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The use of thermoresponsive Hydrogel membrane as modulated drug delivery system

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Abstract:

Stimuli-sensitive polymers are suitable candidates for novel drug delivery systems, since they release drugs in a controlled manner in response to a stimulus such as temperature. In the present study temperature-sensitive polymer of N-isopropylacrylamide (NIPAAm) was evaluated to modulate release of drugs with different molecular weights. Membranes of poly NIPAAm and its copolymers with acryl amide (AAm) were prepared by casting monomers, cross linker, and initiator between two glass plates with a defined spacer thickness. These thermo sensitive hydrogels that cross linked with N,N-methylene-bis-acrylamide (MBAAm) showed a swelling transition temperatures (37°C) that was used in the permeation control of hydroxy urea (HU) and erythromycin (Er). Permeation rates of the drugs in various temperatures were investigated. It was shown that the diffusion rate of HU and Er through membranes is increased with a decrease in temperature. This phenomenon may be explained by the swelling (hydration) properties of the polymers and the thermodynamic influence of temperature and may be used as on-off switching key for controlled release of different molecules.

Keywords:

Thermosensitive hydrogels . Membranes . Hydroxyurea . Poly NIPAAm . Copoly NIPAAm/Aam

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