BIOMEDICAL ACTIVITY OF POLYURETHANES

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L'article présente les aspects généraux concernant la biocompatibilité des polymères avec des propriétés biomédicales et plus particulièrement des applications du polyuréthanes dans ce domaine.

1. INTRODUCTION

Polymers of a variety of chemistries, in many shapes and forms, have found applications in diverse biomedical fields such as implantation of medical devices and artificial organs, prostheses, ophthalmology, dentistry, replacement of hip and knee joints, cardiac implants, tissue engineering or artificial skin, bone substitutes, dental additives, hearing aids, blood control, and wound dressings. Polymer-based delivery systems enable controlled slow release of drugs into the body, making possible targeting of drugs into sites of inflammation or tumors. Prodrugs with macromolecular carriers have been used for such purposes, these compounds being accumulating in tumors as a consequence of the higher permeability of membranes tumor cells as compared to normal cells. Subsequently, body enzymes *in situ* catalyze the release of the drug. The application of synthetic polymers for gene therapy has been investigated, providing a safer way of gene delivery than use of viruses as vectors. Polymeric materials have also extensively been used for biosensors, in testing devices, and for bio-regulation [18].

Synthetic materials used in the body in this way are widely referred to as biomaterials. A biomaterial has been formally defined as a non-viable material used in a biomedical device intended to interact with biological systems [52], more specifically as "any material, natural or man-made, that comprises whole or part of a living structure or biomedical device which performs, augments, or replaces a natural function of a bodily tissue or organ". The key requirement of any material or combination of materials used in the body is that, in addition to providing mechanical support or repair, it should be biocompatible. Biocompatibility is defined by the response of the biological system to the biomaterial, which is seen as a foreign body and which provokes a cascade of interrelated reactions both systematically as well as locally at the interface with the biomaterial. Until recently, a biocompatible material was essentially thought of as one that has the quality of not having toxic or injurious effects on biological systems. The recent discoveries in this field have imposed the extending of the definition, a biomaterial