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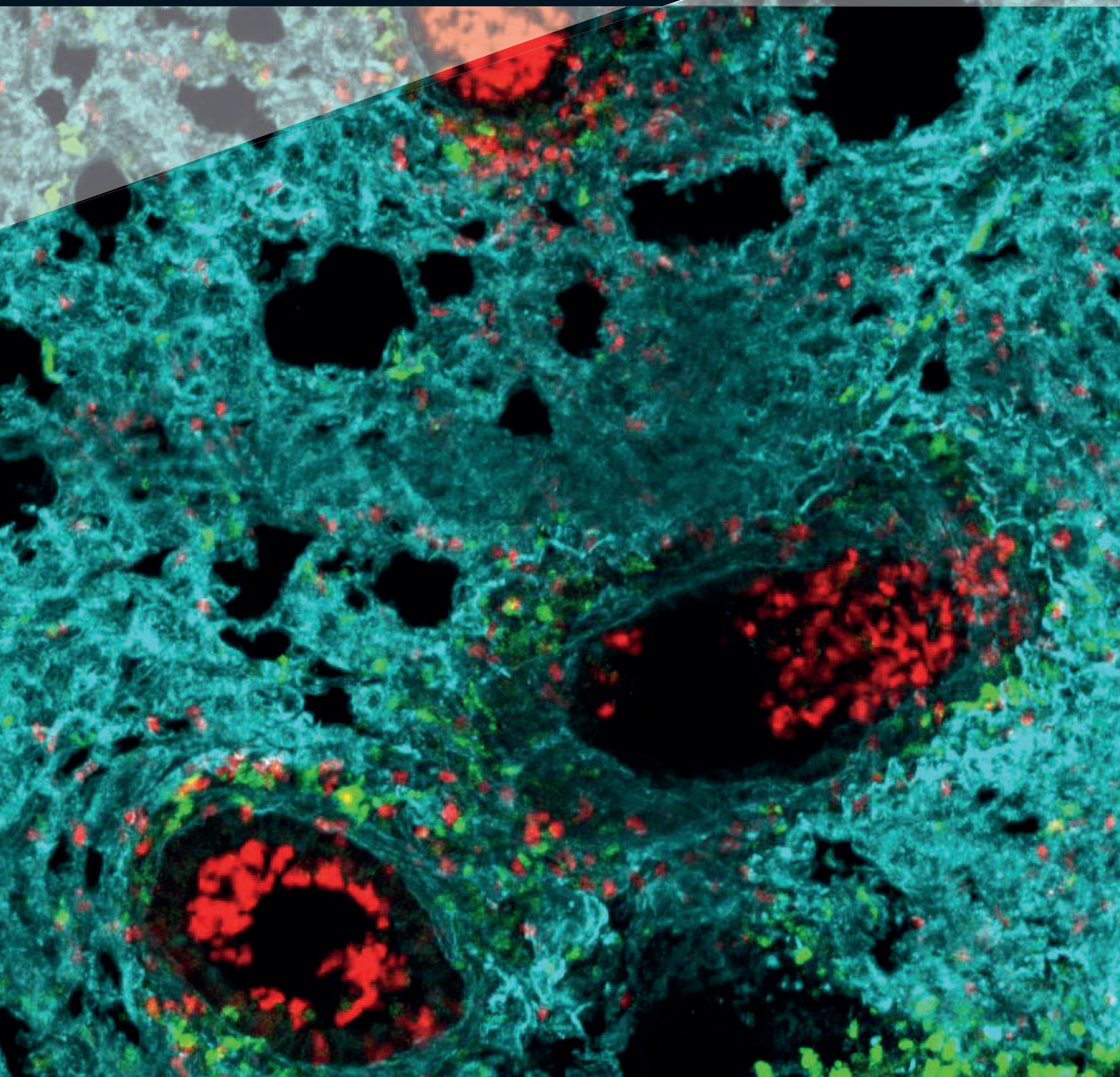

contents #21

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Questioning to Move Forward: When Evidence Redefines Cardiovascular Medicine

Science advances when it dares to re-examine its own certainties. This issue of CNIC Pulse brings together three paradigmatic examples of how cutting-edge cardiovascular research—rigorous, collaborative, and strongly translational—is transforming not only what we know, but how we care for people throughout their lives. From acute myocardial infarction to dementia, and from pregnancy as an origin of cardiovascular disease, the CNIC shows that questioning dogma is not an act of rupture, but one of scientific responsibility.

The clearest expression of this philosophy is the REBOOT clinical trial. For decades, beta-blockers have been routinely prescribed to patients who have suffered a myocardial infarction. This indication has been supported by robust evidence, but evidence generated in a clinical context very different from today's. Now, thanks to an international effort led from Spain by the CNIC, we know that in patients with uncomplicated myocardial infarction and preserved ventricular function, these drugs do not reduce mortality or cardiovascular events. This is not about "withdrawing" treatment, but about refining medicine—administering what truly provides benefit and avoiding what does not. The fact that these findings were published simultaneously in *The New England Journal of Medicine* and *The Lancet*, and are already influencing clinical guidelines, confirms the global impact of REBOOT and consolidates the CNIC as a driver of change in international medical practice.

But the significance of this research extends beyond the drug itself. REBOOT forcefully introduces two key ideas for present-day and future cardiology: treatment individualization and a sex-based perspective. The data suggest that men and women do not always respond in the same way to cardiovascular therapies—a powerful reminder that precision medicine is not an abstract concept, but a real clinical necessity. Investigating these differences is not optional; it is essential to delivering care that is both fairer and more effective.

Dr. Valentín Fuster, General Director
Spanish National Center for
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This integrative outlook also extends to the brain. The international symposium "Understanding the Neurovascular Network to Prevent Dementia" highlights an increasingly undeniable truth: cognitive function cannot be protected without preserving vascular health. Dementia—one of the major health challenges of the twenty-first century—is not only a neurological problem; to a large extent, it is the consequence of cardiovascular processes that act silently over decades. Understanding the neurovascular network opens the door to early prevention strategies, at a stage when the course of the disease can still be altered. Caring for the heart also means caring for the brain.

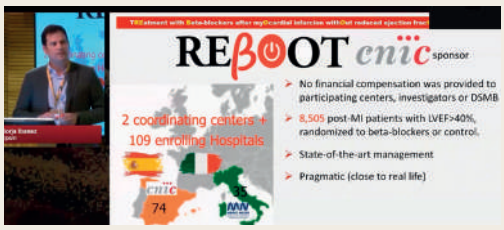
Finally, I would like to highlight a project that takes us back to the very origin of many diseases: pregnancy. The PlacHeart project redefines the placenta as a central player in the future cardiovascular health of both mothers and their children. Far from being a transient organ, the placenta emerges as a key regulator whose dysfunction can program cardiovascular risk, congenital malformations, and even vascular dementia years later. Incorporating obstetric history into the assessment of cardiovascular risk in women is not a minor recommendation, but a paradigm shift with profound clinical and social implications.

REBOOT, the neurovascular network, and PlacHeart share a clear common thread: twenty-first-century cardiovascular medicine is continuous, integrated, and preventive. It begins before birth, is shaped throughout life, and demands decisions based on solid, up-to-date, and contextualized evidence. In all these areas, the CNIC does not merely participate—it leads, demonstrating that a public Spanish research center can help set the global scientific agenda and transform clinical practice. ■

TRAN2GAIN

REBOOT: the trial reshaping cardiology and cementing the CNIC's place as a driver of new clinical practice

For decades, the routine prescription of beta-blockers after myocardial infarction has been one of the cornerstones of clinical cardiology—an unquestioned recommendation embedded in international guidelines and applied daily in hospitals around the world. Today, that long-standing certainty is beginning to crack, thanks to the REBOOT clinical trial—an ambitious CNIC-led international study that is already reshaping medical practice and redefining the future of clinical guidelines.



The study was led by CNIC Scientific Director Dr. Borja Ibáñez, who combines this role with work as a cardiologist at Hospital Universitario Fundación Jiménez Díaz and a group leader in the Spanish cardiovascular research network (CIBERCV). "Until now, more than eight out of every ten patients recovering from an uncomplicated heart attack have been discharged on beta-blockers, but REBOOT is set to change the treatment of these patients worldwide," said Dr. Ibáñez. "The results of REBOOT represent one of the most significant advances in the therapeutic strategy for acute myocardial infarction in recent decades."

REBOOT (Treatment with Beta-Blockers after Myocardial Infarction without Reduced Ejection Fraction) enrolled 8,505 patients who had a myocardial infarction but maintained ventricular function. More than 500 researchers participated voluntarily in the study, working at 109 hospitals across Spain (74) and Italy (35). The Italian arm was coordinated by the Mario Negri Institute in Milan, under the leadership of cardiologist Roberto Latini, through a collaboration agreement with the CNIC.

Every year, there are 2 million heart attacks in Europe and around 70,000 in Spain. A recent trial challenges the widespread use of beta-blockers after hospital discharge

Participants were randomly assigned to receive or not receive beta-blockers after hospital discharge. All other components of current standard-of-care therapy were maintained, and patients were followed for a median of nearly four years.

Although generally considered safe, beta-blockers can cause side effects such as fatigue, bradycardia (low heart rate), and sexual dysfunction.

Each year, more than 2 million people in Europe have a heart attack, including around 70,000 in Spain. Traditionally, more than 80% of these patients have been discharged on beta-blockers—a practice that the REBOOT trial results call into question.

After a myocardial infarction, patients are typically prescribed multiple medications, and this complex treatment plan can make adherence difficult, explained Dr. Ibáñez. "Beta-blockers were incorporated early into standard heart attack treatment because, at the time, they significantly reduced mortality. Their benefit was linked to reduced cardiac oxygen demand and the prevention of arrhythmias. But therapies have evolved dramatically over the past 40 years. Today, occluded coronary

arteries are reopened rapidly and systematically during a heart attack, and this has drastically reduced the risk of serious complications such as arrhythmias. In this new context—where the extent of cardiac damage is smaller—the need for beta-blockers is no longer clear. While we routinely test new drugs, it is far less common to rigorously examine whether long-established treatments can be withdrawn."

The REBOOT results, published in *The New England Journal of Medicine* and presented at the European Society of Cardiology Congress in Madrid in August 2025, are unequivocal: in this group of patients, long-term beta-blocker therapy does not reduce mortality or the incidence of new cardiovascular events.

Xavier Rosselló, CNIC researcher, cardiologist at Hospital Universitario Son Espases in Mallorca, and one of the leaders of both the REBOOT trial and a supporting individual patient–data meta-analysis—published simultaneously in The Lancet—explained: "Taken together, these two studies provide compelling evidence that post-infarction patients with fully preserved contractile function—an ejection fraction above 50%—do not benefit from beta-blockers, whereas those with moderate or greater dysfunction—below 50%—do."

"It is a clear message for the medical community," said Ibáñez. "This is not about indiscriminately withdrawing treatment, but rather about identifying which patients truly benefit and which do not."

A collaborative effort with global impact

REBOOT is not an isolated study. Its conclusions, initially supported by the meta-analysis published simultaneously in *The Lancet*, were subsequently reinforced by a much larger international collaborative meta-analysis in *The New England Journal of Medicine*.

Presented at the American Heart Association Congress in New Orleans in November 2025, the larger meta-analysis integrated data from nearly 18,000 patients across several contemporary randomized clinical trials. The results confirm that beta-blockers do not reduce the risk of death, recurrent infarction, or heart failure after an acute myocardial infarction in patients whose cardiac contractile function is normal.

Dr. Ibáñez, principal investigator of the meta-analysis and one of its four senior investigators,

explained that the study analyzed individual patient data from all contemporary trials in this setting: REBOOT (Spain and Italy), REDUCE-AMI (Sweden), BETAMI (Norway), DANBLOCK (Denmark), and CAPITAL-RCT (Japan). All included patients had survived a myocardial infarction while maintaining normal left ventricular function (left ventricular ejection fraction ≥50%), indicating preserved cardiac performance.

> For years, men and women have been treated as if they responded equally to therapies. REBOOT reminds us that evidence must always be analysed through a gender perspective

The message is consistent: beta-blockers are no longer necessary after myocardial infarction in patients without ventricular dysfunction.

Dr. Ibáñez emphasized, however, that "beta-blockers remain an essential therapy for other patient groups, such as those with reduced left ventricular ejection fraction (<50%) after infarction or those with other conditions such as chronic heart failure or cardiac arrhythmias."

He also stressed that "these results do not mean that patients have been treated incorrectly until now, but rather reflect the profound improvements in heart attack management in recent years, which mean that beta-blockers are no longer required in this specific context."

For Dr. Valentín Fuster—CNIC General Director, President of the Mount Sinai Fuster Heart Hospital, and investigator in the REBOOT trial—the value of REBOOT goes beyond the drug itself. "This trial represents exactly the kind of research the CNIC should be leading: clinical studies that address a relevant question, are designed with rigor, and ultimately change medical practice internationally."

Dr. Fuster also highlighted the symbolic importance of the project: "It is rare for a public Spanish research center to lead a trial capable of challenging long-standing clinical recommendations. REBOOT shows that Spanish research can help set the global scientific agenda."

Sex differences: a critical variable

One of the most relevant secondary analyses derived from REBOOT, published in the *European Heart Journal*, introduced sex as a crucial variable. The study showed that women with preserved cardiac function who receive beta-blockers after a heart attack have a worse prognosis than those who do not receive them.

"For years, we have treated men and women as though they respond identically to therapy," said Dr. Rosselló. "REBOOT reminds us that evidence must be analyzed through a sex-specific lens."

"Although women in this meta-analysis experienced more adverse events when treated with beta-blockers—something we had already observed in REBOOT," explained Dr. Ibáñez, "this difference was not large enough to reach statistical significance. This may reflect differences in drug–sex interactions between southern and northern Europe, or other factors. In any case, it is reassuring that the potential adverse effect observed in a small subgroup of women does not appear to be consistent when all trials are analyzed together."

Dr. Fuster noted: "We have long studied sex differences in cardiovascular disease. We already knew that disease presents differently in women and men, and this study significantly advances our understanding by showing that responses to medication are not necessarily the same. This work should help drive the much-needed sex-specific approach to cardiovascular disease."

According to Rosselló, these findings reinforce the need for increasingly individualized therapeutic decisions: "It is not enough to know that a patient has had a heart attack; we must understand their biological and clinical profile—and now also their sex—to optimize treatment."

Changing a clinical guideline is arguably one of the greatest achievements in medical research. It means that the evidence is so robust that it compels us to rethink how we treat millions of patients

Dr. Ibáñez emphasized that the CNIC is committed to studying sex differences in the patterns of cardiovascular disease and treatment responses.

From evidence to clinical guidelines

The impact of REBOOT is already being felt. CNIC-led studies have been cited as key references in the development of new European clinical practice guidelines—a decisive step in translating trial results into real-world changes in patient care.

"Changing a clinical guideline is probably one of the greatest achievements in medical research," said Fuster. "It means the evidence is so strong that it forces us to rethink how we treat millions of patients."

From evidence to clinical guidelines

Beyond beta-blockers, REBOOT symbolizes a deeper transformation for the CNIC, acting as a catalyst for clinical trials that challenge dogma and redefine standards of care. A model of translational research that connects the laboratory, the hospital, and clinical guidelines.

"REBOOT represents a turning point," concluded Rosselló, "not only in how we treat myocardial infarction, but in how we view the contribution of Spanish clinical research."

In a healthcare landscape that increasingly demands decisions grounded in robust evidence, the REBOOT trial confirms that the cardiology of the future is already being written—and that the CNIC occupies a central place in that story.

As Dr. Fuster summarized, "This study joins other landmark trials coordinated by the CNIC—such as PESA, SECURE, and DapaTAVI—that are reshaping clinical practice worldwide."

Today, the CNIC stands among the research centers with the greatest global influence on the diagnosis and treatment of cardiovascular disease. ■

"Understanding the Neurovascular Network to Prevent Dementia": why understanding the neurovascular network matters for dementia prevention

Dementia has become one of the most pressing public-health challenges of the 21st century. As populations age and effective curative treatments remain elusive, prevention is emerging as the most promising strategy. Against this backdrop, the international symposium **Understanding the Neurovascular Network to Prevent Dementia,** organized by the CNIC and Fundación Ramón Areces, focused attention on a factor that has long been underestimated: the neurovascular network. This complex system—integrating blood vessels, neurons, and the brain's protective and clearance mechanisms—is now recognized as central to preserving cognitive function.

The meeting was coordinated by CNIC General Director Valentín Fuster; Costantino Iadecola, Director of the Feil Family Brain and Mind Research Institute at Weill Cornell Medicine (New York); Marta Cortés-Canteli, from the Cajal Center for Neuroscience (CSIC); and María Ángeles Moro, Coordinator of the CNIC Program on Cardiovascular Risk Factors and Brain Health.

Growing evidence links cognitive decline and dementia closely to cardiovascular health. As Fuster emphasized during the symposium, "Cardiovascular diseases are now recognized as the underlying cause of a wide range of cognitive syndromes, defined as vascular cognitive impairment and dementia."

The neurovascular network is key to dementia prevention and closely linked to cardiovascular health

A substantial body of research also indicates that cardiovascular and metabolic risk factors—hypertension, diabetes, obesity, and atherosclerosis—contribute to other forms of dementia, particularly Alzheimer's disease. "These factors can interact over many years during preclinical stages, long before symptoms appear," Fuster explained, underscoring the urgency of understanding these mechanisms in order to develop effective preventive strategies.

A network essential for cognitive function

The human brain contains nearly 700 kilometers of blood vessels, responsible for supplying oxygen and nutrients to an organ that accounts for just 2% of body weight yet consumes around 20% of the body's oxygen. "This alone highlights the critical importance of the cerebral vasculature," noted Moro.

Neurons, astrocytes, microglia, endothelial cells, pericytes, and smooth-muscle cells together form an integrated signaling network that precisely coordinates vascular activity with neuronal excitability, synaptic plasticity, immune responses, and cerebral clearance mechanisms. "This complex interplay must be understood both in health and in disease, because it is essential for brain function and cognition," she added.

Cerebral vessels: active players, not bystanders

Key advances presented at the symposium addressed cerebral small-vessel disease, capillary dysfunction, and their contribution to

brain aging and dementia. For Cortés-Canteli, cerebral vessels are "not mere bystanders" but "active partners in neuronal signalling, metabolism, immunity, and waste clearance."

She also highlighted growing evidence for

the close interdependence of immunity and hemostasis. "When this delicate balance is disrupted, the microcirculation is compromised, cerebral blood flow decreases, and processes are triggered that can ultimately lead to dementia," Moro explained.

Iadecola recalled that until relatively recently, the vascular component was barely considered in diseases such as Alzheimer's. "If a patient had suffered a stroke, an Alzheimer's diagnosis was often ruled out automatically. That created a misleading perception," he said. It is now well established that mixed dementia—arising from the combination of vascular pathology and neurodegeneration—is the most common form of cognitive impairment.

Cortés-Canteli further stressed that cardiovascular health is a fundamental element in Alzheimer's pathogenesis, reframing the disease as systemic rather than purely neurological. "The prevalence of Alzheimer's triples among individuals with atherosclerosis, and increasing atheromatous plaque burden is associated with reduced cerebral metabolism and higher levels of blood markers of neuronal death," she noted.

Proper brain vascular function is essential for maintaining cognitive performance

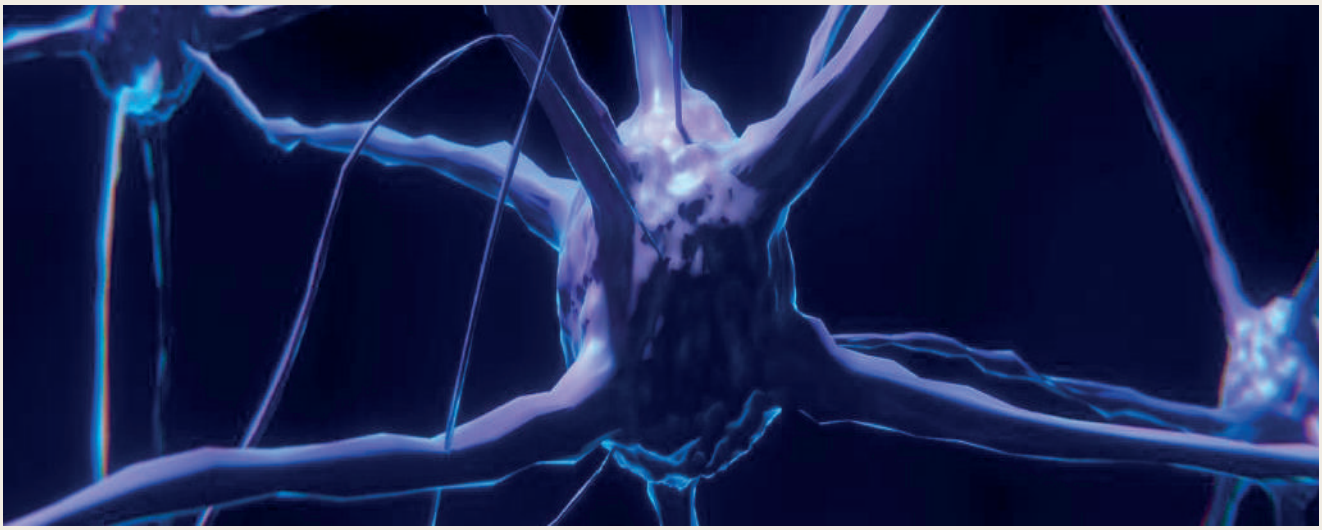
The symposium brought together leading international experts who addressed the problem from a multidisciplinary perspective. Among them, Andy Shih (Seattle Children's Research Institute – University of Washington) presented advances in optical imaging to study neurovascular function and the blood–brain barrier; Susanne van Veluw (University of Edinburgh) analyzed the relationship between small-vessel disease and dementia; and Joanna Wardlaw, a global leader in neuroimaging, shared her work on brain aging, stroke, and vascular dementia.

Towards meaningful dementia prevention

The message emerging from the meeting was unequivocal: understanding the neurovascular network is essential for preventing dementia. Integrating vascular biology with neuroscience will make it possible to identify early biomarkers, intervene on modifiable risk factors, and delay—or even prevent—the onset of cognitive decline.

Controlling risk factors like hypertension and obesity may help prevent dementia

In Fuster's words, "If we want to curb the dementia epidemic, we must start long before symptoms appear—by looking after the heart to protect the brain." ■



PlacHeart: an international network to understand how the placenta influences the cardiovascular health of mothers and children

The placenta is a vital organ during pregnancy, essential for fetal development and for adapting the mother's body to the demands of gestation. The role of the placenta extends beyond nourishing the fetus, and its activity has profound impacts on maternal and fetal and infant cardiovascular health during and after pregnancy.

The PlacHeart network is dedicated to unravelling the molecular and cellular mechanisms that link the placenta to the cardiovascular health of mothers and children.

"Failure of placental function can give rise to severe complications, such as cardiovascular disease in the mother and congenital heart defects in the baby. While there is evidence linking these conditions to placental dysfunction, the specific causes remain poorly understood and are often overlooked in clinical practice," explained Dr. José Luis de la Pompa, a researcher at the CNIC and at CIBER CV, whose group is participating in the project "The Placenta in Maternal and Fetal Cardiovascular Health and Disease," funded by the Leducq Foundation.

"This project focuses on the origins of heart defects and heart disease, particularly how these may begin during pregnancy, rather than later in life as traditionally believed. Although heart disease often manifests in people later in life, we're asking whether its roots can be traced back to early development in the womb. This is a relatively new concept, as it is assumed that heart defects originate in the heart itself, not in a distant organ such as the placenta," said **Dr. Ananth Karumanchi of Cedars-Sinai Medical Center (USA), who is coordinating the project alongside Dr. Didier Stainier at the Max Planck Institute for Heart and Lung Research (Germany).**

Dr. Karumanchi added that half a dozen genes involved in the so-called 'placenta-heart axis' have already been identified, whose alteration in the placenta can cause heart defects in the foetus. In addition, certain signalling pathways, such as the insulin-like growth factor pathway, have been found to be essential for maternal cardiovascular health. In pregnancies with pre-eclampsia, a molecule appears to block this pathway, which could explain the long-term vascular damage in affected women.

"We are studying how a diseased placenta can secrete factors that damage the mother's blood vessels, contributing to problems such as premature heart attacks, strokes, or vascular dementia. This could represent a new independent risk factor for heart disease in women, even greater than smoking in some cases," added Karumanchi. "One of the most important clinical takeaways is that every physician should ask women about their pregnancy history as part of their annual exam? Did the patient experience specific complications like preeclampsia or growth restriction? Was the baby born small? These can be strong predictors of future cardiovascular issues and should be treated as seriously as traditional risk factors like cholesterol or blood pressure."

De la Pompa concluded that "the ultimate goal is to improve the prevention and treatment of cardiovascular disease associated with placental dysfunction, improving the health of mothers and children worldwide." ■

CNIC coordinates Cure Heart & Brain, a COFUND program of excellence in cardiovascular and brain research

Cure Heart & Brain is a COFUND postdoctoral program coordinated by the CNIC, aimed at outstanding researchers of any nationality with an interest in studying the heart, the brain, and the connection between them—areas of major medical and social relevance.

The program promotes research excellence with a strong translational focus, supported by the participation of 24 partner institutions and companies from different countries and sectors. These partners provide opportunities for advanced training, collaboration, and research stays. The project has an overall duration of five years, during which three-year postdoctoral contracts are offered.

The selection and recruitment process was conducted in accordance with the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, ensuring a merit-based, independent, and transparent procedure. A total of 67 applications were received and evaluated exclusively on the basis of scientific excellence by external experts who are members of the CNIC External Scientific Advisory Committee.

The program has enabled the recruitment of 12 international postdoctoral researchers (6 women and 6 men) from countries including the Czech Republic, France, Germany, Italy, Portugal, the Netherlands, the United Kingdom, China, Cuba, Japan, and South Korea.

The program offers a comprehensive and structured training plan, designed to develop both advanced scientific competencies and key transferable skills. This plan will include specialized training in translational cardiovascular and neurovascular research, as well as in innovation, entrepreneurship, results valorization, and collaboration with the non-academic sector. In addition, open science practices, responsible research data management according to the FAIR principles (Findable, Accessible, Interoperable, and Reusable), and public engagement and science communication will be actively promoted.

The program promotes excellent research with a clear translational focus, thanks to the participation of 24 partner organizations and companies from different countries and sectors

Fellows will acquire and consolidate new skills through advanced training, specialized workshops, practical activities, and experiences in international, interdisciplinary, and intersectoral mobility, which will strengthen their professional profiles and employability both within and outside academia.

Cure Heart & Brain brings together 24 associated partners from different countries and sectors, 12 of which belong to the non-academic sector (including industry, SMEs, clinical entities, and third-sector organizations). These partners will provide a clear translational dimension to the program by offering secondments or service commissions (21 partners), contributing to specialized training activities (18 partners), and actively participating in the candidate evaluation and selection processes (17 partners).

Moreover, partners will participate in the individualized co-supervision of the fellows, ensuring a multidisciplinary and intersectoral approach in the development of research projects and in the professional guidance of the researchers.

CNIC group leaders will serve as the primary supervisors of the fellows. These are researchers with extensive experience in leading competitive international projects, doctoral and postdoctoral training, and scientific leadership in their respective fields.

Each fellow will also have at least one co-supervisor from an associated partner institution, ensuring joint, complementary supervision aligned with the scientific and professional development objectives of the program. The supervision model will include regular monitoring, personalized career development plans, and continuous assessment of scientific and training progress.

The overall objective of the program is to enhance the creative, innovative, and translational potential of a new generation of researchers in the cardiovascular and neurovascular fields, strengthening their capacity to generate excellent knowledge with clinical and social impact.

Cure Heart & Brain will contribute to increasing the visibility of research outcomes among the public through communication, dissemination, and public engagement activities. Structurally, the program will facilitate the attraction and retention of international talent in Europe, reinforce European human capital in biomedical research, and promote knowledge transfer across sectors and countries, fostering the global circulation of talent. ■

Director of the Laboratory of Epidemiology and Health Services Research at the Institute of Clinical Physiology of the National Research Council (IFC-CNR)

Sabrina Molinaro: "THE BEST CHOICES FOR PUBLIC HEALTH AREN'T ALWAYS IMPLEMENTED IMMEDIATELY"

Sabrina Molinaro, Psy.D., M.S., Ph.D., is the Director of the Laboratory of Epidemiology and Health Services Research at the Institute of Clinical Physiology of the National Research Council (IFC-CNR), Italy. She leads a multidisciplinary team investigating population health, risk behaviours, and health system innovation. With over 50 coordinated research projects and more than 170 scientific publications, her work bridges epidemiology, data science, and economics to inform evidence-based public health policy. Since 2016, she has coordinated the European School Survey Project on Alcohol and Other Drugs (ESPAD), involving 49 European countries in collaboration with the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). Her current research focuses on modeling disease trajectories, integrating AI into precision medicine, and developing econometric tools to evaluate health policies.

Your research emphasizes integrating diverse disciplines—from psychology and epidemiology to data science and economics. How do you manage interdisciplinary collaboration within your research group to ensure coherent and productive outcomes?

The National Research Council is a governmental organization—it's not like a university, because we don't teach; we do research full time. When I started, my first degree was in psychology. I'm not a practicing psychologist now, but I think that foundation is very important. It trained me to look at human behavior and context, even though I realized early on that I wasn't so interested in individual therapy. I tried it when I was young, but after a few cases, I understood that what fascinated me was not the individual story but the larger design—the behavior of populations.

That curiosity led me to statistics, then epidemiology and public health. I became interested in prevention—understanding not only what goes wrong in individuals, but why certain patterns repeat across communities. My doctoral work was on youth and drug use, and that opened many doors—PhD, postdoc, grants—and, in a way, shaped the trajectory of my career. But I never wanted to stay limited to one topic. Substance use is important, of course, but it's only one of many risk factors that influence young people's development. I wanted to look more broadly at health and society.

When I joined the Institute of Clinical Physiology in Pisa, which is similar to CNIC in Spain, my research expanded further. The Institute began as a cardiovascular research center with a small hospital attached. Our director at the time, Dr. Luigi Donato, was a visionary—he started, back in 1997, to collect data on every patient coming to the hospital. Over time, this became a massive database: clinical records, analytical results, imaging data—a kind of early biobank. He also built a data warehouse centered on the patient.

When I joined as an epidemiologist, my role was to make all

this information usable for clinicians. That was the second chapter of my career: developing systems that integrate clinical, social, and behavioral data, allowing us to look at health in a 360-degree way. But soon, we realized that clinical data alone wasn't enough. To really understand people, we need to know about their environment, lifestyle, job, and social context. So, we started to collect survey data on these aspects—what we now call a kind of "statistical twin" of each person.

Today, we talk about digital or artificial twins in health research, but the idea came from this: to build a model that can predict health outcomes by combining biological, behavioral, and social data. Because people's behaviors—often those associated with "fun," like alcohol, tobacco, or gambling—are also risk behaviors. Understanding these patterns is key to prevention.

So, in terms of interdisciplinary collaboration, this is exactly what I do: bring together people from very different backgrounds—psychologists, clinicians, data scientists, economists—and find the common language between them. I often say I'm not an expert at anything, but I can talk with everyone. I'm not a cardiologist, not a psychologist, not a statistician, but I can help them build a model together. That's what matters, connecting their expertise to understand the whole picture.

How useful is all this information for public health?

It's fundamental. The challenge, however, is when you work with governments. I often work with various ministries and with the central government and my role is to provide a clear understanding of what is true, what benefits public health, and what doesn't. But then politics inevitably comes into play, and with it come many other competing interests. So, the best choices for public health aren't always implemented immediately. That's where public health research plays a crucial role: it pushes in the right direction.

For example, in Italy right now, there's a major debate around electronic cigarettes. Among adolescents—students aged 15 to 19—we've seen a significant decline in traditional cigarette use since around 2007. Although there was a slight increase after the COVID pandemic, especially within family groups, the overall trend was downward.

To truly understand people, we need to know their environment, lifestyle, work, and social context

That's similar to what we've seen in Spain.

Yes, but what's concerning is that the use of electronic cigarettes and heat-not-burn products has skyrocketed since COVID. As a result, the overall prevalence of nicotine use—both traditional and electronic—has returned to levels we saw 20 years ago. That means we've essentially lost two decades of prevention efforts. We spent years educating young people that smoking is harmful, and now they're turning to these new devices, whose long-term health effects we still don't fully understand.

This mirrors what happened in the mid-20th century, when traditional smoking became widespread. We're facing a similar uncertainty now. What we do know is that nicotine is addictive, and tobacco is unquestionably harmful. These new products contain both, and we don't yet know the full consequences.

Another concern is that many young people start with electronic cigarettes and eventually transition to traditional ones. And we're having this debate without a clear public health stance against electronic cigarettes. Taxation on these products is still very low, even though their retail price is similar to traditional cigarettes. That means the tobacco industry profits significantly more from these newer products.

People's behaviors, often associated with "fun," such as alcohol, tobacco, or gambling, are also risk behaviors

We're actually going to the European Parliament to advocate for increased taxation on electronic cigarettes. I'm not saying it's the perfect solution, but it's a step that acknowledges the potential harm. If we do nothing and remain passive, we're essentially saying, "Yes, it's a problem, but it's also a source of income."

Just like traditional tobacco; it's a revenue stream for governments.

Exactly. And the same goes for gambling. In Italy, gambling generates around €156 billion annually. About 10% of that—roughly €15 billion—goes to the government through taxes. It's a massive amount of money. We know gambling can be addictive, and while the government does allocate some resources to address gambling-related disorders, it's like a spoonful of water in the sea—far from sufficient.

Back to tobacco use among youth: I'm not sure about the regulations in Italy, but in Spain, electronic devices are treated similarly to traditional tobacco. In the UK, however, the National Health Service actually recommends electronic cigarettes as a tool to help people quit smoking. I've had interesting discussions with colleagues from the UK about this. If we know these devices are harmful, why are they being recommended?

So, it seems to be a scientific and medical debate, with no universal consensus.

I completely understand. My response to those who advocate for harm reduction is this: if someone is a heavy smoker—say, 20 traditional cigarettes a day—then switching to electronic or heat-not-burn products might be a reasonable step. It's not ideal, but it's better than continuing with traditional cigarettes. That's harm reduction.

But that's a very different scenario from young people who are just starting to smoke. They're not switching from 20 cigarettes a day, they're starting with electronic devices and then moving on to other substances. And when we talk about flavored electronic cigarettes—papaya, mango, milk and mint—what are we really talking about? Have you ever met a heavy smoker who smokes milk and mint-flavored cigarettes?

It's not reasonable. It's not about quitting—it's about marketing to young people. And that's a serious public health concern.

You also study social phenomena like Hikikomori—social withdrawal among young people. How does that fit into your research?

Yes, the Hikikomori phenomenon started in Japan in the 1990s, and I remember reading about it as a student, thinking, "This could never happen in Italy." But now, our national student survey shows that around 2–4% of Italian students exhibit similar behaviors—severe social withdrawal.

I often say that I'm not an expert in anything, but that I can talk with everyone. I'm not a cardiologist, a psychologist, or a statistician, but I can help them build a model together

These young people spend most of their time isolated in their rooms—sleeping, eating, studying, and gaming alone. Parents often don't realize it's a problem, because they think their child is "safe" at home, away from external dangers. But over time, isolation becomes total, and it's very hard to reverse.

Part of the issue is societal: today's young people live under high pressure, constantly controlled, and often find more comfort in the virtual world than in real social interactions. Over time, even those virtual connections fade, and they withdraw completely. This is not just a youth issue—it's a reflection of the society we're building.

If you had unlimited time and funding, what would you most like to study in the future?

I would like to develop models to monitor how our society is changing, using what we call the exposome approach. The exposome integrates all kinds of influences on health: behaviors, environmental exposures, genetics, and clinical data. My dream is to create a comprehensive model for prevention—one that helps us anticipate future risks before they become widespread.

I want to contribute to building a future in which people live long, healthy, and active lives, where they are a resource rather than a burden

Because we know populations are aging. That's good, but only if people age in good health. If we become a society of fragile, chronically ill elderly people, that's a challenge for everyone. So, I want to contribute to building a future where people live long, healthy, and active lives—where they are a resource, not a burden.

It may sound idealistic, but that's my motivation: to help people stay healthy through better understanding, better data, and better prevention. ■

The Gulbenkian Institute for Molecular Medicine in Lisbon

Edgar Gomes: "I DO WHAT I LOVE AND WOULDN'T CHANGE IT FOR ANYTHING"

Dr. Edgar Gomes is a cell biologist whose work explores how the internal architecture of cells shapes their function, focusing on the organization and positioning of organelles, especially nuclei, in muscle cells. Currently based at the Gulbenkian Institute for Molecular Medicine in Lisbon, Dr. Gomes leads a research group studying how the spatial arrangement inside cells affects muscle development, performance, and disease. His discoveries have helped reveal that the position of the nucleus is not just a structural feature, but a key determinant of muscle function.

Why is understanding the architecture of cells, how organelles are positioned or connected—so important for biology and medicine?

It's very important because all these organelles within cells are responsible for different functions and activities. To understand how a cell works, you need to know how its organelles communicate and interact. Many diseases arise from miscommunication even within a single cell. Not all diseases, of course, but many dysfunctions have roots in this. So, understanding this communication has a big impact on our knowledge of disorders and diseases—and that really fascinates me.

What makes skeletal muscle a fascinating model for studying cell organization?

What first drew me to skeletal muscle was my interest in where the nucleus is located inside a cell. Most cells have a single nucleus, and I started by studying this in fibroblasts. But muscle cells can have up to 600 or even 800 nuclei—so for someone studying nuclear positioning, it's a paradise.

It's also known that the position of nuclei in muscle cells is associated with muscle disorders. In fact, as early as the 1960s, when the first muscle biopsies were done for diagnostics, one of the key parameters was where the nuclei were located. That was part of how muscle disorders were defined, even though at the time it wasn't clear whether it was a cause or a consequence. So skeletal muscle turns out to be the perfect system to study where nuclei are and what they do.

How can studying cell architecture help us understand or treat muscle diseases?

I define cell architecture as how different organelles communicate and interact within the cell. Of course, the nucleus—the biggest organelle—is the one I've been most interested in, but all the internal scaffolding is crucial. Skeletal and cardiac muscles are particularly fascinating because they have this contractile machinery that constantly changes the cell's shape and size to create force. That makes them perfect for studying how internal organization supports function. During my postdoc, I studied how fibroblasts polarize during migration—how they know where to go. We discovered that the nucleus moves to the back of the cell when it starts migrating. That observation led me to study nuclear positioning more deeply, and skeletal muscle became the ideal system for it.

What do you see as the biggest challenge in this field today?

I'd say one major breakthrough—rather than a challenge—was when our group, together with another team working in Drosophila, provided the strongest evidence that nuclear position is important for muscle function. That was a key finding. The challenge had been to prove that the position really matters, and we managed to do that.

Technology has advanced rapidly in recent years. How has this changed the way you do research?

It changes everything. Sydney Brenner said, "Progress in science

depends on new techniques, new discoveries and new ideas, probably in that order." He was a Nobel laureate who discovered the genetic code, and he understood that technology drives research. If you look back, that's always true. Progress comes not only from scientists creating new tools, but also from researchers adopting technologies from other fields and applying them in new ways. There are countless examples of that.

Your work involves many international collaborators. How do these partnerships shape your research?

A lot. One of the most beautiful things in science is interacting with people. Those interactions fuel discoveries and ideas. Talking to other scientists—sometimes even a short conversation after a seminar—can completely change your perspective. Many of my ideas were shaped by such exchanges.

People might wonder why you chose to continue your research in Portugal instead of moving elsewhere, like the United States.

Actually, nobody has ever asked me that! I started my lab in Paris, but I'm Portuguese, and now that I'm back in Portugal, things are going very well. I'm happy here. Of course, it's also nice to be close to home and to have a local impact through the training and mentoring I do. Culturally, I love Portugal, and I'm glad my kids are growing up here. I've lived five years in New York, five in Paris, and now ten in Portugal. Everywhere I've lived, I've met people from all over the world. There's definitely a difference between northern and southern Europe, but also a shared European culture.

Spain, Portugal, Italy, Greece, we have a lot in common. Sometimes it's even funny how similar things are; walking around a Spanish city, I often feel like I'm back home. Of course, not everything is perfect, like cars parked on sidewalks, but the atmosphere feels familiar. One thing I appreciate about southern Europe is the balance between rules and empathy. We like to solve problems pragmatically. That practicality, I think, is a strength.

Do you think this southern European culture influences the way you do science?

Absolutely. For example, southern Europeans are often very creative and resourceful; we find ways to solve problems. Americans, in contrast, tend to be extremely hardworking and persistent, sometimes achieving results by brute force. Northern Europeans, on the other hand, tend to be more rigorous and structured. In southern Europe, sometimes we lack that same level of rigor, which isn't ideal. I often remind my students that precision and discipline in writing and experimenting are essential. These are stereotypes, of course, but there's some truth to them.

One of the most beautiful things about science is interacting with people. Those interactions fuel discoveries and ideas

You mentioned your students. Do they work differently from how you did in the past?

Yes, very differently. Today, the output per hour is much higher thanks to new technologies. But the expectations are also much higher. Papers now require far more data than they did 30 years ago. We also tend to compare today's students with how we remember ourselves, but that's not always fair. Some of my students are more hardworking or more talented than I was at their age. Work–life balance is another difference. We often say it's a new issue, but I think it's part of a natural evolution. My parents used to work on Saturdays, it was normal then. Now it isn't. Society has evolved, and that's a good thing. People today can live decently without working extremely long hours, so why shouldn't they? Every generation thinks the next one has it easier. That's just part of getting older.

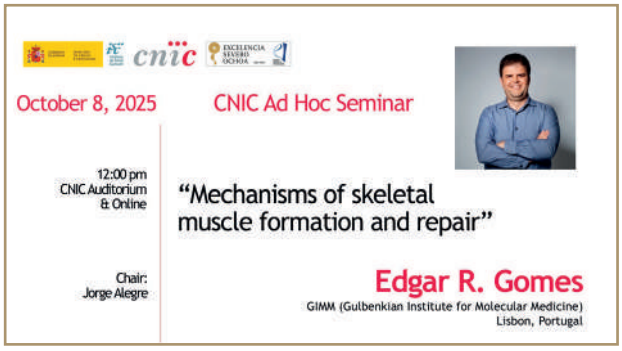
How difficult is it to learn to be the leader of a team?

The most important thing is choosing the right people. That's not easy, and sometimes I think it's a lot of serendipity. The right match between person and project makes all the difference.

If you had unlimited time and resources, what kind of research would you do?

Honestly, I'd do exactly what I'm doing now. I'm very happy with my work. One thing I love is that my research depends on the people in my lab. I might have many ideas, but if I don't have the right person for a particular project, it won't happen. I don't assign projects just to fill slots; I match them to people's interests and strengths. So, my research evolves with the people around me. Some ideas take five, ten years to become reality. Others never happen. But that's fine. It's part of the process. I'm doing what I love, and I wouldn't change it for anything. ■

One thing I appreciate about southern Europe is the balance between rules and empathy. We like to solve problems pragmatically. That practicality, I believe, is a strength



Assistant Professor of Pediatrics and Genetics at Stanford University School of Medicine and Akiko Yamazaki and Jerry Yang Faculty Scholar in Pediatric Translational Medicine at the Stanford Maternal & Child Health Research Institute

Dr. Casey Gifford: "WE ARE ALL SUPPOSED TO HAVE OUR GENOME SEQUENCED'

The laboratory of Casey Gifford, Assistant Professor of Pediatrics and Genetics at Stanford University School of Medicine and Akiko Yamazaki and Jerry Yang Faculty Scholar in Pediatric Translational Medicine Stanford Maternal & Child Health Research Institute, studies how coordination between multiple cell types guides the early development of the heart, one of the first organs to form. Disruptions in this process can lead to congenital heart disease (CHD). Gifford seeks to identify the genetic and molecular mechanisms that govern this development and how their disruption leads to disease, with the goal of advancing personalized medicine for patients with CHD and comorbidities such as autism. Her team uses cardiac organoids to model the interaction between cell types, investigates the genetic relationship between cardiac and brain development, and uses large-scale CRISPR screening to discover genetic interactions that influence complex heart defects. These strategies reveal both overlooked monogenic causes and combinations of variants that together contribute to severe cardiac malformations.

Your laboratory is integrating artificial intelligence (AI) and stem cells to identify the genetic causes of congenital heart disease

So the first hurdle we have to overcome for understanding the genetics is we actually have to understand all the places in the genome that are used during heart development. And that is really hard to do using traditional statistics and computational approaches. And so we have turned to using AI to disentangle all the complicated changes that are happening in the gene regulatory landscape during differentiation. Because AI models, and in particular these deep learning models, they can sift through all this data and pull out patterns a lot better than some of the more traditional approaches to understanding this data.

Have you designed any specific AI tool to do that?

No, so I am not a computer scientist by training. I am not a clinician. But my research is focused all on the heart. I'm not a tool developer. Some people love developing tools, whether they're computational or experimental. I'm much more of a question person with my question being, why does this child have congenital heart disease. But I love taking advantage of the tools that other people make. And so I teamed up with a computer scientist who developed this AI model called ChromeBPNet, which is able to learn regions of the genome that are important for gene regulation. He developed the computational model and then I developed and adapted a stem cell model and then we worked together on it collaboratively to try and use the ability of AI to sift through all these patterns much more quickly and efficiently than we would have been able to do otherwise. We can actually learn how the differentiation of all these cells is working and then why it's going wrong in development in the context of congenital heart disease.

Do you have any results with this model?

We've uncovered a number of non-coding regulatory regions of the genome that we believe are important for development using this AI model for development in general, for the heart. And that's important because if you then want to look in the non-coding region of the genome for mutations that cause disease, this AI model, integrated with our stem cell model, helps narrow your search space. It's like shining a flashlight on the area where you should look for mutations when

you're trying to understand disease. We have a few examples of that where we have identified regions that this model predicts are important, and then we've found mutations in patients in those regions that the model has said are important. That's important because it's, again, helping us uncover the genetic causes of this disease, for which we have very few. And that's really the first step to developing therapeutics because there's no therapeutic options for these kids.

And with this approach, can you prevent or diagnose these diseases before the disease has developed?

That would be one goal. And usually when I tell people I want to prevent it before it develops, they kind of laugh at me because they're like, well, the heart develops before a woman knows she's pregnant. And so from that perspective, it sounds like it would be really hard to prevent these defects. Because that's when the heart develops and that's when we think disease starts, it is really in the first month of pregnancy or gestation. But I think we can prevent it based on this idea that some of the genetic causes of congenital heart disease are inherited from healthy parents. I think that if we sequenced a healthy person's genome and we said, aha, you have this mutation that isn't sufficient for disease on its own, that's why you're healthy. But if it's inherited by a child or a baby that has other mutations, then there's a high likelihood there'll be disease. And that comes, so I guess to work my way backwards, we think that congenital heart defects are caused by a combination of mutations. Some of them are inherited from healthy parents. Some happen de novo during development. And so at least if we could identify those that are inherited from a healthy person, we could develop therapeutics that mitigate whatever that mutation does.

And when a woman, if we sequence your genome and we say, when you're ready to have kids, you have a higher risk of having a kid with this disease, the way we already do this, we do this for a number of different mutations, cystic fibrosis, Tay-Sachs, people get sequenced and you're told you're at high risk. There's no therapeutics in those cases either to prevent, except IVF. So you can screen embryos that way. But in our case, I think that we could develop a therapeutic that a woman could take prophylactically while she's trying to get pregnant. And so this approach would only work in a planned pregnancy setting, but I think we could develop a therapeutic a woman could take, and it would rescue whatever mutation puts her at high risk, and then we could prevent at least serious disease. Some people think that's crazy, but we already do that. Because when women want to have children, they're told to take a vitamin with folic acid. And that extra folic acid helps us avoid spinal defects. It's the same idea. There's no harm in having too much folic acid. So that shows that if we, but we just, we don't know what the folic acid is for congenital heart disease. If we did, I think that's proof that we could find a way to mitigate it. So that's our goal, is if we understand the genetics, especially this inherited component, then we could develop therapeutics for women to use when they're trying to get pregnant. And we would at least be able to say, you're at high risk of having a child with a congenital heart disease, whereas other people are at lower risk. It all starts with just understanding the regions of the genome that are important for the heart to develop. We can't do any of this if we don't actually pinpoint all the places in the genome. And that's where this model, this AI model comes in. Because we can't search the genome very efficiently using traditional approaches. We have to be able to use these higher throughput complex systems.

> It's like shining a flashlight on the area where mutations should be searched for when trying to understand a disease

> Our idea is that congenital heart defects are caused by a combination of mutations

But you must do this genetic test for all mothers before they have children.

Yes.

So that's... I think that's unusual.

Maybe or maybe not. I mean, I think everyone, most people are having their genome sequenced now at some point during care. I guess in the United States at least.

I think it will be commonplace everywhere in the not too distant future. It assumes we're all going to have our sequence, our genome sequenced, and we're going to know that there are certain genes or regions of the genome that put you at high risk. And if you have them, the other way to think about it is, which makes it a little more economic, is that there are a couple of pathways that are really critical for heart development. And congenital heart disease probably arises from perturbations to these few pathways. The genes and the mutations that cause those perturbations all converge on the same pathways. But the genes and the mutations themselves can be different, but they're all affecting the same pathways. They're converging on one spot. I think if we knew that one spot, that one convergence, we can also target that therapeutically. Then we don't need to worry about the specific mutation in all these different individuals. We can kind of group them into pathways, even, like all these individuals that have mutations that affect this pathway, this convergence point can take this one therapeutic. Whereas this other group can take this other one. So that's my life goal. I'm sure it'll take my entire career.

What kind of therapy are you thinking of? Gene therapy?

No, because this would be in zygotes, and so I think gene therapy would be hard. I mean, although IVF will probably always be an option, in which case then gene therapy would work. And then it wouldn't have to be a prophylactic thing. Then if you spontaneously or randomly become pregnant unplanned, then it would still be applicable. But I think that there's a lot of different ways to deliver biomolecules to the baby. Although I think that's still something that's being worked out. If you're trying to treat a baby in utero, what's the most effective delivery vehicle? Lipid nanoparticles, some sort of biocapsid. I don't think that's clear yet. So for us, I have to wait for those tool developers. There's a bunch of people developing those tools. And then once they develop those tools, I will have an answer for congenital heart disease, and then I would love to work with them on that.

You also studied the relation between cardiovascular disease, heart disease, and brain disease.

If you're diagnosed with congenital heart disease, there's a very high likelihood you'll be diagnosed with neurodevelopmental delay. And that's like congenital heart disease, which is an umbrella term for a lot of different defects, neurodevelopmental delay is an umbrella term for defects or phenotypes like autism and ADHD, and now includes Asperger's, and also a broad spectrum, which is speech delay. Lots of different phenotypes fall under the umbrella. And for a long time, people thought that these diagnoses in kids with congenital heart disease were secondary. So the first reason could be that kids with severe disease spend the first few years of their life in a hospital. And so they just don't have the socialization. And some people thought that was the problem. Another hypothesis was that if you have a heart defect, in utero or postnatally your heart's not working effectively, maybe the brain's not getting enough oxygen. So the neurodevelopmental delay could be secondary to the heart defect. But a couple of years ago, groups identified genes and mutations in kids with congenital heart disease that were previously associated with neurodevelopmental delay. Those kids had neurodevelopmental delay and no congenital heart disease. That suggests a shared genetic cause between congenital heart disease and neurodevelopmental delay. One goal in my lab is to define when there's a genetic cause, so we can do better risk assessment. This is meaningful because early intervention is really helpful. If we can sequence a baby's genome at birth and find mutations affecting both heart and brain, we can get help early.

If you are diagnosed with a congenital heart disease, there is a high probability that you will also be diagnosed with a delay in neurological development

I'm not sure if it's appropriate to ask about U.S. funding at the moment.

The NIH isn't issuing any new grants at the moment. No new funding is being provided, in part because the government is shut down. If you already have a funded grant, you can continue spending that money, but no new funds are being distributed. What's most frustrating is that the federal government and the current administration keep coming up with these radical ideas to "reform" NIH or government funding — ideas that are supposedly meant to improve scientific rigor but really make no sense and don't benefit scientists. Often it feels like it's driven by greed: the money isn't meant for supporting science, but for other purposes. I will admit, the NIH RO1 review system in particular does tend to favor incremental science, and I agree that some change is needed. We need more support for high-risk, high-reward research. I also agree that reproducibility is an issue in some areas of science. But the solution isn't to slash funding or suddenly cut paylines from 18% to 2%. That would just drive talented scientists out of the system. Similarly, making H-1B visas prohibitively expensive undermines our ability to recruit top international talent, which is exactly how U.S. science has become so strong and successful, by attracting brilliant minds from around the world. Reducing funding or access to talent is not the answer, and it's incredibly frustrating to see these obstacles placed in the way of scientific progress.

Do you think this situation could have any impact on scientific progress in the US.

Absolutely, absolutely. One example is with postdocs who come to the U.S. Many start on a J-1 visa and eventually plan to transition to an H-1B. Now, we're being told that postdocs who have already been in the U.S. for two or three years — who have moved from around the world and invested time in their projects, their teams, and their careers — would face a $100,000 cost to obtain this visa. They simply don't have that kind of money. These postdocs are fully invested in their work, but now they may have to leave. No institution has the resources to cover everyone in this situation. This isn't just unfortunate; it's devastating for them. They would have to start over elsewhere, losing continuity in their research and potentially derailing their careers. It's not only a loss of potential new talent, it's also the loss of the talent that has already committed to the U.S. scientific system. This is going to have a negative impact on everyone: the individuals, the labs, and ultimately the scientific progress in the country. ■

It's not only about the loss of potential new talent, but also the loss of talent that has already committed to the U.S. scientific system

Professor of Biochemistry at Padua University Medical School

Luca Scorrano: "MY FASCINATION WITH MITOCHONDRIA HAS BEEN LIKE A FIRST LOVE"

Luca Scorrano, M.D., Ph.D., is a Professor of Biochemistry at Padua University Medical School (Italy) whose work explores how mitochondrial structure dictates cellular function. His laboratory pioneered the discovery of cristae remodeling and mitochondrial dynamics, identified the MFN2/Ermit tether between ER and mitochondria, and revealed how mitochondrial shape controls processes from apoptosis and stem cell differentiation to heart development, progesterone synthesis, and defense against infection. Scorrano's research has uncovered mechanisms behind optic atrophy, angiogenesis, adipocyte browning, and mitochondrial disorders, and his findings have led to potential targeted therapies. He has authored 231 papers, is a Clarivate Highly Cited Researcher (2021, 2022, 2024), EMBO member (2012), and Academia Europaea member (2019).

You trained as an MD. Have you ever practiced clinically?

I completed all the clinical requirements, and I'm still registered as an MD in Italy, so technically I could practice. But it's better for patients that I don't.

So, you didn't enjoy practicing medicine?

Not exactly. That's why I love mitochondria. I found basic science far more intellectually stimulating. At the University of Padua, where I did my MD, there's a long tradition in mitochondrial research, so joining a mitochondrial lab felt natural.

How did you start working with mitochondria?

I initially started in a molecular oncology lab, but I didn't find it very interesting. While still a medical student, I began visiting Paolo Bernardi's lab, who later became my PhD mentor. After completing my MD and clinical rotations, I joined the PhD program under his supervision in the Department of Biomedical Sciences. That's when I started doing hardcore basic science—bioenergetics, studying how mitochondria convert energy from food and regulate ion fluxes across the inner mitochondrial membrane.

What fascinated you most about mitochondria?

During my PhD, I became fascinated by the role of mitochondria in programmed cell death—a field that was very prominent in the late 1990s. It was astonishing to see that this tiny cellular organelle, essential for converting food into usable energy, is also central to apoptosis, or cellular suicide. In other words, mitochondria are a double-edged sword: indispensable for life, yet equally essential for death.

In 1996, Xiaodong Wang made a remarkable discovery: a component of the same machinery used for ATP production—oxidative phosphorylation—also initiates apoptosis. This was a striking example of how nature repurposes the same system for multiple functions. Inspired by this, I went to

Harvard Medical School to join Stan Korsmeyer's lab, where I studied how mitochondria change shape during these processes. Korsmeyer, a founding father of apoptosis research, had discovered most of the genetic regulators of cell death.

How has your understanding of mitochondria evolved over the years?

Over the years, I've seen mitochondria evolve in our understanding—from "ATP factories" to central regulators of inflammation, cellular recycling, stem cell maintenance, metabolism, and many other cellular processes. The cardiovascular system is no exception: mitochondria are critical not only for producing the ATP needed for heart contraction, but also for vascular regulation, smooth muscle contraction, stem cell differentiation into cardiomyocytes, and angiogenesis. In my view, changes in mitochondrial shape are just as important as their bioenergetic functions.

My fascination with mitochondria has been like a "first love"—initially sparked by their role in energy metabolism, then deepened by their central role in regulating fundamental cellular processes. Over time, my research has expanded to include communication between mitochondria and other organelles. But, as with a first love, you never forget it—and I haven't.

How do mitochondria evolve and maintain these functions?

This is a fascinating concept. Mitochondria are descendants of archaeobacteria that invaded primordial cells. It's a bit more complicated than that, but essentially, this parasitic relationship became mutually beneficial. Mitochondria could harness metabolites from the host cell, and their ATP production was far more efficient than glycolysis alone.

However, there was a challenge: these bacteria had their own replication machinery, which involved both fusion and division. Over evolutionary time, the host cell gained control by losing the bacterial genes responsible for division and instead using proteins—already employed to regulate other membrane systems—to control mitochondrial shape and behavior. This makes perfect evolutionary sense: the invading organelle provided a benefit but also posed a threat, which the host mitigated by integrating mitochondrial regulation into existing cellular signaling pathways.

During my PhD, I became fascinated by the role of mitochondria in programmed cell death, a field that was very prominent in the late 1990s

This control is precise: the cell can direct mitochondria to specific locations, coordinate their division with the cell cycle, and manage asymmetric partitioning during division. But mitochondria are not passive—they can "take revenge." If the cell damages their membranes, mitochondria release proteins that trigger cell death. If both inner and outer membranes are compromised, they release mitochondrial DNA, which the cell interprets as a viral infection, triggering inflammation.

Thus, control comes with a price. The organelle contains "venoms" that can harm the cell or organism if mismanaged. It's a truly stimulating example of symbiosis: mitochondria are domesticated yet retain the capacity to defend themselves. During intracellular infections, mitochondria dynamically change shape to control invaders, serving as the first line of defense, while pathogens can manipulate them to escape at the right moment.

Studying mitochondrial morphology reveals the heart of this evolutionary battle between host and parasite. Perhaps the host has "won," but only partially—evolution is never final. There is no ultimate victory, only ongoing adaptation.

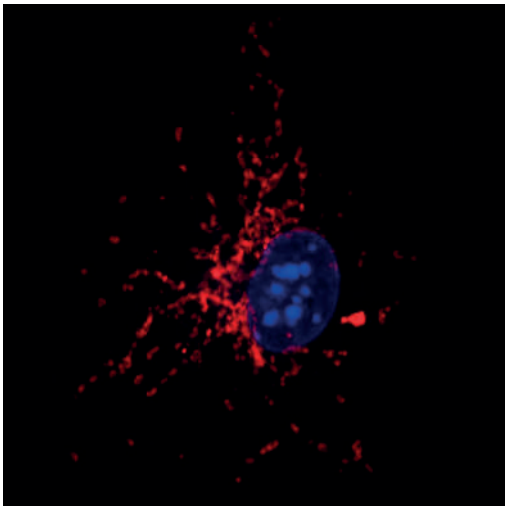
You mentioned that mitochondrial shape and dynamics are involved not only in the cardiovascular system but also in cancer, infection, and pregnancy.

Yes, it's a complex topic. For example, during pregnancy, one critical moment occurs around the third month, when the site of hormone production needs to shift. Remarkably, all cholesterol-derived hormones—testosterone, progesterone, and estrogen—pass through intermediates produced in mitochondria. This means mitochondria are essential for sexual reproduction: without the right mitochondrial enzymes or the proper cholesterol supply at the correct time, sex hormone production would fail.

In mammals and birds, mitochondrial regulation

of hormone synthesis is crucial for species conservation. At the level of the placenta's syncytiotrophoblast, changes in mitochondrial shape ensure cholesterol delivery is precise, supporting progesterone production and maintaining pregnancy. Human pregnancy is intrinsically inefficient: only about 30% of unprotected intercourse at peak fertility results in a child, and most miscarriages occur around this critical third-month switch—exactly when mitochondrial shape changes are most important.

Problems with mitochondrial dynamics have also been linked to preeclampsia and eclampsia, which are major causes of maternal morbidity and mortality. While the exact mechanisms are not fully understood, these examples highlight how central mitochondria are across multiple biological processes.



Unfortunately, research into mitochondrial roles in pregnancy has lagged behind cardiovascular research, partly because it has been historically considered a "women's issue." Cardiovascular diseases, which primarily affect men in later life, have been studied more extensively. Nevertheless, we now know that mitochondrial shape and dynamics are critical for cardioprotection, determining the extent of damage during ischemia-reperfusion, remodeling the heart in cardiomyopathy, and supporting angiogenesis.

From an evolutionary perspective, mitochondria are descendants of archaebacteria that invaded primordial cells

Mitochondrial diseases are among the most prevalent genetic disorders

How does this knowledge help in understanding mitochondrial diseases?

Mitochondrial diseases are among the most prevalent genetic disorders. Although they have diverse genetic causes, they often affect the same cellular pathways—similar to how different types of cancer impact common mechanisms yet have unique features. We are only now beginning to understand in depth how mitochondria function and what goes wrong with these disorders.

Research is challenging because there are relatively few patients, making clinical trials difficult, and funding is limited, so most work falls on academic laboratories. Despite these obstacles, we have a responsibility to improve patients' lives. Currently, treatment is mostly supportive, which is frustrating, but I believe that in the next 10–15 years, breakthroughs will provide therapies that substantially improve quality of life.

Much like cancer, each mitochondrial disorder may require tailored therapies. To achieve this, we must first understand the fundamental principles of mitochondrial function and dysfunction. Our goal is not only to extend life but also to ensure patients can live with dignity. I remain closely connected with many mitochondrial disease patients and the associations that support them, which continually reinforces the urgency and importance of this work. ■

Antony N. Brady Professor of Comparative Medicine, Professor of Pathology, and Director of the Vascular Biology and Therapeutics Program at Yale University

Carlos Fernández-Hernández: "EXCELLENCE COMES FROM GENUINE INTERACTION BETWEEN BASIC AND CLINICAL RESEARCH"

Dr. Carlos Fernández-Hernández studied Biochemistry and Molecular Biology at the Universidad Autónoma de Madrid. He studied for his PhD between 1999 and 2004 under Professor Miguel Ángel Lasunción at Hospital Ramón y Cajal (Madrid), subsequently moving to Yale University for postdoctoral training with Professor William Sessa. Carlos later established his own laboratory in the Department of Medicine at New York University. Today, he is the Antony N. Brady Professor of Comparative Medicine, Professor of Pathology, and Director of the Vascular Biology and Therapeutics Program at Yale University.

What is the current focus of your research?

My lab studies lipid metabolism. We've identified a new class of glycerophospholipids—called plasmalogens—that play an important role in macrophage pro-inflammatory activity and in regulating both vascular wall inflammation and the morphology of atherosclerotic lesions. When these phospholipids are dysregulated, lesions become more severe. And when we manage to control them, we can slow lesion progression.

How do you identify them?

We performed a screening to find genes that are modulated in macrophages when they are loaded with cholesterol. Using this approach, we identified a new family of enzymes that regulate plasmalogen metabolism and the formation of pro-inflammatory intermediates called lysoplasmalogens. We saw that these lipids accumulate in the necrotic core of atherosclerotic lesions and are associated with a more pronounced inflammatory phenotype in arteries.

Plasmalogens are synthesized through an enzymatic pathway that begins in the peroxisome and is then remodeled in the plasma membrane via the Lands cycle, which regulates lysoplasmalogen formation. To manipulate this pathway, we can inhibit the phospholipases that generate these intermediates or attempt to regulate the enzyme that degrades them. When this enzyme is missing, lysoplasmalogens accumulate, and the severity of inflammation and atherosclerosis increases.

How did you enter this field? Was it an interest from your university days?

My parents are physicians, so I was always interested in biomedicine, and I studied Biochemistry with the idea of going into research. I started at Hospital Ramón y Cajal working on lipid metabolism, mainly cholesterol. And since high cholesterol is a cardiovascular risk factor, when I moved to the U.S. twenty years ago, I decided to dig deeper into how alterations in lipid metabolism contribute to cardiovascular disease.

My lab has made important discoveries: we were the first to identify the role of small nucleolar RNAs in lipid homeostasis; we discovered a microRNA, miR-33, that regulates cholesterol flux and reverse transport, and we showed that suppression of miR-33 attenuates lesion progression. Later, we expanded our research to the liver (fatty liver and cirrhosis), the brain (Alzheimer's), and now also the heart, using models of heart failure with preserved ejection fraction.

Your research is very translational.

Yes. Research at my center is evenly divided between physician-scientists and basic researchers. Collaboration is essential. Clinicians understand the disease, and basic scientists understand the underlying biological mechanisms. Our research is highly translational, like here at the CNIC. The key is genuine interaction, not just coexistence. It's not enough to put clinicians and basic scientists in the same building; you need to create an environment where they truly want to work together. At Yale, for example, many pilot projects require a clinical PI and a basic PI, and that requirement creates the conditions for genuine interaction.

When you set up your lab, did you already have this philosophy?

My PhD thesis was full-on basic research, all in cell lines. Then, when I went to the U.S., my goal was to study how alterations in lipid metabolism were linked to cardiovascular disease. My postdoctoral training at Yale was where I really learned vascular biology—atherosclerosis models, angiogenesis, tumor angiogenesis, and so on.

That training gave me a dual perspective: I come from a very basic-research background, but I learned the molecular mechanisms of cardiovascular disease. And for the past 20 years, we've combined basic studies with translational research and human samples.

At Yale, I collaborate with cardiologists and vascular surgeons. Our starting point is often alterations observed in patients, which we then take to animal models to investigate the molecular mechanism. This is what's called bench-to-bedside—or bedside-to-bench—research.

Excellence comes from the interaction between basic and clinical research. There must be respect and collaboration. Some centers house both but lack the microenvironment needed for interaction. In our center, that interaction happens organically, and I think this is the case here too.

You've been at Yale for 20 years. How has this collaborative culture evolved?

This has always been my approach, perhaps for family reasons. I understand both the basic researcher who wants to do only basic science and the clinician who wants to do only clinical work. Discoveries can come from either side.

> Excellence comes from the interaction between basic and clinical research. There must be respect and collaboration

> Many centers fail because they put people together but do not create the mechanisms that facilitate interaction. The interaction must be real, not superficial

But if you want real commitment between the two groups, you need excellent people on both sides and you need to actively promote collaboration. At Yale, for example, we have pilot projects where it's mandatory to have both a clinical PI and a basic science PI. Many centers fail because they put people together but don't create mechanisms to facilitate interaction. Interaction must be real, not superficial.

There also has to be a collaborative environment; if this is lacking, you need to rethink the ecosystem.

Valentín Fuster brought this same vision of collaboration to the CNIC. Valentín is a physician-scientist and has always had a deep respect for basic research. He's been a crucial figure for biomedicine in Spain. And I'm confident that bringing in more clinicians will not come at the expense of basic research excellence; indeed, this combination has been key to the center's success.

In the United States, the MD–PhD pathway is very clearly defined: medical training is followed by a PhD and then postdoctoral training. That model could be developed further here. Research-active cardiologists in the United States can spend many years in training—including medical school, a fellowship, a PhD, and postdoctoral training—and their training pathways formally allocate protected time for research. This is very different from the typical career path in Spain.

When you recruit for your group, do you take all this into account?

I've never put much weight on labels like PhD, MD, or MD–PhD. What really counts is whether someone is genuinely interested in science. Everything else can be learned.

This science vocation is not easy to detect in an interview, because interviews are rehearsed. What I usually do is ask candidates to read a few papers and then discuss them with me. I'm not especially concerned with whether the questions they ask are good or bad; instead, what I'm looking for is genuine interest and scientific curiosity.

Academic degrees don't define anything. What defines someone is their motivation: whether they want to do science, whether they're curious, whether they ask questions, whether they want to be in the lab not out of obligation but because they want to discover things.

I also don't think a researcher is defined by publishing 200 or 300 papers. Take Elaine

Raines, for example. She never earned a PhD, yet her work with Russell Ross revolutionized the field of atherosclerosis, and she was involved in fundamental discoveries about the pathophysiology of the disease. Today, the American Heart Association honors her legacy through its Young Investigator Award.

But in Spain, formal qualifications do matter for career progression, don't they?

Unfortunately, yes.

Some more examples: Joe Goldstein and Mike Brown won the Nobel Prize for discovering the low-density lipoprotein receptor. The key papers were published in *The Journal of Biological Chemistry*, not in *Nature* or *Science*. Napoleone Ferrara's discovery of VEGF was published in Biochemical and Biophysical Research Communications. And just this year, Shimon Sakaguchi won the Nobel Prize for the discovery of regulatory T cells, which play a fundamental role in autoimmune diseases, cancer, and many other conditions. The paper reporting that finding was published in *the Journal of Immunology* in 1995.

Today, scientific evaluation relies far too heavily on impact factors and percentiles, when it should instead be based on scientific content. You can have 300 publications, including two Nature papers, but if you can't explain why your research matters in one minute, then perhaps it doesn't.

Our evaluation criteria are too rigid, and we fail to assess real scientific contribution. I recognize that we need defined metrics, but the ones we use today are not the right ones. And often this comes down to external pressure: "Why did you choose this person and not another one who has ten more papers?" That kind of pressure creates barriers that prevent genuine discussion of the science.

Your lab has federal funding. Have the current cuts affected you?

No. Ongoing grants already have their funds transferred. The real issue is the current budget freeze: Republicans and Democrats have not yet reached an agreement.

Many newly submitted grants are not being reviewed—neither approved nor rejected—so there will inevitably be delays. I was fortunate to have my grants awarded just before the change in government. This is not the first time this has happened, but the duration is unusual. We've already been in this situation for five weeks. It looks as though it may be resolved soon, but no one really knows.

> I have never believed in labels: PhD, MD, MD–PhD... What matters is that the person has a genuine interest in science

When politics becomes polarized, situations like this arise. Personally, I believe virtue lies in the middle ground. I believe in moderation. There has to be accountability—if a party is corrupt or consistently makes poor decisions, change is necessary.

Sometimes decisions do not benefit everyone, and that creates frustration. You see that here and elsewhere. But failing to make decisions is even worse: it generates conflict on both sides.

My final question: there seems to be a growing disregard for science, both in the United States and here—denialism, vaccines, and so on. Is that something you perceive?

Science has always been under pressure. The environment has been difficult since the 2008 financial crisis. Funding success rates are now below 10%. If you're a denialist, you shouldn't go into science. When funding is tight, you have to look for alternatives—collaborations with industry, program projects, new funding pathways. Dwelling on the negative doesn't help.

> You can have 300 papers and two in Nature, but if you can't explain why your research is important in one minute, maybe it isn't

Young researchers are the most vulnerable. If they begin their careers under pressure to publish five papers, they lose sight of what really matters. When you work under pressure, you don't try to refute your hypothesis; you try to confirm it with two experiments. The best researchers work to falsify their hypotheses.

That pressure also leads people not to repeat experiments and not to seek reproducibility. This is why so much biomedical data is irreproducible. Salvador Moncada once told me: if a result is important, it has to be reproduced by different hands and using different approaches. That mindset is being lost today because of the pressure researchers are under. We need to evaluate scientists on the basis of their scientific contribution, not impact factor. ■

Head of the Radiology Department at Hospital de Sant Pau

Josep Munuera: "UNDERSTANDING EVOLUTION HELPS US UNDERSTAND TODAY'S DISEASES"

Josep Munuera, Head of the Radiology Department at Hospital de Sant Pau, is a radiologist specialized in neuroradiology—specifically cerebral vascular imaging—and principal investigator in one of the PESA Brain projects. He is also the principal investigator of a Plan Nacional project that uses advanced MRI to quantify cerebral vascular parameters.

What is the goal of this research?

Essentially, the aim is to extract quantitative data from cerebral blood vessels using flow sequences, magnetic susceptibility, and vascular anatomy, in order to measure vascular characteristics that until now could only be assessed visually—or were simply impossible for the human eye to analyze.

Quantification allows us to obtain numerical data on blood vessels: number, shape, size, diameter, number of branches, flow, velocity, tortuosity, and so on. For example, tortuosity [the degree to which blood vessels deviate from a straight path] is associated with certain cerebral vascular diseases and also with normal brain aging. Until now, all of this was evaluated visually, with limited precision. The trend is to extract these parameters mathematically, so that we can generate comparable metrics and better understand what is happening across different diseases.

Until recently, neurology and cardiology were considered divergent fields.

And yet, once you understand how a vascular system behaves, it is relatively easy to understand the relationship between different systems. We need to stop thinking of the brain as an isolated system. Blood vessels do not "end" at each anatomical region—the vascular system is a single, continuous network. That is why it should not surprise us that having arterial or venous disorders in the limbs may be associated with an earlier onset of neurodegenerative disease. We need more integrated perspectives.

Has this new paradigm been fully adopted, or does it still need consolidation?

I think it will take a few more generations for this truly transversal vision to be fully established. It has begun in the basic sciences and in research, and is being adopted more slowly by the medical specialties. In hospitals, traditional structures still weigh heavily—departments, professional silos. The key to breaking down these barriers will probably be functional units—multidisciplinary teams working together.

At the CNIC, more and more groups are moving in this direction. More generally, we perhaps still need to convince some clinicians of the relationship between vascular disease and dementia.

Can you give an example?

I'll tell you an anecdote. In 2005, I was working at Vall d'Hebron Hospital performing MRI scans on patients with acute cerebral infarction. Next to me was a cardiac imaging radiologist. I wanted to quickly classify the type of stroke; he said, "It would be useful to know whether it's of cardioembolic origin." So we added a "black blood" sequence to obtain a two-chamber image of the heart and see whether there were thrombi in the atrium or atrial appendages. It was very early-stage work, but it already represented a natural integration that allowed us to reach a complete diagnosis in under 15 minutes.

That kind of approach—together with the combined use of

imaging data, other omics, and computation—has encouraged a convergence of specialties that previously worked separately or in parallel.

Or perhaps they are actually the same disease.

We need to explore the origin of diseases from all perspectives. If you treat one aspect without treating the other, you are not really treating the patient. We have to look at the whole person.

You have that perspective because you work with images and don't have a clinical bias.

It's not about bias, but with experience you develop what I would call an 'agnostic' approach. In my training, we were taught to look at the image first, almost de novo, without additional information. Only afterwards did we add the clinical layer, to make sense of the finding and correlate it with the patient's situation. That way of working has stayed with me: looking at the image without preconceptions allows you to generate new hypotheses.

Looking at the image without biases allows the generation of new hypotheses

And this has coincided with the boom in imaging techniques.

Yes, and in that respect I consider myself privileged. I've lived through the explosion of advanced imaging, including MRI, CT, PET, and ultrasound. Over the past decade, MRI has become a key tool for understanding anatomical, physiological, and pathological processes—and even aspects of human evolution. And now, with the rise of computation and artificial intelligence, the analytical scope of advanced imaging techniques is expanding even further.

It's impossible not to talk about AI.

For me, the key is being able to compute data—ever larger volumes of it—much more quickly. Processing information used to take months; now that time is dramatically reduced, allowing us to devote more time to interpreting relationships between results.

In imaging fields (radiology, pathology, and others), computer vision also allows us to extract information that humans simply cannot interpret—for example, the tortuosity of microvessels measuring 1–3 mm. This was unthinkable twenty years ago.

A few weeks ago, new studies from the BRAIN project were published.

I think BRAIN represented three fundamental things. First, something basic but at the same time revolutionary: collaboration. Building a shared project to collect and share data. That changed the paradigm in many centers.

Second, it coincided with the emergence of advanced MRI, and this allowed us to understand the brain as a fully connected system—the connectome.

PESA Brain enables the study of the evolution of a healthy population: normal anatomical variations, their distribution, and how they relate to eurodegenerative changes and cardiovascular factors

And third, it broke down barriers between fields: anatomy, physiology, psychiatry, and technology. That model has since been replicated in different ways, for example in PESA Brain. PESA Brain allows us to study the evolution of a healthy population: normal anatomical variations, their distribution, and how they relate to neurodegenerative changes and cardiovascular risk factors.

Let's return to AI. How do you think it will change research?

I see three major areas. First, operations: coding, billing, data transfer, and database cleaning. This might sound like a minor issue, but it will free up an enormous amount of professionals' time.

Second, data extraction and model generation. We are facing a tsunami of data that we are currently unable to exploit. AI facilitates data analysis, the identification of relationships, and the grouping of profiles. It also allows us to extract information from examinations performed for other purposes. For example, a CT scan done to study lung metastases also contains information about a patient's metabolic state, coronary arteries, muscle mass, and fat distribution. And in turn, we can relate metabolic status to cancer progression.

Finally, new AI models: synthetic data that will allow us to expand knowledge and databases where data are insufficient. Another emerging field will be hypothesis-driven AI—not only analyzing data, but generating new hypotheses. I'm very curious to see where this takes us.

And what does evolution have to do with all this?

As a radiologist, my field of knowledge is anatomy—but in digital form. And you cannot understand anatomy without understanding human evolution. The evolution of the skull or of blood vessels can explain why we develop certain diseases.

For example, the size and shape of deep cerebral veins in neonates are related to hemorrhage risk; variants of the cerebral arterial circle are associated with the size of certain infarcts; and the size of venous foramina in the skull influences intracranial pressure and, secondarily, tau protein accumulation, by altering venous and glymphatic drainage. The size of these foramina is directly related to human bipedalism. Understanding evolution helps us understand today's diseases.

The evolution of the skull or blood vessels can explain why we have certain diseases

So understanding our ancestors helps us understand modern disease?

Exactly. The evolution of hominids can explain certain types of disease. ■

Department of Public and Occupational Health and the Amsterdam Public Health Research Institute at Amsterdam UMC, the Netherlands

Dra. Femke van Nassau: "WE KNOW THAT EVERY MOVEMENT COUNTS-EVERY STEP COUNTS"

Dr. Femke van Nassau is an implementation scientist at the Department of Public and Occupational Health and the Amsterdam Public Health Research Institute at Amsterdam UMC. Since completing her PhD in 2015, she has focused on bridging the gap between science, practice, and policy. She leads a research group, has published over 80 peer-reviewed articles and two book chapters, and has secured more than €3 million in competitive research funding. Her work centers on three pillars: implementation science, including scaling up interventions, understanding implementation mechanisms, testing strategies, and conducting process evaluations; developing, implementing, and evaluating lifestyle interventions in schools, communities, workplaces, football clubs, and hospitals; and measuring physical activity in national and international projects. She founded the Amsterdam Center for Implementation Science (AmsCIS) and co-founded the Netherlands Implementation Collaborative (NIC) and the Sport and Exercise Implementation Network (SPIN). She also serves as an advisor to researchers seeking to strengthen the implementation components of their projects. As an educator and mentor, she has supervised more than 60 Bachelor's and Master's students and currently supervises 10 PhD candidates. Through her combined leadership, research, and education efforts, she is advancing the field of implementation science and training the next generation of professionals.

What exactly is physical activity, and how much physical activity is recommended?

Physical activity is any form of movement you do; it could be walking, exercising, or even gardening. Being busy with your body and making sure you're active, that's physical activity. We look at different contexts of activities: how you're active at work, at home, or maybe how you commute. I remember collaborating on the PEASA-TANSNIP Project here at CNIC in Madrid, and I had a bike, so I would cycle to CNIC. And yes, that's also a form of activity. It depends on the person, whether you are really active or less active. The World Health Organization (WHO) has guidelines that say you need to be active for at least 150 minutes per week, which translates to about 21 minutes a day. That could be moderate to vigorous activity. It's not really slow walking, but something a bit more intense. However, we see that many people do not meet those recommendations. We use cars, we sit in offices, and we take the elevator instead of the stairs. So, there are a lot of programs or initiatives being organized to make people more active and to help as many people as possible meet the physical activity guidelines.

You mentioned things that you can do every day without any effort — like taking the stairs, walking on the street, or riding a bicycle. But when people think about physical activity, they usually think about something you have to do in a sports center or gym. So how can these programs convince people that there are other ways to improve their health without going to a gym?

I think the WHO framed it in their guidelines: 150 minutes of moderate to vigorous activity. But now they also say every movement counts, every step counts. That's changed over the years. We know that people who are not active, if they move just a little bit more, have the most health gain. People who are already active and become even more active also benefit, but not as much. So, the message now is if you're

not active at all, at least try a little. Try to walk a bit for example.

In our programs or campaigns, we try to make people aware of what physical activity is — that it's not only going to the gym or cycling on the road, but that every form of activity counts. Even dancing, playing with kids, or working in the garden are forms of activity. In lifestyle programs, we often ask people to monitor their behavior at the start — maybe with a questionnaire or an activity tracker — and then we look at what their current level is, what the recommendation is, and what's possible for them to move a bit more toward the recommendation.

For some people, it's going to the gym. For others, it's walking daily with neighbors, playing tennis, or taking the stairs. Some people already have active jobs, so we discuss what's possible in their situation. I think it's important to leave autonomy with people but help them understand where they are now, what the recommendation is, and what small steps they can take.

I don't know if there are any numbers about physical activity in the Netherlands. Do you have any?

In the Netherlands, about half of adults are not meeting the physical activity guidelines. We cycle a lot. But now we have a lot of electric bikes, which also influences things. Still, not everybody cycles. If you live in the city, many people take the metro or subway. If you live outside the city, people often take the car.

So yes, we cycle a lot, but it's still hard for people to meet the recommendations — especially because the guidelines refer to moderate to vigorous activity. If you only take a brief, slow walk, you're not adding many minutes to your weekly total. That's why the WHO changed its approach to "every movement counts." Even small increases in movement improve your health, but it takes time to reach the full physical activity guidelines.

We use the car, sit in offices, and take the elevator instead of the stairs

How do you measure people's physical activity? You mentioned trackers and devices.

There's a difference between people monitoring their own behavior and researchers measuring it. For personal monitoring, activity trackers — even simple ones — can give step counts, which is good feedback. For research, we use validated questionnaires asking people about their average day: how much they walk, how much vigorous activity they do, etc. Or we use devices.

For example, in one study, we used a device people stick on their leg for a week. It records all movements and accelerations, and later we analyzed the data to see if their activity changed after participating in an intervention. We know that questionnaires tend to overestimate how much people exercise and underestimate how much they sit. Devices give a more accurate estimate — but they're more expensive and sometimes intrusive, so not every study can use them.

What kind of program works best? Should we have personalized programs in the future; one program for each person?

We've developed many programs - in communities, sports clubs, hospitals, schools, and workplaces. I think each program should include key ingredients for behavior change. That means monitoring your behavior, comparing it to the guidelines, setting a goal, working toward that goal, and reflecting on your progress. That's essential.

If new behaviors do not become habits, it is difficult to maintain them once the program ends

This can also be done in group programs. For example, we had a successful project in professional football clubs: a group-based program. Everyone looked at their data, discussed it, and set personal goals. Coaches

were trained to give individual support. Another project is PESA-TANSIP here in Madrid; we offered office workers one-on-one coaching with psychologists using motivational interviewing. It worked very well, people loved it. But when the coaching stopped, many returned to their old habits. That's the challenge with all lifestyle interventions: if new behaviors don't become habits, it's hard to maintain them after the program ends.

What is the best age to promote physical activity?

I think it's important to promote amongst all ages, but with different focuses. For preschoolers (ages 0–4), it's about developing motor skills and involving parents to create awareness. In schools, it's important to include sport activities, develop motor skills, and help kids try different sports so they can find what they like. Not everyone loves football or hockey, some might enjoy something else. It's also about experiencing the fun of being active.

Teenagers are different. They want to make their own decisions. When they move from primary to secondary school, a lot changes, and many stop doing sports. So that's another key moment. Then as adults, when you start a family or get older, priorities shift, staying active helps maintain health and energy. Across the lifespan, promoting physical activity is always important, but the focus and motivation change depending on age and context.

Maybe the problem isn't just governmental, it's educational. How can we change that? What kind of program could help?

There are different opportunities: personal, social, and governmental. Family and friends play a role-model function, but so does the environment. Governments can help make environments more inviting and active by making the active option the easy, default choice. We've moved from focusing only on individual behavior change to considering the whole context, including the "obesogenic" environment.

In the end, we need all three levels: individual interventions, social support, and environmental or policy changes. It's a long process. Not all political parties prioritize prevention, but sometimes companies or communities take initiative. For example, in the Netherlands, some companies fund playgrounds in low-income neighborhoods, providing free activities for kids and training local youth as role models.

Still, it's challenging. We often have evidence-based interventions that work, but they're not implemented in practice. What works in the Netherlands might not work in Spain without adaptation. Even within Spain, what works in Madrid might not work in Huesca. Part of our research now focuses on implementation; how to make sure what works in theory is actually used in real life.

What works in the Netherlands may not work in Spain without adaptation, and what works in Madrid may not work in Huesca

One of the challenges you mentioned is that programs have a beginning and an end. So the problem continues after the program. Have you found any solution to that?

It's not cost-effective to keep running programs forever. So we usually work with participants toward the end of the program to think ahead: What will you do after this? Sometimes the group continues on their own. Others find new options like joining a gym or a walking group. But we have to make people aware that, for example, a 12-week program is just the start, they need to plan what comes after.

Talking about medical doctors. Can physical activity work like a treatment?

Yes, we've done projects on that, part of the Exercise is Medicine movement. We know exercise works, but when we asked doctors why they don't prescribe it, they said: "I don't have enough knowledge about physical activity. I'm not sure how to talk about it with patients. If someone comes in with an ear problem, it's strange to start talking about exercise." They also said: "If I start that conversation and the patient isn't motivated, I don't know what to do next or what local options exist."

So, we developed the idea of a lifestyle broker in hospitals. When doctors see certain risk factors — smoking, high BMI, etc. — they refer the patient to a lifestyle broker. The broker is trained to motivate people and knows what options are available nearby. That way, the doctor's role is just to identify and refer. It's working well so far, and we're evaluating its cost-effectiveness. It looks promising.

And what about electronic devices? Are they useful for people?

It depends on the person. We had a project where participants received coaching and activity trackers. Some loved the tracker; some didn't like it at all and preferred the personal coaching. Some people used it only at the beginning to understand their behavior and then stopped. Others, like me, enjoy tracking every day. So, we always say behavioral change is like a toolbox. The tracker is one tool, it works for some people, but not for everyone.

For example, personal coaching, setting goals, having supportive people around you, learning what a healthy lifestyle is, and knowing what opportunities exist in your area. We provide different tools, but not every tool works for everyone. Some people only need the tracker; others just need social support. Some buy a dog and walk every day, that's what works for them. So, there's no one-size-fits-all solution. Even in group programs, you can help many people by seeing what tool from the toolbox works best for each.

What should the role of the government to promote or facilitate physical activity?

Governments should know what programs exist, which ones are effective, and promote those. They should raise awareness among citizens and clinicians and also improve the built environment, making active choices easier. There's no single solution. But if policymakers make physical activity a priority, there's a lot of room for improvement and visible progress.

In the Netherlands, depending on the municipality, the government supports low-income families to be more active. But not everyone wants to go to the gym. So, instead of investing only in gyms, it's good to also invest in playgrounds and free community activities for children. People with less money are often in poorer health, so governments should focus support on those groups.

Since most people live in big cities, what's the responsibility of city planners and designers to make physical activity easier?

I think when municipalities build new areas, they should invite physical activity experts to be part of the planning. When I visit places, I always notice if there's a cycle lane or a playground. So it's good to have people with that perspective in the design team. For example, in many buildings like here at the CNIC, it's easy to find the stairs, which encourages use. But in hotels, sometimes you can't find the stairs, you have to ask, and they're hidden behind a dusty door. There are many small opportunities like that to make the active option the easy option. When designing or renovating cities, it's important to include people with that active-living mindset. ■

Governments should know which programs exist, which are effective, and promote them

TWO CNIC PROJECTS SELECTED IN THE LA CAIXA FOUNDATION 2025 HEALTH RESEARCH CALL

Two CNIC projects were selected in the 2025 Health Research Call launched by the la Caixa Foundation.

The selected projects are:

- Anthracycline Legacy in Bone Marrow and Long-Term Cardiovascular Risks in Cancer Survivors, led by Dr. Borja Ibáñez.
- Improving Gene Therapy for Life-Threatening Heart Conditions, led by Dr. Juan Bernal.

In the 2025 edition, the Health Research Call of the la Caixa Foundation selected 34 pioneering biomedical research projects, each awarded up to €1 million. The projects are led by 25 Spanish research centers, universities, and hospitals, and 9 Portuguese institutions.

A total of 714 proposals were submitted to this eighth edition of the call, which focused on several major health challenges: neuroscience, cardiovascular and metabolic diseases, oncology, infectious diseases, and enabling technologies applicable to these areas.

Àngel Font, Deputy General Director of Research and Fellowships at the la Caixa Foundation, remarked: "Biomedical research is one of the most powerful ways to improve people's lives. The 34 funded projects address highly diverse challenges from different perspectives, yet they all share three essential foundations needed to achieve a more hopeful future for patients and their families: collaboration, talent, and innovation." ■

Anthracycline Legacy in Bone Marrow and Long-Term Cardiovascular Risks in Cancer Survivors

- Leader: Borja Ibáñez, Centro Nacional de Investigaciones Cardiovasculares Carlos III (F.S.P.), Spain
- Partner institutions: Centro Nacional de Investigaciones Oncológicas (CNIO) (Dr. Felipe Cortés) and Hospital Universitario La Paz, Madrid (Dr. Teresa López-Fernández).
- Budget: €999,500

Thanks to major advances in cancer treatment, more people are surviving the disease than ever before. However, many survivors face a higher long-term risk of cardiovascular problems—especially if their treatment included a widely used class of chemotherapy drugs called anthracyclines. While the short-term cardiac effects of these drugs are well known, the long-term damage they cause—often silent for decades—remain poorly understood.

This project aims to uncover how anthracyclines leave a hidden "legacy" in the body that can lead to heart failure years after treatment. According to Dr. Ibáñez, researchers believe that anthracyclines induce persistent changes in the heart and bone marrow that remain latent until another stressor, such as aging or high blood pressure, activates them. "Using advanced imaging, genetic analysis, and animal models, we will study how these changes develop over time."

A key focus is the bone marrow, which produces immune cells that influence cardiovascular health. "We will investigate how anthracyclines may reprogram these cells in ways that increase long-term cardiovascular risk, and whether specific genetic mutations make some people more vulnerable to these effects," explained Dr. Ibáñez.

By combining experimental research with studies in cancer survivors, the project aims to identify early markers of risk and develop personalized strategies to prevent heart problems before they arise. Dr. Ibáñez concluded: "This could lead to improved screening tools, new treatments, and a better quality of life for millions of cancer survivors." ■

Improving Gene Therapy for Life-Threatening Heart Conditions

- Leader: Juan Antonio Bernal, Centro Nacional de Investigaciones Cardiovasculares Carlos III (F.S.P.)
- Budget: €498,352

Arrhythmogenic cardiomyopathy (ACM) is a rare inherited heart disease characterized by a high risk of ventricular arrhythmias. Despite its low prevalence in the general population, it is the second most common cause of sudden cardiac death in young people and athletes.

Although the principal gene involved is known, more than 1,000 different mutations have been identified, posing a major challenge for developing effective therapies. Current treatments help control symptoms but do not halt disease progression, underscoring the urgent need for innovative therapeutic approaches.

The "Improving Gene Therapy for Life-Threatening Heart Conditions" project aims to design new gene therapies that overcome the limitations of conventional strategies, which focus solely on adding a functional gene copy. As project leader Dr. Bernal explained, the proposed advanced therapies are aimed at "addressing complex mutations more precisely and effectively."

The team is developing the first experimental model of ACM. "This model will allow us to study the disease in much greater detail and evaluate potential treatments, assessing their ability to reduce symptoms and slow progression," said Dr. Bernal.

These advances, he added, "could transform treatment options for patients with ACM and set an important precedent for precision therapies targeting other inherited cardiac diseases."

By overcoming the inherent limitations of current gene therapy approaches, the project seeks to offer more effective alternatives for high-risk patients, advance the field of cardiovascular gene therapy, and open new horizons of hope for patients and their families. ■

THE CNIC AT THE EUROPEAN SOCIETY OF CARDIOLOGY CONGRESS

The CNIC played a prominent role at the European Society of Cardiology Congress (ESC Congress 2025), held in Madrid. CNIC experts led scientific sessions, presented high-impact studies and consensus documents, and received international recognition, reinforcing the center's position as a leading institution in cardiovascular research and care.

The 2025 congress, held under the theme "Global Health: cardiology without borders", brought together thousands of professionals with the shared aim of addressing global challenges in cardiovascular health and discussing the latest scientific and clinical advances.

Inaugural Lecture by Dr. Valentín Fuster

CNIC General Director Dr. Valentín Fuster was selected by the World Heart Federation (WHF) to deliver the Inaugural Lecture at the WHF World Congress of Cardiology, held within the framework of the ESC Congress. This distinction, awarded by the WHF for the first time, recognizes individuals with exceptional contributions to global cardiovascular health.

Promoting cardiovascular health from childhood through educational programmes that encourage healthy habits from an early age is a key strategy for the global prevention of heart disease

In his address, Dr. Fuster emphasized the importance of promoting cardiovascular health from childhood as a cornerstone of global prevention strategies, highlighting the value of educational programs that encourage healthy habits from an early age.

Broad Scientific Participation

Throughout the congress, CNIC researchers took part in multiple scientific sessions covering topics ranging from disease mechanisms to new diagnostic and therapeutic approaches. These included high-impact presentations on cardiovascular risk, clinical trials, and advances in structural and regenerative cardiology.

Highlights included the REBOOT trial, led by Dr. Ibáñez, which represents a paradigm shift in the use of beta-blockers after myocardial infarction; a study led by Dr. Pablo García-Pavía, published in *The New England Journal of Medicine*, demonstrating the superior performance of a new drug over standard treatment in patients with obstructive hypertrophic cardiomyopathy; and a study led by Dr. Enrique Lara, published in the *European Heart Journal*, which for the first time showed that gene-activation CRISPR technology (CRISPRa) can be used in vivo to treat genetic cardiac diseases.

REACT: precision prevention in action

In parallel, nearly 650 congress participants took advantage of the opportunity to undergo 3D carotid artery ultrasound imaging—an essential tool for the early detection of atherosclerosis—through the REACT project. REACT is an international precision-medicine initiative coordinated by Copenhagen's Rigshospitalet and the CNIC, with the goal of transforming the prevention of atherosclerotic cardiovascular disease.

The main aim of this research activity was to assess the prevalence of silent atherosclerosis among cardiology congress attendees. The initiative is also expected to contribute to greater awareness of early prevention strategies for atherosclerosis-related cardiovascular disease, the underlying biological cause of most deaths worldwide.

Participants were offered a non-invasive 3D vascular ultrasound of the carotid arteries to evaluate the presence of atherosclerotic plaques. This fast procedure (taking less than five minutes to examine both carotids) provides precise and valuable information on the presence or absence of atherosclerosis and plays a central role in the REACT project's strategy to detect silent disease at its earliest stages. As a precision-medicine tool, it delivers highly relevant data to support personalized and early prevention of atherosclerosis.

Thanks to collaboration between Spanish and Danish REACT investigators and the company Philips, images were analyzed in real time using artificial-intelligence-assisted software. Participants received a non-clinical report summarizing the presence and burden of atherosclerosis.

Nearly 650 participants at the Congress took advantage of the opportunity to undergo a 3D ultrasound scan of their carotid arteries, a key method for the early detection of atherosclerosis, thanks to the REACT Project

Joint session with the Spanish Society of Cardiology

The CNIC and the Sociedad Española de Cardiología (SEC) also held a joint session on research, innovation, and methodology within the framework of SEC Congress 25. Moderated by Drs. José M. de la Torre Hernández and Héctor Bueno, the session brought together CNIC researchers to discuss the present and future of cardiovascular research in Spain and to showcase the CNIC's impact on the professional development of its scientists.

ESC Consensus Document on Mental Health and Cardiovascular Disease

Another milestone of the CNIC's presence at the ESC Congress was the presentation of the ESC Clinical Consensus Document on Mental Health and Cardiovascular Disease by Dr. Héctor Bueno, a CNIC investigator and cardiologist at Hospital Universitario 12 de Octubre.

Developed by an international working group, the document calls for the systematic integration of mental health into cardiovascular care. It recommends routine screening for psychological symptoms in patients with cardiovascular disease and the incorporation of psychosocial factors into cardiovascular risk assessment.

The consensus also proposes the creation of Psycho-Cardio Teams, bringing together cardiovascular professionals and mental-health specialists to provide more integrated, person-centered care. This cultural shift could lead to significant improvements in both clinical outcomes and patients' quality of life. ■

THE CNIC HOSTS CARDIOTOX 25, THE LEADING INTERNATIONAL CONGRESS ON CARDIOVASCULAR HEALTH IN CANCER PATIENTS

As in previous editions, the event brought together professionals from multiple disciplines—including oncology, hematology, cardiology, primary care, nursing, and other health fields—with a shared goal: optimizing cardiovascular care throughout the cancer journey. The congress was chaired by cardiologist Dr. Teresa López-Fernández, who also participates in CNIC-coordinated research projects.

The program featured a distinguished panel of national and international experts who addressed the latest advances and practical approaches in cardio-oncology and onco-hematology.

Dr. Borja Ibáñez, CNIC Scientific Director, served on the congress scientific committee. Dr. Ibáñez leads several cardio-oncology projects that will be discussed during the meeting, including RESILIENCE (Remote Ischemic Conditioning in Lymphoma Patients Receiving Anthracyclines), funded by the European Commission, and LURK (Anthracycline Legacy in Bone Marrow and Long-Term Cardiovascular Risks in Cancer Survivors), supported by the Fundación "la Caixa".

During the Cardiotox meeting, the CNIC hosted an information booth at the entrance to Hospital Universitario La Paz to engage with patients and the general public, providing details about the RESILIENCE project and offering tests of blood pressure and cholesterol levels. ■

ISABEL GEMIO FOUNDATION AWARDS €60,000 TO CNIC RESEARCH PROJECT LED BY HENAR CUERVO

The Isabel Gemio Foundation awarded a €60,000 grant to the research project "Identification and Characterization of Key Factors in the Progression of Arteriovenous Malformations," led by Dr. Henar Cuervo of the Molecular Genetics of Angiogenesis Research Group at the CNIC.

Dr. Cuervo's research focuses on understanding how different signaling pathways regulate key cellular behaviors involved in the formation of new blood vessels—knowledge that is essential for tackling complex vascular disorders such as arteriovenous malformations.

"A healthy vascular system requires blood vessels to be properly organized," explained Dr. Cuervo. "Arteries carry blood rapidly away from the heart, but once it reaches the tissues, it must pass through a network of capillaries that distribute oxygen and nutrients to cells."

In arteriovenous malformations (AVMs)—a group of rare diseases—this capillary network is absent, and arteries connect directly to veins. This abnormality leads to uncontrolled blood flow and vessel enlargement, which can cause disfigurement, amputations, hemorrhagic stroke, and even death.

Treatment of AVMs typically relies on invasive surgical procedures that do not always fully eliminate the lesion and often require multiple interventions. Although genetic mutations associated with these malformations have been identified, how they contribute to disease onset and progression remains poorly understood.

"In this project," noted Dr. Cuervo, "we propose a comprehensive study that combines the analysis of genetic mutations and proteins present in patients' blood with experiments in animal and cellular models."

"Our goal," she added, "is to gain a deeper understanding of the mechanisms driving the disease, improve patient classification, and develop safer, more effective, and more personalized treatments."

The project will be carried out in collaboration with researchers at Hospital Universitario La Paz, Hospital Universitario 12 de Octubre, and the National Hospital for Paraplegics of Toledo.

The total funding will be distributed over two annual installments of €30,000. Release of the second installment will be contingent on a favorable evaluation by the Scientific Committee. The project is initially planned for one year, with the possibility of extension to a maximum of two years following a positive annual review.

CARDIOVASCULAR HEALTH WITH A GENDER PERSPECTIVE: EXPERTS FROM 21 EUROPEAN COUNTRIES GATHER IN MADRID FOR THE JACARDI GENERAL ASSEMBLY

The CNIC hosted the Third General Assembly of JACARDI, the major European initiative to improve the prevention and treatment of cardiovascular disease and diabetes, with gender and health equity at the center of the debate.

The Assembly brought together more than 200 representatives from 21 European countries, as well as spokespersons from the European Commission, the WHO Regional Office for Europe, scientific societies, and patient organizations. The meeting program placed gender and equity at the center of the agenda, along with sustainability, data monitoring, and the upcoming EU Cardiovascular Health Plan.

JACARDI is a joint action of the European Union under the EU4Health Programme, which runs from 2023 to 2027. With 81 partner institutions in 21 countries, JACARDI coordinates European efforts to strengthen health literacy, improve early detection, promote integrated and person-centered care, empower patient self-management, and support the workforce participation of people living with noncommunicable diseases.

With equitable access to prevention and quality care as a priority, participants in this assembly reflected on the progress made during the first two years of JACARDI, highlighting lessons learned and obstacles overcome, while improving care pathways in various settings across European health systems.

JACARDI, part of the programme, brings together 81 European institutions to strengthen health literacy, early detection and patient-centred care

"At the heart of JACARDI is the belief that healthcare systems should serve everyone, fairly and equitably. That is why equity and diversity are not secondary issues at JACARDI, but fundamental to everything we do. This General Assembly in Madrid is an opportunity to show that together we can accelerate change towards a more equitable and healthy future," said Dr. Benedetta Armocida, coordinator of JACARDI.

"Women are more likely to die from a heart attack, yet they remain underrepresented in clinical trials, leaving significant gaps in knowledge that perpetuate inequality in healthcare. Recognizing gender differences in cardiovascular disease is not about division, but about improving care to meet each person's unique needs," explained Dr. Héctor Bueno, leader of the JACARDI working group on data availability and quality, coordinator of the clinical hospitalization and research area at the i+12 Research Institute at Hospital 12 de Octubre in Madrid, and leader of a CNIC research group.

The meeting took place at a crucial moment, coinciding with the European Commission's preparation of its Cardiovascular Health Plan. By plugging JACARDI's ideas and pilot experiences into this political momentum, the Assembly aimed to strengthen motivation, collaboration, and collective capacity to reduce the burden of noncommunicable diseases across Europe. ■

KEY BRIEFING ON NEW ERC WORK PROGRAMME DEVELOPMENTS FOR 2026 AND 2027

The CNIC and the Spanish Foundation for Science and Technology (FECYT) organized a key briefing session to clarify the major changes introduced in the European Research Council (ERC) Work Programmes for 2026 and 2027—changes that redefine how scientific projects in Europe will be submitted and evaluated.

The information session, held at the CNIC and co-organized by the CNIC and FECYT, included 11 bilateral meetings and an in-depth analysis of these new developments and their potential to further strengthen scientific excellence.

The event was opened by Vicente Andrés García, Director of Basic Research at the CNIC, and Esther Rodríguez Blanco, Director of International Affairs at FECYT. The programme also featured a presentation by Mercedes García Arenal, a member of the European Research Council (ERC) Scientific Council, who outlined the key elements and innovations of the new funding cycle.

During the session, two CNIC researchers—Almudena Ramiro, Director of the B-Cell Lymphocyte Biology Group and ERC Advanced Grant awardee, and David Sancho, Director of the Immunobiology Group and ERC Grant awardee—emphasized that the ERC not only promotes cutting-edge research but also provides added value even before funding is secured. They stressed that submitting an ERC proposal is a decisive step for any scientist seeking to consolidate an independent research line.

A more strategic two-stage evaluation process

One of the most significant structural changes is the consolidation of a clearer and more strategic two-stage evaluation process. This reform responds to a long-standing request from the research community: to simplify the first stage and avoid an overload of proposals that attempted to demonstrate everything from the outset, often resulting in dense and difficult-to-read submissions.

The new approach allows applicants to present clearer and bolder ideas, with a stronger focus on their scientific contribution.

From 2026 onward, proposal evaluation will be more distinctly divided into two phases. In the first phase, panels will assess only a five-page project summary, the applicant's CV, and their track record. Feasibility will no longer be evaluated at this stage, which will focus exclusively on the boldness, originality, and transformative potential of the scientific idea. The second phase will be reserved for detailed analysis, including methodology, work plan, risks, resources, and team structure.

With this reform, the ERC aims to better distinguish between conceptual excellence and technical excellence, encouraging more ambitious proposals.

Greater flexibility and broader eligibility

The ERC will also expand and make more flexible the grounds for extending the post-PhD eligibility window for Starting and Consolidator Grants. Parental leave and situations involving gender-based violence or other forms of violence are now explicitly recognized as valid reasons for extension.

Speakers also highlighted that applying for an ERC call provides value even without securing funding: it helps strengthen research lines, increases the visibility of each scientific area, and—when proposals reach the second stage—offers highly valuable expert feedback.

Overall, the new features of the 2026–2027 Work Programme reinforce the ERC's core mission to support transformative scientific ideas through rigorous and transparent evaluation processes that reflect the real diversity of research talent in Europe. ■

ALFONSO X EL SABIO UNIVERSITY AND THE CNIC SIGN A FRAMEWORK AGREEMENT TO PROMOTE RESEARCH IN HEALTH SCIENCES AND BIOMEDICINE

Alfonso X el Sabio University (UAX) and the CNIC signed a framework collaboration agreement aimed at establishing the foundations for joint development of advanced research projects, researcher training, and the promotion of scientific initiatives of excellence in the fields of health sciences and biomedicine.

The agreement, which has an initial duration of three years, represents a strategic alliance designed to foster interaction between CNIC and UAX faculty researchers. It will support scientific talent development through curricular and extracurricular internships for undergraduate students, predoctoral contracts, and the participation of CNIC researchers in UAX academic activities.

As part of the celebration of this alliance, Dr. Borja Ibáñez, scientific director of the CNIC, gave a lecture entitled "CNIC: a translational research center," in which he highlighted the importance of collaboration between academic institutions and research centers to accelerate the transfer of scientific knowledge to clinical practice.

In addition to the educational framework agreement, the two institutions signed a specific agreement to launch and fund the UAX–CNIC predoctoral fellowship. UAX doctoral students will be eligible for this unique opportunity to carry out their doctoral theses at the CNIC, reinforcing the shared commitment of both institutions to the training of early-career researchers.

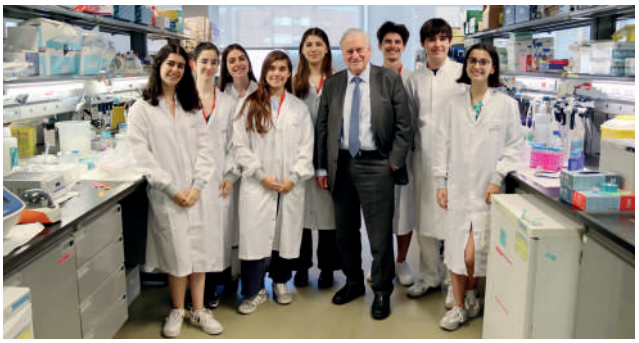
Both institutions guarantee high standards of research excellence. UAX will provide physical space and institutional resources for the development of joint projects, making available biomedical laboratory positions equipped with state-of-the-art research technologies for predoctoral and postdoctoral researchers. In turn, the CNIC will contribute technical supervision and the necessary material resources, as well as oversee the scientific training of the researchers.

According to Dr. Borja Ibáñez, "this agreement strengthens our commitment to training new generations of scientists and to creating a collaborative environment in which biomedical research can advance more rapidly and robustly. Together with UAX, we are taking a decisive step toward promoting high-impact projects and offering young researchers real opportunities for growth within an environment of scientific excellence."

"Collaboration with leading institutions is key to promoting high-level research projects and strengthening our role as an active agent in the generation of science. Together with the CNIC, we seek to advance the construction of a research ecosystem that contributes to medical progress and people's well-being," said Aida Suárez, dean of the Faculty of Biomedical and Health Sciences.

The alliance between UAX and the CNIC marks the starting point of a strategic collaboration that will expand through new shared scientific initiatives and future specific agreements. The goal is to consolidate an ecosystem of excellence in research and training in a field of critical importance to global health, given that cardiovascular diseases remain the leading cause of mortality worldwide. Progress in this area reinforces both institutions' commitment to prevention, medical advancement, and social well-being. ■

ACÉRCATE PROGRAM AND CNIC–EUCYS AWARD 2024



Once again, eight of Spain's top high school students took part in the ACÉRCATE program, organized by the CNIC as part of its CNIC-Joven Training Plan. The aim of this initiative—personally championed by the CNIC's General Director, Dr. Valentín Fuster—is "to attract and train the brightest young minds from the earliest stages, creating a wellspring of excellence in cardiovascular research."

This year's call, open to high school students across Spain, selected six young women and two young men from more than 50 eligible applicants. Participants in this edition came from Asturias, Extremadura, Galicia, the Community of Madrid, Castile and León, the Valencian Community, and Andalusia.

Including the 2025 cohort, a total of 136 students have now participated in the program. In addition to experiencing the day-to-day activity of cutting-edge research at the CNIC, the students shared their experiences and questions not only with CNIC researchers but also directly with Dr. Fuster. Dr. Fuster views the launching of training programs at such early educational stages as essential for attracting future researchers, as young people represent "the future of research in our country."

On this occasion, ACÉRCATE participants also had the opportunity to exchange experiences with Ludmila Kvasnovska, winner of the CNIC–EUCYS Award 2024, linked to the European Union Contest for Young Scientists (EUCYS). This international competition recognizes outstanding scientific projects by young researchers aged 14 to 20. Kvasnovska was selected for her individual biomedical research project entitled "Potential Biomarkers of Age-Related Chronic Inflammation." ■

CNIC & SEC COURSE: "CARDIOVASCULAR PATHOPHYSIOLOGY: FROM SYMPTOMS TO GENES"

The CNIC and the Spanish Society of Cardiology (SEC) have developed a new online course entitled "Cardiovascular Pathophysiology: From Symptoms to Genes." The course is aimed at cardiologists, cardiology residents, physicians specialising in other disciplines related to vascular disease, as well as basic and clinical researchers in the cardiovascular field. Its objective is to bridge the gap between basic and clinical research and everyday medical practice.

The course is directed by Borja Ibáñez Cabeza (CNIC) and Ignacio Fernández Lozano (Puerta de Hierro University Hospital, Madrid) and is included in the SEC Campus catalogue. It will be open from 10 December 2025 to 10 February 2026 and has a total duration of 20 hours.

During this period, participants must complete all modules, self-assessment questionnaires and the satisfaction survey in order to gain access to the final examination. A minimum score of 80% correct answers is required to obtain accreditation.

The programme combines video lectures delivered by practising professionals, supporting materials and a discussion forum where participants can ask questions and share experiences. Once the course has been completed, participants will have unlimited access to the content through the "Supporting Documentation" section.

The course is accredited with 20 CASEC credits awarded by the SEC Accreditation Committee. In addition, accreditation has been requested from the Higher Council of the Medical Profession for CPD/CME (SEAFORMEC–EACME). ■

EXCELLENCE IN THE SCIENCE COMMUNICATION

Cell Genomics: CNIC scientists reveal how the cellular energy system evolved—and how this knowledge could improve the diagnosis of rare genetic diseases

A study, led by the GENOXPHOS group at the Spanish National Centre for Cardiovascular Research (CNIC) and the Biomedical Research Networking Centre in the area of Frailty and Healthy Ageing (CIBERFES), and directed by Dr. José Antonio Enríquez, has revealed how the OxPhos system evolved over millions of years—from the first vertebrates to modern humans. "Understanding this evolution helps explain why some genetic mutations cause rare but serious diseases that affect the OxPhos system," say José Luis Cabrera lead author of the article, whose research is supported by the 'la Caixa' Foundation.

Published in Cell Genomics, the study describes the molecular evolutionary strategies of the OxPhos system, the main site of metabolic and energy integration in the cell. It also shows how this information can be used to identify mutations that cause disease.

Working in collaboration with Fátima Sánchez-Cabo, head of the CNIC Computational Systems Biomedicine group, the researchers analyzed the interaction between the two types of DNA that encode OxPhos proteins: nuclear DNA (inherited from both parents) and mitochondrial DNA (inherited only from the mother).

The study also introduces an innovative new tool: ConScore, a predictive index that assesses the clinical relevance of mutations in the 103 OxPhos proteins. "ConScore is based on the evolutionary divergence of these proteins across vertebrates—including primates and other mammals—and complements human population genetic data," says Enríquez. An evolutionary analysis of the OxPhos system reveals the adaptive diversity of each respiratory complex, shaped by the interaction between proteins encoded by mitochondrial and nuclear DNA.

The authors affirm that ConScore provides a new framework for interpreting potentially pathogenic mutations, opening the door to improved diagnosis and treatment of mitochondrial diseases.

This study not only advances our understanding of how human cells evolved, but also brings us closer to new solutions for patients with rare genetic disease.

The study has received funding from the European Union's NextGenerationEU/Recovery, Transformation and Resilience Plan/PRTR, CIBERFES; Fundación 'la Caixa',Human Frontier Science Fundation; Severo Ochoa grant awarded by MICIU/AEI and the European Social Fund (ESF invests in your future). ■

Cabrera-Alarcón, J. L., Rosa-Moreno, M., Sánchez-García, L., Hernansanz Agustín, P., Jiménez-Gómez, M. C., Martínez, F., Sánchez-Cabo, F., & Enríquez, J. A. (2025). Structural diversity and evolutionary constraints of oxidative phosphorylation. Cell Genomics, 5(7), 100945. https://doi.org/10.1016/j.xgen.2025.100945

Nature: A gut microbiota metabolite linked to atherosclerosis could revolutionise diagnosis and treatment

A new study led by the CNIC has identified imidazole propionate (ImP), a metabolite produced by gut bacteria, as a driver of atherosclerosis— as a driver of atherosclerosis, the disease behind most heart attacks and strokes. 'This metabolite is uniquely produced by intestinal bacteria,' explains CNIC researcher Annalaura Mastrangelo, one of the study's two first authors. 'Our study shows that its presence in the bloodstream is associated with the development

of active atherosclerosis in people who otherwise appear healthy.'

The discovery offers a promising alternative to current diagnostic tools, which typically involve costly and complex imaging techniques. 'Detecting this blood marker offers a major advantage because current diagnostic tools rely on advanced imaging techniques that are complex, expensive, and not covered by public health systems. Blood levels of ImP provide a diagnostic marker that could help identify apparently healthy individuals with active atherosclerosis, and thus enable earlier treatment.' says Mastrangelo.

imageBut the discovery goes even further. Co–first author Iñaki Robles-Vera explains: 'We not only observed elevated ImP levels in people with atherosclerosis, but also showed that ImP itself is a causal agent of the disease".

David Sancho, head of the CNIC Immunobiology Laboratory, lead author on the study and ERC grantee notes that 'this discovery is important because it opens the way to a completely new line of treatment.'

The CNIC-led study was conducted through extensive collaboration with researchers at multiple national and international centres: Mount Sinai Fuster Heart Hospital and the Icahn School of Medicine at Mount Sinai (New York, USA); the Fundación Jiménez Díaz Health Research Institute; the Universidad Autónoma de Madrid; the Spanish cardiovascular research network (CIBER-CV); the University of Gothenburg (Sweden); the University of Athens (Greece); Inmunotek S.L.; the University of Michigan (USA); Hospital de La Princesa; the Center for Metabolomics and Bioanalysis (CEMBIO) from Universidad CEU San Pablo; the University of Heidelberg (Germany); and the Sols-Morreale Biomedical Research Institute (IIBM-CSIC).

The study was supported by funding from the European Research Council (Consolidator and Proof of concept grants), Spanish Ministry of Science, Innovation, and Universities; the Spanish State Research Agency; the European Union's NextGeneration funding mechanism; and the "la Caixa" Foundation. ■

Mastrangelo, A., Robles-Vera, I., Mañanes, D., Sancho, D., et al. Imidazole propionate is a driver and therapeutic target in atherosclerosis. Nature (2025). 10.1038/s41586-025-09263-w

Science Translational Medicine: A hospital imaging technique used in cancer care improves the monitoring and treatment of atherosclerosis

Scientists at the CNIC showed that 18FDG-PET, an imaging technique widely used to study other conditions, can also be used to monitor atherosclerosis by measuring cellular metabolism within arterial plaques. The findings, published in *Science Translational Medicine*, could improve the clinical management of this disease and accelerate the development of new treatments.

18FDG-PET (fluorodeoxyglucose positron emission tomography) is a nuclear imaging technique that uses a radioactively labeled glucose analog to detect tissue metabolic activity.

The CNIC study demonstrates that the 18FDG-PET signal reflects the metabolic activity of atherosclerotic plaques, rather than merely indicating inflammation, as was previously believed.

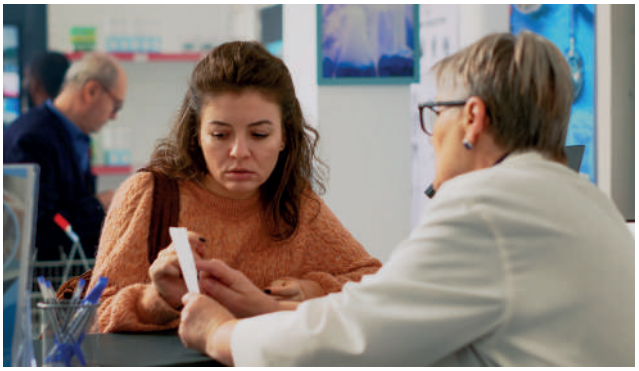
"The 18FDG-PET signal tracks the activity of cells within atherosclerotic lesions and can therefore serve as a sensitive tool for evaluating treatment efficacy and disease progression risk," explained CNIC researcher Paula Nogales, lead author of the study together with Jacob Bentzon, of Aarhus University (Denmark) and formerly head of the Experimental Pathology of Atherosclerosis group at the CNIC.

This discovery opens the door to using a widely available hospital imaging technique to improve clinical monitoring of atherosclerosis and speed the development of new therapies for this silent but potentially deadly disease.

The study received funding from the European Research Council (ERC) under the European Union's Horizon 2020 Research and Innovation Programme; the Spanish Ministry of Economy, Industry, and Competitiveness (MEIC), with co-funding from the European Regional Development Fund (FEDER); the Instituto de Salud Carlos III, with FEDER/EU co-funding; the Madrid regional government; and the "la Caixa" Foundation (AtheroConvergence). ■

Nogales, P., Velasco, C., González-Cintado, L., Sharysh, D., Mota-Cobián, A., Izquierdo-Serrano, R., Torroja, C., del Rio-Aledo, D., Morales-Cano, D., Mota, R. A., Benguría, A., Dopazo, A., Sánchez-Cabo, F., Vázquez, J., España, S., Carramolino, L., Mateo, J., & Bentzon, J. F. (2025). Atherosclerotic disease activity is associated with glycolytic enzyme expression across multiple cell types and is trackable by FDG-PET. Science Translational Medicine. https://doi.org/10.1126/scitranslmed.ado6467

European Heart Journal: after a heart attack, women have a worse prognosis when treated with beta-blockers



The REBOOT study, coordinated by the CNIC and presented at the ESC Congress 2025, revealed important sex-specific differences in beta-blocker therapy after myocardial infarction in patients with preserved cardiac function. While men showed no benefit or harm, women with fully normal heart function (LVEF ≥ 50%) faced higher risks of death, reinfarction, or heart failure when treated with beta-blockers.

Women also had a worse cardiovascular profile and received some guideline-recommended therapies less often. CNIC investigators Drs. Ibáñez, Rosselló, and Fuster highlighted that these results call for a personalized, sex-specific approach to post-heart attack treatment, suggesting that standard beta-blocker therapy may need to be reconsidered for women.

The REBOOT trial, the largest of its kind, provides key insights for tailoring therapy and improving outcomes for women worldwide.

The CNIC-funded REBOOT trial was carried out with the collaboration of the Spanish Society of Cardiology (SEC) and the Spanish cardiovascular research network CIBERCV. ■

Rosselló X, Domínguez-Rodríguez A, Latini R ... and Ibáñez B, et al. Beta-blockers after myocardial infarction: effects according to sex in the REBOOT trial. Eur Heart J. 2025; DOI: 10.1093/eurheartj/ehaf673

European Heart Journal: genes linked to sudden cardiac death increase the risk of heart failure in patients with genetic dilated cardiomyopathy

A study led by Dr. Pablo García-Pavía and Dr. Fernando Domínguez—investigators at the CNIC and cardiologists at Hospital Universitario Puerta de Hierro and CIBERCV—shows that patients with genetic dilated cardiomyopathy who experience severe arrhythmias are at an elevated risk of developing advanced heart failure and requiring a heart transplant. The study, published in the *European Heart Journal,* was conducted through collaboration among 19 Spanish hospitals and the analysis of more than 1,200 patients.

Dilated cardiomyopathy can have multiple causes, but in many cases results from genetic mutations. Not all mutations have the same effect, with alterations to some genes driving faster and more severe disease progression. The new study demonstrates that patients with mutations in genes known to be associated with severe arrhythmias and sudden cardiac death (LMNA, FLNC, PLN, TMEM43, RBM20, and desmosomal genes) are also more likely to develop serious heart failure complications. These patients face a higher likelihood of needing a heart transplant, requiring ventricular assist devices, or even dying due to disease progression.

The new finding has important clinical implications, allowing high-risk patients to be identified early and referred sooner to specialized heart failure units. The discovery also underlines the importance of initiating treatments to slow disease progression as soon as possible—even when heart dysfunction is still mild.

This study received funding from the Instituto de Salud Carlos III (PI20/0320), co-financed by the European Regional Development Fund/European Social Fund, and the Pathfinder Cardiogenomics Programme of the European Union's European Innovation Council (project DCM-NEXT; project 101115416). ■

Mora-Ayestarán, N., Ochoa, J. P., Gómez-González, C., Navarro-Peñalver, M., Gallego-Delgado, M., Larrañaga-Moreira, J. M., Robles-Mezcua, A., Basurte-Elorz, M. T., Rodriguez-Palomares, J. F., Climent-Paya, V., ... Garcia-Pavia, P. (2025, 29 de agosto). Arrhythmic genotypes in dilated cardiomyopathy and risk of advanced heart failure. European Heart Journal. https://doi.org/10.1093/eurheartj/ehaf605

NEJM & The Lancet: CNIC-led REBOOT clinical trial challenges 40-year-old standard of care for heart attack patients

The REBOOT study, coordinated by the CNIC together with the Mario Negri Institute in Milan, showed that beta-blockers do not benefit patients who have suffered an uncomplicated myocardial infarction and maintain normal cardiac function, challenging a medical practice that has been in place for more than four decades.

The results, published simultaneously in *The New England Journal of Medicine* and *The Lancet,* and presented at the European Society of Cardiology (ESC) Congress in Madrid, mark a paradigm shift in post-heart attack treatment.

"REBOOT will change the treatment of heart attacks worldwide. More than 80% of patients with uncomplicated heart attacks are discharged with beta-blockers, but our results show that this is not necessary in these cases," explained Dr. Borja Ibáñez, principal investigator of the study, scientific director of the CNIC and cardiologist at the Jiménez Díaz University Hospital.

Funded by the CNIC, this study promises to simplify and optimize post-heart attack treatment, reducing side effects and improving patients' quality of life.

Ibáñez, B., Latini, R., Rossello, X., Dominguez-Rodriguez, A., Fernández-Vázquez, F., Pelizzoni, V., Sánchez, P. L., et al.; REBOOT-CNIC Investigators. Beta-Blockers after Myocardial Infarction without Reduced Ejection Fraction. The New England Journal of Medicine. Published online August 30, 2025. doi: 10.1056/

Rosselló, X., Prescott, E., Kristensen, A. M., Ibanez, B., et al. (2025). Beta-blockers after myocardial infarction with mildly reduced ejection fraction: An individual patient data meta-analysis of randomised controlled trials. The Lancet. Advance online publication. https://doi.org/10.1016/S0140-6736(25)01592-2

European Heart Journal: CNIC scientists report the first use of CRISPR activation to treat a cardiac disease in mice

An international multidisciplinary team led by scientists at the CNIC, with the participation of scientists at Hospital Universitario Puerta de Hierro and the University of California San Diego, demonstrated for the first time that CRISPR-based gene activation (CRISPRa) can be used to treat genetic heart disease in vivo. The study, published in the *European Heart Journal* and presented at the European Society of Cardiology Congress in Madrid, paves the way for novel targeted therapies for patients with genetic cardiac disorders. This approach could be especially useful for patients with conditions caused by mutations in genes too large to be targeted with conventional gene therapy.

The study was funded by the Spanish Ministry of Science, Innovation, and Universities, the Spanish cardiovascular research network (CIBERCV), and the European Innovation Council of the European Union. ■

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NEJM: major international study confirms that beta-blockers are no longer needed in post-infarction patients with normal heart function

A landmark meta-analysis published in *The New England Journal of Medicine* and presented at the AHA 2025 Congress in November 2025 concluded that beta-blockers do not reduce death, recurrent heart attack, or heart failure in patients who have suffered a myocardial infarction but maintain normal cardiac function (ejection fraction ≥50%).

Led by the CNIC, the study pooled individual data from 17,801 patients across five major clinical trials—REBOOT, REDUCE-AMI, BETAMI, DANBLOCK, and CAPITAL-RCT—representing the most comprehensive analysis to date. The results showed no clinical benefit from beta-blocker therapy in this population, regardless of age, sex, or type of drug used.

After nearly four years of follow-up, about 8% of participants experienced a major cardiovascular event, with identical rates between treated and untreated groups. The findings hold true for all endpoints, including mortality, new infarctions, heart failure, and serious arrhythmias.

The researchers emphasized that beta-blockers remain essential for patients with reduced ejection fraction (<50%), chronic heart failure, or arrhythmias, but are no longer necessary for the majority of post-infarction patients whose heart function is preserved.

This discovery represents a paradigm shift in cardiology. For over 40 years, all heart attack survivors were prescribed lifelong beta-blockers, based on outdated studies from the 1970s and 1980s. Modern treatments have drastically improved outcomes, making this therapy unnecessary for most patients.

Dr. Valentín Fuster, CNIC General Director and co-author, called the findings "one of the most important changes in cardiology in recent decades." Dr. Borja Ibáñez, the study's lead investigator, stressed that patients should not stop their medication without medical advice, as some may need beta-blockers to treat other conditions.

While beta-blockers are generally safe, their side effects—such as fatigue or sexual dysfunction

can affect quality of life. Removing unnecessary prescriptions could therefore improve patient well-being.

The findings are expected to reshape international clinical guidelines, marking a turning point in post-infarction care worldwide.

The study was supported by funding from the CNIC; the Swedish Research Council; the Swedish Heart and Lung Foundation; Region Stockholm; South-Eastern Norway Regional Health Authority; the Research Council of Norway; the Danish Heart Foundation; the Novo Nordisk Foundation, and the Research Institute for Production Development Kyoto (Japan). ■

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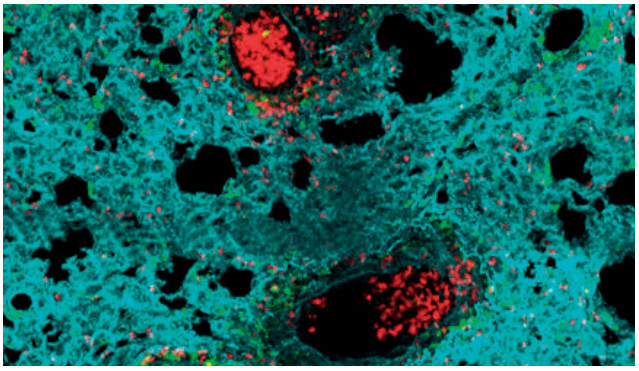
Nature: NeuMap, a pioneering map of neutrophils that redefines their role in health, infection, and inflammation



Neutrophils are the most abundant immune cells in the body and the first to respond to infection or tissue injury. Yet despite their importance, until now very little was known about how they truly function, how they change depending on the tissue they inhabit, or how they contribute not only to host defense but also to inflammatory, cardiovascular, or cancer-related diseases. Their diverse actions enable them to save lives during infection but can also worsen inflammation, as seen in conditions such as COVID-19.

To unravel this complexity, an international consortium led by scientists at the CNIC, Universidad Carlos III de Madrid (UC3M), Yale University, and Westlake University (China) has developed NeuMap, the first comprehensive map describing how neutrophils are organized across tissues, life stages, and disease states. With NeuMap, scientists have, for the first time, a clear guide to navigate the immense heterogeneity of these cells, opening a new era in the understanding and control of the immune system.

The study, published in *Nature*, analyzed more than one million cells using next-generation sequencing technologies.

The atlas is freely available to the scientific community worldwide.

The research received funding from the Cancer Research Institute; Ministerio de Ciencia, Innovación y Universidades/ Agencia Estatal de Investigación (AEI); Fundación BBVA; Worldwide Cancer Research; NIH; Deutsche Forschungsgemeinschaft; Fundación Leducq; IZKF/IMF Münster, Bachynski Family Foundation; Canada Foundation for Innovation; National Medical Research Council and Skin Research Institute of Singapore; National Natural Science Foundationof China; European Union "NextGenerationEU/ PRTR, and the European Regional Development Fund. ■

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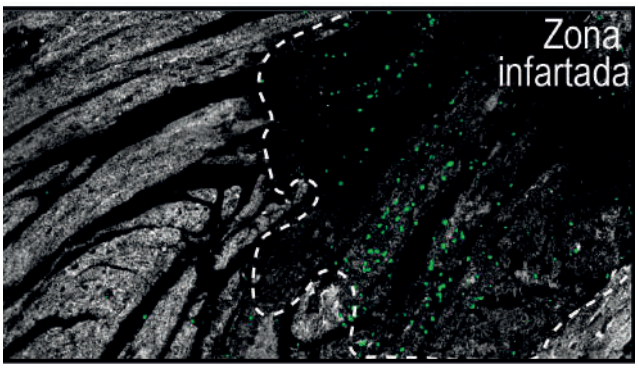
JEM: neutrophils are less aggressive at night, explaining why nighttime heart attacks cause less damage than daytime events



Heart attacks that occur at night are less severe than those that strike during the day. A study from the CNIC explains why. Published in the *Journal of Experimental Medicine*, the study led by Dr. Andrés Hidalgo's group at the CNIC shows that neutrophils—a type of white blood cell—have an internal clock that regulates their aggressiveness throughout the day and determines the extent of damage they cause to the heart after a heart attack.

The researchers also developed a pharmacological strategy in experimental models to block the molecular clock in neutrophils, keeping them in a 'nighttime' state and thereby reducing their harmful potential during a heart attack.

The immune system protects the body against microorganisms that cause infection. Because humans are diurnal—active during the day and asleep at night—the likelihood of exposure to pathogens is higher during the day. The immune system therefore adjusts its activity peaks to this circadian rhythm.

However, this same defensive response can become harmful. It is well known that in stressful situations such as myocardial infarction, the immune system can cause severe collateral damage to tissues.

The findings reveal a neutrophil circadian 'checkpoint' that protects against excessive inflammation and can be therapeutically activated to protect the body.

The results open the door to new therapies based on chronobiology (the branch of biology that studies how living organisms structure their physiological processes in time), with the potential to protect the heart and other organs from inflammatory damage without weakening the body's natural defenses.

The study was supported by funding from Fundación La Caixa; the US National Institutes of Health (NIH); the Spanish Ministry of Science, Innovation, and Universities (MICIU); the China Scholarship Council; ANR PRC; Fondation pour la Recherche Médicale (FRM); the Leducq Transatlantic Network of Excellence on circadian effects in stroke; the Spanish Society of Cardiology; and support from AstraZeneca, Boehringer Ingelheim, and Janssen. ■

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CNIC & SOCIETY

Awards & Scholarships

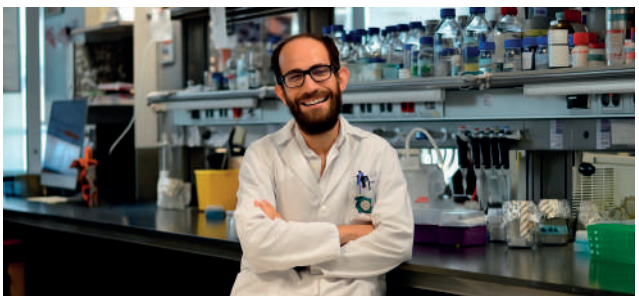
The Dominican Republic Honors Dr. Valentín Fuster with Its Highest Distinction

The Dominican Republic has awarded the Orden de Duarte, Sánchez y Mella to Dr. Valentín Fuster, Director General of the National Center for Cardiovascular Research (CNIC). The Order of Merit of Duarte, Sánchez, and Mella is the nation's highest distinction, recognizing individuals for their distinguished service to the Dominican Republic, exceptional achievements, contributions to humanity, scientific discoveries, artistic excellence, and other outstanding accomplishments.

Dr. Miguel Torres, 2025 National Genetics Award

Researcher Miguel Torres Sánchez received the 2025 National Genetics Award in the applied category, awarded by the Spanish Genetics Society (SEG) for his contribution to the development of regenerative therapies for the heart.

Jorge Alegre-Cebollada awarded the Michael and Kate Bárány Prize 2026



The Biophysical Society is pleased to announce Jorge Alegre-Cebollada have been named recipient of the 2026 Michael and Kate Bárány Award. Dr. Alegre-Cebollada will be recognized for the pioneering the study of protein mechanics in living systems, revealing how mechanical forces govern protein function and contribute to human disease.

Vicente Andrés and Ana Barettino awarded for Best Scientific Work from the Chair of Rare Diseases at the University of Almería

CNIC researchers Vicente Andrés and Ana Barettino have been honoured at the 1st Edition of the Awards for Best Scientific Work from the Chair of Rare Diseases at the University of Almería. Specifically, Dr Vicente Andrés, Director of Basic Research at the CNIC and leader of the Cardiovascular Physiopathology group

Dr. Valentín Fuster awarded Doctor Honoris Causa and Presidential Honorary Award in Cyprus

During an official ceremony, the President of Cyprus, Mr. Nikos Christodoulides, presented Dr. Fuster with the Presidential Honorary Award, acknowledging his outstanding contributions to cardiovascular health and his lifelong commitment to advancing medical science. In addition, the European University of Cyprus conferred upon him the title of Doctor Honoris Causa, a distinction reserved for individuals whose scientific achievements and dedication have had a profound impact on society.

CNIC researcher Agustín Clemente Moragón receives the CSIC's Outstanding Doctoral Thesis Award

CNIC researcher Agustín Clemente Moragón received the Outstanding Doctoral Thesis Award from the Spanish National Research Council (CSIC), an organisation attached to the Ministry of Science, Innovation and Universities.

CNIC receives a donation to research Hutchinson-Gilford progeria syndrome

The Molecular Cardiovascular Physiopathology and Genetics Laboratory, headed by Dr Vicente Andrés, received a donation of €10,000 from the Alexandra Peraut Progeria Association, made possible thanks to a fundraising gala held last March. This donation will help to further research in Dr. Andrés' laboratory on Hutchinson-Gilford progeria syndrome (HGPS), an ultra-rare genetic disease, commonly known as progeria, which affects only 1 in 20 million people.

FECYT awards quality certification to REPISALUD, the institutional scientific repository of ISCIII, which includes CNIC and CNIO

The Spanish Foundation for Science and Technology (FECYT) has awarded its quality certification to REPISALUD, the institutional repository of the Carlos III Health Institute (ISCIII) and its foundations CNIC and CNIO.

CNIC research featured on the cover of National Geographic Spain

The November issue of the Spanish edition of National Geographic magazine dedicates its cover story to the heart and the latest advances in cardiology, with a prominent role for the CNIC.

Activities

Visit to the University of Arizona

The Dean of the University of Arizona, Michael M.I. Abecassis, visited the CNIC facilities and held a meeting to discuss projects with Dr. Valentín Fuster, Dr. Borja Ibáñez and Dr. Hesam Sadek.

PHDAY: Stronger Science, Healthier Lives

Science and Innovation Week 2025 & Researchers' Night

To mark Science and Innovation Week 2025 and Researchers' Night, the CNIC organised a series of activities to raise awareness of the work carried out at the centre and bring science to people of all ages.

Preliminary agreement signed for the first collective bargaining agreement, which will benefit more than 400 CNIC professionals

CNIC participates in the 16th Popular Heart Race to promote cardiovascular prevention

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WHAT'S ON
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CNIC & SOCIETY

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