The contribution of N- and C-terminal regions to chaperon function and oligomerization of small heat shock protein IbpA from Acholeplasma laidlawii

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Small heat shock proteins (sHSPs) are ubiquitous molecular chaperones that prevent the irreversible denaturation of proteins under the heat shock conditions. Well studied sHSPs IbpA and IbpB from *Escherichia coli* work in strong cooperation and are necessary for bacterial survival at high temperatures. *Acholeplasma laidlawii*, the only one free-living bacteria of Mollicutes, carries only one gene encoding the sHSP protein IbpA (*Al*IbpA).
Here we report the role of the N- and C-termini of *A. laidlawii* IbpA for its oligomerization and chaperone function. Independently on the temperature, a protein forms heterogeneous mixture of globular and fibrillar structures with ratio of 1:6, while the removal of either 12 or 25 N-terminal amino acids lead to the formation of only fibrillar structures. Since in *E. coli* the IbpB blocks fibrils formation by IbpA, we suggest that the N-terminus of *Al*IbpA carries inhibitory motif which complements the lack of IbpB and is responsible for globular structure formation. By contrast, the ΔN12 and ΔN25 *Al*IbpA retained the chaperone functions on the insulin, leaving the question regarding the functional role of N-terminus opened. The deletion of the C-terminal conserved LEL motif, which is shown to be required for oligomerization of *E. coli* IbpA, or its substitution to SEP, impaired the temperature stability of *Al*IbpA and abrogated the chaperone function, while the protein remained presumably in globular state. By contrast, only N- and C-terminally truncated protein containing pure α-crystalline domain was unable to interact with substrates while formed a huge oligomeric conglomerates, probably, because of α-crystalline self-oligomerization. These data suggest non-trivial properties of *Al*IbpA, which seems to combine functions of both IbpA and IbpB-like proteins and recognizes the substrate proteins via both N- and C-termini.
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