Absorbable Polymers from Functionalized Terephthalic Acid

Rao S. Bezwada*

Bezwada Biomedical, LLC, P.O. Box 6357, Hillsborough, New Jersey 08844

INTRODUCTION

Polyesters derived from terephthalic acid, such as polyethylene terephthalate (PET), polytrimethylene terephthalate (PTT), and poly (1, 4-butylene terephthalate) (PBT) are used extensively for making fibers and molding articles[(1)]. Some of these are used in biomedical applications such as non-absorbable surgical sutures and are considered to be safe and biocompatible. Unfortunately, these polymers are non-absorbable and, therefore, cannot be used as absorbable sutures or as absorbable polymers for the controlled release of drugs.

However, due to the availability and numerous applications of the polyester derived from terephthalic acid, it is imperative to enhance its native value, for example, by functionalizing it and preparing absorbable polymers from it. The resulting absorbable polymers should have a specific controlled degradation profile or range enabling controlled release of drugs over an extended, controllable time range when physically admixed with these polymers. Furthermore, the polyesters derived form functionalized terphthalic acid is expected to be sterilizable by gamma radiation while still retaining a desirable level of physical and biological properties unlike the commercially available synthetic absorbable polymers used to prepare implantable surgical devices.

This paper describes for the first time the functionalization of terephthalic acid monomer with safe and biocompatible molecules such as glycolic acid, lactic acid, caprolactone, and dioxanone. The polymers derived from resulting novel difunctionalized terephthalic acid showed controlled hydrolysis profiles.

Synthesis of functionalized terphthalic acid, their polymerizations and their in vitro hydrolysis will be presented and discussed.

REFERENCES

(1) (a) Engineering Thermoplastics : Properties and applications, by James M. Margolis (1985) (b) Selecting Thermoplastics for Engineering Applications by Charles P. Macdermott, Aroon V. Shenoy (1997).