Chapter 7

DEGRADABLE SYNTHETIC BIOPOLYMERS IN MEDICINE

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1.INTRODUCTION

Biopolymers can be examined in three parts as natural, semi-natural and synthetic. Rather than natural and semi-natural polymers, in this section, synthetic degradable biopolymers in medicine and their properties are tried to be explained.

Biopolymers was founded in 1963 and gain importance in the medicine industry with their low toxicity, different physical and chemical properties. Biopolymers are divided into two as degradable and non-degradable polymers in nature. Degradable and non-degradable polymers are preferred depending on the usage life and place in metabolism. Their common point is that they are compatible with living metabolism. Biocompatibility, growth ability, production in large quantities and specific areas of use have given importance to synthetic biopolymers in the health sector. In this section, the properties of degradable synthetic biopolymers and their use in the field of medicine are emphasized.

2.DEGRADABLE SYNTHETIC BIOPOLYMERS IN MEDICINE

Today, studies are carried out on 10 different biodegradable synthetic polymers: polylactic acid, polyglycolic acid, polycaproalctone, polyhydroxybutyrate, polybutylene succinate, polyvinyl alcohol, polyethylene adipate, polyether sulfone, polyurethane and polyvinylpyrrolidone. Biodegradable polymers derived from these polymers are frequently emphasized by scientists due to their tensile and impact strength, low toxicity, ease of production on a large scale allowing the production of polymers with different physical properties with mixtures and their derivatives can be handled.

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3.CONCLUSION

Biodegradable polymers, which have been produced for use in the medical field since the 1960s, are gaining more and more importance. This is evident in the number of publications. However, the fact that they do not have the desired level of physical and chemical resistance has made the development of biopolymers necessary. Biopolymers with biodegradable properties, on the other hand, are finding more and more medical uses with their easy dissolution in nature, high number of derivatives, biocompatibility, sufficient physical and chemical resistance. In this context, it is an inevitable fact that the newly developed biodegradable polymers will create more economic and wider usage areas thanks to their advanced physical and chemical properties. Oxygen concentration in polymers significantly affects their degradability and changes in chain length are important in the physical strength of polymers. The most striking disadvantage of degradable biopolymers is that they do not have sufficient physical strength depending on the place of use. The reasons for this are based on insufficient chain length or unsuitable crystal/amorphous region ratios (elasticity) in polymers.

In this section, the general properties of synthetic biodegradable polymers, which are frequently studied, and their usage areas in the medical sector are tried to be explained. Apart from these polymers, synthetic nondegradable biopolymers and natural biopolymers are also used in different ways in the medical field. It is promising for the future to make nondegradable polymers degredable by adding side groups or to develop semi-synthetic polymers with sufficient physical strength by changing the chain structures of natural polymers.

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