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Polymer system targeted with oligopeptides simultaneously useful for fluorescence-guided endoscopic surgery and targeted tumor therapy

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The polymer carrier based on poly(N-(2-hydroxypropyl) methacrylamide) labeled with a fluorescent dye Dyomics 633 and targeted with oligopeptides GE-7 or GE-11 was designed, synthesized and characterized. Both peptides are specific targeting ligands binding to epidermal growth factor receptor that is overexpressed on surface of many tumor cells. The targeting peptide sequences were attached to the polymer backbone using a "click" reaction between the N-terminal azide group of the peptide and dibenzocyclooctyne group attached to the polymer precursor. The fluorescent polymer-peptide conjugate was designed primarily as a diagnostic tool for a successful fluorescence-guided endoscopic surgery. Specific accumulation of the polymer system in the tumor mass is accompanied with the fluorescence signal from the malignant cells, which enables more precise resection of the tumor without damaging the healthy tissue. Moreover, replacement of the fluorescent dye with a cytostatic drug provides a targeted polymer system used for advanced treatment of the neoplastic diseases. Flow cytometry was used for examination of the binding efficacy of the oligopeptide-targeted conjugates to epidermal growth factor

receptor (EGFR) on the cell membranes of the malignant cells. The results showed that the highest binding efficacy was achieved with polymers bearing GE-11 targeting oligopeptide reaching to 146% of the binding of the control polymers with a scrambled peptide in human hypopharyngeal carcinoma cells (FaDu) and to 250% in human breast adenocarcinoma cells (MDA-MB-231). The polymer conjugates targeted with oligopeptides GE-7 or GE-11 can be used as materials with multiple functions as confirmed by *in vitro* experiments using flow cytometry and confocal microscopy.

Biography

Robert Pola has completed his PhD in the Institute of Macromolecular Chemistry (IMC), Czech Academy of Sciences in 2009. He is a research fellow of the Department of Biomedical Polymers of IMC. He has published 28 papers in peer-reviewed international journals. His research is focused on synthesis of peptides and polymer precursors used for preparation of water-soluble polymer drug delivery systems for efficient treatment of cancer and for vaccination.

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