



Conversion of yeast phosphoglycerate kinase into amyloid-like structure.

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Abstract

Yeast phosphoglycerate kinase is a structurally well-characterized enzyme consisting of 415 amino acids without disulfide bonds. Anion-induced refolding from its acid-unfolded state gives rise to the formation of worm-like amyloid fibrils with a persistence length of 73 nm. Electron microscopy and small-angle X-ray scattering data indicate that the fibrils have an elliptical cross-section with dimensions of 10.2 nm \times 5.1 nm. About half of all amino acids are organized in form of cross- β structure which gives rise to typical infrared spectra, X-ray diffraction and yellow-green birefringence after Congo red staining. The kinetics of amyloid formation, monitored by infrared spectroscopy, dynamic light scattering and X-ray scattering, was found to be strongly dependent on protein concentration. The infrared data indicate that the formation of cross- β structure practically comes to an end already after some hours, whereas the length-growth of the amyloid fibrils, monitored by small-angle X-ray scattering, was not yet completed after 1,300 hours.