



Press Release

Fewer antibody diversity as we age

Studies in African killifish reveal how the immune system ages

As we age, our immune system works less well. We become more susceptible to infections and vaccinations no longer work as effectively. A research team led by Dario Riccardo Valenzano investigated whether short-lived killifish undergo aging of the immune system. Indeed, they found that already at four months of age, killifish have less diverse circulating antibodies compared to younger fish, which may contribute to a generalized decrease in the immune function.

The immune system must constantly respond to new attacks from pathogens and remember them in order to be protected during the next infection. For this purpose, B cells build an information repository and produce a variety of antibodies that can directly recognize the pathogens.

"We wanted to know about the antibody repertoire in old age," explains Dario Riccardo Valenzano, who led the study. "It is difficult to study a human being's immune system over his or her entire life, because humans live a very long time. Moreover, in humans you can only study the antibodies in peripheral blood, as it is problematic to get samples from other tissues. For this reason, we used the killifish. It is very short-lived and we can get probes from different tissues."

Killifishes are the shortest-lived vertebrates that can be kept in the laboratory. They live for only three to four months, age in a time-lapse and have become the focus of ageing research in recent years due to these characteristics.

Less antibody diversity

The researchers were able to characterize with high accuracy all the antibodies that killifish produce. They found that older killifish have different types of antibodies in their blood than younger fish. They also had a lower diversity of antibodies throughout their bodies.

"If we have fewer different antibodies as we age, this could lead to a reduced ability to respond to infections. We now want to further investigate why the B cells lose their



ability to produce diverse antibodies and whether they can possibly be rejuvenated in the killifish and thus regain this ability," says Valenzano.

The research for this study was conducted at the Max Planck Institute for Biology of Ageing and was funded by the CECAD Cluster of Excellence for Aging Research and the Collaborative Research Center 1310 at the University of Cologne. Dario Riccardo Valenzano is now group leader of the research group "Evolutionary Biology / Microbiome-Host Interactions in Aging" at the Leibniz Institute on Aging - Fritz Lipmann Institute (FLI) and Professor at Friedrich Schiller University in Jena.

Press picture:

You can find pictures of the press release under the following link:

<https://age.canto.de/s/UQCE8>

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20190402_Killifish_4966_02_1200.jpg

The African killifish (*Notobranchius furzeri*) can be used to study the ageing of the immune system.

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The African killifish (*Notobranchius furzeri*) is the shortest living vertebrate that can be kept in the laboratory.

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Dario Valenzano uses the African killifish to study the ageing of the immune system.

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William J Bradshaw, Michael Poeschla, Aleksandra Placzek, Samuel Kean, Dario Riccardo Valenzano

Extensive age-dependent loss of antibody diversity in naturally short-lived turquoise killifish

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About the Max Planck Institute for Biology of Ageing

The Max Planck Institute for Biology of Ageing investigates the natural ageing process with the long-term goal to pave the way towards increasing health during ageing in humans. It is an institute within the Max Planck Society, which is one of Germany's most successful research organisation. Since its foundation in 2008 the institute is an integral part of the Cluster of Excellence in Aging Research CECAD (Cellular Stress Responses in Aging-Associated Diseases). More at www.age.mpg.de

About the Leibniz Institute on Aging

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

About CECAD

The Cluster of Excellence in Aging Research CECAD (Cellular Stress Responses in Aging-Associated Diseases) is an interdisciplinary research network of the University of Cologne and the Max Planck Institutes for Biology of Aging and Metabolism Research, the University Hospital of Cologne and the German Center for Neurodegenerative Diseases (DZNE), in which more than 500 scientists from over 50 nations are engaged in researching and deciphering molecular mechanisms of aging and age-associated diseases. Since 2007 the cluster is funded within the framework of the Excellence Strategy of the German federal and state governments. More at www.cecad.uni-koeln.de.