CONCEPT: CHAPERONE PROTEINS

●Some *small* proteins quickly fold without any intervention, but _____ proteins fold slow & are more likely to need help.

□ Misfolded & unfolded proteins can result in protein _____ (clump of non-functional proteins).

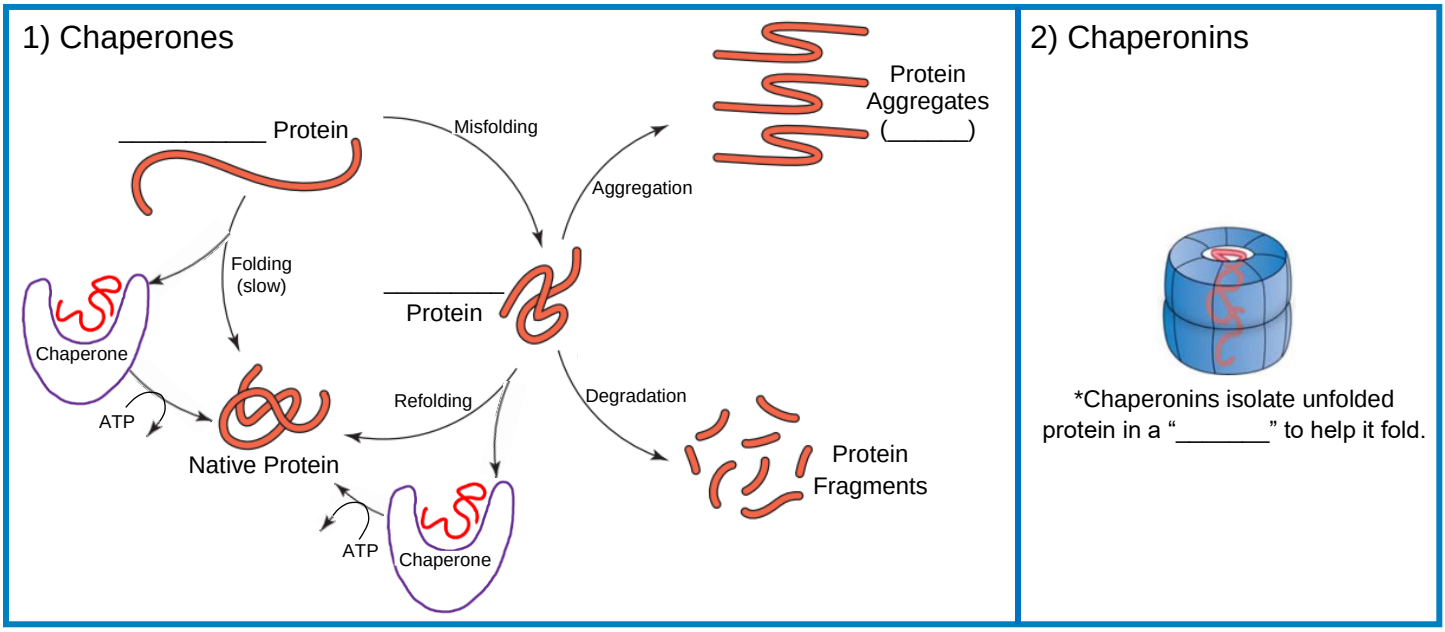
□ Many diseases such as Alzheimer's & Parkinson's result from misfolded proteins called _____.

1) _____: proteins that bind to other unfolded proteins & use ATP to increase their rate of correct folding.

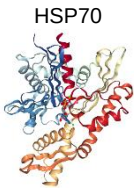
□ Example: Heat-shock chaperones facilitate proper folding of proteins denatured due to _____.

2) _____: class of chaperone that use ATP & assists in protein folding by creating a "cage" around the protein.

EXAMPLE: Molecular chaperones & chaperonins.



PRACTICE: Heat shock protein 70 (HSP70), a chaperone protein found in many organisms, is one of the most highly conserved proteins in all of biology. Which of the following statements about HSP70 is true?



a) HSP70 operates by forming a large cage around the unfolded polypeptide to increase its solubility.
b) HSP70 facilitates proper protein folding without the use of energy.
c) Cellular expression of HSP70 concentration significantly increases in high temperature environments.
d) Expression of HSP70 concentration decreases or stays constant in high temperature environments.

PRACTICE: Which statement best describes how chaperones perform their function?

a) They prevent intermolecular hydrophobic interactions to facilitate proper protein folding.
b) They prevent the premature aggregation of secondary structures, allowing the hydrophobic core to form.
c) Chaperones are proteases that digest and disrupt protein aggregates when they form.
d) They hydrolyze ATP to physically manipulate proteins into their appropriate shape.

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PRACTICE: Which statement most accurately characterizes the effect of high temperatures (>50˚C) on protein folding?

a) High temperatures increase the rate of protein folding so proteins adopt their native fold faster.

b) There is little to no effect of high temperature on protein folding.

c) At high temperatures, proteins are denatured but will re-fold into their native state upon cooling.

d) At high temperatures, proteins are denatured and at risk of forming intermolecular aggregates.

PRACTICE: Which of the following statements is false concerning Heat shock protein 60 (HSP60), a chaperonin protein?

a) HSP60 is required for some proteins to make their proper protein folding process spontaneous.

b) Like HSP70, HSP60 facilitates proper protein folding through binding & hydrolysis of ATP.

c) Cellular expression of HSP60 concentration increases in high temperature environments.

d) HSP60 operates by forming a large cage that the unfolded polypeptide enters to assume its native fold.