

Turning Kinesin On the Unconventional Way

Jing Xu

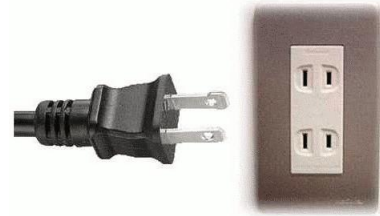
Gross Lab, UC Irvine



Macroscopic Machine



- Coffee Maker
- Energy source



- Operation
 1. Turn machine on.
 2. Use feature.
 3. Turn machine off.

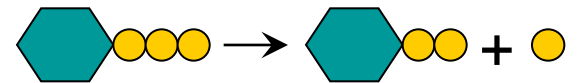
Nano-Machine



Vale, *Cell* (2003)

- Molecular Motor: Kinesin-1

- Energy source

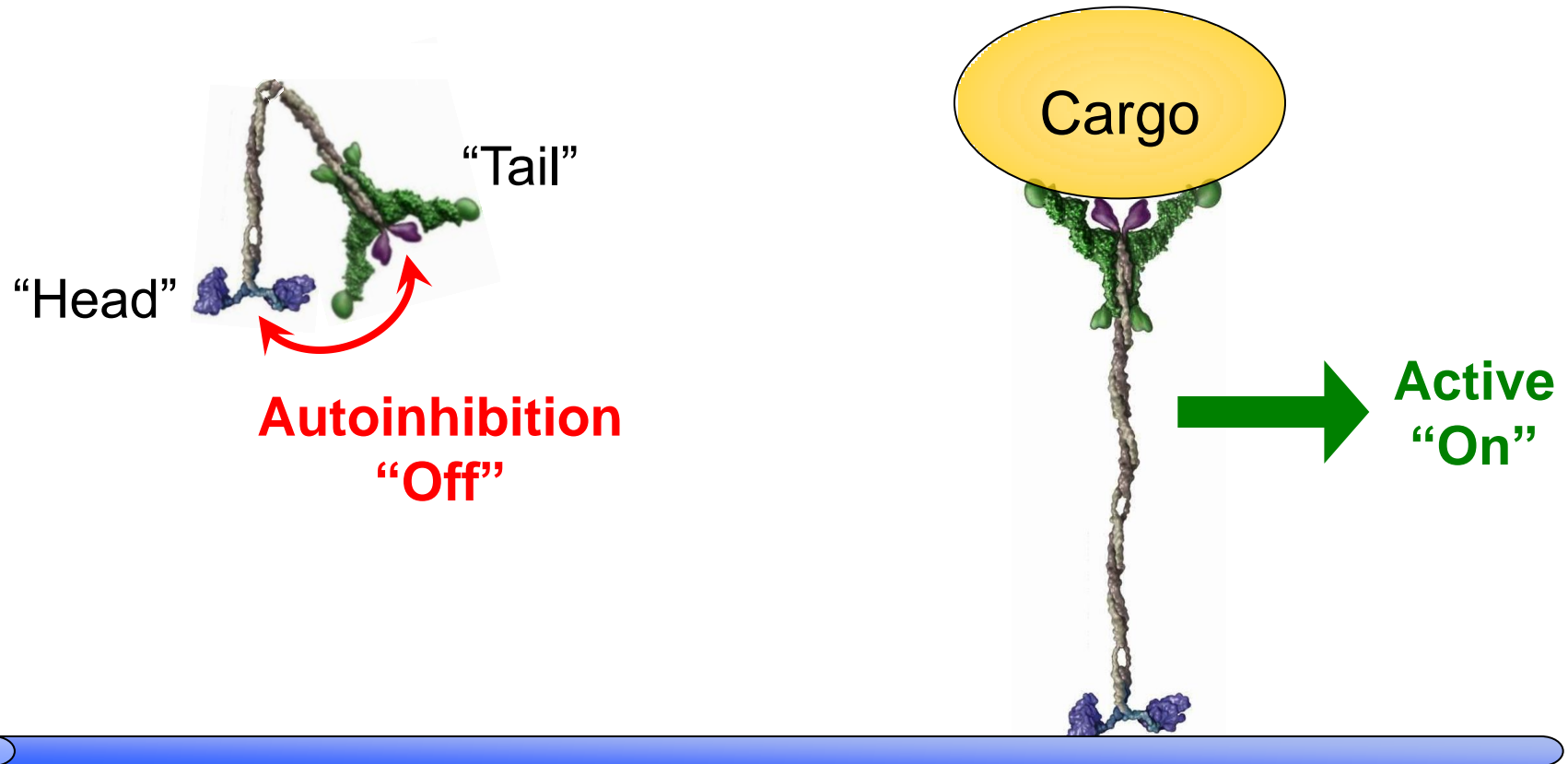


$$\Delta G \sim -0.5 \text{ eV} \sim -20 k_B T$$

- **Operation?**

1. Turn machine on?

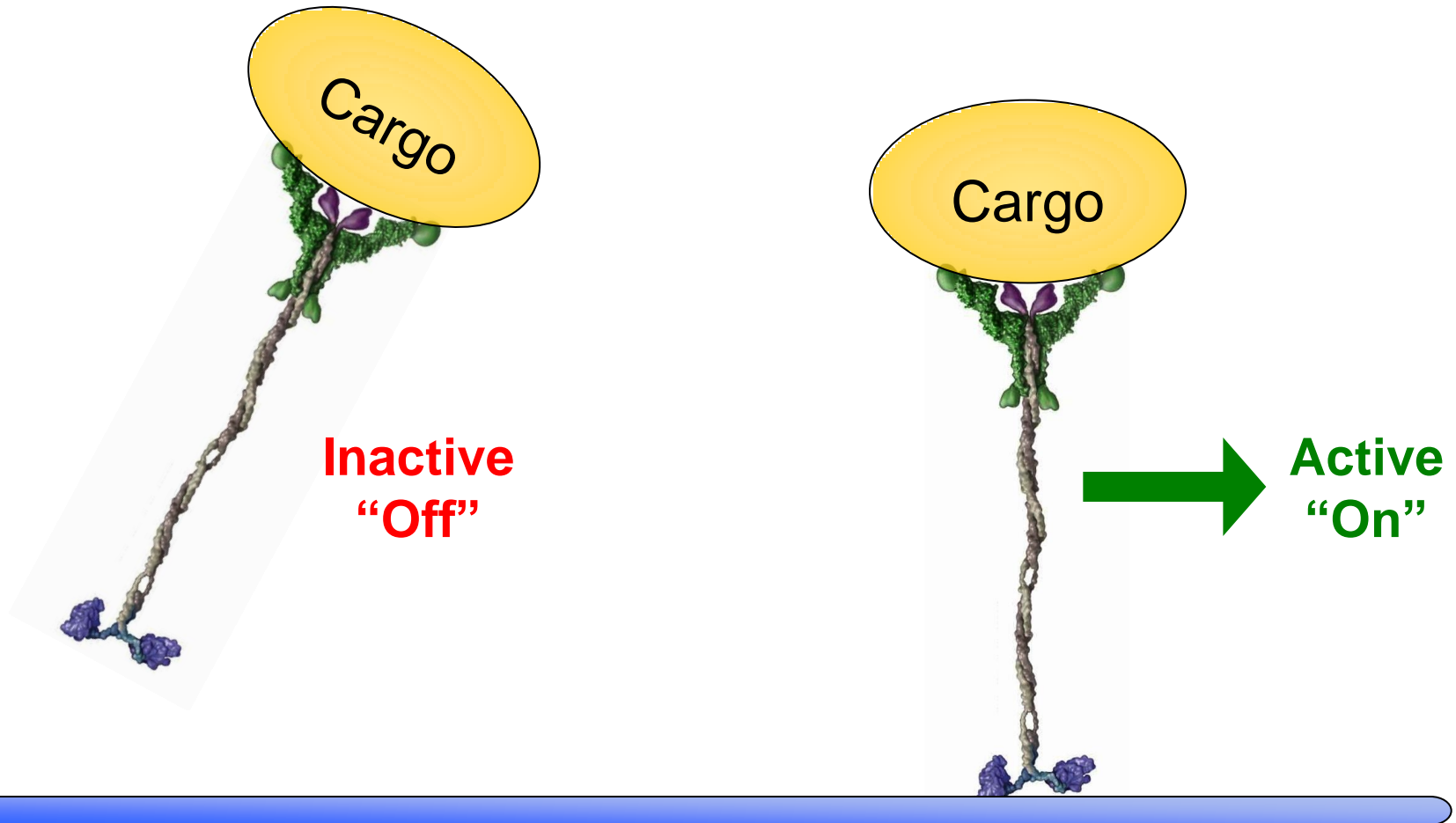
Conventional Wisdom: Head-Tail Interaction



Microtubule

Hackney et. al, *JBC* (1992), Cai et. al, *JCB* (2007), Dietrich et. al, *PNAS* (2008), ...

Biology: There Exists Higher Order Regulation



Microtubule

Welte et. al, *Cell* (1998), Shubeita et. al, *Cell* (2008), Encalada et. al, *Cell* (2011)

Tail-Independent Inactivation, Reversible

