Journal of Molecular Biology
Volume 427, Issue 18, 11 September 2015, Pages 2919-2930

Review

The Mechanism and Function of Group II Chaperonins

Tom Lopez [1, †], Kevin Dalton [2, †], Judith Frydman [1, 3]

Show more

https://doi.org/10.1016/j.jmb.2015.04.013

Highlights

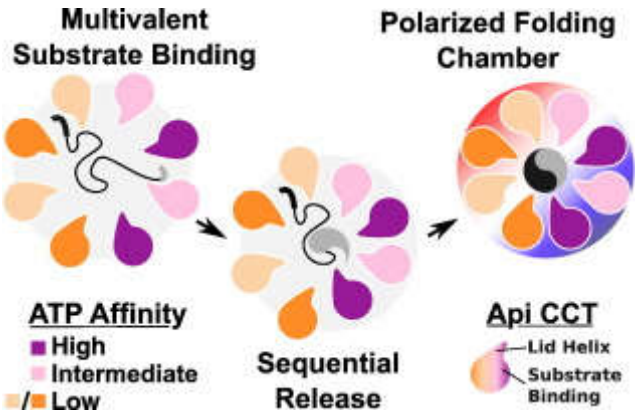
- Chaperones are enzymes that assist protein folding in the cell and maintain cellular proteostasis.
- The eukaryotic chaperonin TRiC/CCT consists of two stacked rings of eight paralogous subunits each.
- TRiC promote ATP-dependent folding of polypeptides (10% of the eukaryotic proteome).
- A structural and mechanistic understanding of this essential chaperonins starts to emerge.
- Unusual design principles of this class of chaperone that underlie its unique role are revealed.

Abstract

Protein folding in the cell requires the assistance of enzymes collectively called chaperones. Among these, the chaperonins are 1-MDa ring-shaped oligomeric complexes that bind unfolded polypeptides and promote their folding within an isolated chamber in an ATP-dependent manner. Group Ⅱ chaperonins, found in archaea and eukaryotes, contain a built-in lid that opens and closes over the central chamber. In eukaryotes, the chaperonin TRiC/CCT is

hetero-oligomeric, consisting of two stacked rings of eight paralogous subunits each. TRiC facilitates folding of approximately 10% of the eukaryotic proteome, including many cytoskeletal components and cell cycle regulators. Folding of many cellular substrates of TRiC cannot be assisted by any other chaperone. A complete structural and mechanistic understanding of this highly conserved and essential chaperonin remains elusive. However, recent work is beginning to shed light on key aspects of chaperonin function and how their unique properties underlie their contribution to maintaining cellular proteostasis.

Graphical abstract



Download high-res image (192KB) Download full-size image

Previous Next

Keywords

chaperones; protein folding; proteostasis; chaperonin; TRiC/CCT

Special issue articles Recommended articles Citing articles (54)

[1] T.L. and K.D. contributed equally to this work.