Environmental Factors Affecting The Aggregation State of Aβ(25-35): Role of DHA-Induced Membrane Fluidity

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Aβ amyloid peptide has an important role in the manifestation and in the progression of Alzheimer disease. It has a tendency to aggregate, forming low-molecular weight soluble oligomers, higher-molecular weight protofibrillar oligomers and insoluble fibrils. The relative importance of these single oligomeric-polymeric species in relation to the morbidity of the disease is currently being debated. Here we present an AFM microscopy study of Aβ(25–35) aggregation in different conditions. Aβ(25–35) is the smallest fragment retaining much of the biological activity of the full-length peptide. Phosphate buffer, lipid DOPC and lipid DHA/DOPC were selected as paradigms of aqueous physiological solutions and cell membrane-mimicking environments. Our study shows that the aggregation process of Aβ(25–35) on lipids is always characterized by the presence of annular oligomers. Their conformational evolution during time, as monitored by in-liquid AFM experiments. The addition of DHA to the lipid makes the lipid substrate more fluid, and helps to preserve membrane integrity against protein aggression.