

New research tool for studying mitochondrial disorders and aging

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Mitochondria. Credit: Wikipedia commons

Researchers at Karolinska Institutet in Sweden have developed a new research tool for studying how mitochondrial protein synthesis is affected by disease, pharmaceuticals, aging and different physiological situations such as exercise and diet. The study is presented in the scientific journal *Cell Reports*.

The mitochondria are the power plants of our cells and are essential for converting the energy in the food we eat to a useful cellular energy currency. Proper regulation of mitochondrial function is critically important for human health. There are not only a large number of known inherited [mitochondrial disorders](#) that often seriously impair the function of the brain, heart, [skeletal muscle](#) and other organs, but decreased mitochondrial function also plays an important role in aging and age-associated human diseases.

"It is crucial to unravel how mitochondrial function is regulated in order to better understand these disorders and develop new treatment strategies," says Nils-Göran Larsson, professor at the Department of Medical Biochemistry and Biophysics at Karolinska Institutet, who led the study.

Mitochondria contain their own [protein](#) synthesis factories, the mitoribosomes, that are distinct from the other ribosomes in the cell. Although there has been marked progress in our understanding of the structure and composition of the mitoribosome over recent years, the regulation of their function is poorly understood. Now, the research group at Karolinska Institutet describes a novel strategy to identify proteins that interact with and regulate the mitoribosome. They have created a model, the MitoRibo-Tag mice, in which every mitoribosome contains a small tag which can be used as a type of fishing rod to isolate mitoribosomes. Using large-scale proteomics analyses, the new tool enables identification of interacting proteins in a variety of tissues.

The researchers identified all 82 proteins that make up the mitochondrial ribosome, as well as a large number of associated factors. Some of the identified factors are novel mitochondrial proteins of unknown function that may have important roles in controlling mitochondrial protein synthesis.

"We believe that the MitoRibo-Tag mice will be a valuable tool for future studies of how mitochondrial protein synthesis is affected by disease, pharmacological interventions, aging and different physiological situations such as exercise, [caloric restriction](#) and [high-fat diet](#)," says Miriam Cipullo, Ph.D. student at the Department of Medical Biochemistry and Biophysics, Karolinska Institutet, and co-author of the paper.

More information: Jakob D. Busch, et al. "MitoRibo-Tag Mice Provide a Tool for In Vivo Studies of Mitoribosome Composition." *Cell Reports*, online 5 November 2019, [DOI: 10.1016/j.celrep.2019.09.080](https://doi.org/10.1016/j.celrep.2019.09.080)

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