

How a small worm may help the fight against Alzheimer's

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Image of a C. elegans roundworm. The blue fluorescence highlights the tissue producing most N-acetylglucosamine. Credit: MPI for the Biology of Ageing

(Medical Xpress)—Scientists at the Max Planck Institute for Biology of Ageing in Cologne have found that a naturally occurring molecule has the ability to enhance defense mechanisms against neurodegenerative diseases. Feeding this particular metabolite to the small round worm



Caenorhabditis elegans, helps clear toxic protein aggregates in the body and extends life span.

During ageing, proteins in the human body tend to aggregate. At a certain point, protein aggregation becomes toxic, overloads the cell, and thus prevents it from maintaining normal function. Damage can occur, particularly in neurons, and may result in <u>neurodegenerative diseases</u> like Alzheimer's, Parkinson's or Huntington's disease. By studying model organisms like Caenorhabditis elegans, scientists have begun to uncover the mechanisms underlying neurodegeneration, and thus define possible targets for both therapy and prevention of those diseases. "Although we cannot measure dementia in worms", explains Martin Denzel of the Max Planck Institute for Biology of Ageing, "we can observe proteins that we also know from human diseases like Alzheimer's to be toxic by measuring effects on neuromuscular function. This gives us insight into how Alzheimer actually progresses on the molecular level".

Now, the scientists Martin Denzel, Nadia Storm, and Max Planck Director Adam Antebi have discovered that a substance called Nacetylglucosamine apparently stimulates the body's own <u>defense</u> <u>mechanism</u> against such toxicity. This metabolite occurs naturally in the organism. If it is additionally fed to the worm, "we can achieve very dramatic benefits", says Denzel. "It is a broad-spectrum effect that alleviates protein toxicity in Alzheimer's, Parkinson's and Huntington's disease models in the worm, and it even extends their <u>life span</u>."

This molecule apparently plays a crucial role in quality control mechanisms that keep the body healthy. It helps the organism to clear toxic levels of protein aggregation, both preventing aggregates from forming and clearing already existing ones. As a result, onset of paralysis is delayed in models of neurodegeneration - How exactly the molecule achieves this effect is yet to be uncovered. "And we still don't know whether it also works in higher animals and humans", says Antebi. "But



as we also have these metabolites in our cells, this gives good reason to suspect that similar mechanisms might work in humans."

More information: Martin S. Denzel, Nadia J. Storm, Aljona Gutschmidt, Ruth Baddi, Yvonne Hinze, Ernst Jarosch, Thomas Sommer, Thorsten Hoppe, and Adam Antebi. "Hexosamine pathway metabolites enhance protein quality control and prolong life." *Cell*, 13 March 2014

Provided by Max Planck Society

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