

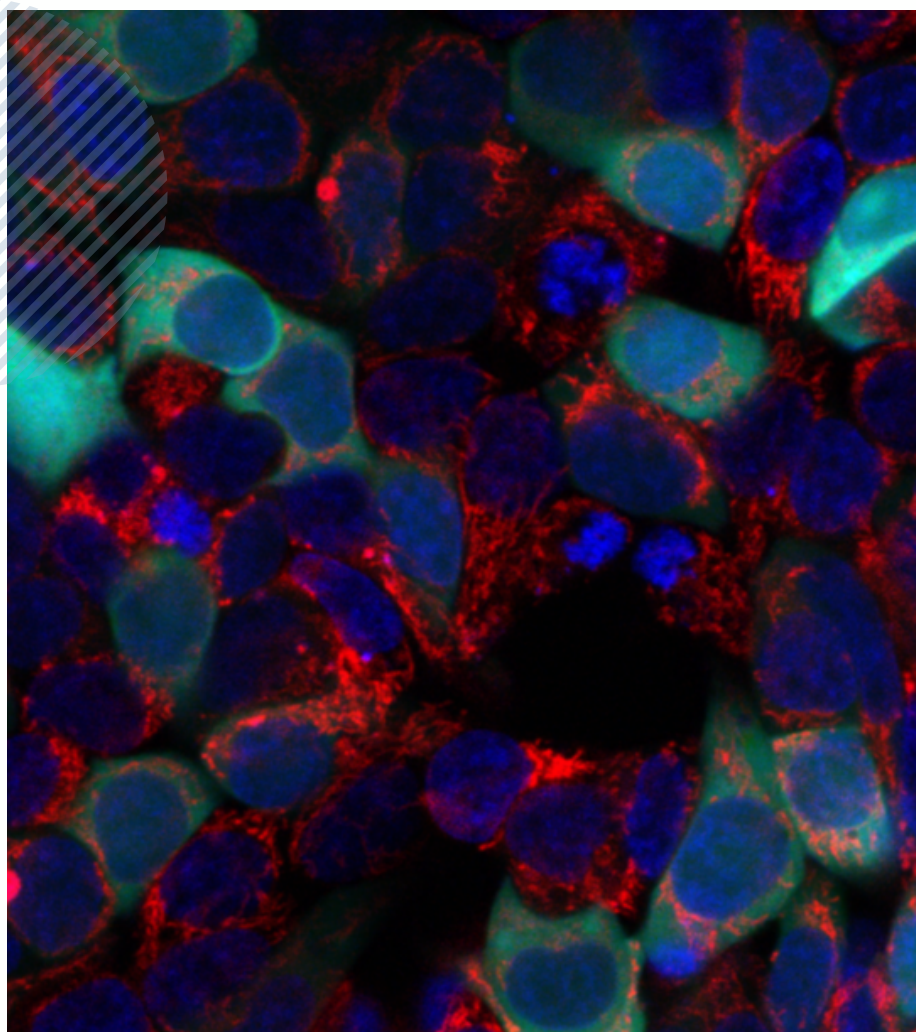
NEWSLETTER

SOCIEDADE PORTUGUESA DE BIOQUÍMICA



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Confocal image of HeLa cells transfected with Mcl-1-expressing plasmid, showing Mcl-1 in green, mitochondria in red, and nuclei in blue.

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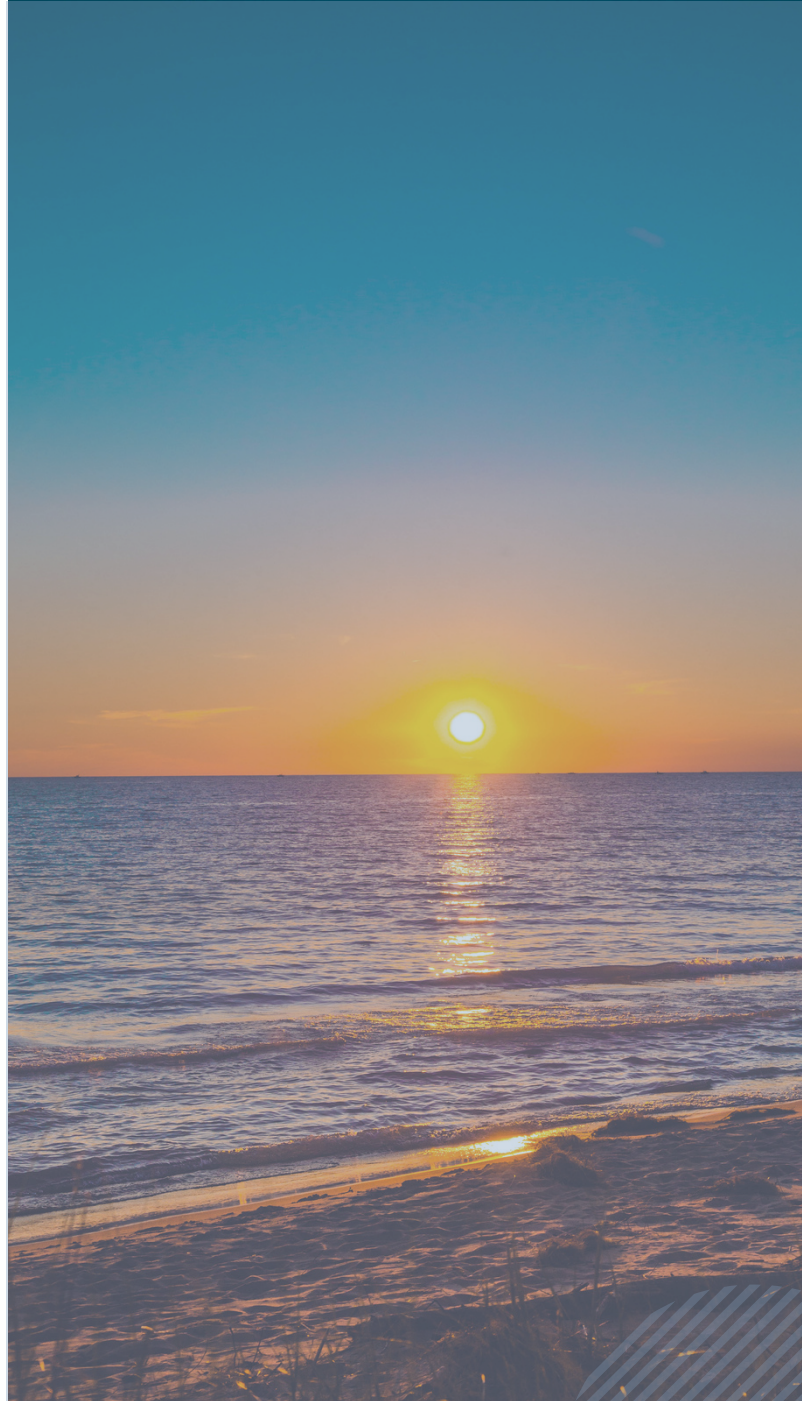
In this Edition:

In this issue of the SPB Newsletter, we feature an interview with Miguel Seabra, from NOVA Medical School of Universidade NOVA de Lisboa. He reflects on his career path, his research experience in a group led by two Nobel Prize laureates, and his key contributions to science on different dimensions.

Nuno Raimundo, from MIA – Portugal and Penn State College of Medicine, U.S., shares his insights into interorganelle communication and aging.

This newsletter also highlights the experience of Manuel João Costa, from the University of Minho, in the FEBS Education Committee (2021–2025), a reflection of Margarida Gama Carvalho, from the University of Lisbon, on the mission of the FEBS Science and Society Committee, as well as upcoming events, including the Iberian Plant Biology congress, the 29th FEBS congress, the IUBMB Education Symposium, the FEBS3+ meeting, and the 2nd FEBS Workshop on Redox Medicine.

Wishing all members of the SPB community a fantastic summer!



The SPB Directive Committee

Interview

Miguel Seabra

For this edition's Newsletter, we talked with Miguel Seabra, Full Professor at NOVA Medical School of Universidade NOVA de Lisboa, where he coordinates research in Cellular and Molecular Medicine, and Head of Global Eye Initiative at Fundação Champalimaud



Having studied to be an MD, why did you decide to dedicate your career exclusively to research?

After earning my MD in 1986, I decided to pursue a PhD in the U.S. through the Fulbright Program. The main reason was the emerging molecular biology revolution, which was largely absent from Portugal's medical curriculum at the time.

I had also started doing research in one of the few good departments at the NOVA Medical School - Biochemistry - and loved the intellectual atmosphere.

Initially, I did not intend to leave medicine completely, but doing a PhD in the U.S. made it difficult to return and balance clinical duties with research. I also had early success in research, and did not want to lose five years in medical specialization only to return to science later.

How did you choose the topic for your PhD and why focus on protein modifications?

I started with an interest in nutrition and cardiovascular disease. Once in graduate school, I had the freedom to explore many areas and take foundational courses in genetics, biochemistry, and protein structure.

I initially wanted to work on lipids in cardiovascular disease, but my intended advisor actually recommended another lab - Brown and Goldstein's - due to the exciting research there. I began studying LDL receptor regulation, which led me to prenylation, especially when a new postdoc brought enzymology expertise to the group.

That evolved into research on protein prenylation, and I focused on the Rab GTPases with unique prenylation pathways, which became the core of my PhD.

What was the most valuable lesson you learned in a lab led by two Nobel Prize winners?

I learned an incredible amount - not just in the lab, but from the entire research center. Weekly seminars by worldwide experts broadened my understanding of biomedicine. In the lab, I had to develop self-confidence and handle rigorous but fair critiques.

The environment was demanding but rewarding – if you worked hard and produced results, you were well supported. I was given dedicated technicians and resources despite being a PhD student in a lab mostly made up of postdocs.

What has been the most important scientific discovery of your career?

In fundamental research, I would say my PhD work on prenylation. We discovered that a component of the prenylation machinery is deficient in a rare inherited retinal disease – choroideremia. This finding opened many research directions. I also take pride in our work on Rab27 function.

What do you consider your greatest achievements?

These span multiple domains. In fundamental research, the discoveries I just described.

In technology, the development of a conditional knockout model of choroideremia, which led us to viral gene therapy clinical trials – the first for this condition and second in the world in the retina.

On the science policy side, I led reforms in Portuguese science funding as FCT president, creating new, and sometimes controversial, mechanisms to support excellence in science.

What advice would you give to young scientists?

You must love science. If you are not thinking about your experiments while brushing your teeth in the morning, it may not be the right path.

It is a demanding and competitive career, so you need to be driven by a deep desire to contribute to scientific knowledge and make an impact

Besides funding, what do you think is needed to make Portuguese science more competitive?

While more funding is critical, we also need a more politically independent FCT and stable, long-term research funding. Predictability is key to planning.

Higher education investment must also improve – currently, universities struggle to support research, and the competitive research funding does not always cover infrastructure and overheads.

In other countries, generous university funding bridges that gap.

News & Views

Understanding aging at multiple scales: from cellular organelles to organisms



Nuno Raimundo, MIA – Portugal, University of Coimbra, and Penn State College of Medicine, U.S.

Aging is a biological process that is equally fascinating and daunting: cells and organisms progressively deteriorate prior to their demise. This process ensures that only the most fit members of a species remain, and can be seen as organism quality control.

But an organism, especially the type of organism that is reading this text, is a complex structure of many billions of cells organized in cells (neurons, osteoblasts, immune cells), tissues (e.g., heart, liver, skeletal muscle), systems (circulatory, digestive, skeletal, etc.).

Cells keep our tissues functional which keep our organs alive and our systems working. Aging starts at our cells, and when a tissue starts accumulating cells that are aged, the tissue starts showing signs of dysfunction, which affect the function of the organ, which affect the behaviour of the system. Thus, to understand human aging (to go back to the species reading this text), we need to understand cellular aging. My lab is working on many questions that compose the grand puzzle of cellular aging.

How do we determine if a cell is aged? How do we determine if anything is aged? It is easy to look at an object, a car, a house, any physical structure, and see if it looks aged or new. Any structure withstands damage, and any structure can be repaired. The difference between damage and repair determines if the damage accumulates or if the structure is, let's say, rejuvenated.

Like an automobile, cells also show signs of aging. These are often referred as “hallmarks of aging” in the scientific literature, to illustrate that scientists broadly agree that they are present in aging cells.

The hallmarks of aging include loss of quality control of many important cellular processes. For example, the self-digestion process, known as autophagy, is important for cells to degrade macromolecules or organelles that are no longer functioning properly.

Autophagy is one of the processes that is dysregulated in aged cells, which results in the accumulation of dysfunctional organelles and of macromolecules that should not be around. Simply put, autophagy is the cellular waste management system: garbage is put in bags (autophagosomes) which are transported to the recycling plant (lysosomes).

When autophagy stops working properly, waste accumulates in places where it shouldn't be. Lysosomes function as the cellular recycling plant: they break down major cellular components (really major, even other organelles!) into the smallest building blocks (proteins, lipids, sugars) and direct these building blocks to other cellular organelles so that they can be reused. In aged cells, some aspects of lysosomal biology are not working well, which results in excessive degradation of some compounds (generating too many of certain building blocks) while other macromolecules remain untouched.

Another hallmark of cellular aging is mitochondrial dysfunction. Mitochondria are the organelles in our cells that generate ATP – the energy currency – and are therefore known as the power plants of the cells.

Mitochondria are typically tubular structures (imagine a plate of spaghetti), which constantly fuse and fragment. In aged cells, mitochondria are predominantly hyperfused and are less efficient in energy production.

The cellular DNA, the rule book of the cell, progressively accumulates errors as cells age and starts occasionally losing some pages or making them unreadable.

And then, there is the biggest red flag of cellular aging: cells become senescent. Senescence is a process of the cellular aging process, in which the cells stop dividing, and start informing other neighbour cells that they are no longer in a perfect state.

Problem: this information unnerves their neighbours, and may provoke other cells to enter a state of senescence.

So keeping the number of senescent cells as low as possible is an important strategy to counter aging. Some of the therapies that are currently being tested hit precisely this angle: several senolytics (molecules that kill senescent cells but not functionally younger cells) are being used to remove senescent cells and limit tissue aging.

In my lab, our main question is how do the different components of the cells (DNA, mitochondria, lysosomes, etc) communicate with each other and how does that communication contribute to cellular aging. We have observed that cells with perturbations in mitochondria modify the behaviour of their lysosomes, and cells with perturbations in lysosomes modify the behaviour of mitochondria.

By harnessing this knowledge, we solved a developmental defect in animals with defective mitochondria by manipulating the lysosome – showing that interorganelle communication can be a feature of the disease mechanism, but can also be a target for novel therapies.

We are now exploring different aspects of inter-organelle communication and their contribution to aging and senescence: mitochondria-lysosome, but also mitochondria-endoplasmic reticulum, mitochondria-peroxisomes, lysosomes-nucleus, among others.

The ultimate goal is to understand cells as networks of organelles and to comprehend how each of these organelles, as well as their interactions with others, contributes to cellular, tissue and organ aging.

So, to understand how our cells age, we can study how they accumulate damage, and how they repair it. Some cells, called stem cells, they are specialized at keeping themselves young; others have relatively short lifespans, and then are replaced by younger, healthier cells; other cells, such as neurons, must live for decades and require extensive maintenance.

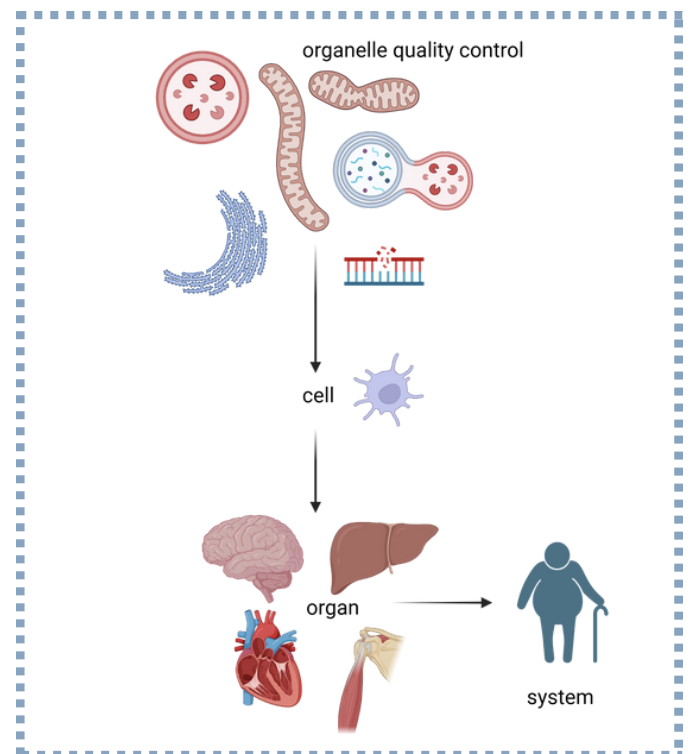


Fig 1. Ageing can be assessed at multiple scales (subcellular, cellular, organ, organism).

In our lab, we focus on how cellular organelles, and the way they communicate with each other, contribute to cellular and organismal aging. We are particularly interested in how mitochondria, lysosomes, endoplasmic reticulum and peroxisomes impact each other, as well as processes such as DNA maintenance/repair and autophagy.

SPB Activities

The FEBS education committee experience: Lessons for the future

Manuel João Costa, School of Medicine, University of Minho

As my mandate with the FEBS Education Committee concluded in February 2025, I want to reflect on my experiences and lessons learned as a full member, after being nominated by SPB. The committee's focus is to enhance education across Europe in the field of molecular life sciences, promoting initiatives that support pedagogical innovations and improve educational practices. I was elected to the committee in 2021, with my first meeting on February 9, and invited by FEBS for a second term in early 2023.

Despite the formal recognition of the importance of education in developing a more critical and inclusive society, it is evident that education is still regarded as a non-priority in many European countries. Throughout many discussions, the committee frequently addressed how to elevate education in public discourse across FEBS and across national societies. Alarming, there are funds available from FEBS that remain unutilized by some national societies, indicating that more engagement in education is required by the national communities.

In this context, I'm proud to highlight that the Portuguese Biochemical Society is well-regarded within FEBS for its active involvement in educational initiatives and its successful hosting of international FEBS-sponsored events like the "Evidence-Based Teaching in Your Biomolecular Classroom: Catalyzing Student Engagement" symposium (2021), or the "Symposium on Pedagogical Innovation in Biosciences: How to Engage Students in Our Practices?" (2023).



Both events successfully attracted international colleagues and provided critical input to attendants. Adding to this, education was particularly highlighted in the XXII National Congress of Biochemistry of the Portuguese Society in 2024 with the inclusion of a dedicated symposium. This led to the onward commitment to always include a section dedicated to education in the National Congress and the Young Researchers' Forum.

During my tenure, I contributed to the vision and initiatives of the FEBS Education Committee, which included leading workshops and events such as the Joint Education Workshops FEBS/ Croatia BMB society "Research on Education" (2022), in Zagreb, or the FEBS Hellenic BMB society "ATHENS: Approaches in Transformative and Holistic Education for Novel Science" workshop (2024).

In July, I will be leading a session at the FEBS 2025 congress in Istanbul titled "From Challenges to Opportunities: Integrating AI in Biosciences Education."

I am particularly delighted to have participated in designing the groundbreaking FEBS Education Academy and launching its initiatives at the FEBS Education and Training Conference in Antalya, Turkey (2024) (Fig. 2). A special achievement during this period was the publication of "A white paper from the FEBS Education and Training Conference: challenges, opportunities, and action plans for transforming molecular life sciences education". Additionally, I have the honor of serving as the Editor of the Education Section of the FEBS Open Bio journal, where I published a feature titled "Maximizing Engagement: Active Learning Approaches for Large Classes."

I have also had the opportunity to scaffold bridges between the Portuguese and Brazilian education communities in biochemistry through the "Tanto Mar" initiative, fostering collaborative efforts in education across both regions.



Fig 2. FEBS Education and Training Conference
Antalya, Turkey, 2024.

I would like to express my sincere gratitude to the Board of the SPB for their confidence in me, particularly to Vítor Costa. I also want to thank Margarida Fardilha for her energetic engagement and initiative.

Additionally, I extend my appreciation to the Committee's President, Ferhan Sagin, under whose guidance new foundations are being created. Lessons Learned: Engaging in the FEBS Education Committee has been immensely rewarding and important for SPB. Elevating our critical reflection is essential, and a feasible way to achieve this is through sharing best practices and co-designing the future across societies.

I observed how colleagues doing exciting work in their courses were inspired by meeting peers and gaining insights into their own potential. We all face similar challenges in designing quality education across societies. We must develop into a community of peers who meet, discuss, and reflect on our practices in the classroom. Recognition of teaching is becoming increasingly important across Europe for career advancement. Let's seize this opportunity to come together within SPB and FEBS to nurture and value a community focused on education in molecular biosciences.

This future demands a critically engaged community of academics who recognize the importance of understanding how to implement, and are committed to advancing research-based education within their institutions and countries. While we've made significant progress, it's essential to keep moving forward. Although we may not yet have a clear path, I am confident that we will soon experience an "aha" moment that will transform molecular life sciences education, akin to the impact of PCR in DNA amplification.

SPB Activities

The FEBS Science and Society Committee: Bridging Molecular Life Sciences and Society

Margarida Gama Carvalho, Faculty of Sciences, University of Lisbon. Elected member of the FEBS Science and Society Committee, effective 1 January 2025

At the turn of the 21st century, the molecular life sciences gained unprecedented societal visibility, driven by advances in biotechnology and the transformative potential of the Human Genome Project. As the tools to analyse and modify biological systems became increasingly powerful and accessible, public interest and scrutiny intensified.

This period, marked by rising public mistrust in science, also revealed growing concern within the scientific community regarding a mismatch between European science policies and funding structures. In particular, researchers faced increasing bureaucratization of EU research programmes and a shift towards top-down, application-driven agendas, often to the detriment of fundamental, curiosity-driven research.

It was in this context that the Executive Committee of the Federation of European Biochemical Societies (FEBS) approved the creation of the Science and Society (S&S) Committee in 2001, following a proposal by then-FEBS President Julio Celis. Initially tasked with advising the FEBS on societal issues arising from scientific advances, whether present or anticipated, the Committee's mandate was soon broadened to include monitoring European science policy and issuing recommendations to national and European bodies on all aspects of research policy.



This evolution reflected the proactive role FEBS assumed during a critical phase in shaping European science policy. Indeed, between 2002 and 2014, a coordinated effort led by FEBS and championed by the Committee's first Chair, Federico Mayor, former UNESCO Director-General, contributed significantly to strengthening EU support for life sciences research. This period, initiated in the wake of the Lisbon Strategy (2000), stands out as a rare example of sustained, interdisciplinary mobilisation by scientists and scientific organisations to influence science policy at the European level.

The impact of this movement, culminating in the creation of the European Research Council (ERC), has been analysed in detail by Julio Celis and former Portuguese Minister of Science José Mariano Gago in an article published in *Molecular Oncology*¹, one of the four FEBS journals. Today, the ERC remains the EU's flagship bottom-up funding mechanism, enabling researchers to define their own scientific agenda and receive funding based solely on scientific excellence.

1. Celis, J. E. & Gago, J. M. *Shaping science policy in Europe. Mol. Oncol.* 8, 447–457 (2014).

This legacy continues to inform the current mission of the FEBS Science and Society Committee, chaired by Prof. Emmanouil Fragkoulis. The Committee comprises three additional members from different FEBS Constituent Societies, elected by the FEBS Council, and plays an active role in shaping science policy through participation in two key research advocacy organisations: the Initiative for Science in Europe (ISE) and the Alliance for Biomedical Research in Europe (BioMed Alliance).

A central objective of the Committee is to mobilise scientists and national societies to engage more proactively in science policy, advocating for sustained support for fundamental research at the national level. In parallel, the Committee promotes critical reflection on the broader societal, ethical, and cultural dimensions of the molecular life sciences, and supports science communication and public engagement initiatives to foster trust and mutual understanding between scientists and the wider public.

These goals are actively supported through a dedicated grant scheme for FEBS Constituent Societies to develop outreach initiatives in their respective countries. Among its flagship activities, the Committee organises the annual Science in the Street event, held in conjunction with the FEBS Congress, to promote public engagement with the molecular life sciences.

In 2025, the event will take place in collaboration with the Istanbul Jazz Festival and the Istanbul Foundation for Culture and Arts (IKSV). This innovative initiative will blend neuroscience and music in a public performance led by Prof. Peter Vuust, a renowned neuroscientist and jazz musician, offering an accessible and culturally resonant experience that connects science with everyday life.

In an era of increasing complexity and global challenges, it is essential that scientists not only generate knowledge but also contribute actively to shaping the institutional and policy frameworks that govern research. The FEBS S&S Committee remains firmly committed to this mission, ensuring that the voice of the scientific community is represented in both policy processes and public discourse.



Fig 3. The 2025 “Science in the Street” event, coordinated by S&S Committee member M. Gama Carvalho, introduces a novel model for public engagement through a partnership with the Istanbul Foundation for Culture and Arts (IKSV), organiser of the Istanbul Jazz Festival. The event poster for “Groove on the Brain” features FEBS guest speaker and performer Prof. Peter Vuust, Director of the Danish National Research Foundation’s Center for Music in the Brain, and Prof. Güneş Özhan, Head of the Department of Molecular Biology and Genetics at İzmir Institute of Technology and local FEBS member.

Calendar & Events

01 - 04/07

Iberian Plant Biology - 2025 Congress

Murcia, Spain

[LINK](#)

16-20/11

11th International Symposium on Autophagy

Lorne, Victoria, Australia

[LINK](#)

05-09/07

29th FEBS Congress

Istanbul, Turkey

[LINK](#)

25-26/08

IUBMB Education Symposium 2025

Petaling Jaya, Malaysia

[LINK](#)

08-10/09

[BC]2 Basel Computational Biology Conference

Basel, Switzerland

[LINK](#)

29/09
to
03/10

4th Molecular Biosystems Conference in Eukaryotic Gene Regulation & Functional Genomics

Puerto Varas, Chile

[LINK](#)

24-27/09

FEBS3+ Meeting

Belgrade, Serbia

[LINK](#)

06-09/10

2nd FEBS Workshop on Redox Medicine

Luso, Portugal

[LINK](#)

29-31/10

RNA Horizons 2025 Therapeutics Symposium

Palermo, Sicily, Italy

[LINK](#)