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Use of Polymers in Sustained Drug Release System

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The polymers are inseparable part of our life. The use of polymers and polymer based sustained drug release system has been widely studied by numerous scientists and achieved many fruitful results. The first polymeric devices developed for controlled drug release system was way back in 1960s. The use of hydrogels in drug delivery applications was discovered in the 1960 by Wichterle and Lim. In the mid 70s, hydrogel membranes based on poly methacrylates was used in studies for the design of controlled release systems containing fluorides, for the treatment of dental caries in the patients. Folkman and Long in 1966 first represented a drug delivery system based upon the diffusion of small molecules through the wall of silicone rubber tubing.

Polymer based controlled drug release systems are generally classified as either reservoir membrane devices or matrix monolithic devices. In it the release is controlled by a polymeric membrane that surrounds a drug moiety. These polymeric membranes may be sub-divided into hydrophobic, nonporous, microporous and water-swollen, hydrophilic substances like hydrogels. Various cellulose materials like cellulose triacetate, polycarbonate and polypropylene, could be used in the formation of membranes with a diameters of the order of 1.5×10^{-3} μm to several microns. Transdermal drug therapy is effectively administered by the use of polyacrylate, vinyl polymers, polyurethane and cellulose derivatives.

Polymers that are used in pharmaceutical coating are primarily based on cellulosic and acrylic polymers, as they both have good film-forming properties that enable them in the production of tough protective coatings. The processability of chitosan into film-forms may permit its extensive use in the formulation of film dosage forms or as drug delivery systems. Chitosan could be dissolved in organic acids such as lactic acid and acetic acid, before casted to films. Starch acetate (SA) polymer has been investigated as a novel, multifunctional excipient for the direct compression tableting process. Drug release rate is influenced by factors such as rate of diffusion across the membrane, tablet coating so that neither dissolution nor degradation of the polymer should occur during its active lifetime. Various materials such as fibrinogen, fibrin, and collagen have been tested as carriers for drug delivery systems. Collagen has been shown to have potential as a biomaterial since it is a major constituent of connective tissue. In addition to biocompatibility and non-toxicity to most tissues, collagen has efficient structural, physical, chemical and immunological properties that could be easily altered.

Polymers are playing a significant role in sustained drug delivery system. I hope young scientists could further elaborate the field and its applicability to explore the intricacies of the God's wonderful creations.

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