

Healthcare industry BW

Baker's yeast: not only good for baking

Researchers from the Institute of Biochemistry and Molecular Biology and the Centre of Biological Signalling Studies (bioss) of the University of Freiburg have discovered a new mechanism that regulates the lifespan of mitochondrial proteins.

Mitochondria not only generate most of the cell's supply of energy, they also accommodate a large number of signalling pathways and control programmed cell death (apoptosis). The smallest disturbance in these functions can lead to serious diseases such as diabetes, cancer and neurodegenerative diseases such as Parkinson's and Alzheimer's.

In the study that has just been published in the renowned scientific journal "Cell", the researchers used mitochondria from baker's yeast, a model organism that functions according to the same principles as human cells. The majority of mitochondrial proteins are encoded in the cell nucleus and need to be transferred into the mitochondria after synthesis. This transfer is enabled by signalling sequences that guide the proteins to specific recognition sites on the mitochondria, which then enable the protein to enter these organelles.

Once the proteins have entered the mitochondria, a specific enzyme removes the signalling sequences. In cooperation with a team of researchers from Dortmund, the Freiburg researchers have systematically investigated and determined these signalling sequences for more than 600 mitochondrial proteins.

To the researchers' surprise, many of these signalling sequences are cleaved not just once, but twice. The researchers also discovered the enzyme that cleaves the signalling sequences. "This enzyme is a protein that is highly conserved in bacteria and humans," said Nora Vögtle, doctoral student at the Freiburg "Membrane proteins and biological membranes" research training centre and lead author of the publication. This additional processing step protects the proteins from premature degradation.

According to Prof. Dr. Chris Meisinger, project and group leader, these results provide completely new insights into the degradation of proteins in cell organelles and can be used to clarify a broad range of disease mechanisms.

Contact:

Prof. Dr. Chris Meisinger
Institute of Biochemistry and Molecular Biology/
Centre of Biological Signalling Studies (bioss)
University of Freiburg
Tel.: +49 (0)761/203-5287
Fax: +49 (0)761/203-5261
E-mail: christof.meisinger@biochemie.uni-freiburg.de

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