PC 10

MODIFICATION OF IRON OXIDE NANOPARTICLE SURFACE WITH A WATER-SOLUBLE POLYMER VIA SOLUTION POLYMERIZATION

M. Babič[a], D. Horák[a], P. Jendelová[b], M. Trchová[a]

[a]*Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Heyrovského nám. 2, CZ-162 06 Praha 6, Czech Republic (babic@imc.cas.cz)*

[b]*Institute of Experimental Medicine, Academy of Sciences of the Czech Republic, Vídeňská 1083, CZ-142 20 Praha 4, Czech Republic*

Maghemite (γ-Fe_2O_3) nanoparticles were obtained by coprecipitation of Fe(II) and Fe(III) salts with ammonium hydroxide followed by the oxidation with sodium hypochlorite. They were used as seeds in the solution radical polymerization of *N,N*-dimethylacrylamide (DMAAm). The presence of poly(*N,N*-dimethylacrylamide) (PDMAAm) on the maghemite surface was confirmed by elemental analysis and FT-IR ATR technique. Resulting nanoparticles were characterized also by scanning and transmission electron microscopy and dynamic light scattering. The effects of the presence of nanoparticles in the polymerization mixture on conversion of DMAAm and molecular weight of PDMAAm bound to maghemite were described. Effects of some reaction parameters on steric stabilization of colloidal particles and the coating efficiency were also investigated.

PDMAAm-coated nanoparticles were successfully tested for labeling of rat and human bone marrow mesenchymal stem cells (MSC). The labeling efficiency and cell viability were compared for cells incubated with both coated and uncoated maghemite nanoparticles and commercially available dextran-coated iron oxide (Endorem®). The labeling efficiency of human MSC was higher with PDMAAm-modified nanoparticles than with the dextran-modified (Endorem®) and uncoated nanoparticles. In gelatin, even small number of labeled cells changed the contrast in the MR image. PDMAAm-coated nanoparticles provided the highest T_2 relaxivity of all investigated particles. *In vivo* MR imaging of PDMAAm-coated iron oxide-labeled rMSC cells implanted in a rat brain confirmed their better resolution compared with Endorem®-labeled cells. Such particles are promising for a long-term monitoring of migration, proliferation and differentiation of stem cells in a host organism by noninvasive MR imaging.

The financial support of Academy of Sciences of the Czech Republic, project No. 1QS100100553, is gratefully acknowledged.