

Objectives: Mitochondria Lectures

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686-7020

If you can answer the questions listed below, you will have mastered the objectives of this series of lectures. This is also a lecture outline.

How Mitochondrial Architecture Supports Function.

1. Describe mitochondrial compartments (subdomains) and name specific functions/sets of enzymes or carrier molecules that are found in each.
2. Be able to identify subdomains or regions in a mitochondrion either from a drawing (cartoon) or an electron micrograph.
3. Define Chemiosmosis. What cytological elements set it up?
4. Describe briefly the theory about the origin of mitochondria from bacteria?
5. Generally define the location of the Citric Acid Cycle. What are its major products?
6. Define the location of the electron transport chain.
7. Where is the proton gradient produced and by what mechanism?
8. Define the proton motive force and how it drives ATP production or transporters. Where is the ATP synthase found in mitochondria?
9. How do mitochondria replicate, including the replication of mitochondrial genes?
10. Under what conditions can replication be abnormal? What signs would you look for in a biopsy at the light or electron microscopic levels?
11. What membrane proteins are critical for the entry of proteins or subunits that can't be made in mitochondria?
12. For proteins that move to the matrix, what helps attract them into the matrix?
13. How is mitochondria DNA like that of bacteria?
14. Discuss mitochondrial inheritance patterns? Differentiate genes that are inherited by Mendelian genetics from those inherited maternally.
15. Why might a woman with a mild mitochondrial disease have children with disease of varying severity?
16. Why is a mutation in mitochondrial tRNA so severe?
17. What would be the impact of a mutation in the D-Loop?
18. What facts or tests would help you differentiate mitochondrial diseases due to:
 - a. A mitochondrial gene
 - b. A D-Loop mutation
 - c. A nuclear gene