
Preface

Proteoglycans are some of the most elaborate macromolecules of mammalian and lower organisms. The covalent attachment of at least five types of glycosaminoglycan side chains to more than forty individual protein cores makes these molecules quite complex and endows them with a multitude of biological functions. *Proteoglycan Protocols* offers a comprehensive and up-to-date collection of preparative and analytical methods for the in-depth analysis of proteoglycans. Featuring step-by-step detailed protocols, this book will enable both novice and experienced researchers to isolate intact proteoglycans from tissues and cultured cells, to establish the composition of their carbohydrate moieties, to generate strategies for prokaryotic and eukaryotic expression, to utilize methods for the suppression of specific proteoglycan gene expression and for the detection of mutant cells and degradation products, and to study specific interactions between proteoglycans and extracellular matrix proteins as well as growth factors and their receptors. The readers will find concise, yet comprehensive techniques carefully drafted by leading experts in the field.

Each chapter commences with a general Introduction, followed by a detailed Materials section, and an easy-to-follow Methods section. An asset of each chapter is the extensive notation that includes troubleshooting tips and practical considerations that are often lacking in formal methodology papers. The reader will find this section most valuable because it is clearly provided by experienced scientists who have first-hand knowledge of the techniques they outline. In addition, most of the chapters are well illustrated with examples of typical data generated with each method. I have made a special effort to ensure a detailed, step-by-step rendition of the methods that would help in reproducing each experimental protocol.

Proteoglycan Protocols is divided into three sections. Part I focuses on the general protocols dedicated to the isolation and purification of proteoglycans from tissues and cells of vertebrates and invertebrates. In nineteen chapters, the most commonly used protocols are reviewed by expert scientists. The reader will be able to isolate proteoglycans from specialized tissues, cell culture, body fluids, analyze the glycosaminoglycan side chains and the protein core, and investigate intracellular biosynthetic events using both qualitative and quantitative approaches.

Part II focuses on the expression, detection, and degradation of proteoglycans. Twenty chapters cover most of the current knowledge regarding these issues of proteoglycan biology. The reader will find protocols describing various approaches in recombinant gene expression systems, together with theoretical and practical gene targeting approaches, using both antisense technology and somatic cell targeting. A variety of unique approaches will enable the reader to inhibit glycosaminoglycan

synthesis, to identify cell mutants in proteoglycan biosynthesis, and to study the degradation of various glycosaminoglycans by using chemical and enzymatic methods. In addition, strategies are described for the identifications in adult human tissues and fluids of proteoglycan degradation products.

Part III comprises twelve chapters focused on understanding the complex interactions between proteoglycans—either the protein or the glycosaminoglycan moiety—and various extracellular matrix proteins, growth factors, and receptors. This is a blooming area that will undoubtedly expand in the near future as we enter the era of proteomics. The reader will find protocols devoted to the theoretical and practical understanding of specific proteoglycan interactions using affinity-based approaches, including affinity coelectrophoresis, affinity chromatography, and optical biosensor and phage display technologies. In addition, proteoglycan interactions with receptor tyrosine kinases and lipoproteins are also covered.

Proteoglycan Protocols has been developed through the efforts of ninety-seven scientists representing ten countries and three continents. I wish to thank all of the authors for their contributions and their outstanding job in summarizing complex protocols and for providing extensive notations. The latter, I believe, will make a crucial difference in the success rate of each experimental strategy.

I would like to thank the Series Editor, John Walker, and the production team at Humana Press for their contributions to the successful realization of this multiauthor book. I am particularly indebted to my assistant Kit Foster for her dedication and continuous effort in this endeavor. She played a key role in the assembly, editing, formatting, general organization, and index preparation of this volume.

From my personal vantage point, I learned immensely during the process of assembling and editing the chapters. I am thankful for that and amply rewarded.

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