ユーザーグループ：タンパク質結晶構造解析

Thermococcus strain KS-1 由来プレフォルディンβサブユニットの結晶構造

Crystal Structure of prefoldin beta subunit from *Thermococcus* strain KS-1

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Prefoldin (PFD) is a heterohexameric molecular chaperone that is found in eukaryotic cytosol and archaea. PFD is composed of α and β subunits and forms a “jellyfish-like” structure. PFD binds and stabilizes nascent polypeptide chains and transfers them to group II chaperonins for completion of their folding. Recently, a whole genome from *Thermococcus kodakaraensis* KOD1 was reported and shown to contain the genes of two α and two β subunits of PFD. The genome of *Thermococcus* strain KS-1 also possesses the two sets of α (α1 and α2) and β (β1 and β2) subunits of PFD (TsPFD). However, the functions and roles of each of these PFD subunit have not been well investigated. We crystallized the TsPFD α2-β1 complex. The obtained crystals belong to the space group *I*422 with unit cell dimensions of *a*=*b*=71Å, *c*=114Å and diffracted to 1.9Å resolution. The SIRAS phased electron density map showed clear peaks corresponding to the β1 subunit, whereas the α2 subunit was not observed. The refinement of the structure composed only of the β1 subunit reduced the crystallographic R_{work} and R_{free} factors to 17.7% and 19.7%, respectively. TsPFD β1 subunits form a tetramer with four coiled-coil tentacles resembling the “jellyfish-like” structure of heterohexameric PFD. β hairpin linkers of β1 subunits assemble to a β barrel “body” around a central four-fold axis. Size exclusion chromatography and multi-angle light scattering analysis shows that the β1 subunits form a tetramer at pH 6.8. The tetrameric β1 subunits can protect against aggregation of a relatively small proteins, such as insulin and lysozyme. The structural and biochemical analyses imply that PFD β1 subunits act as a molecular chaperone in living cells of some archaea.

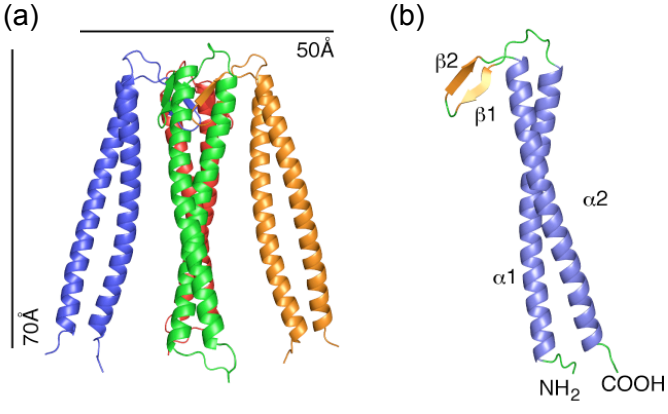

Figure The "jellyfish-like" structure of the TsPFD β1 subunits tetramer
(a) The side view of the TsPFD β1 subunits tetramer generated by the crystallographic four-fold symmetry. The four subunits are colored blue, green, red and orange, respectively. (c) The monomer structure of the TsPFD β1 subunit.