

Press Release

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ERC Consolidator Grant for LifeLongFit project at the FLI

Dr. Maria Ermolaeva from the Leibniz Institute on Aging – Fritz Lipmann Institute (FLI) in Jena has received the coveted ERC Consolidator Grant from the EU, in the sum of two million euros. The LifeLongFit project, now funded for the next five years, is looking at ways to contribute to healthier aging through the influence of mild stress.

Jena. Staying fit for life! Who doesn't dream of this when the first signs of aging start to appear in middle age, when our muscles ache, our hair turns grayer, and a bit of physical activity leaves us out of breath. However, aging is a very complex, multi-layered process that is influenced by a variety of internal and external factors. What is urgently needed is a fundamental understanding of the aging process and the emergence of aging-associated diseases, in order to be able to develop solutions for healthy aging.

Dr. Maria Ermolaeva, leader of the Research Group "Stress Tolerance and Homeostasis" at the Leibniz Institute on Aging – Fritz Lipmann Institute (FLI) in Jena, has received the coveted ERC Consolidator Grant from the EU, with two million euros in funding for the LifeLongFit project, which will spend the next five years looking for ways to improve health as we age. The funding will create up to four new positions at the FLI.

What happens as we age?

As we grow older, more and more damage accumulates in our body, which in turn triggers other forms of harm: for example, our genetic material can become damaged and communication between cells can be disrupted, or the misfolding and clumping of proteins can occur. "These are all things that are harmful to the organism and can lead to disease," reports Dr. Ermolaeva, "but if we are still young and fit, then our body is able to efficiently mitigate such damage through its own repair mechanisms, so that our health is not affected. However, as we grow older, these specialized mechanisms lose their effectiveness and become error-prone leading to dramatic consequences for our bodies."

Effects of moderate stress on aging

Maintaining the body's own damage mitigation mechanisms is therefore one way to age healthily. This can be achieved through moderate stress, which sets off a targeted stress response and thus stimulates repair processes. "Mild stressors have the effect of triggering repair pathways that contribute to the elimination of damaged or no longer functional cellular components, which effectively leads to preservation of cellular functions for longer time," adds Dr. Ermolaeva.

Dr. Ermolaeva's research group has already been able to demonstrate in studies on the nematode worm *C. elegans* that mild stressors – such as the administration of the antidiabetic drug metformin, exposure to mildly pathogenic microbes, or UV radiation – caused the animals to become healthier than the control group without stress. In addition, the moderately stressed worms were more robust and subsequently less susceptible to further stressors.

Different effects on young and old

When treating young and old nematodes with metformin, the FLI researchers unexpectedly ran into a serious problem. “The knowledge and assumptions of how older animals will react to stress is based on experimental data obtained mostly in young animals,” explains Dr. Ermolaeva, “but this turned out to be a major issue, especially in this experiment.” While positive effects were visible in young worms, the drug lost its effect in older specimens and was even toxic to them. “This means that it cannot be assumed from the outset that the results can be transferred one-to-one from young to old, but shows once again how important it is to study the effect of moderate stress in an age-specific manner by also taking into account changes in metabolism or repair activities,” emphasizes the biochemist.

Timing of dosage influences rejuvenation effect

This led to the idea of the LifeLongFit project, an exceptionally time-consuming and risky research approach. The project aims to investigate the influence of a variety of potential mild stressors (e.g., food restriction, microbes, and UV radiation) at different age to determine whether their positive effects are reversed during aging similar to those of metformin. Subsequently, ways of re-activating positive stress responses late in life will be screened for.

This knowledge is essential for deriving an individualized, appropriate treatment for an individual according to age. Ultimately, the main goal of the project is to suggest new pathways for healthy aging that do not require early or even lifelong treatment with drugs, but can be started at any point in life, including old age. “I am very pleased about the ERC grant, and I am very proud and happy to be able to come closer to this challenging goal with my team and the support of the FLI,” reports Dr. Ermolaeva.

“The LifeLongFit project does involve high risks and requires extensive resources,” adds Prof. Alfred Nordheim, Scientific Director of the FLI, “but if the project is successful, it offers enormous opportunities to use this knowledge to develop novel therapies that promote healthy aging. We wish Dr. Ermolaeva and her team the best of luck in this endeavor!”

About the researcher

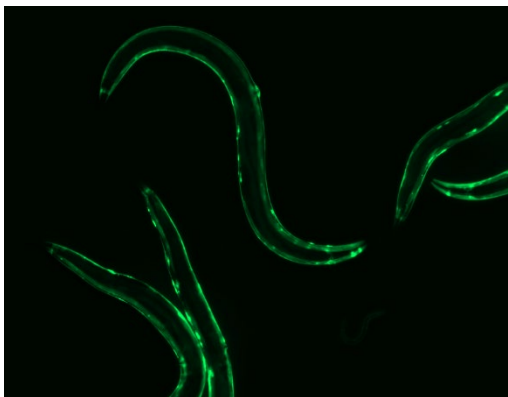
Maria Ermolaeva studied biochemistry at Lomonosov Moscow State University in Moscow, Russia and performed her diploma work at IGB RAS (Institute of Gene Biology, Russian Academy of Sciences) in Moscow. After receiving her diploma in 2002, she was a doctoral student from 2002 to 2008 at EMBL (Mouse Biology Unit, Manolis Pasparakis Lab) in Rome, Italy and at the University of Cologne in Cologne, Germany. From 2008 to 2015 she worked as a postdoc in the Cologne Cluster of Excellence CECAD (Björn Schumacher Lab), where she began her research on the nematode *C. elegans* as a model organism. In April 2015 Dr. Ermolaeva moved to the Leibniz Institute on Aging – Fritz Lipmann Institute (FLI) in Jena, where she heads the Research Group “Stress Tolerance and Homeostasis.”

Dr. Ermolaeva has been a member of the German Association for Aging Research (DGfA) since 2015. From 2015 to 2021 she was the project leader in the DFG Research Training Group “Adaptive Stress Responses” and from 2020 to 2022 the head of the EU-ESF-funded research group FBR 0082. She is currently a project leader in the IMPULS consortium at the Friedrich Schiller University Jena, since 2021, and an associate member of the DFG Excellence Cluster “Balance of the Microverse” since 2018.

Image



FLI researcher Dr. Maria Ermolaeva receives the coveted ERC Consolidator Grant for her project LifeLongFit. (Photo: FLI / Nadine Grimm)



Through studies on the nematode *C. elegans*, but also on other model organisms, the ERC-funded project LifeLongFit will look for ways to achieve healthier aging. (Photo: FLI / Maria Ermolaeva)

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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. More than 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

The **Leibniz Association** connects 97 independent research institutions that range in focus from natural, engineering and environmental sciences to economics, spatial and social sciences and the humanities. Leibniz Institutes address issues of social, economic and ecological relevance. They conduct basic and applied research, including in the interdisciplinary Leibniz Research Alliances, maintain scientific infrastructure, and provide research-based services. The Leibniz Association identifies focus areas for knowledge transfer, particularly with the Leibniz research museums. It advises and informs policymakers, science, industry and the general public. Leibniz institutions collaborate intensively with universities – including in the form of Leibniz ScienceCampi – as well as with industry and other partners at home and abroad. They are subject to a transparent, independent evaluation procedure. Because of their importance for the country as a whole, the Leibniz Association Institutes are funded jointly by Germany’s central and regional governments. The Leibniz Institutes employ around 20,500 people, including 11,500 researchers. The financial volume amounts to 2 billion euros. For more information: www.leibniz-gemeinschaft.de/en/.