



Book review

Fluorine and Health Molecular Imaging, Biomedical Materials and Pharmaceuticals, A. Tressaud, G. Haufe (Eds.), first ed. Elsevier (2008). +792 pp., ISBN: 978-0-444-53086-8

Fluorine is undeniably an unusual and fascinating element attracting the interests of the academic, medical and industrial communities. There is a general consensus that the impact of fluorine on health is enormous with an extremely diverse range of applications. This is well captured in this monograph written by chemists, physicists, physicians and engineers in a style understandable to all. Although written with great clarity, this book is not suitable for a neophyte as some knowledge of chemistry, biochemistry and biology is required. To familiarise the user with the spectrum of applications contained within this volume, the editors, two world's leading experts in fluorine chemistry, have subdivided the book into three distinct sections.

The book opens with one section composed of five chapters on the use of fluorine in the context of molecular imaging. Logically, this first section features a chapter reviewing the methods available to date for the preparation of ^{18}F -radiotracers. This account assumes some basic knowledge of nuclear chemistry but guides the reader through the art of ^{18}F -labelling of small molecules and also gives a very brief outlook on the radiosynthesis of ^{18}F -macromolecules such as peptides and oligonucleotides. The use of ^{18}F -radiotracers in a clinical context is discussed in three subsequent chapters with applications in neurology, cardiology and oncology respectively. The reader will grasp the concepts associated with ^{18}F -based positron emission tomography (PET) both as a diagnostic tool and as a technology to monitor response to therapy. In some cases, the underlying principles explaining how the radiotracers were designed and how they work, are very well explained. The few tables providing the name of representative PET tracers with their synthesis or their functional targets are most helpful. Almost 800 references are provided for this section entirely devoted to the synthesis and applications of ^{18}F -radiotracers. One aspect, which is not discussed, is the use of PET to advance drug discovery. Much of the expenses associated with drug development is the result of costly late-stage failures and the pharmaceutical industry is now relying on molecular imaging and PET as an important enabling technology to accelerate the process from the discovery to market launch of a new drug candidate. A chapter engaging with this aspect of molecular imaging would have been most valuable. This section however ends with a very interesting contribution outlining the use of ^{19}F magnetic resonance in the context of non-invasive physiology (with the description of reporter molecules) and pharmacology. On its own, this last chapter provides an impressive number of references, almost 450.

The second section on the description of fluorinated biomedical materials is divided in seven chapters. This section covers a number of important topics that will also be of interest to a wider audience. The content is extremely varied and covers the

chemistry of fluoride-based bioceramics, the use of fluorine in dentistry and dental restoratives as well as the application of fluorinated biomaterials in cardiovascular surgery and in eye surgery. Perfluorochemicals are also featured in this section with applications as oxygen carrier or microreactor. The preparation of targeted PFC-stabilized microtubules supporting contrast agents is also discussed along with a very brief overview on PFC-based abiotic tags for controlled recognition, selection and biopolymer pairing. The last chapter of this section is a refreshing and very useful addition with a more general essay on the impact of fluorine on the environment, some insightful discussion on the ADME properties of fluoride, and on the presence of fluoride in our diet. This section provides the reader with circa 900 references.

The editors have elected to discuss the impact of fluorine on the pharmaceutical industry in the last section. Six chapters covering circa 400 references are presented with an opening discussion aimed at giving the reader some of the basic concepts explaining why a fluorine substituent is so frequently incorporated in drug targets. This chapter proceeds with an overview of fluorinated pharmaceuticals based on natural products with some insight of their synthesis and mode of action. The following chapters are very clearly written but more specific. They constitute a collection of "case studies" on various topics: the synthesis and evaluation of fluorinated monoamine oxidase inhibitors, the synthesis and applications of fluoroolefin dipeptide isosteres, the influence of fluorinated amino acids in native polypeptide environment and a final chapter on the fluorinase enzyme. In essence this section is a fairly narrow sampling of how fluorine can benefit drug design and the reader is invited to look at other specialised books and reviews to have a fuller appreciation of the benefit of fluorine for drug discovery.

Despite the fact that the ordering of the three main sections seems awkward, the scope of the book is certainly unique and amazing. With more than 2500 references, internationally renowned experts pass on to the reader the current level of knowledge. The critical analyses of some of the latest developments and applications provide an excellent overview on how fluorine has improved and will continue to benefit health. This book is not intended as a stand-alone text, nor is it a comprehensive review of the area as this field is progressing very quickly but it will serve as a most useful additional reference for graduate researchers and specialists in the field.

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Available online 17 May 2009