

Presence of magnetic fluids led to the inhibition of insulin amyloid aggregation

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The magnetic properties as well as the size distribution of magnetic fluids containing magnetic nanoparticles stabilized electrostatically with perchloric acid (MF1) or sterically with sodium oleate (MF2 - MF4) dispersed in water (MF1, MF2 and MF3) or in physiological saline solution (MF4) and consequently functionalized by bovine serum albumin (MF2) or dextran (MF3) are presented. The MFs showed superparamagnetic behaviour without hysteresis loop at room temperature. The morphology and particle size distribution observed by transmission electron microscopy, scanning electron microscopy confirmed spherical shape of magnetic nanoparticles with core magnetic diameter $D_{MAG} = 10$ nm. The hydrodynamic diameters of the prepared MFs considering the magnetic core and the coating were found of 26 nm and 63 nm for MF1 and MF2, for MF3 and MF4 the diameters were equal to 65 nm and 80 nm, respectively. We investigated ability of MFs to affect insulin amyloid aggregation causing serious problems in the treatment of diabetes by insulin injection or by insulin pumps. Interaction of MFs with insulin amyloid aggregation led to decreasing of insulin fibrillization depending on the magnetic fluid properties.

9.7 cm

13.4 cm

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