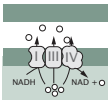


ATP synthesis



$$N_{\text{ATP synthase}} \approx 3000 \text{ ATP synthases}$$

$$r_{\text{ATP synthesis}} \approx \frac{300 \text{ ATP / sec}}{\text{synthase}} \quad \text{BNID: 114701}$$

$$N_{\text{protons}} \approx 4 \text{ H}^+ / \text{ATP} \quad \text{BNID: 101442}$$

$$r_{\text{proton use}} \approx N_{\text{ATP synthase}} \times r_{\text{ATP synthesis}} \times N_{\text{protons}}$$

$$\approx 3000 \text{ synthases} \times \frac{300 \text{ ATP}}{\text{sec} \times \text{synthase}} \times \frac{4 \text{ H}^+}{\text{ATP}}$$

$$\approx 5 \times 10^6 \text{ H}^+ / \text{sec}$$

$$r_{\text{transport}} \approx 1500 \frac{\text{H}^+ / \text{sec}}{\text{e}^- \text{ transport chain}} \quad \text{BNID: 114704}$$

$$\quad \text{BNID: 114687}$$

$$\frac{r_{\text{proton use}}}{r_{\text{transport}}} \approx \frac{5 \times 10^6 \text{ H}^+}{\text{sec}} \times \frac{1 \text{ e}^- \text{ transport chain} \times \text{sec}}{1500 \text{ H}^+}$$

$$\approx 3000 \text{ e}^- \text{ transport chains}$$

number of ATP synthase per cell

ATP synthesis rate per synthase

protons transported into cytosol per ATP

rate of proton depletion

rate of proton transport into intermembrane space by electron transport chain

number of electron transport chain complexes