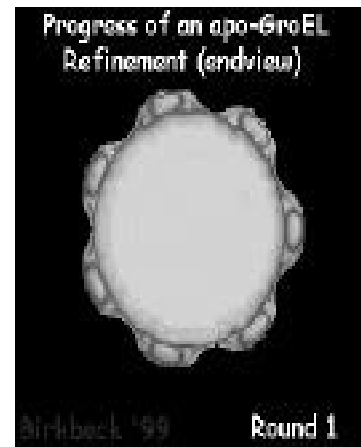
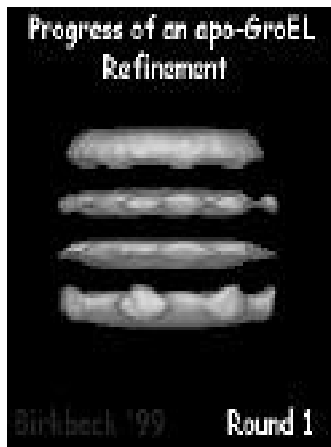
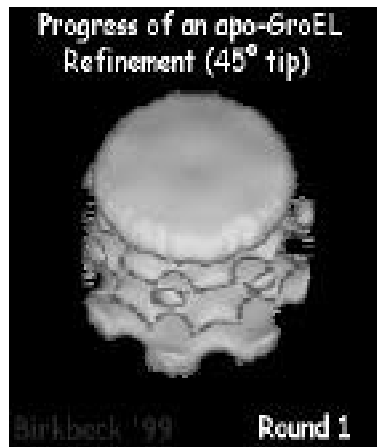


Chaperone



Kai Wan

- 1. the history of chaperone
- 2. the families of chapeone
- 3. One chaperone: GroEL and GroES
- 4. A simple example of chaperone.
- 5. The function of chaperone in food science.

The history of chaperone

The history of chaperone

- In 1978, the first term molecular chaperone was originally coined to describe the function of nucleoplasmin, a nuclear protein that facilitates chromatin assembly by preventing improper interactions between histones and DNA.

The history of chaperone

- Later the term was generalized to include a range of functionally related, but diverse, proteins that assist the folding and assembly of other proteins.

The history of chaperone

- Current definition describes a molecular chaperone as a protein which transiently binds to and stabilizes an unstable conformer of another proteins, and through regulated binding and release ,facilitates its correct fate in vivo

The families of chaperone

The families of chaperone

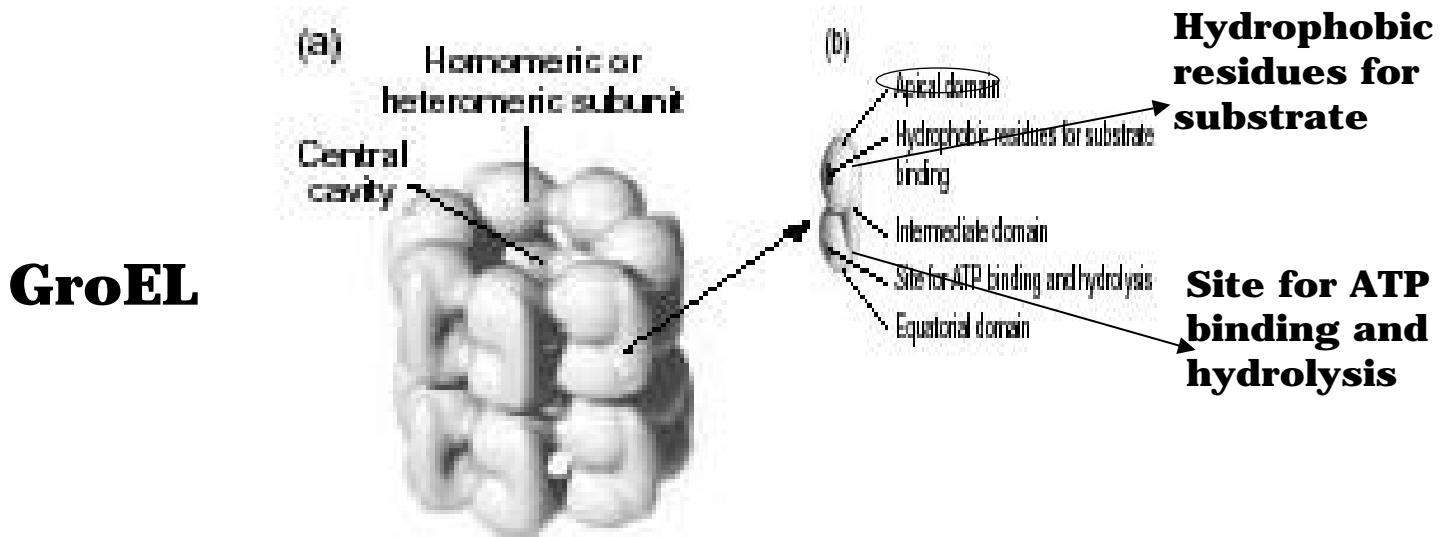
- Molecular chaperones comprise several highly conserved families of related proteins, many of which are also heat shock proteins, which is synthesized during the exposure of organisms to heat or other stresses

The families of chaperone

Eukaryotes	Prokaryotes
Chaperone proteins	
Hsp90, Hsp70, Hsp 40, Small Hsps	HtpG, DnaK, DnaJ, LbpA
Chaperonin proteins	
GroupI	
Hsp60-Hsp10	GroEl-GroES
GroupII	
TCP- 1	TF55,56, thermosome

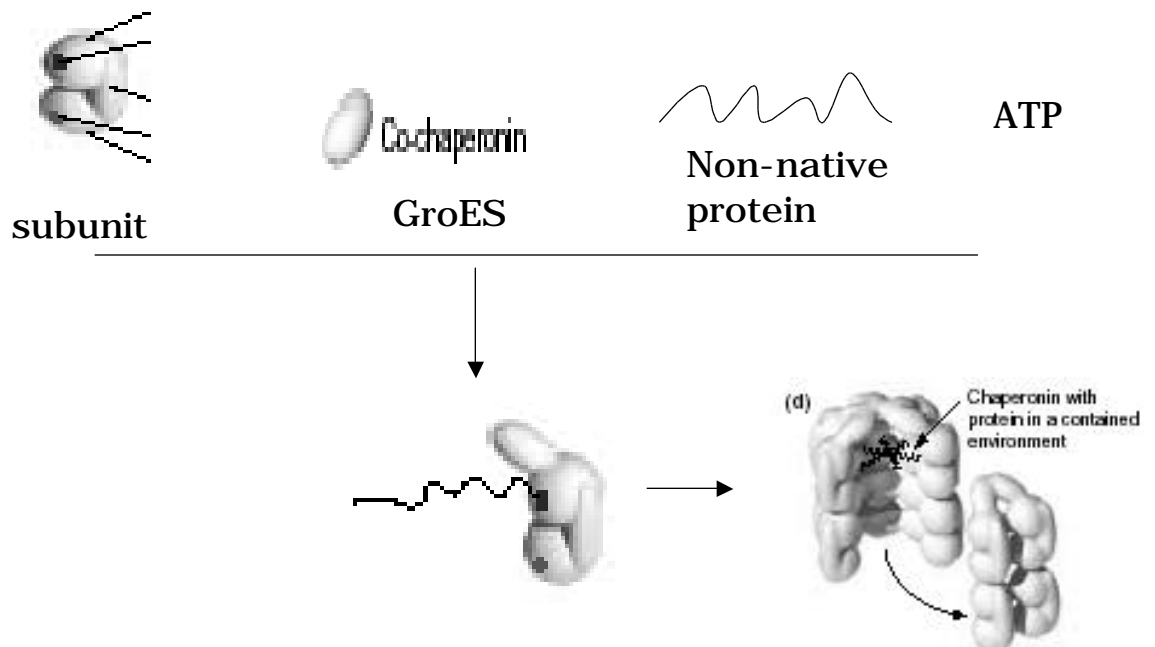
GroEL-GroES

GroEL-GroES



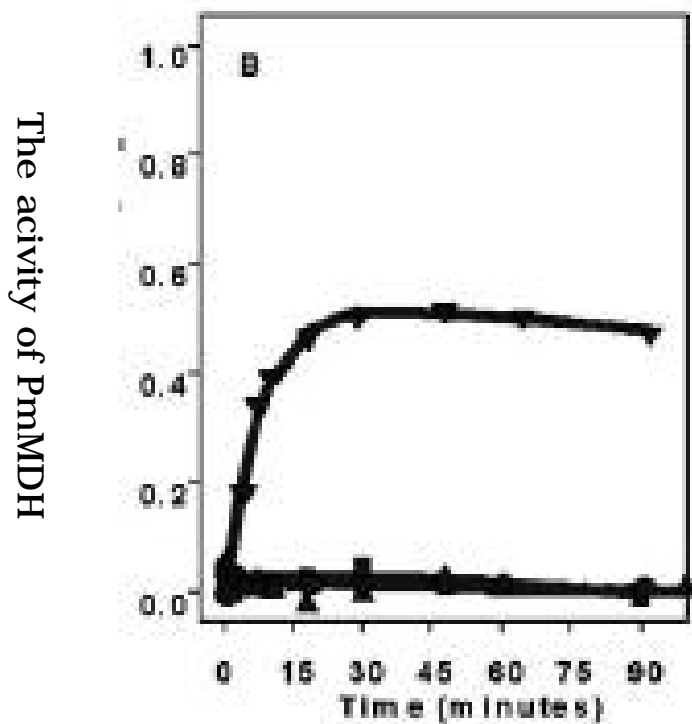
The chaperonin is a homo-oligomer of 14 subunits. These subunits have an apical, intermediate and equatorial domain and are arranged in two heptameric rings, defining two central cavities.

GroEL-GroES



A simple example of chaperone

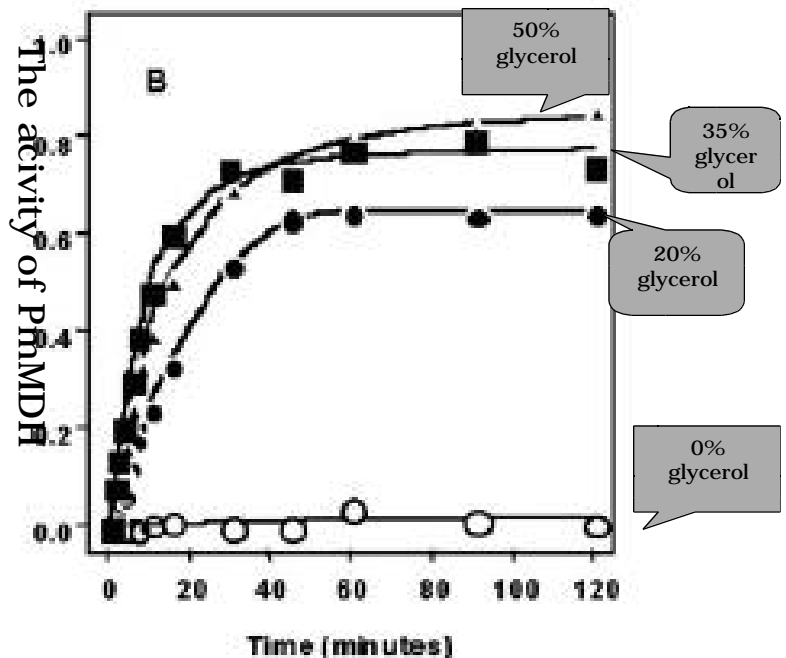
A simple example



- Porcine mitochondrial malate dehydrogenase (PmMDH) can not refold spontaneously. After the help of GroEL-GroES-ATP, it can renature.

A simple example

- However, in this experiment, the spontaneous renaturation (without the chaperonin) can happen in different concentrations of glycerol. The reasons maybe is that increasing solution viscosity can stabilize the native fold and inhibit the intramolecular collapse or monomer folding.



The function of chaperone in food
science ?

The function of chaperone in food science

- Some plants, such as maize, can express Hsp during heat stress. But this feature can not be used in food production because we can not control the following pathway triggered by Hsp.

The function of chaperone in food science

- In the processing of food, can we add some chaperone to change the structure of other proteins?
- I think that it is difficult. Two reasons:
 - 1. The chaperone is an functional protein. It will highly raise the price of food.
 - 2. The activity of chaperone needs the ATP, which is expensive.

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Thank you