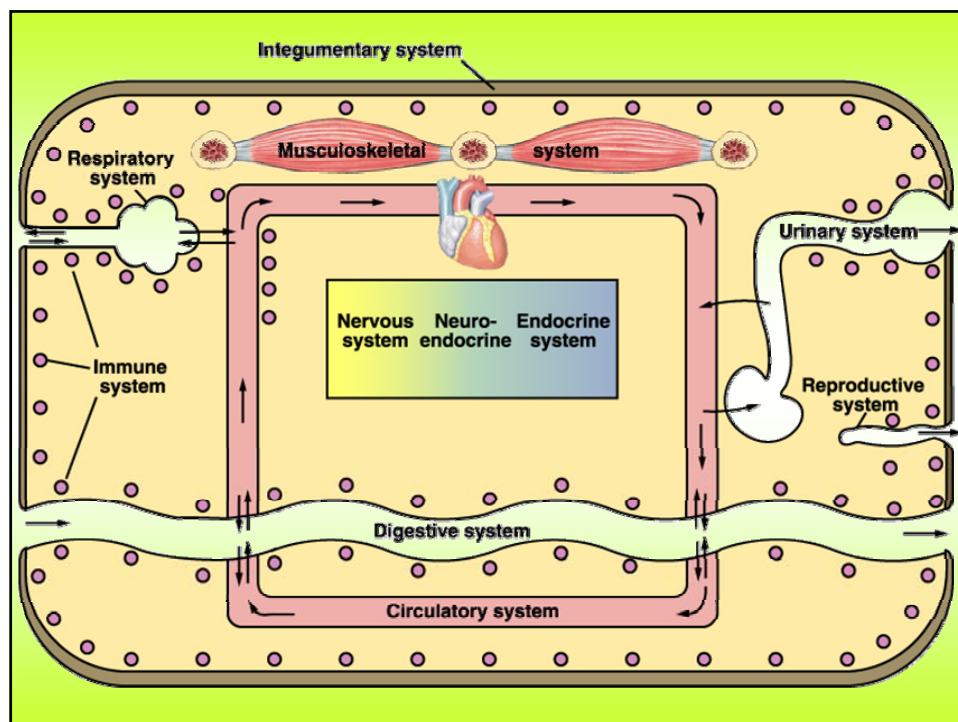
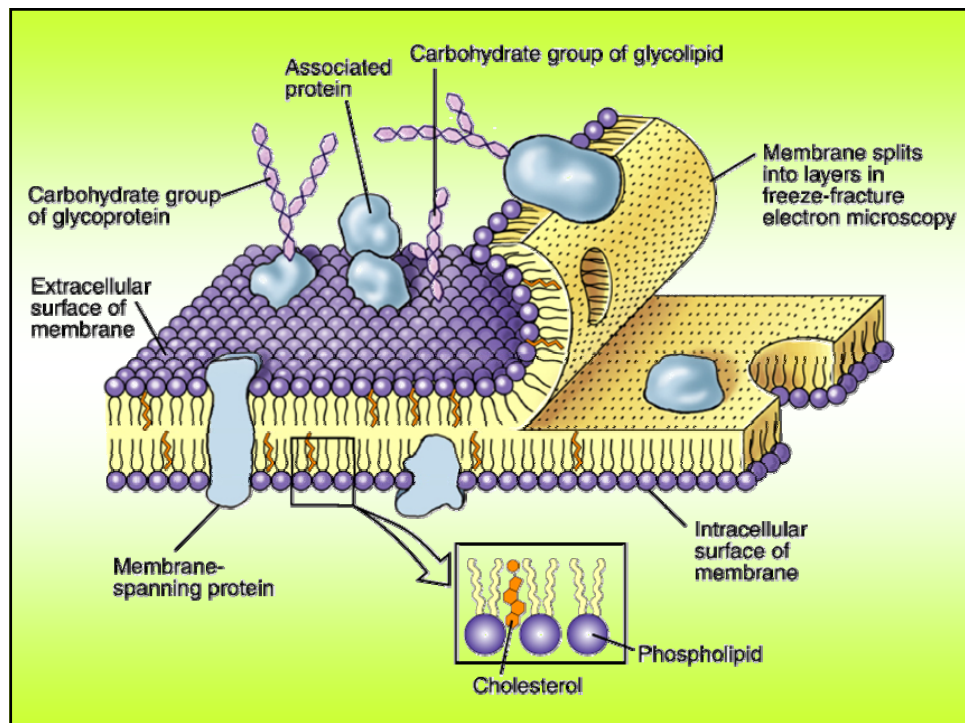
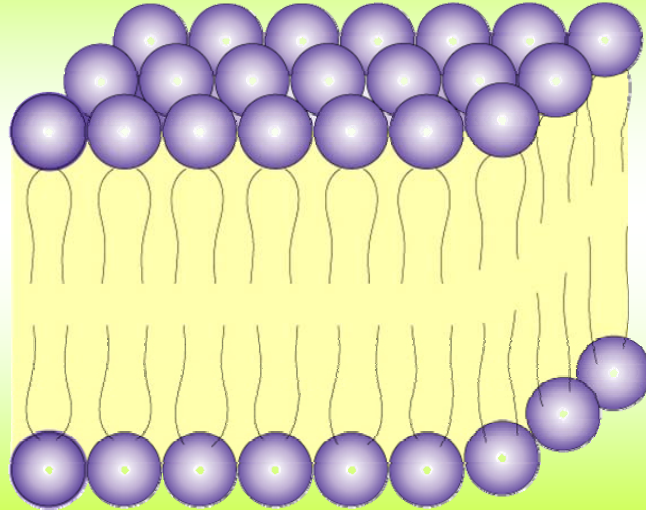
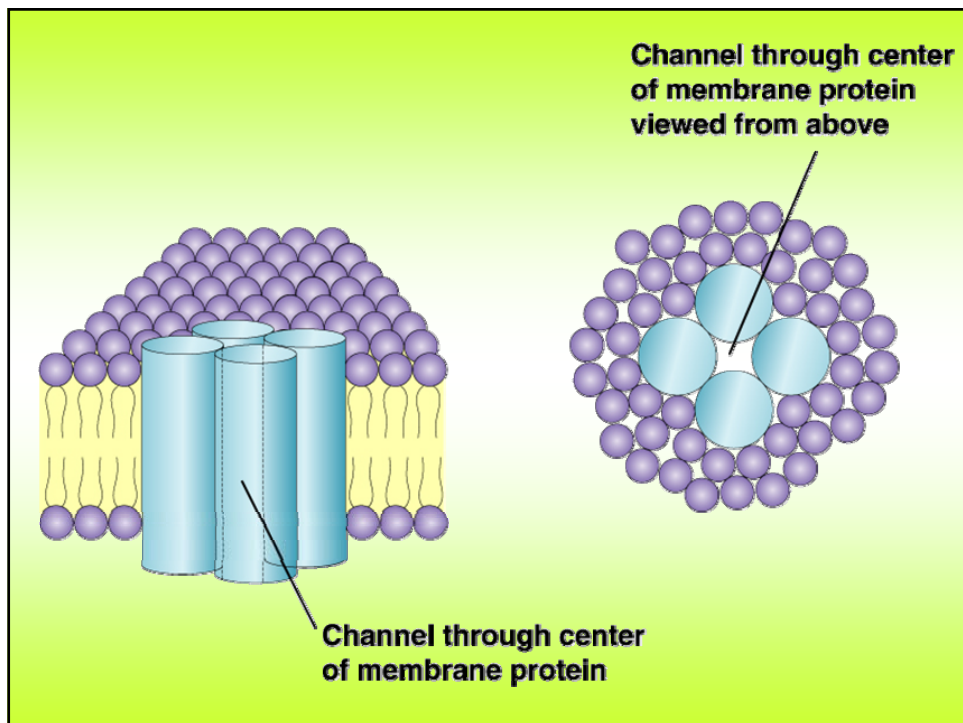
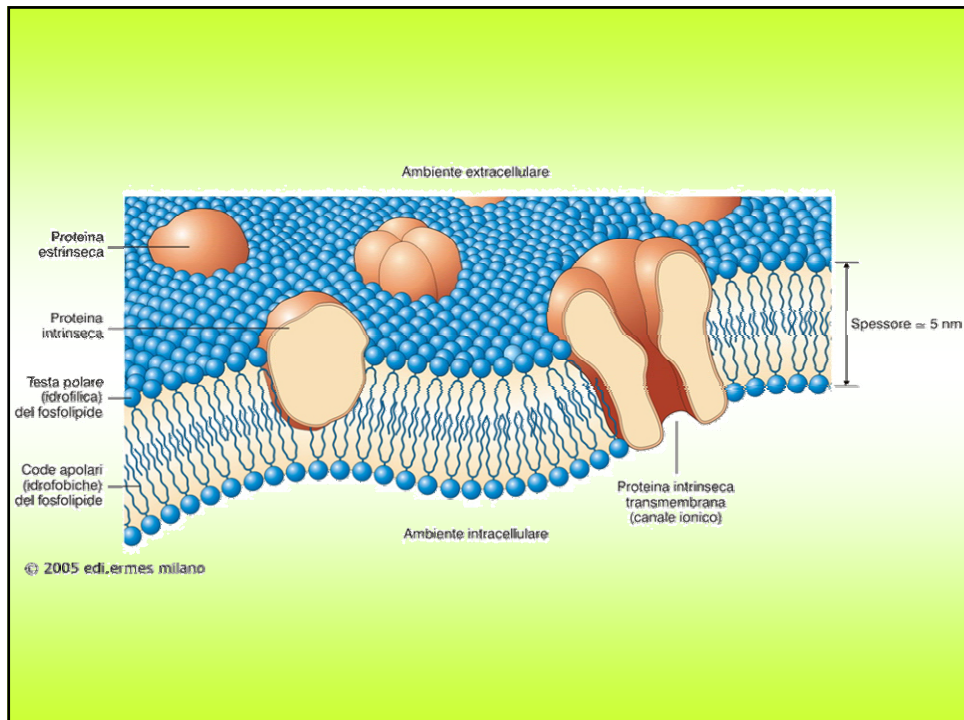
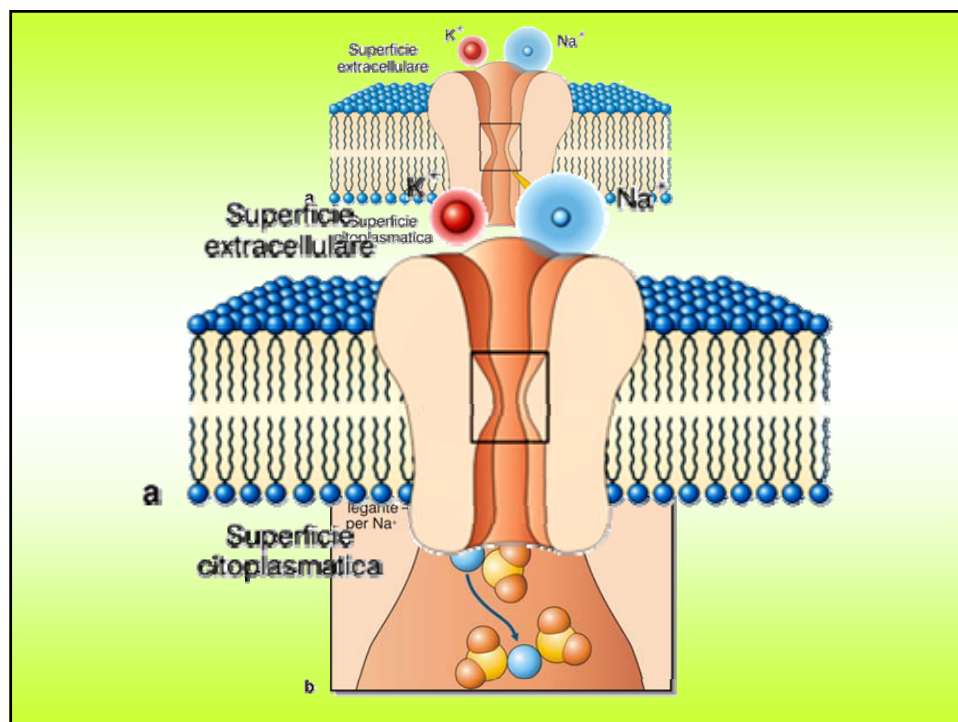
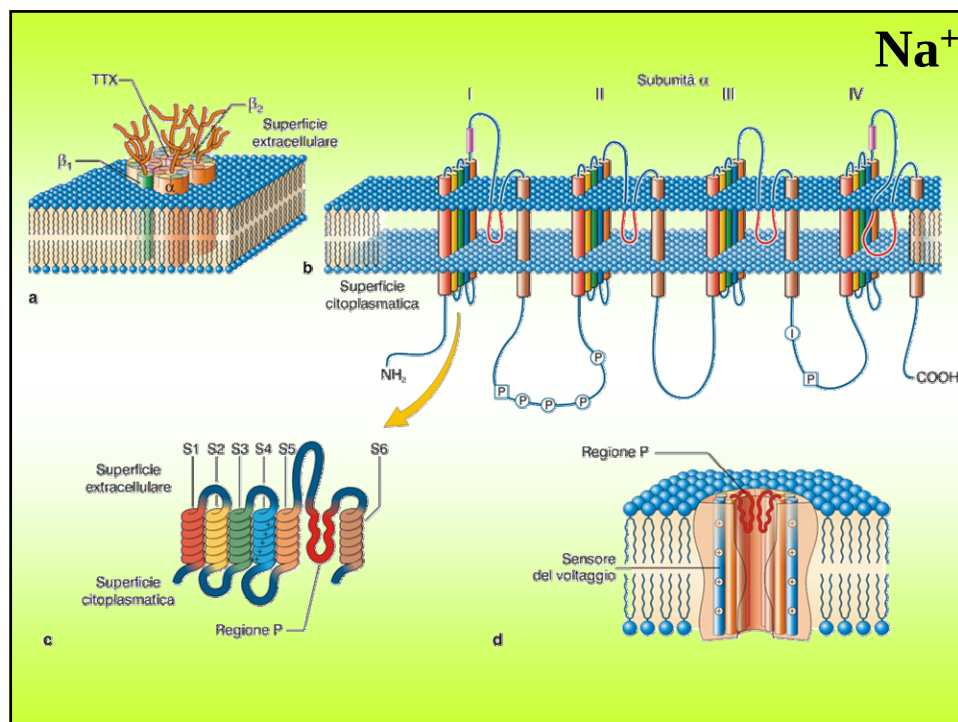


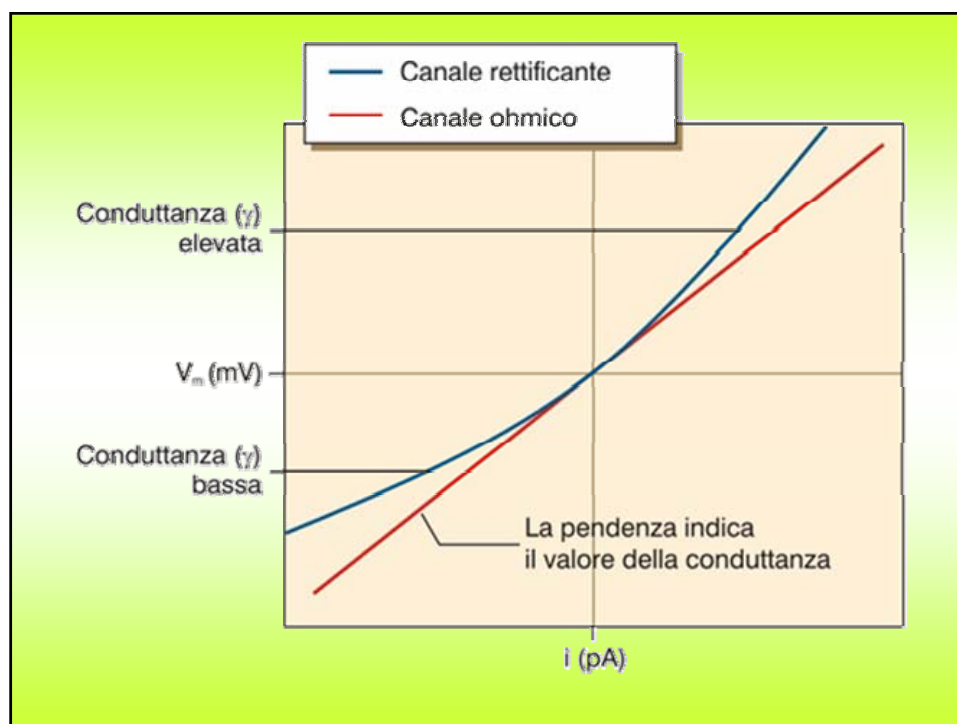
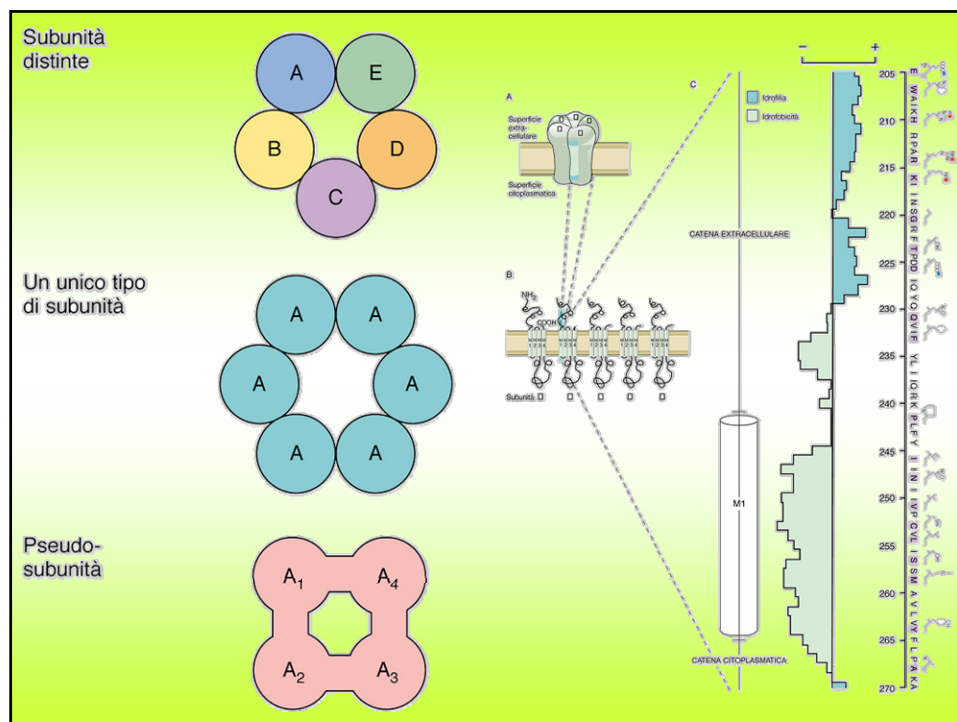


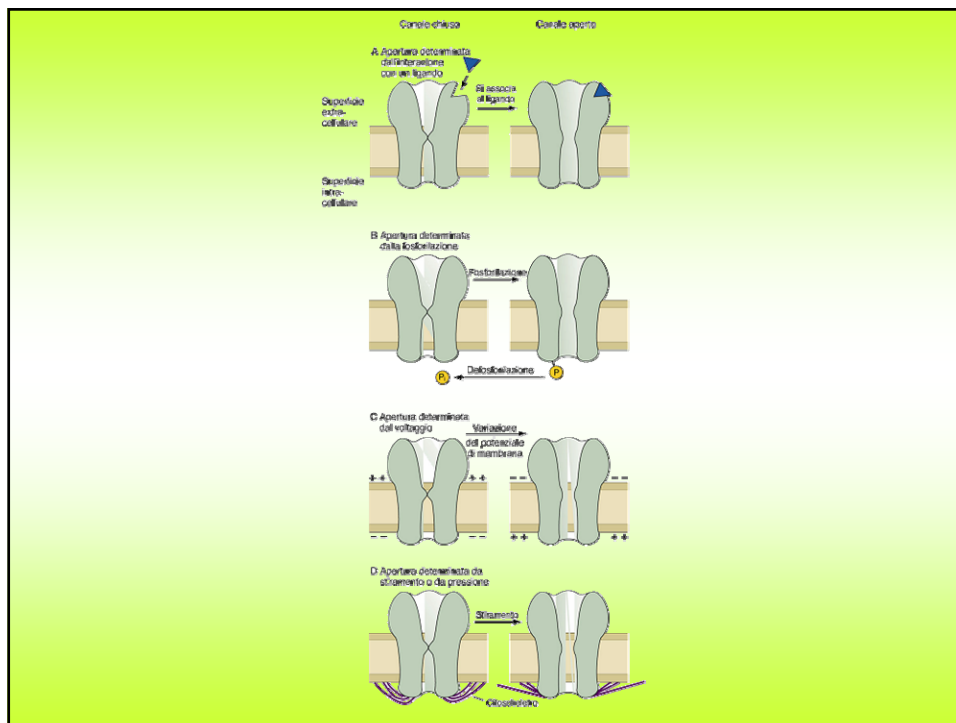
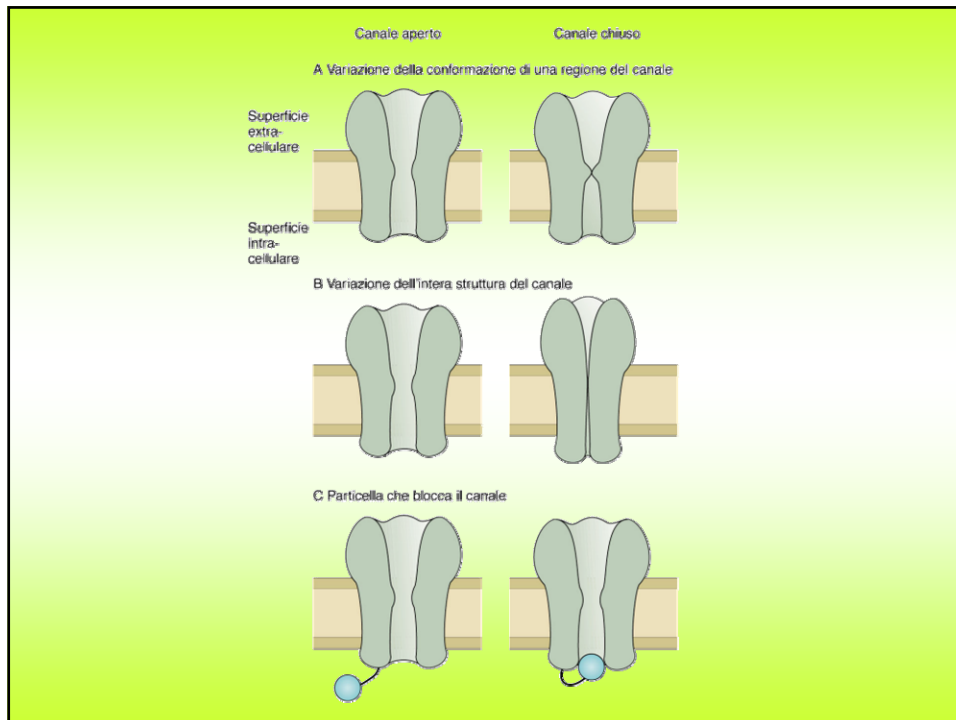
Cell membrane

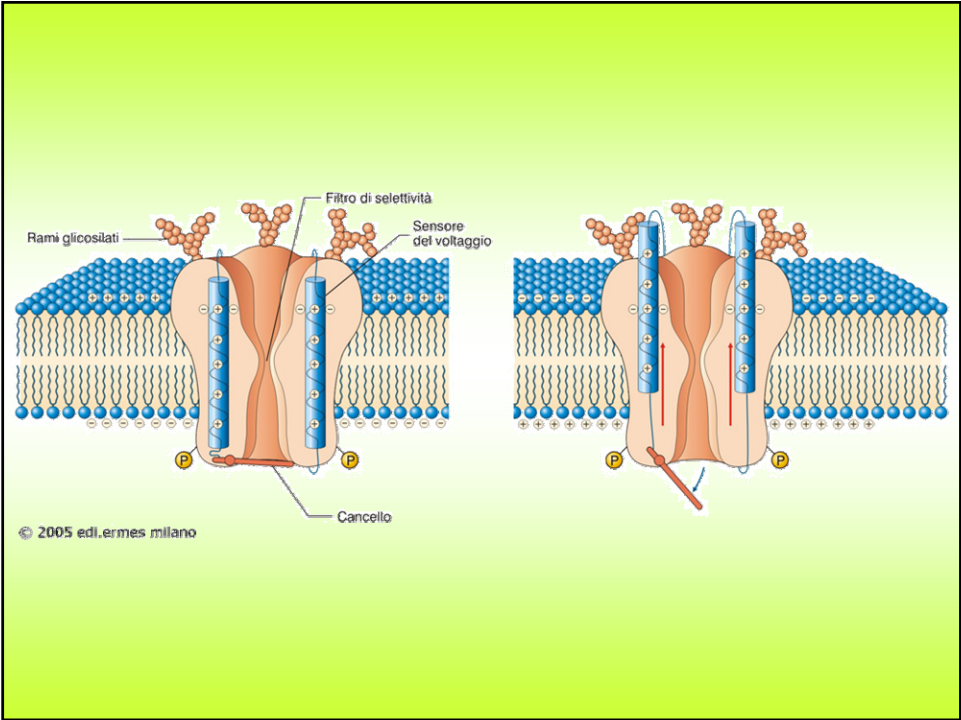
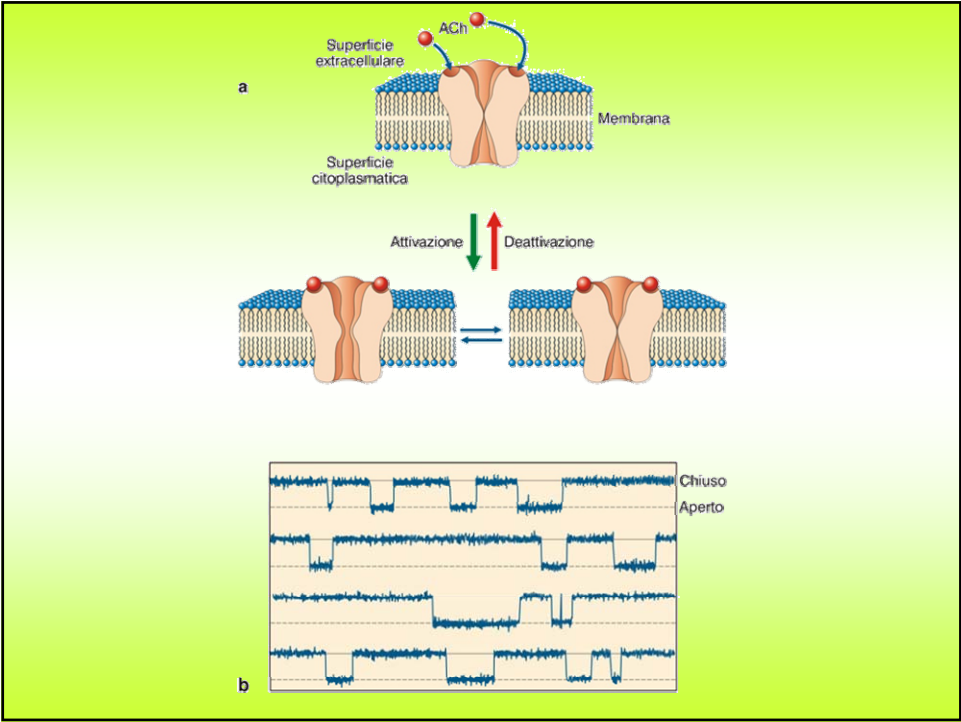


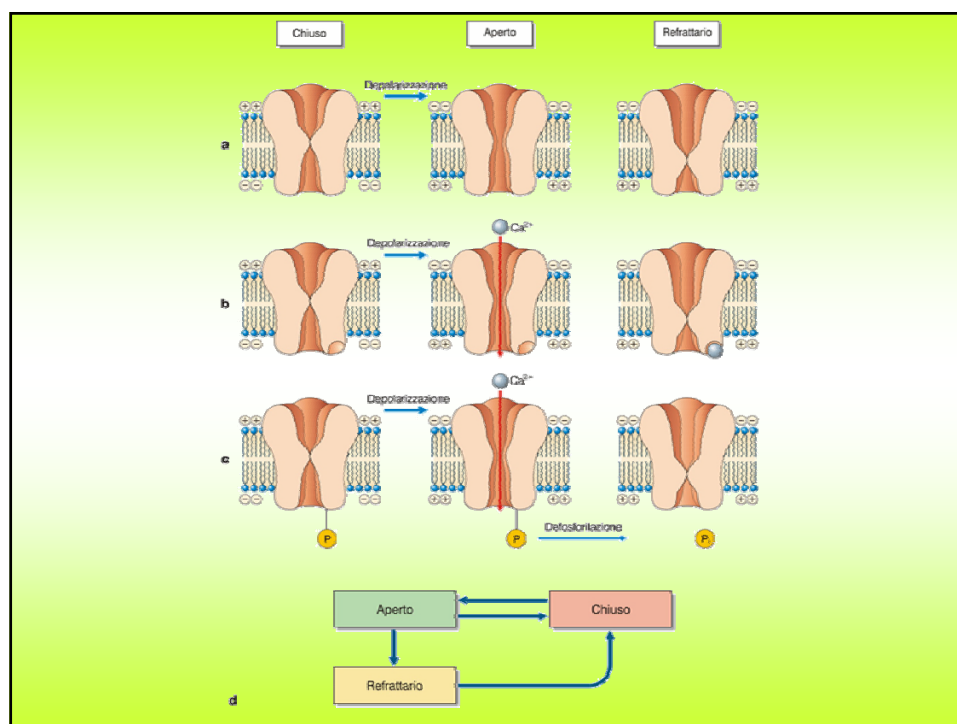


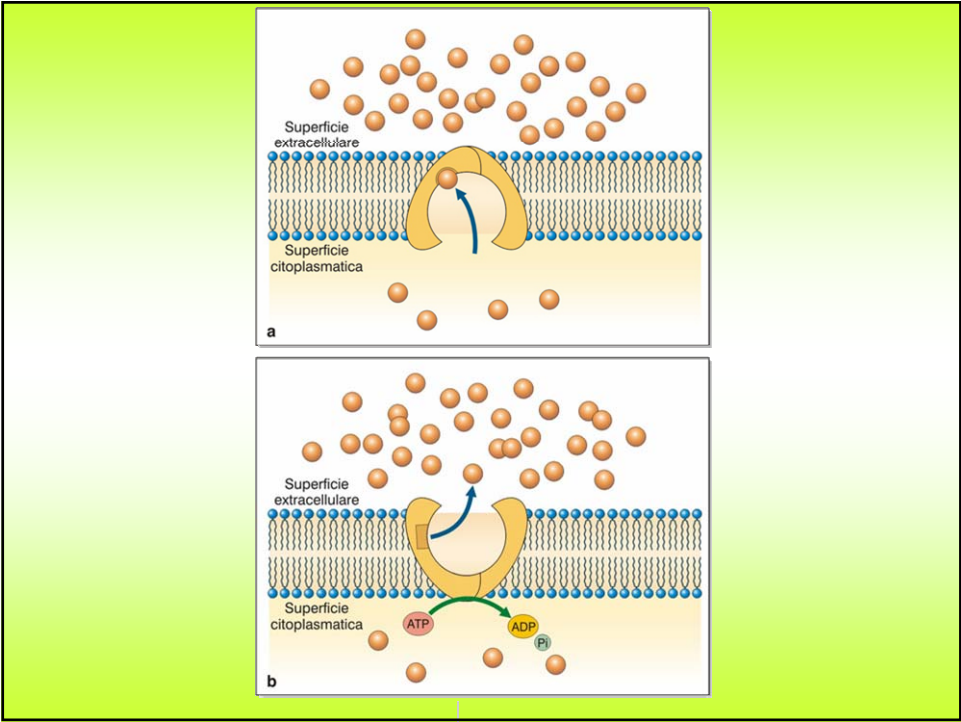
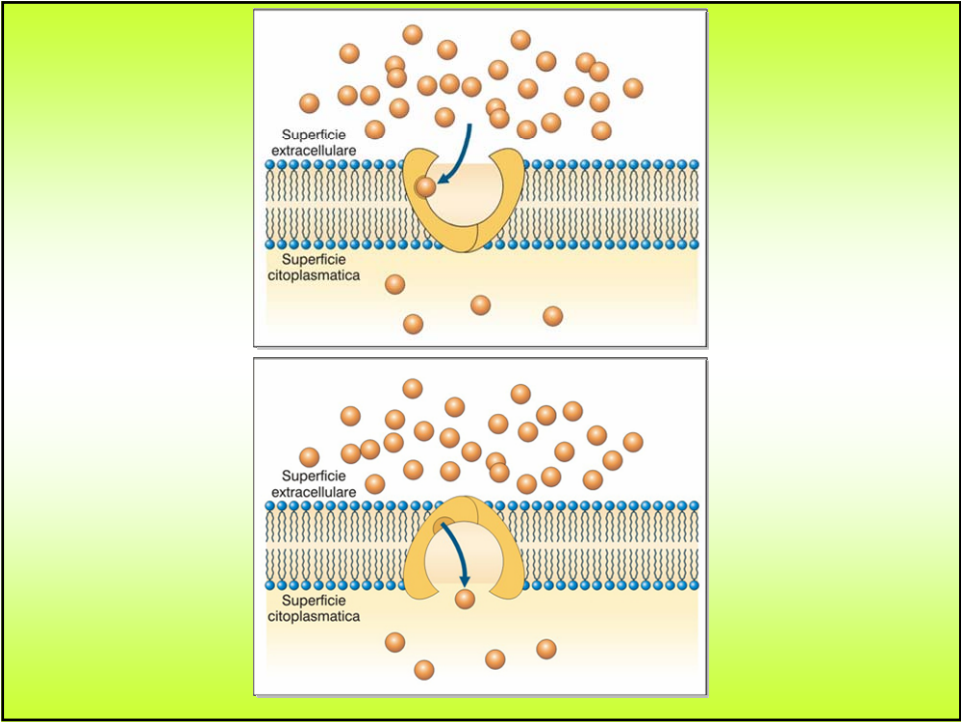






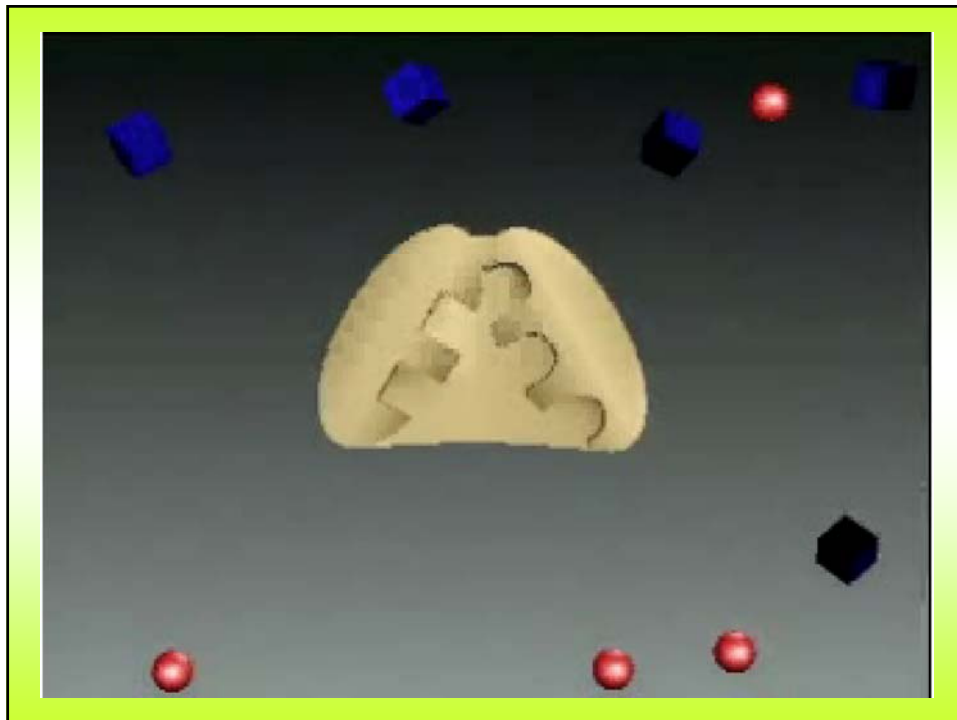


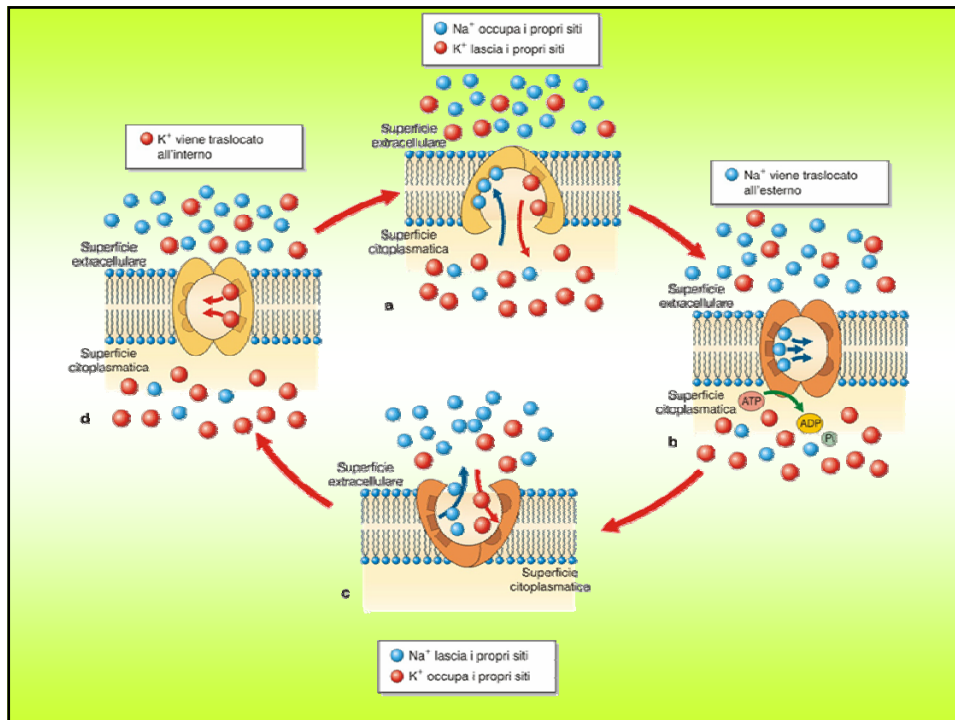




Principali tipi di pompe

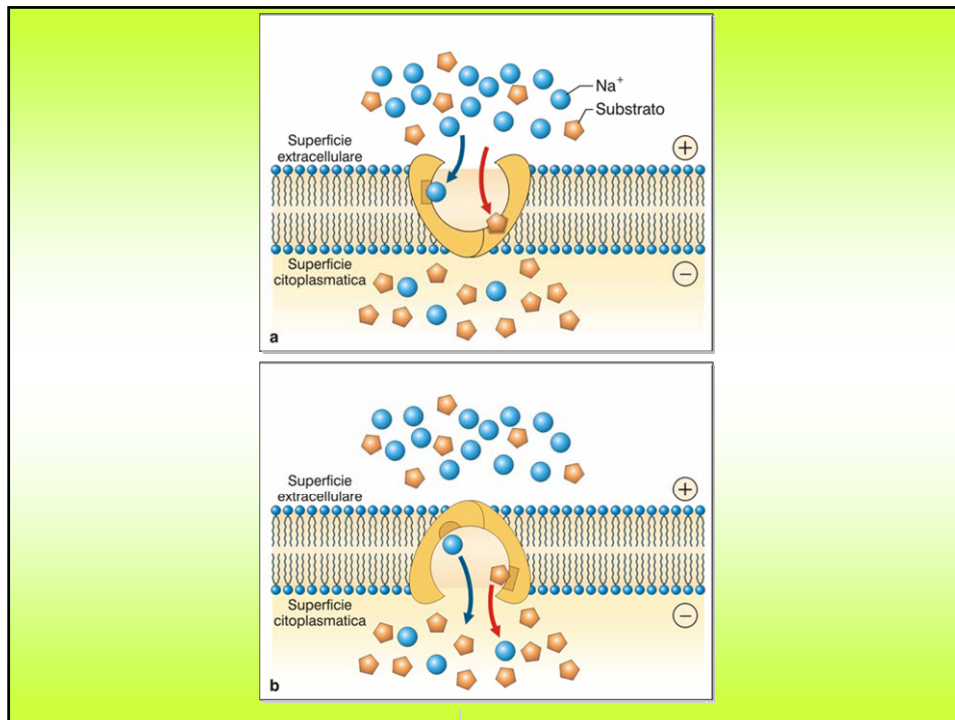
- ATPasi protoniche (trasportano H^+)
- ATPasi per il calcio (Plasma Membrane Ca^{2+} ATPase, PMCA – Sarcoplasmatic-Endoplasmatic Reticulum Ca^{2+} ATPase, SERCA)
- ATPasi Na^+/K^+ dipendente (pompa del sodio e del potassio)





Cotrasporto

- **Simporto:** due molecole vengono trasportate nella stessa direzione; il gradiente di concentrazione di una delle due funziona da “motore”.
- **Antiporto:** due molecole vengono trasportate in direzioni opposte; anche in questo caso, il gradiente di concentrazione di una delle due funziona da “motore”.

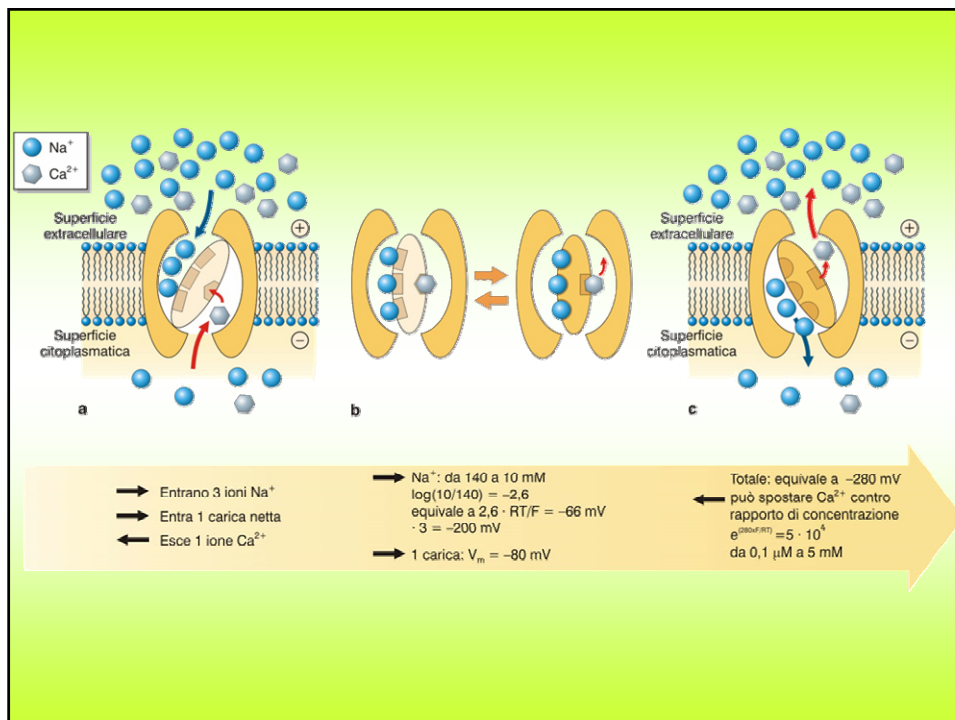


Principali sistemi di simporto (piccole molecole organiche)

- Trasportatori di glucosio: SGLUT1 e SGLUT2
- Trasportatori di aminoacidi
- Neurotrasportatori: GAT (GABA), DAT (dopamina), NET (noradrenalina, amine), SERT (serotonina), di glicina, di colina, Na⁺/K⁺ dipendenti (glutammato e aspartato)

Sistemi di simporto ionico

- Trasportatori di $\text{Cl}^- \text{K}^+/\text{Cl}^-$ (KCC): trasportano il Cl^- verso l'esterno della cellula
- Trasportatori di $\text{Cl}^- \text{Na}^+/\text{K}^+/2\text{Cl}^-$ (NKCC): trasportano il Cl^- verso l'interno della cellula



Principali sistemi di antiporto

- Scambiatore $\text{Na}^+/\text{Ca}^{2+}$
- Scambiatori Na^+/H^+ e $\text{Cl}^-/\text{HCO}_3^-$
- Neurotrasportatori vescicolari (dipendenti da ATPasi protoniche che pompano H^+ verso l'interno delle vescicole)