CNIC Researcher Florian Weinberger Awarded ERC Advanced Grant for the project CARDIOSWITCH

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CARDIOSWITCH aims to uncover how the mechanical activity of heart muscle cells shapes cardiac biology and to develop new regenerative strategies for congenital heart disease

The European Research Council (ERC) has awarded an ERC Advanced Grant to Centro Nacional de Investigaciones Cardiovasculares Carlos III (CNIC) researcher Florian Weinberger Florian Weinberger for the project CARDIOSWITCH, which aims to uncover how the mechanical activity of heart muscle cells shapes cardiac biology and to develop new regenerative strategies for congenital heart disease.

The five-year project will receive up to €2,428,125 in funding through the ERC Advanced Grant programme, one of Europe's most prestigious and competitive research funding schemes.

CARDIOSWITCH will develop innovative tools to reversibly control the activity of cardiomyocytes—the cells responsible for heart contraction—with unprecedented precision. By combining stem cell-derived cardiac models, human cardiac tissue and preclinical models, the project will investigate how mechanical workload influences cardiomyocyte proliferation, organisation, and function.

A major objective of the project is to determine how many actively contracting cardiomyocytes are required to restore heart function, a key question for the development of regenerative therapies. CARDIOSWITCH will also test new approaches to improve the transplantation of stem cell-derived cardiomyocytes and reduce the risk of ventricular arrhythmias, one of the main barriers to their clinical application.

Dr. Weinberger said: "A distinctive aspect of **CARDIOSWITCH** is its focus on congenital heart disease. While most cardiac regeneration research has concentrated on adult patients with coronary artery disease, this project targets a patient population that may be particularly well suited to benefit from regenerative approaches: children with congenital heart defects".

Despite major advances in surgery and clinical care, therapeutic options capable of restoring damaged or underdeveloped heart muscle in these patients remain extremely limited. By understanding how mechanical activity regulates cardiomyocyte biology and regeneration, CARDIOSWITCH aims to pave the way for innovative therapies specifically tailored to the needs of children with congenital heart disease.

Florian Weinberger said: "Understanding how the rhythmic contraction of heart muscle cells regulates cardiac biology could unlock entirely new opportunities for regeneration, especially for children, for whom effective treatment options remain limited."

The project builds on Weinberger's expertise in cardiac tissue engineering, optogenetics, chemogenetics and preclinical models of congenital heart disease. Ultimately, CARDIOSWITCH aims to establish a foundation for regenerative therapies capable of restoring coordinated heart function in children with severe congenital heart defects.

Florian Weinberger conducts his research within the Cardiovascular Regeneration program at the CNIC.

The ERC Advanced Grants support outstanding senior researchers pursuing ambitious, curiosity-driven projects with the potential to lead to major scientific breakthroughs. In the 2025 competition, the ERC awarded €838 million to 319 researchers across Europe. The grants are funded through the European Union's Horizon Europe programme.

President of the European Research Council, Prof. Maria Leptin**,** said: *"*The new Advanced Grant projects demonstrate the creativity, ambition, and intellectual boldness that frontier research requires. The ERC's role is to support researchers who are asking difficult scientific questions and want to venture into unexplored territory in pursuit of new knowledge*."*

Ekaterina Zaharieva, European Commissioner for Startups, Research, and Innovation, said: "These projects embody the spirit of scientific exploration that drives progress. The increase in applications

from researchers based outside Europe shows that initiatives such as ‘Choose Europe’, aimed at attracting and keeping talent, are helping to reinforce Europe's appeal to top scientific talent worldwide.”

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