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POLYMORPHISM OF AMYLOID FIBRILS FORMED FROM BETA-2-MICROGLOBULIN

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Persistence of high concentrations of beta-2-microglobulin (β2M) in the blood of patients with acute renal failure leads to the development of hemodialysis amyloidosis. In the tissues and organs of patients with this disease, there is an accumulation of amyloid plaques formed from the full-length β2M and its truncated forms without 6 and 10 N-terminal amino acid residues. In the present work, a comparative study of the structure and photophysical properties of these amyloid fibrils was carried out. Using of intrinsic UV – spectroscopy, CD – spectroscopy and electron microscopy methods allowed to show some differences in the structure of amyloid fibrils formed from full-length and truncated forms of β2M. To confirm the polymorphism of the studied samples, their interaction with the fluorescent probe thioflavin T was studied. The key point in these experiments was the use of the equilibrium microdialysis for the preparation of the test solutions. The study of these solutions by various spectroscopic approaches made it possible to calculate the binding parameters of thioflavin T to β2M amyloid fibrils and determine the photophysical characteristics of the bound dye. Analysis of the results allowed us to confirm the variety of the structure of amyloid fibrils formed from the full-size and truncated β2M forms, as well as to show their significant difference from the fibrils formed from other amyloidogenic proteins (in particular, model proteins of insulin and lysozyme).

Keywords: β-2-microglobulin (β2M), hemodialysis amyloidosis, amyloid fibrils, thioflavin T (ThT), equilibrium microdialysis, binding parameters