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Leibniz-Institut für Alternsforschung - Fritz-Lipmann-Institut e.V. (FLI)
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AI-based method for age prediction, mortality risk, and geroprotective validation

AI-based aging clock secures nearly €100K in federal funding for cross-species age prediction and geroprotection research.

Jena, Germany. Researchers at the Leibniz Institute on Aging - Fritz Lipmann Institute (FLI) in Jena have achieved remarkable success in securing federal funding through the GO-Bio Initial program of the Federal Ministry of Education and Research (BMBF). After securing funding for in 2023, they succeeded again now. Dr.-Ing. Debdas Paul, a postdoctoral data scientist in Prof. Alessandro Cellerino's research group, has been awarded €99.924 in funding for his innovative project, marking a continued triumph following previous funding successes.

The longevity technology sector is dedicated to optimizing health throughout the human lifespan by developing novel technologies. One of the biggest challenges for this industry is conducting the extensive, complex clinical trials necessary to evaluate the long-term health impacts of potential geroprotective compounds. To address this, researchers have turned to predictive biomarkers of health and biological age—so called "Aging Clocks" based on AI models. However, many of these biomarkers do not translate across species, a critical issue when extrapolating findings from short-lived animal models to humans.
In the project "GBi5S: Multi-omic, Multi-tissue Intelligent Aging Clock (MOMAC)," Dr.-Ing. Debdas Paul together with Prof. Cellerino and business development expert Darya Krasilnikov from the Scuola Normale Superiore in Pisa, is developing an advanced aging clock that leverages deep learning techniques to predict age primarily from transcriptomic data. Importantly, the model is versatile—it can also integrate epigenetic, proteomic, and other omics data, facilitating cross-species translation.

This aging clock will have broad applications, including assessing the impact of geroprotective compounds on human tissues by analyzing publicly available perturbation datasets, such as those from L1000 assays. Effects identified in silico can be validated using omics data from a short-lived laboratory animal model, the killifish—the shortest-lived vertebrate that nevertheless shares key aging hallmarks with humans.

"Our platform technology uses deep neural network architecture to accurately predict age from high-dimensional, noisy transcriptomic data," says Dr.-Ing. Paul. "By detecting the effects of geroprotective compounds, this technology facilitates the evaluation of interventions in preclinical and clinical studies, as well as in personalized medicine." He adds, "The integration of adversarial learning and binary stochastic filtering—a novel approach originally developed by Dr. Elisa Ferrari—is a breakthrough in our field. I am excited to further develop and validate this model with my team, with the ultimate goal of translating it into a viable product."

The MOMAC project is also supported by the FLI's internal SPARK mentorship program of the Core Facility Technology Transfer, which aids in advancing the maturity of innovative technologies. With this timely funding, the project will finalize its intellectual property strategy and identify potential target markets, while also making the MOMAC platform

accessible to academic and industry collaborators.

The GO-Bio Initial program is a two-stage funding initiative supporting early-stage ideas in the life sciences, with up to €1.1 million available annually for exploratory and feasibility phases.

Background Information
The Leibniz Institute on Aging – Fritz Lipmann Institute (FLI) – upon its inauguration in 2004 – was the first German research organization dedicated to research on the process of aging. Around 350 employees from around 40 nations explore the molecular mechanisms underlying aging processes and age-associated diseases. For more information, please visit www.leibniz-fli.de.

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