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What is responsible for atypical dependence of the rate of amyloid formation on protein concentration: Fibril-catalyzed initiation of new fibrils or competition with oligomers?

An abnormal dependence of the rate of amyloid formation on protein concentration has been recently observed by Meisl et al. for Aβ40 peptides associated with alzheimer's disease. To explain this effect, Meisl et al. proposed a novel mechanism of fibril growth, the fibril-catalyzed initiation of fibril formation. Here we offer an alternative explanation of the observed anomalous kinetics: formation of metastable oligomers competing with fibril formation by decreasing the concentration of the fibril-forming free monomers. We show that the oligomer sizes resulting from the anomalous dependence of the fibril growth rate on protein concentration are close to the sizes of oligomers observed by electron microscopy. This work has been supported by the RSF grant 14-24-00157.

Biography

Alexei Finkelstein done his PhD in biophysics, Moscow PhysTech., 1976, DSc biophysics, Moscow University 1991. Author of >250 scientific papers and books "Protein Physics", (five Russian, two english and two chinese editions), and "physics of protein molecules" (in Russian). citation index by google scholar about 8400, hirsch index about 42. Since 1970, member and since 1999, head of protein physics laboratory at the institute of protein research, RAS. Since 1998, full professor of the Moscow University. Awards from FIRCA, INTAS, CASP, HHMI (3 times), RFBR, RSF, moscow grant, etc. State Prize of Russia in Science (1999), elected to the Russian Academy of Sciences (2008).

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