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Receptor biology, M. F. Roberts, A.E. Krutchen
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The ability of living organisms to communicate and modify their behaviour is an essential requirement for their survival. This process, which is called signal transduction, begins with the recognition of the 'signal' by the organism. At the molecular level, this process usually involves the detection of the signaling molecule by a 'receptor'. An understanding of the behavior of receptors, their characterization, and appreciation of their functioning, is integral to the development of new drugs and therapeutics. This book attempts to provide a basic appreciation of receptor biology, suitable for undergraduates, as well as researchers who have not been exposed to the molecular basis of signaling mechanisms earlier.

The introductory chapter provides a basic overview of definitions and terms that are used throughout the text. An overview of the material that will be covered is also presented, to orient the reader to the contents of the book. A welcome inclusion in this chapter is a brief overview of the history of receptor theory and enunciation of concepts of pharmacology. Too often, one does not appreciate the fundamental insight that early researchers provided, when basic aspects of protein structure and function were so little understood.

Since many receptors are present on the cell membrane, the following chapters discuss the structure of lipid membranes and proteins. The rather brief overview of protein structure and function is perhaps redundant when the book is clearly directed to those with some knowledge of basic biology. The introduction to 'first messengers', such as hormones and polypeptides is well prepared, as is the brief overview of various types of receptors, including receptor tyrosine kinases and G-protein coupled receptors. What is especially welcome is a chapter devoted to receptor theory. Too often, students use the terms K_d , IC_{50} or B_{max} without a clear understanding of what they mean, or how these are derived from experiments. These concepts are explained in a clear and simple manner here, so that it is accessible to undergraduates and graduates alike.

The third part of the book deals with various signaling systems including ion channels, G-protein coupled receptors, receptor tyrosine kinases and nuclear receptors. The summaries of these complex systems are well written, and clearly illustrated. Almost all receptor families, including the transforming growth factor beta (TGF β) serine-threonine kinase receptors, and guanylyl cyclase receptors, are briefly described.

These chapters would serve as excellent primers in introductory classes on signaling systems. There is a wealth of information that has been obtained in the past decade of the structure and signaling outputs following activation of G-protein coupled receptors, and this has been nicely summarized.

The final sections in this book are directed towards describing biological systems where receptor function has been found to play an important role. This is an interesting section, since it provides relevance in terms of biology to the reader. Important signaling pathways such as the MAPK (mitogen-activated protein kinase) pathway, second messenger-mediated signaling via cAMP, cGMP, gaseous molecules, calcium and inositol phosphates, are all covered with sufficient detail for the reader to appreciate the complexity and cross-talk in cellular signaling. Aspects of receptor-mediated signaling during metazoan fertilization and development, and importantly, aberrations in receptor signaling caused by receptor mutations in diverse diseases such as cancer, cholera, cystic fibrosis, cardiovascular diseases, obesity, depression and diabetes, provide a meaningful and application-oriented turn to the discussion. Finally, given the current interest in neuroscience and functioning of the brain, the last chapter is devoted to the role of receptors in the mind. Here, memory, schizophrenia, addiction and the function of opioid receptors are all presented in a concise and understandable manner.

Overall, this book is a useful addition to presenting fundamental aspects of receptor biology to undergraduate students, as well as graduate students who propose to think about receptors in their research activities. It would also be a good addition to the textbooks recommended for medical students. Most drugs mediate their action by binding to, and regulating the activity of, various receptors. A greater understanding of the molecular basis for drug action would no doubt lead to an appreciation of reasons for side effects of these drugs, and spur medical professionals to direct and maybe pursue research in aspects of receptor biology in future.

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