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Mitochondrial motility, fusion, and fission in yeast

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Mitochondria are essential organelles of eukaryotic cells. They are the major sites of energy production and play important roles in programmed cell death and aging. In many cell types, mitochondria show an amazingly dynamic behaviour. They continuously move along cytoskeletal tracks, and their membranes frequently fuse and divide. These processes are important for maintenance of mitochondrial functions, for inheritance of the organelles upon cell division, for cellular differentiation, and for programmed cell death. As the machinery of mitochondrial biogenesis and inheritance has been highly conserved during evolution, it can be studied in simple model organisms such as yeasts. Systematic screening of comprehensive yeast mutant collections has revealed novel molecular components and cellular pathways required for mitochondrial fusion, division, motility, mitochondrial DNA inheritance, and respiratory activity. Large scale genetic analyses are combined with functional characterization of newly identified proteins by biochemical and imaging techniques. The aim of this work is to obtain a comprehensive picture of the molecular processes contributing to mitochondrial biogenesis in a simple eukaryotic cell.

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