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A two-domain folding intermediate of RuBisCO in complex with the GroEL chaperonin

Ramanathan Natesh^{1,*}, Daniel K Clare^{1,*}, George W Farr^{2,*}, Arthur L Horwich^{2,3} and Helen R Saibil¹

¹Crystallography and Institute of Structural and Molecular Biology, Birkbeck College London, Malet Street, London WC1E 7HX, UK

²Department of Genetics, Yale University School of Medicine, Boyer Center, 295 Congress Avenue, New Haven CT 06510, USA

³Howard Hughes Medical Institute, Yale University School of Medicine, 295 Congress Avenue, New Haven CT 06510, USA

*Present addresses:

R Natesh, School of Biology, Indian Institute of Science Education and Research
Thiruvananthapuram, Computer Science Building, CET Campus, Thiruvananthapuram 695016,
Kerala, India

DK Clare, Electron Bio-Imaging Centre, Diamond Light Source, Harwell Science & Innovation
campus OX11 0DE, UK

GW Farr, Aeromics, Inc., 28 School St., Branford, CT 06405 USA

Correspondence to Helen R Saibil h.saibil@mail.cryst.bbk.ac.uk

Postal address and Telephone number :

Crystallography and Institute of Structural and Molecular Biology, Birkbeck College London, Malet
Street, London WC1E 7HX, UK
+44 207 631 6820

Abstract

The chaperonins (GroEL and GroES in *Escherichia coli*) are ubiquitous molecular chaperones that assist a subset of essential substrate proteins to undergo productive folding to the native state. Using single particle cryo EM and image processing we have examined complexes of *E. coli* GroEL with the stringently GroE-dependent substrate enzyme RuBisCO from *Rhodospirillum rubrum*. Here we present snapshots of non-native RuBisCO - GroEL complexes. We observe two distinct substrate densities in the binary complex reminiscent of the two-domain structure of the RuBisCO subunit, so that this may represent a captured form of an early folding intermediate. The occupancy of the complex is consistent with the negative cooperativity of GroEL with respect to substrate binding, in accordance with earlier mass spectroscopy studies.

Keywords

protein folding, GroEL, chaperonin, non-native protein, RuBisCO, single particle cryo-EM.

Abbreviations

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