enhancement in the distance covered by cdkl5-/- larvae. We also administrated the candidate compounds to WT larvae. Our findings revealed no notable increase in the total distance traveled by the WT larvae, strongly suggesting that the rescue observed in mutant fish is cdkl5¬-specific. To validate the effectiveness of the candidate molecules, larvae were subjected to varying concentrations of a new batch of the candidate drugs. Our data revealed a progressive increase in the total distance covered by cdkl5-/- larvae in a dose-dependent manner, providing additional confirmation of the potential of the tested candidates to reverse the abnormal swimming behavior phenotype. Together, these findings identified several small molecules that could rescue the motor behavior phenotype in cdkl5-/- zebrafish, establishing them as promising candidates for further evaluation of potential therapeutic applications for CDD.

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P21

The impact of metabolic modulators on the viability of glioblastoma cells

Victor Yassuda[1], Alba Orea-Soufi[2], Bibiana I. Ferreira[1,2,3], Wolfgang Link[4], Ana Luísa De Sousa-Coelho[2,3,5]

[1]Faculdade de Medicina e Ciências Biomédicas, Universidade do Algarve, Faro, Portugal [2]Algarve Biomedical Center Research Institute (ABC-RI), Universidade do Algarve, Faro, Portugal [3]Algarve Biomedical Center (ABC), Universidade do Algarve, Faro, Portugal [4]Instituto de Investigaciones Biomédicas "Alberto Sols" (CSIC-UAM), Madrid, Spain [5]Escola Superior de Saúde, Universidade do Algarve, Faro, Portugal

Glioblastoma is the most common and aggressive tumor of the central nervous system. One of the reasons for these alarming figures may be related to its altered and flexible energy metabolism, conferring an advantage for the cancer cells to adapt and survive. Therefore, one of the major goals associated with the development of therapeutic strategies is to understand the mechanisms of tumor energy metabolism in order to modulate it, and with these perspectives, new therapies can be developed. The aim of this work was to evaluate the effects of drugs and conditions that modulate energy metabolism on the viability of glioblastoma cells. To this end, viability was analyzed by colorimetric assays using tetrazolium (MTT) were performed with the LN229 human glioblastoma cell line treated with a glycolysis inhibitor (dichloroacetic acid 10 µM and 50 µM), a mitochondrial respiratory complex I inhibitor (phenformin 1µM and 5µM), and in a glucose-free medium condition for 48 hours. The results obtained showed no significant differences in viability when cells were treated with DCA compared to the control. By contrast, a dose-dependent decrease in cell viability was observed when cells were treated with phenformin. Finally, there was also a decrease in cell viability when these were cultured in glucose-free medium compared to the control high glucose media. The results obtained provide new insights on the energy metabolism of glioblastoma, which indicates that inhibiting the mitochondrial electron transport chain is more efficient than inhibiting glycolysis mainly related to its plasticity in obtaining energy, which has been shown to be one of the keys to tumor progression and aggressiveness.

P22

Developing multifunctional anti-Alzheimer's agents using 1,2,3-triazole hybrids

Ana R. Costa[1,2,3], Célia M. Antunes[1,2,3], Sofia Ernesto[4], Flávia Pinto[4], Beatriz Rodrigues[4], Anthony J. Burke[4,5], Elisabete P. Carreiro[6]

[1]Department of Medical and Health Sciences, School of Health and Human Development, University of Évora [2]Institute of Earth Sciences, Institute of Research and Advanced Training, University of Évora [3]Academic Clinical Center of Alentejo, C-TRAIL, Évora, Portugal [4]Department of Chemistry and Biochemistry, School of Sciences and Technologies, University of Évora [5]Faculty Pharmacy, University of Coimbra. [6]Institute for Research and Advanced Training (IIFA), LAQV-REQUIMTE, University of Évora

Alzheimer's disease (AD) is a neurodegenerative disease with high mortality and morbidity, for which there is still no cure, despite all the efforts of researchers over the last three decades. Flavonoids, a class of polyphenols present in our diet, possess multiple biological activities, including anti-AD effects. However, flavonoids have low bioavailability and permeability, which compromises their therapeutic efficacy. Molecules containing the 1,2,3-triazole unit in their structure also have a wide range of pharmacological properties, including anti-AD.

The main goal of this work was to identity more effective anti-Alzheimer agents from a new library of quercetin-1,2,3-triazole hybrids (I–IV), evaluating their antioxidant activities, protection against hydrogen peroxide-induced oxidative stress and inhibition of cholinesterases (AChE and BuChE).

Hybrids IIf and IVa-d showed potent in vitro inhibitory activity on eqBuChE (IC50 values between 11.2 and 65.7 µM). Hybrid IIf, the best inhibitor, was stronger than galantamine, displaying an IC50 value of 11.2 µM for eqBuChE, and is also a competitive inhibitor. Hybrids IVa, b, d, e have potent antioxidant activity in vitro, like quercetin, at a concentration of 100 µg/mL.

When studied in a cellular model, quercetin showed low capacity in cellular protection against hydrogen peroxide-induced oxidative stress, which is probably the result of poor cellular permeability. Quercetin hybrids seem to be able to overcome this difficulty, and compounds IIf, IVb, and IVd were effective in protecting cells against hydrogen peroxide-induced oxidative stress. Furthermore, compound IIf, although ineffective in radical scavenging, also presents a good cellular antioxidant-protection capacity, probably associated with its isatin unit.

The good cellular anti-oxidative protection showed by compounds IIf, IVb, and IVd, combined with low cytotoxicity and low general toxicity in Artemia salina, underline the interest of these compounds as multitarget drugs.

P23 (online)

Comparative analysis of proteomics and genomics of a yeast model of N88S BSCL2/seipin-related human seipinopathy

Mariana Ribeiro1,2 , Verónica Nogueira1,2 , Vítor Costa1,2,3 , Vitor Teixeira1,2

1 i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal 2 IBMC - Instituto de Biologia Molecular e Celular, Universidade do Porto, Porto, Portugal 3 ICBAS - Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto, Porto, Portugal

Lipid droplets (LDs) play a crucial role in storing fats within cells, and the protein seipin, encoded by the human BSCL2 gene and SEI1 gene in yeast, is essential for this process. Mutations in seipin, such as N88S and S90L, are associated with motor neuron diseases known as seipinopathies, causing disruption in N-glycosylation and leading to ER stress, inclusion bodies (IBs) formation and cell death. We used yeast seipin-null mutant cells expressing WT-VN WT-VC and N88S-VN N88S-VC, which differentially express the human WT/N88S forms of seipin, either fused to the 3' region of the N-terminus (VN) or to the C-terminus (VC) of the Venus protein. We observed increased ER stress, diminished antioxidant activity and elevated oxidative damage. A proteomics and genomics approach revealed downregulation of genes related to phospholipid biosynthetic processes, particularly inositol biosynthesis. We focused on INO1, encoding myo-inositol-3-phosphate synthase, whose expression is sensitive to inositol levels. INO1 and other phospholipid biosynthesis genes expression is controlled by the major repressor transcription factor Opi1. In the presence of exogenous inositol, phosphatidylinositol (PI) synthesis is stimulated, phosphatidic acid (PA) levels decrease, and Opi1 is no longer retained in the ER as binding to PA is reduced. Upon activation, Opi1 represses INO1 expression. We show that its expression was inappropriately elevated in N88S-VN N88S-VC mutant cells during aging, possibly due to a faulty increase of PA levels. Deletion of INO1 reduced the percentage of cells carrying IBs (as confirmed by fluorescence microscopy and flow cytometry), indicative of disease pathology. Additionally, we identified alterations in genes related to iron homeostasis, and we showed that N88S mutant cells accumulate iron, unrelated of oxidative stress, but still reduces IB formation upon iron deprivation. Funding: 1. FCT - Fundação para a Ciência e a Tecnologia, I.P (Grants 2022.02305.PTDC, CEECIND/00724/2017, CEECIND/00724/2017 and UIDB/04293/2020). 2. EMBO Grant SEG9890.

P24 (online)

Effect of exercise training on hematological and biochemical parameters: data from a rat model of mammary cancer

Jessica Silva1,2, Tiago Azevedo1,2, Abigaël Valada1, Lara Anjos1, Tânia Moura1, Ana I. Faustino-Rocha2,3, Paula A. Oliveira1,2, José A. Duarte4,5

1Department of Veterinary Sciences, University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal; 2CITAB, Inov4Agro, Vila Real, Portugal; 3Department of Zootechnics, School of Sciences and Technology, CHRC, University of Évora, Évora, Portugal; 4CIAFEL, ITR Laboratory, Faculty of Sport, University of Porto, Porto, Portugal; 5TOXRUN–Toxicology Research Unit, CESPU, Gandra, Portugal

Breast cancer is a prevalent disease in women and engaging in regular physical activity has emerged as a potential preventive measure. Routine monitoring of blood parameters can aid early cancer detection and evaluate treatment response. This study assessed the impact of exercise training on hematological and biochemical parameters in a rat model of mammary cancer. Twenty-eight female rats were divided into four groups (n=7/group): Sedentary (SED); SED+N-methyl-N-nitrosourea (MNU); Exercised (EX); and EX+MNU. SED+MNU and EX+MNU animals received an intraperitoneal injection of the carcinogen MNU (50mg/Kg) at seven weeks of age. Exercised animals underwent training 3 days/week for 18 weeks, climbing a 1-meter-high homemade ladder, 8-12 dynamic movements/climb and 4-8 climbs/session. At the end of the study, animals were sacrificed by intraperitoneal injection of ketamine and xylazine, followed by exsanguination through cardiac puncture. Blood samples were collected for subsequent hematological and biochemical analysis. Data were analyzed using SPSS. In terms of hematological parameters, some differences were found. The EX+MNU group exhibited higher erythrocytes and hemoglobin levels compared to the remaining groups ($p<0.05$). Additionally, elevated lymphocyte levels were found in the EX+MNU group compared to the SED group ($p<0.05$). The remaining parameters hematological and biochemical parameters remained similar across groups. The notable rise in erythrocytes suggests that exercise positively impacts their production, counteracting the bone marrow's negative response to cancer. The concurrent elevation of hemoglobin is expected, being a component of erythrocytes. Lymphocytosis in the EX+MNU signals an ongoing inflammatory response triggered by cancer. In conclusion, exercise appears to positively influence hematological parameters in a rat model of mammary cancer, showing potential benefits in countering cancer-related responses.

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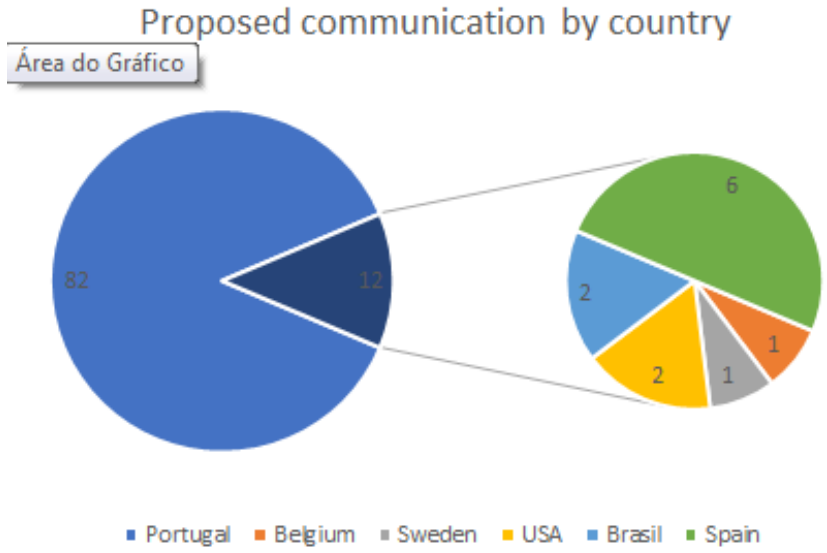
Resume of communications and participants

Information about the communications presented at the IX-SPB Clinical Biochemistry Workshop 2024, Faro: Invited lectures (IL), oral communications (OC), short oral communications (SOC), posters (P) and total communications (TC).

Institution	IL (2)	OC (9)	SOC (15)	P (24)	TC (48)	Participants
University of Ghent, Belgium	1				1	1
Uppsala University, Sweden	1				1	1
Algarve University		4	10	15	29	102
Évora University		1	2	4	7	14
Aveiro University		1			1	2
New Lisbon University		1			1	2
Minho University		1			1	2
Gel4Med, USA			1		1	1
UFRJ, Brasil			1		1	1
Barcelona University				3	3	3
UTAD University				1	1	1
Porto University				1	1	1
ABC Colab		1				1
Total	2	9	15	24	50	132

Total participant countries: Portugal, Sweden, Belgium, Brasil, USA, Spain, Turkiye



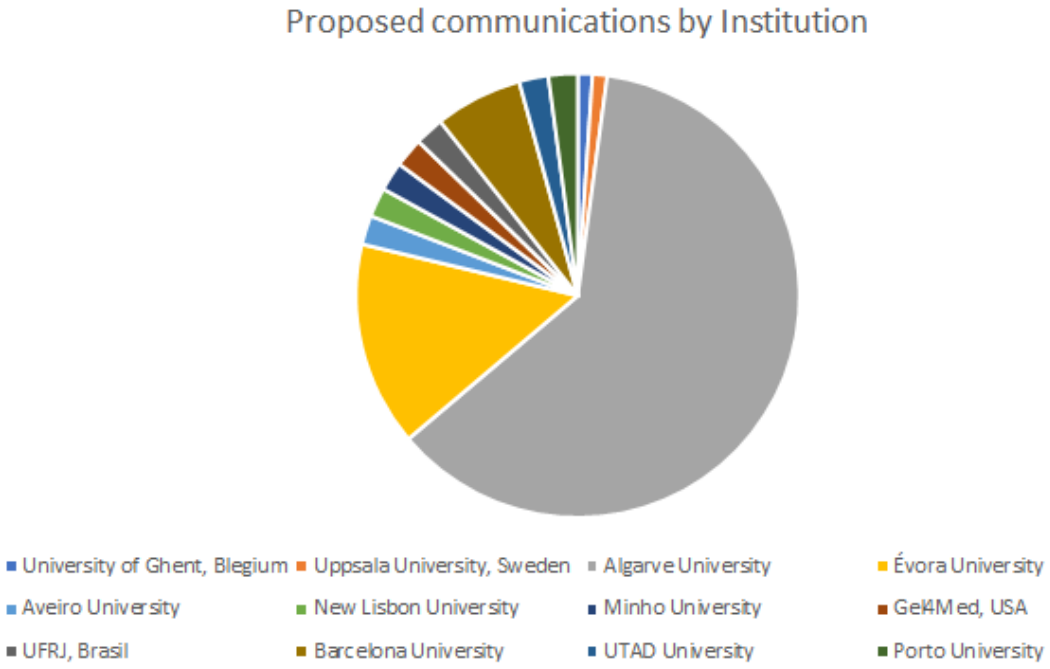


Photo gallery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Invited Oral Communication
RUI DINIS
HESE, EPE, Universidade de Évora
Pathogenic Germline mutations on Hereditary Breast Cancer in Alentejo: is testing worth?
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Sequencing
Data analysis


Female FGF21 liver knockout mice aged in better metabolic condition.
Background and objectives
Methodology
Results
Conclusions


9
INTRODUCTION
METHODS
RESULTS


WGBS
ATAC-Sequencing
Hi-C Sequencing
technology
BMKGENE has a rich experience in eukaryotic mRNA


Znf687 during MC3T3-E1
differentiation


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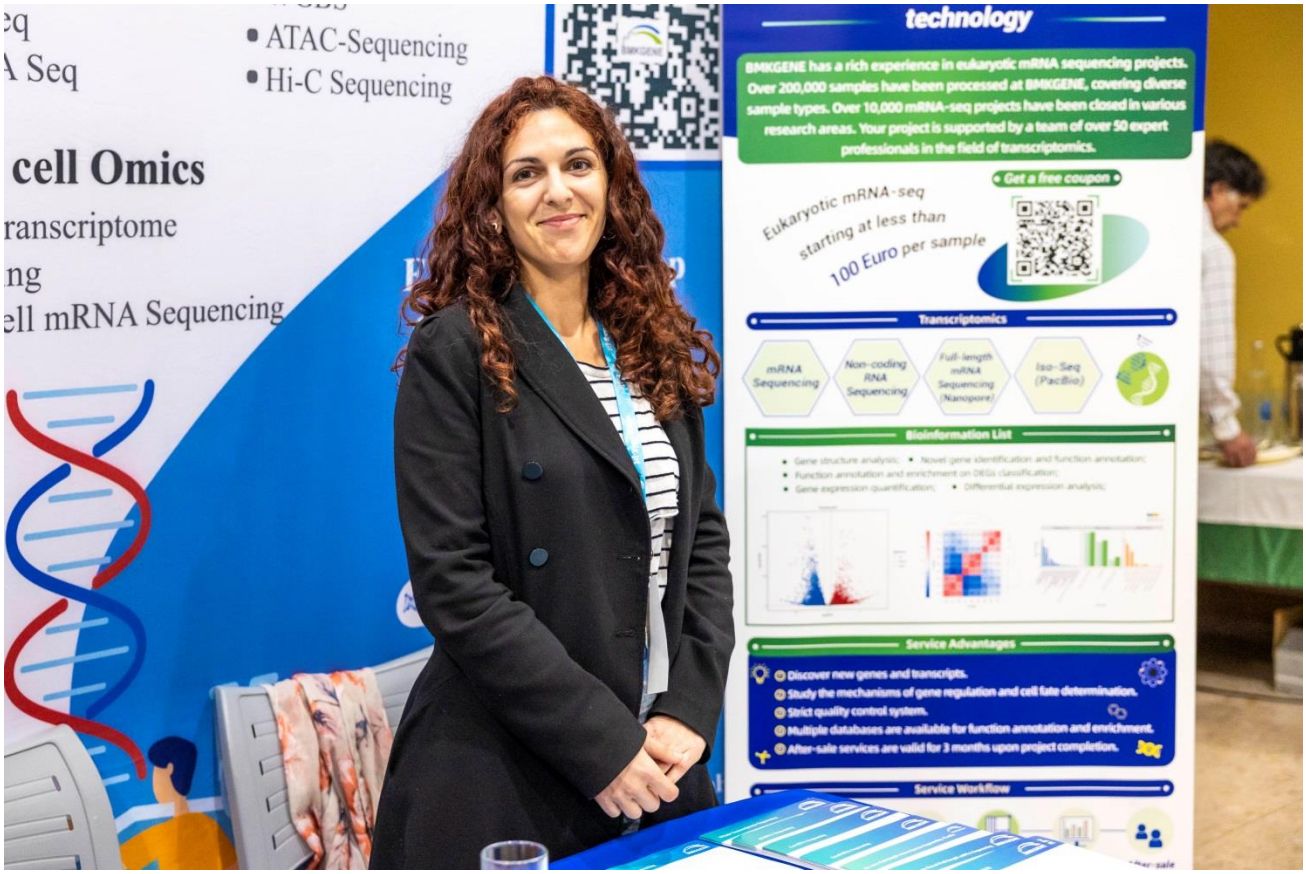
• ATAC-Sequencing
• Hi-C Sequencing
cell Omics
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BMKGENE has a rich experience in eukaryotic mRNA sequencing projects. Over 200,000 samples have been processed at BMKGENE, covering diverse sample types. Over 10,000 mRNA-seq projects have been closed in various research areas. Your project is supported by a team of over 50 expert professionals in the field of transcriptomics.
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Bioinformation List
Service Advantages
Discover new genes and transcripts.
Study the mechanisms of gene regulation and cell fate determination.
Strict quality control system.
Multiple databases are available for function annotation and enrichment.
After-sale services are valid for 3 months upon project completion.
Service Workflow


79


19
DNA
70 YEARS


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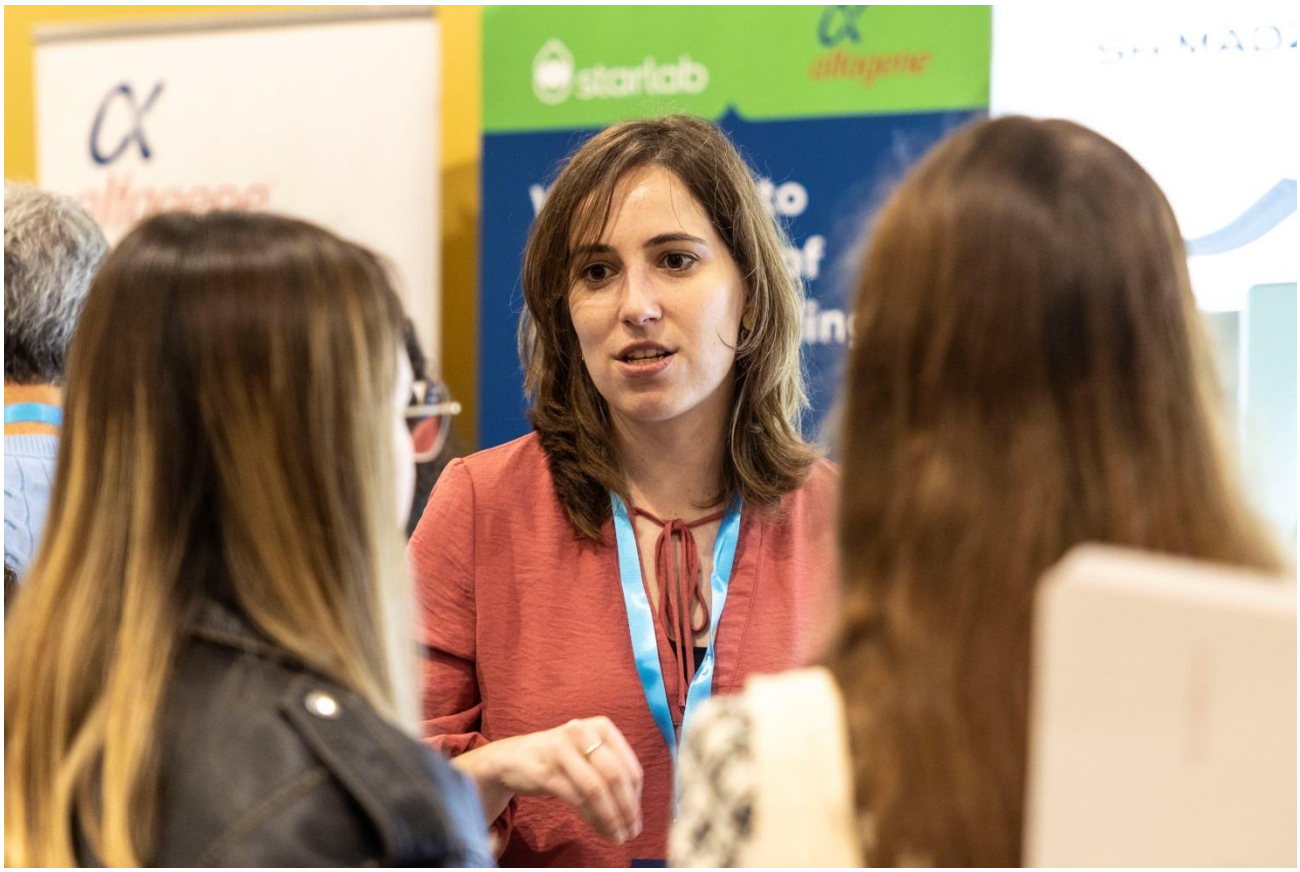
Welcome to
the future
liquid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Ciências da Vida
Microscopia Ótica
Microscopia Eletrónica
Meio Ambiente
Analítica
C. Qualidade Industrial
19
79
19
79

IX CLINICAL BIOCHEMISTRY WORKSHOP
LIFESPAN, HEALTH & METABOLIC DISEASES

Best Selected Oral Communications

- SOC3, **Bárbara Vieira**
- SOC15, **Mariana Teixeira**


IX CLINICAL
BIOCHEMISTRY
WORKSHOP
LIFESPAN, HEALTH &
METABOLIC DISEASES
SPB
Best Selected Posters
- P7, Inês Torradinhas Militão
- P15, Mariano Nicola Llorente

IX CLINICAL BIOCHEMISTRY WORKSHOP
LIFESPAN, HEALTH & METABOLIC DISEASES

Prize Draw Winners

1. Marta Parreira
2. Anne Moraes
3. João Cunha
4. Linda Geraldo
5. Nísia Martins
6. Natércia Conceição
7. Inês Afonso
8. Marisa Belchior
9. Pedro Ramos
10. Cristiana Mourato
11. Mariana Marques
12. Daniela Santos

SPB Clinical Biochemistry Worshops

	City	Year	Topic	Chair
I	Porto	2003	Patologias Inflamatórias	Natércia Teixeira
II	Porto	2006	Sinalização e doença	Natércia Teixeira
III	Porto	2008	Doenças emergentes do séc. XXI	Natércia Teixeira
IV	Faro	2010	Interactions between biochemistry and clinical pratice	Aureliano Alves
V	Coimbra	2012	Translational molecular biochemistry	Catarina Oliveira / Manuela Grazina
VI	Lisboa	2014	Peroxissomes and mitochondria	Isabel Almeida
VII	Porto	2016	Obesidade: Da vida in útero à terceira idade	Natércia Teixeira
VIII	Évora	2018	Allergy and environment	Célia Antunes
IX	Faro	2024	Lifespan, Health and Metabolic diseases	Aureliano Alves/ Leonor Cancela

List of Participants

Name	Affiliation/Organization/Company:	Online/ presential
Alexandra Penha	Universidade de Évora	Presential
Alexandra Sofia Soares Curado de Matos	ABC-RI, FMCB, Universidade do Algarve	Presential
Álvaro Tavaraes	Faculdade de Medicina e Ciências Biomédicas	Presential
Ana Beatriz Tôrres Gonçalves Belesa	Universidade do Algarve	Presential
Ana Borges	Izasa Scientific	Presential
Ana Galveias	University of Évora	Presential
Ana Luísa De Sousa-Coelho	Algarve Biomedical Center Research Institute (ABC-RI), Universidade do Algarve (UAlg)	Presential
Ana Luísa Mota Sousa	CHTMAD	Online
Ana Raquel Silva	Universidade do Algarve	Online
Ana Rodrigues Costa	University of Évora	Presential
Ana Tellechea	Gel4Med Inc., USA	Online
Ana Vila-Santa	Biomarker Technologies (BMK) GmbH	Presential
Anderson Araújo	Universidade do Algarve	Presential
Anne Beatriz Moraes	Universidade do Algarve	Presential
António Matos	Chemicalno Lda	Presential
Antonio Mejia	Universidade do Algarve	Presential
Bárbara Ferreira	Universidade do Algarve	Presential
Bárbara Vieira	Centre of Marine Sciences (CCMAR), Universidade do Algarve	Presential
Beatriz Santos	Universidade do Algarve	Presential
Beatriz Sequeira	Escola Superior de Saúde	Presential
Bibiana Ferreira	Universidade do Algarve	Presential
Brendol Jean Soares da Cunha Cenci	Universidade do Algarve	Presential
Carina Costa	Universidade Aveiro	Online
Carina Dias	Universidade do Algarve, Escola Superior de Saúde	Presential
Carlos Pitães	Izasa Scientific	Presential
Carolina Lopes	Universidade do Algarve	Presential
Carolina Valério Martinheira	Universidade do Algarve	Presential
Catarina Marreiros	Centre of Marine Sciences, University of Algarve, Portugal	Presential
Célia M. Antunes	Universidade de Évora	Presential
Cláudia Maria de Assunção Morais	Siemens Healthineers	Presential
Cláudia Sofia Mestre Viegas	Universidade do Algarve	Presential
Cristiana Mourato	ABC-RI	Presential
Daniel Torres Oteros	Universitat de Barcelona	Presential
Daniela F. Santos	ABC-RI	Presential
David Rijo	Universidade do Algarve	Presential
Débora Varela	Centre of Marine Sciences (CCMAR), Universidade do Algarve	Presential

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Diana Martins	Universidade do Algarve	Presential
Diana Nóias	Universidade do Algarve	Presential
Dulce Isabel de Jesus Arsénio	Universidade do Algarve	Presential
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Ferhan Sagin	Ege University Medical School I Dept. of Medical Biochemistry I Izmir I Türkiye	Online
Gustavo Miguel Sanches Rico	Universidade do Algarve	Presential
Inês Afonso	ABC-Ri	Presential
Inês Baía	Centre of Marine Sciences (CCMAR), Universidade do Algarve	Presential
Inês Castro Almeida	I3S	Online
Inês Ferreira	Universidade do Algarve	Presential
Inês Sofia	Universidade do Algarve	Presential
Inês Torradinhas-Militão	ABC-RI, Algarve Biomedical Center Research Institute	Presential
Inês Vingado	Universidade do Algarve	Presential
Isabel Teixeira	Universidade do Algarve	Online
Jacinta Serpa	NOVA Medical School|Faculdade de Ciências Médicas da Universidade NOVA de Lisboa	Presential
Jaime Freitas	Quimigen	Presential
Jessica Eira Silva	Universidade de Trás-os-Montes e Alto Douro	Online
Joana Silva	Universidade do Algarve	Online
Joana Clemente Dias	Escola Superior de Saúde, Universidade do Algarve (ESSUAlg), Faro, Portugal	Presential
Joana Sofia Camilo Carreira	Universidade do Algarve	Presential
Joana Galhardas	Universidade do Algarve	Presential
Joana Isabel Gomes Camarinha	Universidade de Aveiro	Online
Joana Rodrigues	ABC-Ri	Presential
João Henriques	Sparos	Presential
João Paulo Cunha	Universidade do Algarve	Presential
José Bragança	Faculty of Medicine and Biomedical Sciences, University of Algarve	Presential
Larissa Miguel	Centre of Marine Sciences (CCMAR), Universidade do Algarve	Presential
Laura Costa	Universidade do Algarve	Presential
Laura Isabel Sousa Costa	Universidade do Algarve	Presential
Leonardo Abrãao da Silva Rodrigues	ABC-RI Algarve Biomedical Center Research Institute	Presential
Leonor Cancela	Universidade do Algarve	Presential
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Luís Gabriel	Universidade do Algarve	Presential
M. Dulce Estêvão	Universidade do Algarve - Escola Superior de Saúde	Presential
Manuel Aureliano	FCT, University of Algarve	Presential
Márcio Simão	Universidade do Algarve	Presential
Marco G. Alves	Department of Medical Sciences, University of Aveiro	Presential

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Margarida Serrano	Specanalítica Equipamentos Científicos Lda.	Presential
Maria Eva Vaz Afonso	Hospital Espírito Santo de Évora EPE	Online
Maria João Pereira	Uppsala University	Online
Maria Ribeiro	Universidade do Algarve	Presential
Maria Thereza Amaral	Universidade do Algarve	Presential
Mariana Carvalho	Universidade do Algarve	Presential
Mariana Custódio	University of Évora	Presential
Mariana Marques	University of Évora	Presential
Mariana Teixeira	Algarve Biomedical Center Research Institute	Presential
Mariano Nicola Llorente	University of Barcelona	Presential
Marisa Belchior	Unidade Local de Saúde do Baixo Alentejo (ULSBA)	Presential
Marta Sofia Pereira Baptista Parreira	Universidade do Algarve	Presential
Max Domingues	Centre of Marine Sciences (CCMAR), Universidade do Algarve	Presential
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Miguel Serrano	Faculdade de Ciências da Universidade Lisboa	Online
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Nadia Silva	ABC-RI	Presential
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Nuno Miguel Nunes da Costa	UALG - FMCB	Presential
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Raquel Andrade	ABC-RI, Algarve Biomedical Center Research Institute	Presential
Raquel Cavaco	Universidade do Algarve	Presential
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Sara Mateus	Alfagene	Presential
Sara Vaz	Biomarker Technologies (BMK) GmbH	Presential
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Vânia Roberto	Ageing Better CoLAB (ABC CoLAB)	Presential
Vasco Nunes	Universidade do Algarve	Presential
Victor Yassuda	Faculdade de Medicina e Ciências Biomédicas - Universidade do Algarve	Presential
Vitor Teixeira	i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto	Online
Wilson Pinto	Sparos	Presential

CERTIFICATE

This is to certify that **Mariana Marques** was present at the IX Clinical Biochemistry Workshop - **"LIFESPAN, HEALTH & METABOLIC DISEASES"**, held at the **University of Algarve** on the 26th of january 2024.

On behalf of the organizing committee.

Aureliano Alves, Chair


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IX CLINICAL
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LIFESPAN, HEALTH &
METABOLIC DISEASES
26th JANUARY 2024
Universidade do Algarve
Campus de Gambelas-Faro