

Lecture 21

Transporting Reducing Equivalents into the Mitochondrial Matrix

Oxidative Phosphorylation Overview:

Electron Transport Chain (ETC) Integral membrane electron carriers Mobile electron carriers

Following electrons through the electron transport chain

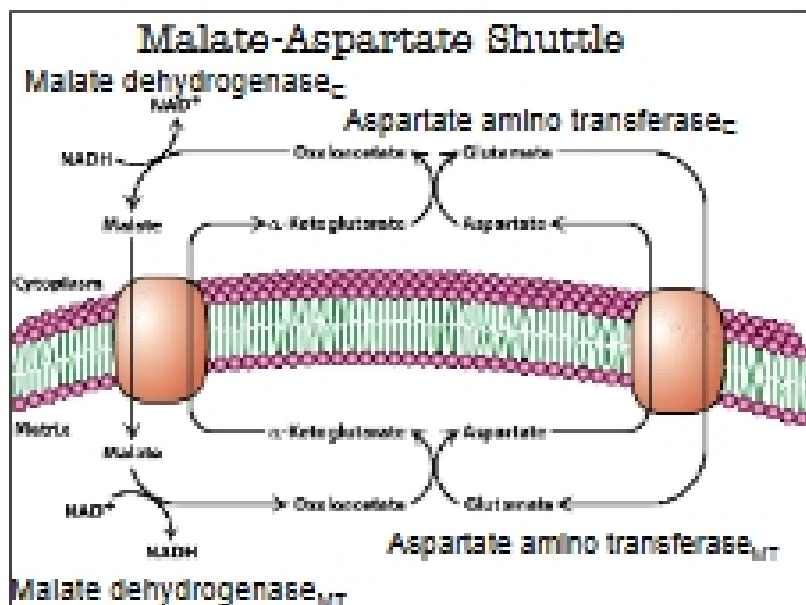
How do reducing equivalents get from the cytoplasm into the mitochondrial matrix?

$\text{NADH} + \text{H}^+ + \text{E-FAD}$ <p>Cytoplasmic Mitochondrial</p> \downarrow $\text{NAD}^+ + \text{E-FADH}_2$ <p>Cytoplasmic Mitochondrial</p> <p>Glycerol 3-phosphate shuttle</p>	$\text{NADH} + \text{NAD}^+$ <p>Cytoplasmic Mitochondrial</p> \rightleftharpoons $\text{NAD}^+ + \text{NADH}$ <p>Cytoplasmic Mitochondrial</p> <p>Malate-aspartate shuttle</p>
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Glycerol 3-phosphate Shuttle

1. Reduction of DHAP to Glycerol-3P
2. Reduction of FAD to FADH₂
3. Reduction of MT e⁻ carrier Q to QH

Matrix: Mobile inner mitochondrial membrane e⁻ carrier
 Q: Ubiquinone (oxidized), QH₂: Ubiquinol (reduced)



NOTES to Help you (no audio)

1) IN Cyto, OAA reduced to Malate
- Malate Dehydrogenase_{Cyto}

2) Malate transported into MT

3) IN MT, Malate oxidized to OAA
- Malate Dehydrogenase_{MIT}

4) IN MT, Glu is deaminated to make α-KG, NH₃ group from Glu is transferred to OAA to make Asp
- Aspartate Aminotransferase_{MIT}

5) Aspartate & α-KG transported to Cyto,

6) IN Cyto, Asp deaminated, makes OAA, NH₃ group from Asp is transferred to α-KG to make Glu. - Aspartate Aminotransferase_{Cyto} (Glu transported into MT)

