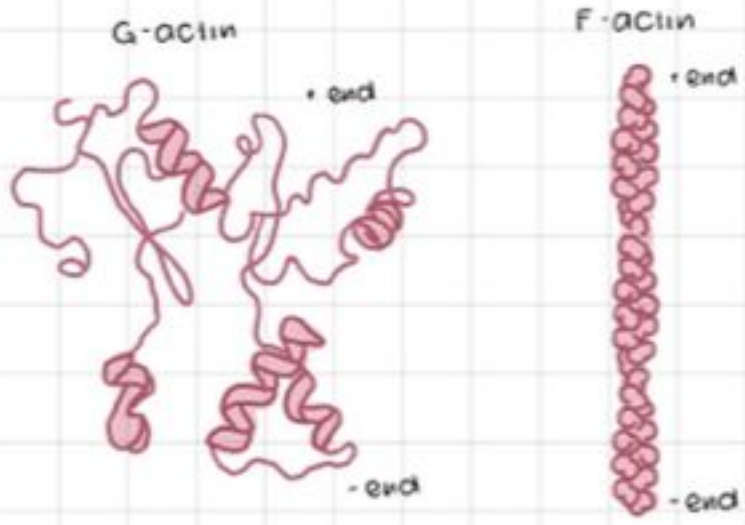
actin

- how are these networks assembled, & how is their activity regulated → understand how they participate in complex behaviors

ACtin Structure

- individ. actin protein: globular; assembles into filaments
- * globular structure: unstable → dynamic; interacts w/ other proteins & water
- polarized assembly: + end & - end, on full filament & individ. proteins
- G-actin: globular, F-actin: filamentous; behave diff. & diff. functions

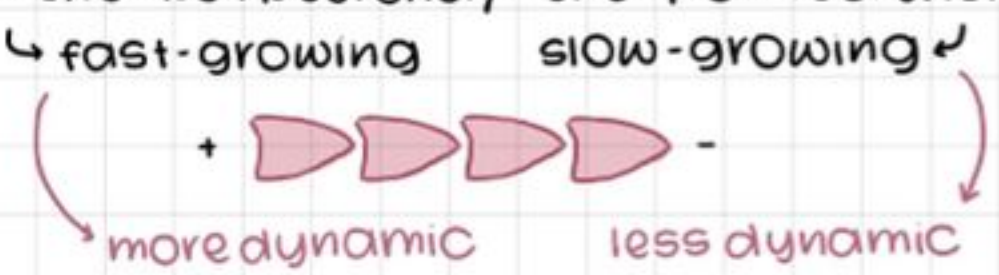


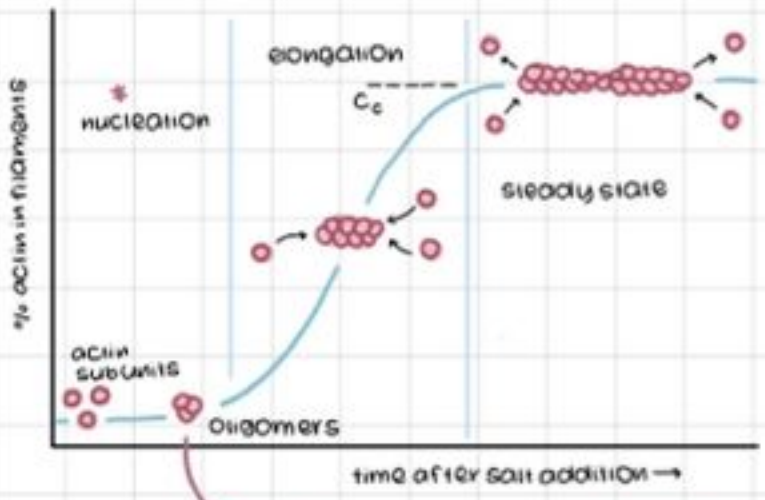
ACtin Conservation

- homologs in other organisms, even bacteria
- slightly diff, same biochem basis

polymerization

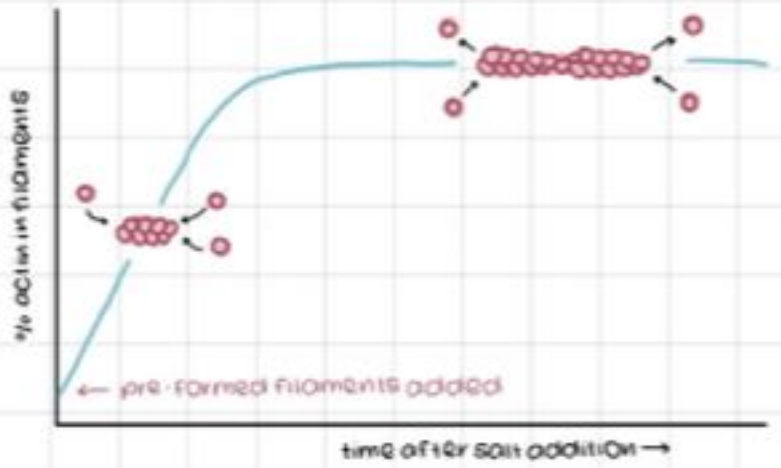
- + end: barbed end, - end: pointed end
  - ↳ fast-growing
  - slow-growing ↵





rate-limiting step / kinetic barrier

- polymerized by hydrolyzing ATP → stabilizes diff conf. → actin can be elongated
- monomers dynamically interact w/ each other → random assoc. → oligomers
- sufficiently stable oligomer → rapid polym.
  - slowed disassoc: overcoming energy barrier
- $rate_{on} = rate_{off}$ at steady state



- eliminates need for monomer interactions
- ATP analog used that can't be fully hydrolyzed → keeps protein in ATP conf. → small seeds are stable & don't disassemble

- limited actin assembly in cells: free proteins sever filaments, some bind to monomers & make them polymerization-incompetent
- * energy stored in filaments: energetic gain to polymerization ($g\text{-actin} > C_c$)

- affinity for G-actin binding at + & - ends: equal; same biochemical identity
  - ↳ state function: only concern is start & end, not pathway