

## Book review

### ***Bioadhesive Drug Delivery Systems: Fundamentals, novel approaches and development***

**Edited by E. Mathiowitz, D.E. Chickering III and C-M. Lehr. ISBN 0-8247-1995-6**

Entanglement is a word often used in describing one of the possible mechanisms of bioadhesion. This book fractured into four parts, attempts to unravel, with some degree of success, the chapters to flow smoothly along a rather contorted path from the basic concepts of bioadhesion to the end stage of product development, akin to many molecules that have translocate the multiple barriers to reach their intended bodily compartment. At first glance bioadhesion ennobles a wonderfully simplistic notion of a polymeric-encapsulated material oozing at a steady stream from the attached strata, but as one delves deeper into the book it soon becomes apparent that the complexities of any successful drug delivery system is the interplay between physical and biological systems.

The editors claim ‘to provide a comprehensive reference on bioadhesion’ is a touch euphonious in that no text is fully comprehensive; this is borne out in the first part dealing with the scientific concepts and background to bioadhesion where, with the notable exception of chapter five concerning the heterogeneity of mucins in different populations, no mention has been given to some of the paramount biological determinants that will ultimately govern any bio/mucoadhesive system. For example, what is the turnover time of mucus and enterocytes in humans? how does it vary across the gastrointestinal tract? and how are these parameters altered in diseased states particularly those of GIT origin? Although some of these

parameters are referred to throughout the book, a chapter devoted to such variables should have been included in this section to give a more global perspective of bio/mucoadhesion.

Part two dealing with methods of evaluating bioadhesive interactions is a collection of rather useful physico-chemical techniques that should provide, both to new and current investigators in the field, appropriate pharmaceutical methods of studying bio/mucoadhesion. In particular, the description of microbalances to measure bioadhesive properties of polymeric materials is rather timely given the financial constraints in scientific research, and a novel adaptation of older and sometimes neglected techniques. In contrast, the following two chapters discuss the use of two broad classes of ‘hi-tech’ techniques such as high resolution microscopical methods (scanning and atomic force microscopy) and direct force measurement (mainly physical methods such as optical tweezers and surface force apparatus) for the potential applications in studying bio/mucoadhesion phenomena. Whilst the inclusion of these recent methods, in a relatively young field, is highly commendable, too much unnecessary emphasis is placed on their theory of physics and scientific formulae rather than on actual practical examples involving bio-polymeric interactions. A glaring omission in this section is the total ignorance of use of biological techniques, particularly the deployment of appropriate animal models, that is the true test of any occlusive delivery systems. Although chapters on measuring receptor-ligand interactions using a centrifugal based method (too detailed mathematical formulae) and skin adhesion measurement of transdermal sys-

tems (very appropriate given the plethora of nicotinic and oestrogen-based marketable products) re-addresses the non-biological trend somewhat, it would have been useful to include a chapter on biological methods in this section.

The final two sections of this book will be more useful to seasoned researchers in the field. Novel concepts and strategies for bioadhesive drug delivery systems is a cutting edge section that explores the use of 'experimental' polymers such as lectins, bacterial ligands and chitosan derivatives as platforms for innovative bioadhesive delivery systems. This is a welcome introduction to a field where there is sometimes the over-reliance, and often exhaustive repetition, of older materials such as polyacrylates. Despite this there is an interesting diversion on the use of older bioadhesive synthetic polymers in a chapter that describes the effect of different polymeric surfaces on the magnitude of intestinal microparticle uptake, a rather timely introduction to the burgeoning field of nanotechnology and its interaction with cellular structures.

Interpenetration, another magic word in the field, best describes the last section (Development issues of bioadhesive drug delivery systems: products and clinical trials) as it retrieves and interconnects physical and biological conceptual aspects of bioadhesion that are dispersed throughout the

first two sections. Each of the six chapters are devoted to bioadhesive drug delivery systems directed against particular bodily compartments that include buccal, nasal, vaginal and ocular cavities, in addition to the more popular routes of transdermal and oral delivery. Each author not only describes the issues, approaches and problems of developing such targeted bioadhesive systems but attaches a historical overview that places the whole concept in to a meaningful context. This section provides a stimulating introduction to those in academia contemplating of transferring their ideas from the bench to the clinic.

Overall, the near completeness of the subject (23 chapters), covering a spectrum of basic, explorative and 'sticky' issues in bioadhesive technology should enthuse junior investigators entering the field and provide alternate ways of approaching the subject to more experienced technologists.

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