

## electron transport chain

- I. Overview
  - A. ATP needed
    1. oxidative phosphorylation
  - B. protein & cofactor complexes
  - C. Historical
    1. chemiosmotic theory
  - D. Protonmotive Force
  - E. Equation / Pathway
  - F. Electron flow
    1. redox centers
  - G. Location & Components
- II. Complex I
  - A. Substrates
  - B. Bound Cofactors
  - C. Structure
  - D. Reactions
    - a. ubiquinone
- III. Complex II
  - A. Substrates
  - B. Bound cofactors
  - C. Structure
  - D. Reactions
- IV. Complex III
  - A. Substrates
  - B. Bound cofactors
    1. cytochromes
  - C. Structure
  - D. Reactions
    1. Q cycling
- V. Complex IV
  - A. Substrates
  - B. Bound cofactors
  - C. Structure
  - D. Reactions
- VI. Complex V
  - A. Structure
    1.  $F_1 - \alpha_3\beta_3\gamma\delta\epsilon$
    2.  $F_0 - a_1b_2c_{10-14}$
  - B. Reactions
    1. passage of  $H^+$ s
    2. rotation of c and  $\gamma$ 
      - a. conformations of  $F_1$ 
        - 1) loose
        - 2) tight
        - 3) open
    3. binding-change mechanism

## VII. Transport

### A. ATP synthasome

1. adenine nucleotide translocase
2. phosphate translocase

### B. NADH

1. malate-aspartate shuttle
2. glycerol 3-P shuttle