

Preface

Any compilation of clinically used drugs must include important inorganic pharmaceuticals such as lithium carbonate and cisplatin. Studies in the field of inorganic-based pharmaceuticals continue to expand; while yet representing a relatively small percentage of total drugs, the inorganic-based drugs fulfil important roles. New developments in metal-based drugs must be seen in the light of utilising the body of knowledge on existing drugs, rather than as isolated examples of inorganic chemistry. To do this, it is important to have as great as possible an understanding and appreciation of the myriad factors which determine the success or otherwise of a clinical agent. The chapters here have been chosen for this purpose as they all strive to combine the chemical understanding of inorganic molecules with their biological activity. It is the purpose of this monograph to present overviews of the chemistry and biology both of well-known clinically used agents and of new potential applications. Rather than attempt an exhaustive listing of all metal-based drugs, we have selected case studies for the reader to study. The introduction in Chapter 1 gives an overview and discusses the outline of the book and will not be repeated here.

The field of drug design and discovery is, by definition, one of the most interdisciplinary. While emphasis tends to be placed on mechanistic studies (target interactions) the pharmacokinetics and tissue distribution are equally important in determining whether a drug will have a sufficient therapeutic index to be of clinical use. Understanding of how chemical structure determines the above factors is a critical cornerstone for the future. Thus, descriptions in this book interweave chemistry with pharmacology and molecular biology. Further, it is important to know and understand how the many structural features of inorganic compounds capable of subtle fine-tuning such as coordination number and geometry, types of ligands and kinetic reactivity may be tailored to the use of medicinal chemistry. In the last years advances have been made on several fronts. More detailed understanding of the current drugs continues to be accumulated, opening new leads for drug design. Advances in genetic and structural biology underscore the genetic basis of many diseases as residing in metalloproteins. These findings offer a rare opportunity for the inorganic chemist to contribute to the genetic understanding of such diseases. Likewise, the trend, especially in cancer, away from an approach of simple testing to drug design based on specific protein and DNA targets also offers an opportunity for the inorganic chemist. What are the design features of a metal-based agent, for example, which would be suitable for current much-studied targets such as topoisomerase and telomerase,

to name but two? It is our hope that reading these reviews will excite the reader and especially young researchers to think in similar directions, so that future examples of metal-based drugs will continue to appear.

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