CONCEPT: KINESINS AND DYNEINS

● Cells transport molecules, vesicles, and organelles throughout the cells on microtubules

□ There are two types of cellular _____

- **Brownian movement** is random thermal motions

- **Salutatory movement** is jerky, stepwise movement in a single direction

□ **Motor proteins** use energy from ATP hydrolysis to transport molecules across a microtubule in a single direction

- **Kinesins** move molecules towards the plus end (away from cell body)

- Over 14 families, but **kinesin I** is the one we will use as an example

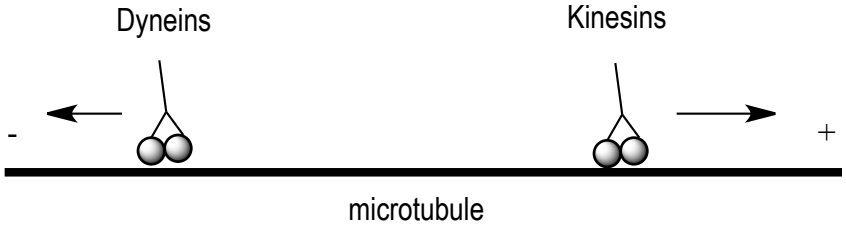
- **Dyneins** move molecules towards the minus end (towards the cell body)

- Interacts with **dynactin** protein to move cargos over long distances

□ There are multiple _____ of motor proteins

- Each has a different speed of movement depending on the cell type in which it's expressed

EXAMPLE: Kinesins and Dyneins



● Motor proteins have a specific _____

□ They function as dimers with two globular heads and a single tail

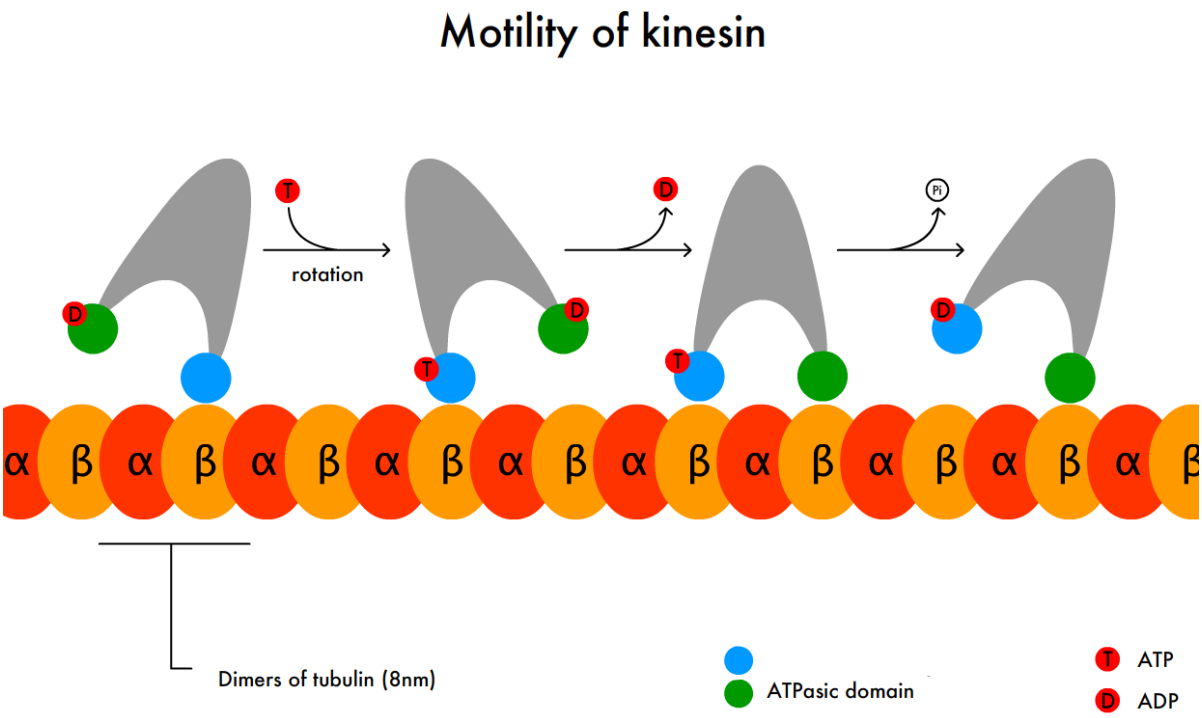
- The two heads bind to microtubules in one orientation, and hydrolyze ATP to move along the microtubule

- The tail attaches to vesicles, cargo, or organelles

□ The heads go through repeated cycles of ATP hydrolysis to continually bind

- **Processive movement** is movement that occurs for long distances without falling off (motor proteins)

EXAMPLE: Movement of kinesin along a microtubule



PRACTICE:

1. True or False: Kinesins move molecules away from the cell body
    a. True
    b. False

2. Where do motor proteins get the energy to move molecules throughout the cell?
    a. ATP
    b. GTP
    c. Breakdown of H_2O
    d. Breakdown of sugars

3. Which of the following motor protein structures directly attaches to the cargo to transport it throughout the cell?
    a. One globular head
    b. Both globular heads together
    c. The motor protein tail
    d. The microtubule