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International Journal of Pharmaceutics 176 (1998) 137–138

international journal of pharmaceutics

Book review

Handbook of Biodegradable Polymers, Abraham J. Domb, Joseph Kost, and David M. Wiseman (Eds.), Harwood Academic Publishers, Amsterdam, ISBN 90-5702-153-6, 526 pp.

The Handbook of Biodegradable Polymers is an excellent resource book on degradable polymers for medical device related applications including drug delivery, wound care, orthopedic fixation, and tissue engineering. It is sufficiently comprehensive and not redundant for a book of 526 pages that was written by a large number of authors (63) to be considered a reference source. The book is divided into three sections and there are 23 chapters, each written by the original researchers or experts on the subject. All but two of the chapters are devoted to a specific polymer or family of polymers that share important attributes of chemical structure and material properties.

The first section comprised of 13 chapters is entitled, 'Synthetic Absorbable Polymers' and covers most of the well studied and relevant polyesters, polyanhydrides, poly(orthoesters) and also includes tyrosine derived pseudo-poly(amino acids), polyphosphazenes, poly(alkylcyanoacrylates), poloxamers, and degradable hydrogels. Some chapters are dedicated to specific polymers, e.g. polycaprolactone (chapter 3) while others describe classes of synthetic polymers and materials, e.g. poly(orthoesters), poly(alkylcyanoxcrylates), degradable hydrogels (chapters 6, 10, and 11, respectively). Each chapter is organised into an introduction followed by informative subsections on polymer synthesis, characterisation, processibility, degradation, biocompatibility, resorption, and clinical applications. There is enough detail in most of the chapters to gain sufficient appreciation of the synthetic challenges, material properties, and applications for the polymer under discussion. It is interesting that poloxamers which are widely used and are biocompatible, but not biodegradable, are included in this first section on synthetic polymers. Such selection seems to go against the primary criterion of degradability for inclusion in the book and begs the question why other widely used polymers such as poly(ethylene glycol) were not included. However, the chapter on poloxamers describes how these materials are being developed for drug delivery and prevention of post surgical adhesion.

The second section entitled, 'Natural, Semi-Synthetic and Biosynthetic Polymers' is divided into seven chapters each on an important class of materials. Included are chapters on polysaccharides, oxidised cellulose, gelatin, collagen, fibrinogen, transductional protein-based polymers, and genetically engineered protein based polymers. The chapter on polysaccharides has a good table outlining several groups of polysaccharides and focuses on the properties and applications of a few of these groups. Also, except for the chapter on fibrinogen, the other chapters tend to follow the organisation of the chapters in the first section. Interestingly the chapter on polyhydroxyalkanoates, e.g. poly(3-hydroxybutyrate) which tend to be microbially derived polymers, is in the first section of the book on synthetic polymers. Presumably this chapter was placed with the synthetic polyesters for the sake of continuity in chemical structure.

The third section is comprised of three chapters and while somewhat mistitled as 'General Properties of Polymers' it is an important section of the

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PII S0378-5173(98)00262-2

book. One chapter is devoted to the mechanisms of polymer degradation and elimination, and another chapter provides an introduction to the surface characterisation of polymers using XPS, SIMS, and AFM. Since the polymers described in this book are being developed to fabricate medical devices, the polymer–biological interface is a critical parameter in the initial stages of device interaction with an organism. Surface analysis is important to delineate structure–property correlations of the polymer surface and while other additional techniques may be required, e.g. contact angle measurements. Together these techniques can provide complementary information leading to an understanding of the polymer surface. The final chapter of the book is about biodegradable polymers for nonmedical applications and provides an insightful perspective about the differences between polymers developed for medical and commodity applications.

Overall this is a book about degradable polymers being developed for medical applications and maybe the title should better reflect this focus. However, this book is highly recommended as a clear and concise reference about many of the degradable materials being developed in this rapidly evolving area of multidisciplined research.

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