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Press Release

Longer life due to faulty RNA processing

If introns remain in certain RNAs, worms live longer

The control of RNA metabolism is crucial to the regulation of animal longevity, researchers from the Max Planck Institute for Biology of Ageing in Cologne have now discovered. They found that worms live longer when certain RNAs are processed differently during RNA maturation. This could be an additional way for organisms to control the ageing process.

RNA is an important transmitter of information in our cells and serves as a blueprint for the production of proteins. When freshly formed RNA is processed, so-called introns are cut out to produce the mature mRNA coding for protein. This cutting is called "splicing" and is controlled by a complex called the "spliceosome".

Long-lived worms

"We found a gene in worms, called PUF60, that is involved in RNA splicing and regulates life span," says Max Planck scientist Dr. Wenming Huang who made the discovery. Mutations in this gene caused inaccurate splicing and the retention of introns within specific RNAs. Consequently, lower amounts of the corresponding proteins were formed from this RNA. Surprisingly, worms with this mutation in the PUF60 gene lived significantly longer than normal worms.

Particularly affected by this defective production were some proteins that play a role in the mTOR signalling pathway. This signalling pathway is an important sensor for the availability of food and serves as a control centre of cell metabolism. It has long been the focus of ageing research as a target of potential anti-ageing drugs. The researchers were also able to show in human cell cultures that reduced levels of PUF60 activity led to lower activity of the mTOR signalling pathway.

PUF60 mutation in humans

"We think that by altering the fate of introns in RNAs, we have discovered a novel mechanism that regulates mTOR signalling and longevity," says Max Planck Director Adam Antebi who led the study. "Interestingly, there are also human patients with similar mutations in the PUF60 gene. These patients have growth defects and neurodevelopmental disorders. Perhaps in the future, these patients could be helped by

MAX PLANCK INSTITUTE FOR BIOLOGY OF AGEING
Joseph-Stelzmann-Straße 9b • 50931 Cologne • Germany
P.O. Box 41 06 23 • 50866 Cologne • Germany
www.age.mpg.de

Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V.
Ust-ID Nr: DE129517720
VR 13378 B
Berlin Charlottenburg
Deutsche Bank AG
IBAN: DE37 7007 0010 0195 1383 14
BIC Swift: DEUT DEMM XXX

administering drugs that control mTOR activity. But of course, this needs more research."

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.

Press picture:
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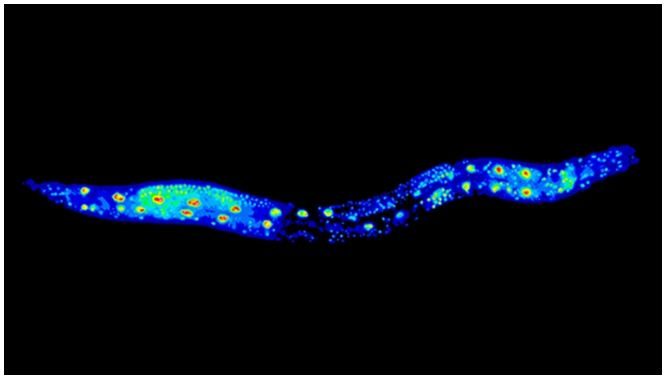

Caption: The roundworm *Caenorhabditis elegans* is an important model organism in ageing research. The worm in the image is labelled with GFP::RNP-6.

Original publication:
Wenming Huang, Chun Kew, Stephanie A. Fernandes, Anna Loerhke, Lynn Han, Constantinos Demetriades, Adam Antebi
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Contact:

Corresponding author: Prof. Adam Antebi
Max Planck Institute for Biology of Aging, Cologne
E-mail: adam.antebi@age.mpg.de

Press and public relations: Dr. Maren Berghoff
Max Planck Institute for Biology of Aging, Cologne
Tel.: +49 (0)221 379 70 207
E-mail: maren.berghoff@age.mpg.de

MAX PLANCK INSTITUTE
FOR BIOLOGY OF AGEING

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 DFG-funded Cluster of Excellence in Aging Research CECAD at the University of Cologne.

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