MITOCHONDRIAL ATP FORMATION

The proton-translocating ATP synthase

1. Electron flow (electric current)
   Source of hydride ions in NADH
2. Proton flow
3. Proton Translocation from Matrix to Intermembrane space or vice versa

The rotor rotates in three 120° stages within the three (static)
   a₁b₁, a₂b₂, and a₃b₃ subunit pairs in the F₁ complex
In each revolution each of these pairs is sequentially activated
Stage 1: (Loose) a₁b₁ binds ADP and Pi loosely
Stage 2: (Tight) a₂b₂ binds ADP and Pi tightly to form ATP
Stage 3: (Open) a₃b₃ releases ATP

Thus 3 ATP is formed from 3ADP+3Pi in each revolution of g
One revolution of g is driven by 10 retro-located protons
   circulating through 10 c-subunits (- but this may vary)

The design and function of some of the sub-units shown is not yet clear and others (not shown) are a major focus of research

With Martin Brand, Richard Cammack, Peter Henderson, Vladimir Skulachev and others

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