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## Preface

Androgens have a critical role in the development and maintenance of the male reproductive system and affect important physiological processes and pathological conditions, including the homeostasis of the normal prostate and prostate cancer. The effects of androgens are mediated by the androgen receptor (AR) which is a ligand-dependent transcription factor that belongs to the nuclear receptor superfamily. Like other steroid receptors, upon hormone binding, AR changes conformation, translocates to the nucleus, binds hormone response elements (HREs) in target promoters, and regulates gene transcription by the recruitment of chromatin modifying and remodelling complexes, coregulators, and other factors of the basal transcription apparatus. In addition, AR can associate with and directly affect other intracellular signalling pathways. This volume is designed with the aim to provide a tool box to study various phases of androgen action, from its entry to the cell to the phenotypic response that the cell mounts, with up-to-date techniques for biochemists, molecular biologists, cell biologists, geneticists, and pathologists.

This volume begins with two chapters that review the history of research on androgen action as well as perhaps the most widely studied area in this regard, androgen action and prostate carcinogenesis. This sets the stage for the ensuing chapters that present various methods to investigate androgen action, starting with **Chapters 3 and 4** which provide state-of-the-art methods to determine androgen levels in biological tissues and fluids; this is an area which has become all the more important with the recent demonstration that even under conditions of low circulating androgens, intra-tissue androgen levels can be quite high. **Chapters 5, 6, 7, 8, 9, and 10** contain experimental procedures to study the activity of AR, including assessment of AR transactivation potential, identification of AR HREs, manipulation of AR levels in cells and xenografts, the role of interdomain interactions on AR function, and advanced microscopy methods to study AR interactions in living cells.

As most other proteins, AR has been shown to be modified posttranslationally in response to not only its natural ligands, but also various other stimuli. **Chapters 11, 12, 13, and 14** focus on some of these modifications, including acetylation and SUMOylation, as well as interactions of AR with other proteins, which can also affect AR modifications, or vice versa. Next are **Chapters 15, 16, 17, and 18** that present more recently developed methods and tools that have greatly facilitated androgen action research, including genome-wide identification of AR HREs, tissue-specific knockout of AR, and androgen-sensitive human prostate cancer xenograft work in mice, as well as novel approaches to analysis of AR function through automated microscopy methods.

As our knowledge of androgen signalling grew, for the phenotype to appear in any particular cell type, it became clear that androgen signalling interacts with various other signalling pathways. The last section of this volume is devoted to methodology to study some salient examples of these interactions. One chapter is devoted to the recently recognized androgen-regulated ETS fusion transcripts that may have a role in prostate cancer progression. The other chapters include methods to study androgen action on apoptotic pathways, crosstalk with Src signalling, as well as direct effects of androgens on

lipid accumulation in prostate cancer cells. These methods provide endpoints that can be assessed when any particular aspect of androgen signalling is perturbed, experimentally or otherwise.

I would like to take this opportunity to thank all the contributors for graciously taking the time to provide their expertise in the excellent protocols; without them and their willingness to share so much of their time and hard-won expertise, this volume would not have materialized. I would also like to thank Dr. John Walker, the Editor-in-Chief of the *Methods in Molecular Biology* series, for his timely support during the editing process.

I believe that this volume provides the reader with a comprehensive overview of, and practical guidance on, the diverse methodologies that are propelling androgen action research forward, both in normal physiology and in disease states. I do hope that those consulting this volume will find it useful.

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