SYNTHESIS AND ANALYSIS OF BIODEGRADABLE NANOGELS

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Abstract

Selective delivery of drugs and diagnostic agents in the body is the focus of many research groups. One of the promising nanocontainers is nanogel - soft nanoparticles, consisting of hydrophilic or amphiphilic polymeric chains. Nanogels have beneficial characteristics: high loading capacity, stability and sensitivity to environmental changes (pH, ionic strength and temperature). But one of the most important problems of using such particles is immune response. So it is vital to avoid long-term accumulation of nanocontainers in the body. For this purpose we can use nanogels with biodegradable cross-links. The aim of this work was to synthesize the biodegradable nanogels and to analyze their degradation in reducing agent water solution and to study loading and release kinetic of anticancer drug.Nanogels were synthesized from block-copolymer polyethylene glycol-b-polymethacrilic acid (PEG-b-PMAA). Stable negatively charged biodegradable nanogels with cross-linked core were synthesized and characterized. Using DLS method we found that size and -potential of nanogel change with pH changing. It was shown that 1 mM glutathione solution is enough to destroy disulfide bonds of cystamine, while 10 M isn't enough for particles degradation. In this way such particles could be used for selective drug release in cells. Loading capacity of nanogels was strongly dependent on the ambient pH during the process (max loading capacity was at pH7 - 45%). The release of drugs was quite fast and slightly depended on pH, but the final concentration of released Dioxadete was only 15%. It gives an opportunity for targeted delivering of drug without loosing most of it.

Keywords: Nanogels, Biodegradable, Selective delivery

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