NEW HOT PAPERS - 2008

November 2008

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Walter Neupert & Johannes M. Hermann talk with *ScienceWatch.com* and answer a few questions about this month's New Hot Paper in the field of Biology & Biochemistry. The authors have also sent along images of their work.

Article Title: Translocation of proteins into mitochondria
Authors: Neupert, W;Herrmann, JM
Journal: ANNU REV BIOCHEM
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SW: Why do you think your paper is highly cited?

The functionality of cells relies on the correct delivery of each newly synthesized polypeptide to its respective cellular location. The processes by which mitochondrial precursor proteins are recognized in the cytosol and transported across the mitochondrial membranes are one of the best-studied examples for such protein translocation processes.

Over the last years a number of novel components of the mitochondrial import machinery were identified and functionally characterized. This provided fascinating insights into the mechanisms by which mitochondrial precursor proteins are transported into mitochondria and sorted into their respective mitochondrial subcompartment. This review article provides a general but detailed overview over the mitochondrial import machinery and its function.

Coauthor
Johannes Herrmann

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

Initially, mitochondria were seen as rather autonomous organelles which simply provide the cell with ATP. Over the last years it became more and more apparent that mitochondria exhibit a number of additional functions which are critical for many cellular processes. One example is the central role of mitochondrial proteins in apoptosis.

Figure 1; View details

Moreover, mitochondrial dysfunctions were found to be associated with many human diseases, in particular with neuropathies like Parkinson's

disease, Alzheimer's disease, and amytrophic lateral sclerosis (ALS). This increased the general interest in mitochondrial biology, including mitochondrial protein biogenesis.

SW: Where do you see your research leading in the future?

Mitochondria are by far not as autonomous as originally believed. They strongly rely on the import of proteins, metabolites, metal ions etc., from the residual cell. These transport processes were studied in the past to quite some detail. However, we still have only a little understanding of how these processes are regulated and how mitochondria and the cell communicate.

It will be exciting in the future to study the regulation of mitochondrial processes, in particular in mammalian cells. We are convinced this will significantly increase our understanding of the basic cellular processes which are of outstanding relevance for human health.

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Figure 1:

Figure 1: Mitochondrial protein sorting. Click for a larger view (please allow time to load).

Keywords: functionality of cells, newly synthesized polypeptide, mitochondrial precursor proteins, cytosol, mitochondrial membranes, protein translocation processes, mitochondrial import machinery, autonomous organelles, apoptosis, mitochondrial dysfunctions, neuropathies, parkinson's disease, alzheimer's disease, amytrophic lateral sclerosis.

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