

63. Mitochondria

1 unit, Giovanni Manfredi, December 2, 2025

- Mitochondrial origins
- Electron transport and the generation of ATP, Calcium homeostasis
- Mitochondrial structure
- Mitochondria-ER connections
- Mitochondrial Biogenesis
- Nuclear-encoded protein targeting to mitochondria
- Mitochondrial dynamics
- Mitochondrial quality control
- Mitochondrial integrated stress response

Paper for “Scientific court”: students critique the paper, with half the class defending the conclusions and the other half opposing the conclusions.

Nakai, R., Varnum, S., Field, R.L. *et al.* Mitochondria transfer-based therapies reduce the morbidity and mortality of Leigh syndrome. *Nat Metab* **6**, 1886–1896 (2024).

<https://doi.org/10.1038/s42255-024-01125-5>

Group A:

Opposing the conclusions of the paper:

Alfroz, Jalwa

Li, Ruofei Faye

McIlhenny, Lauren

Mutaher, Mohammed

Styers, Hannah

Group B:

Defending the conclusions of the paper:

Ahmed, Nibras

Beattie, Kai

Magnus, Karina

Pope, Eleanor

Sussman, Carleigh

Volpe, Christina

Optional Suggested Reading:

6th Edition of the Alberts 'Molecular Biology of the Cell'

Chapter 2, Cell Chemistry and Bioenergetics, Pages 81-84

Chapter 11, Membrane Transport of Small Molecules and the Electrical Properties of Membranes

Chapter 12, The Transport of Proteins into Mitochondria and Chloroplasts, Pages 658-666

Chapter 14, Energy Conversion: Mitochondria and Chloroplasts, Pages 753-782 and Pages 800-809