

Application of injectable pH and temperature sensitive biodegradable block copolymer hydrogels as cell delivery vehicle

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Stimuli-sensitive hydrogels have attracted considerable attention as smart materials in the biochemical and biomedical fields because these materials have the abilities to response environmental changes and induce structural changes. Especially, pH and temperature sensitive hydrogels compared to only temperature sensitive hydrogels may be easy to inject into body without clogging problems. The synthesis of temperature sensitive block copolymer was performed through a ring-opening polymerization of D,L-lactide, ϵ -caprolactone. PEG was used as a macroinitiator in the presence of Sn(Oct)₂. The oligo-sulfamethazine(OSM) was coupled with the end of the block copolymer to show the pH sensitivity of temperature sensitive block copolymer. pH and temperature sensitive hydrogels maintained stable gel in the body condition as 37 °C, pH 7.4 for a long-term. Human osteoblast stem cells had adhered and multiplied on pH and temperature sensitive hydrogels in vitro. Cells were mixed with pH and temperature sensitive hydrogels and subcutaneously injected into the backs of mice in vivo. They were investigated by optical microscope and fluorescence microscope after 2 weeks, 4 weeks and 6 weeks, respectively.