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BOOK REVIEW

Methods in Enzymology, Vol. 416, Glycomics

(M. Fukuda (ed.), Elsevier, Amsterdam-Boston-Heidelberg-London-New-York-Oxford-Paris, 2006, 414 pp., $149.95)

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This book of six sections containing 24 chapters written by an international group of authors considers many practical problems of modern glycobiology.

The first section considers physical methods used for studies of protein carbohydrate interactions. Three chapters of this section deal with such methods as isothermal titration calorimetry, nuclear magnetic resonance, and X-ray structural analysis.

The first chapter of the second section contains information on the use of a phage library for screening of short peptides capable of carbohydrate binding. The second chapter of this section deals with methods used for development, characterization, and application of specific antigens to various epitopes of glycosaminoglycan (GAG) structure. Use of such antibodies opens wide perspectives for studies of very complex GAG structures and biological activity of their structural domains.

The third section of this book contains description of methods used for studies of glycosyltransferases (GT). The first chapter contains information about substrate specificity of β1,3- and β1,4-GT. The second chapter of this section considers analysis of subcellular localization of GT using fluorescent labels and fluorescence activated cellular sorting (FACS). The third chapter of this section deals with studies of GT profiling by means of *in situ* hybridization. The fourth and the fifth chapters of this section describe methods used for identification of GT profile using the reaction catalyzed by reverse transcriptase and enzyme employed for genetic analysis, respectively.

The fourth section of this book summarizes approaches for glycan studies by means of mutants of Chinese hamster ovarian cells (CHO-mutants). The first chapter of this section deals with use of lectin-resistant mutant cells for evaluation of changes in glycan structure. The second chapter describes methods for studies of biosynthesis of glycosyl phosphatidylinositol (playing an important role in binding of many cell membrane proteins) by means of CHO-mutants. Features underlying changes in proteoglycan structure in CHO-mutants are described in the third chapter of this section.

The fifth section considers methods for studies of sulfated glycans and approaches for studies of their biological role. This section begins with a chapter containing information about substrate specificity of sulfotransferases and glycosyltransferases involved into proteoglycan biosynthesis. The second chapter deals with assays of activities of two new sulfatases, heparin/heparan sulfate endosulfatases. The third chapter describes methods for determination of specificity of chemokine–GAG interaction.

The fourth chapter of this section deals with identification of proteoglycan binding proteins.

The fifth chapter of this section deals with studies of glycan functions detected in mice with genetic inactivation of L-selectin ligands of sulfotransferases.

The sixth section deals with studies of glycan functions recognized using overexpression or knockout of certain genes. The section begins with a chapter summarizing data on expression of specific carbohydrates, which appear after transfection of cells with carbohydrate modifying enzymes such as sulfotransferases. The second chapter considers methods used for analysis of N-glycan structure using lectins and α-mannosidase. The third chapter describes results of experiments on inactivation of gene encoding core structure of β-1,3-galactosyltransferase; this results in deficient angiogenesis followed by death of mouse embryos. The fourth chapter considers the role of murine type O-glycans synthesized by β1,6-N-acetylglucosaminyl transferase. The fifth chapter deals with the role of glycans in leukocyte migration from blood circulation to inflammation nidi in various tissues. The authors pay major attention to a certain group of glycoproteins known as selectins, which are located on an endothelial surface. These selectins, which bind specific ligands on the leukocyte surface, are thus involved in motility of these cells towards the inflammation nidi. The chapter analyzes methods used for studies of these processes including laser intravital, transluminescent, and fluorescent microscopy. The final (sixth) chapter deals with methods used for studies of the role of tissue specific glycans in metastasizing processes of various tumors.

The book contains author and subject indexes, bibliography for each chapter, and color photographs at the end of the book.

This book is very informative, and is novel both in terms of problems discussed and also arsenal of new methods used for glycobiology.

This book will be very useful for glycobiologists, bioorganic chemists, and researchers working in the fields of molecular biology and biotechnology. It may be also recommended for university students and their teachers as supplemental material for these fields of science.

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