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Book Review

Controlled Drug Delivery: Challenges and Strategies, edited by Kinam Park. Washington, DC: American Chemical Society, 1997, 629 pp., $145.95.

This book is intended to serve as a reference source for all aspects of the controlled drug delivery of larger molecules such as peptides and protein drugs and I truly believe that it achieves this aim. I would recommend this book for two audiences, namely, for pharmaceutics students who wish to become familiar with more than just zero-order release kinetics of low-molecular-weight drugs, and for established drug delivery scientists and engineers. It will provide the former group with the basics of protein delivery, as well as giving them the latest, molecular biology based targeting approaches useful for landing an interesting job. For the latter group, the book provides an update on advances in feedback and stimuli based drug delivery topics, potentially leading to better and more physiological drug treatments, and stimulating fresh ideas and collaborative efforts.

The book has 29 chapters, each with its own, impressive reference section. The references, however, only cover developments up to 1995. Updates which were added to two chapters were appreciated. It would have been useful if the titles of the referenced papers had been included in the reference format, as it helps interested readers decide whether or not to obtain a specific paper. I found the index of the book to be very comprehensive. The only phrases I looked for but could not find were ''magnetic targeting'' or ''magnetic microspheres.'' (My search is, however, indicative of a personal bias.)

Chapter 1 provides a brief history of controlled-release drug delivery. It is followed by two chapters which deal with approaches to overcome the body's natural protection and defense mechanism against ''unnatural'' high-molecular-weight therapeutic agents such as peptides and proteins, as well as pH-sensitive or cationic liposomes and recombinant viruses. A few drug delivery approaches such as engineering polymeric magic bullets, optimizing biodegradable colloids or fully exploiting the cell surface properties of the gastrointestinal tract for this purpose are discussed in Chaps. 4–6.

Chapters 7–9 provide excellent descriptions of self-regulated or externally activated drug delivery systems based on physiological needs. All three authors base their reviews on the prototypical application in this field, the release of insulin in response to changing glucose blood levels. Systems described in detail include specific long-term feedback sensors which activate mechanical devices (pumps), as well as externally activated (ultrasound, magnetic pulsating fields) release mechanisms. Clear explanations are also given of how modulated drug release can be initiated by chemical or physical signals such as pH and temperature.

Chapters 10–14 deal with the delivery of peptides and protein drugs. All authors show that protein delivery from encapsulation materials such as polyesters (the most frequently used ones) is possible and emphasize the fact that stability concerns are difficult to overcome and more research is needed. One aspect of this area, the use of growth hormone delivery systems in animals, is very interesting to read. I am not sure, however, if ''Animal Health Applications'' is an appropriate title for this chapter, given that forcing cattle or poultry to grow faster may not be to their benefit!

The next chapters, 15–18, deal with applications of tissue engineering, gene therapy, and microencapsulation in drug delivery. They detail the concept of isolating functional, protein producing, but foreign cells by encapsulation into microspheres, matrices or semipermeable membranes. The authors indicate how implanting the encapsulated cells into the host may lead to an inexhaustible source of therapeutic biomolecules, or alternatively, may replace diseased organ function. I found these chapters, with their detailed, carefully chosen graphs and photographs, to be very well written, themselves making the book worth owning.

Chapters 19–24 describe new polymeric materials useful for drug delivery. Within these chapters, pseudo-poly(amino acid)s, transductional protein-based polymers, engineered protein polymers and biodegradable poly(phosphoester urethane)s are reviewed. The chapter on pseudo-poly(amino acid)s such as polycarbonates is particularly comprehensive. The choice of relatively new and unexplored materials fits well into the future-based outlook of the entire book and pinpoints further directions of research and development.

The final chapters about computer simulation, drug release from matrices, and pharmacokinetic and pharmacodynamic aspects of controlled drug delivery serve to complete the field and are a starting point for learning about the mechanisms involved in controlled release. The chapter about the specific FDA regulations for controlled-release dosage forms serves the same purpose and gives an overview that every pharmaceutical scientist or clinically interested researcher must have.

Although all the chapters have been written by different authors, they never feel disjoined. The editor did a very good job of avoiding duplications and making this book highly readable. In short, I recommend *Controlled Drug Delivery: Challenges and Strategies* both as an excellent, up-to-date introduction and as a reference for anyone seriously interested in controlled drug delivery.

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