

REGENERAR

Three million euros fund research led by the University of Coimbra to develop new technology to regenerate the brain

Over the next four years, a European research consortium, led by the University of Coimbra (UC), will develop an innovative technology that could boost the regeneration of neurons in diseases that currently have limited therapeutic options. To do this, the scientists will use epigenetic tools to try to convert brain cells in patients into functional neurons. This research could pave the way for improved treatment of health problems such as stroke or neurodegenerative diseases (pathologies that are linked to the nervous system, affecting movement and causing loss of neurological functions).

The research project *REGENERAR: Improving the Effectiveness and Safety of Epigenetic Editing in Brain Regeneration*, led by the researcher from the UC Faculty of Medicine, the UC Center for Neuroscience and Cell Biology (CNC-UC) and the associated laboratory Center for Innovative Biomedicine and Biotechnology (CIBB), Lino Ferreira, will be funded with around three million euros (2 943 233) by the European Commission, more specifically by the European Innovation Council under the *Pathfinder Open* program, which funds interdisciplinary projects that open doors to innovative technological breakthroughs.

In general terms, *REGENERAR* aims to use epigenetic tools to reprogram certain brain cells into neurons. Basically, it uses what the human body already has, manipulating cells that have increased in number after the disease process, and transforming them into neuronal cells that are very important for brain function.

In the case of the pathologies focused on in this research, Lino Ferreira explains that "the central nervous system has minimal capacity for self-repair, and it is necessary to create alternatives to replace neurons lost as a result of injury, as happens, for example, in stroke or neurodegenerative diseases".

For stroke — which affects more than 15 million people worldwide every year and often causes significant limitations in routine activities such as walking or speaking — for example, "current treatments have focused on restoring blood flow to minimize tissue damage, and there are no approved pharmacological treatments that promote brain repair," explains the research leader.

Thus, recognizing these therapeutic limitations, this European consortium hopes to open a new path for the treatment of stroke and neurodegenerative pathologies by designing a nanoparticle formulation in the laboratory that could, in the future, reach clinical practice.

"This project stems from the vast experience of the UC, and in particular of the Advanced Therapies group affiliated with the Faculty of Medicine and CNC-UC/CIBB, in the development of advanced formulations for the treatment of brain diseases," says the University of Coimbra researcher.



Under the scope of this project, the team will conduct several "rigorous safety tests, using advanced *in vitro* models (tests outside of living organisms), as well as *in vivo* toxicological studies, in accordance with good laboratory practices, to analyze the effectiveness of epigenetic reprogramming for clinical use," says Lino Ferreira. The scientists hope that this new technology can be validated in the laboratory by February 2028.

The University of Coimbra has six academic and industrial entities as partners in this project: the Helmholtz Center in Munich (Germany), the Fraunhofer Institute for Toxicology and Experimental Medicine (Germany), Single Technologies AB (Sweden), the pharmaceutical company Hovione Farmaciência SA (Portugal) and Sociedade Portuguesa de Inovação (Portugal). At the same time, national and European health organizations and patient associations will also be involved in the project to create a strategy for the future translation of this innovative technology into clinical practice.

The six *REGENERAR* partners will meet in Coimbra on March 22, to launch the project.

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