
BOOK REVIEW

Glycobiology

(C. Sansom and O. Markman, eds., Scion Publishing Ltd, UK, 2007, 374 p., \$180)

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This book is dedicated to 80th birthday of Professor Nathan Sharon, one of the founders of glycobiology. The book consists of eight sections and 28 chapters prepared by an international team of authors.

The first section consists of two chapters, which consider historical aspects in the development of glycobiology. Chapter 1 (C. Sansom) of this section deals with the study of lectins, which are carbohydrate-binding proteins and which for long period of time were the main subjects of Professor Sharon's and his colleagues' study.

Chapter 2 (N. Zitzman et al.) is devoted to characterization of glycobiology in study of molecular mechanisms of human diseases, their diagnosis, and treatment.

The second section includes data about synthesis of simple and complex carbohydrates. Chapter 3 (M. Monsigny et al.) characterizes sugar-lectin interactions, synthesis of neoglycoproteins and glycosylated polymers.

Chapter 4 (H. Busse, H. Streicher) contains data about recent developments in the synthesis and application of sialylmimetics. A special part of this chapter analyzes inhibition of viral and bacterial sialidases, and also parasitic *trans*-sialidases. Highly effective synthetic inhibitors of sialyltransferases also are discussed.

The title of the third section is "Analysis and Structure", and it deals with comprehensive approaches and methods for determination of structure and functions of various classes of glycoconjugates.

Chapter 5 (R. Lauder) of this section describes methods for elucidation of structure and function of chondroitin/dermatan sulfates.

Chapter 6 (E. Yates et al.) contains data about structure and conformation of glycosaminoglycans in solutions and in complexes with proteins.

Chapter 7 (D. Harvey) deals with structural determination of N-linked glycans by matrix-assisted laser desorption/ionization and electrospray ionization mass spectrometry.

Chapter 8 (J. Behr, R. Sasisekharan) presents an integrated approach to glycan structure-function relationships. As examples of linear glycans, heparan sulfate and chondroitin/dermatan sulfates are discussed. N- and O-glycoconjugates are considered as branched glycans.

There is discussion of methods used for study of these complex biopolymers.

The fourth section deals with cell biology of carbohydrate and glycoproteins. Chapter 9 (J. Gallagher) describes some observations on the biology of cell surface heparin sulfate proteoglycans. Here the major steps in biosynthesis of heparan sulfate and its structural analogs (syndecans and glypicans) are highlighted, and also participation of these biopolymers in cell adhesion and fine processes of cell development.

Chapter 10 (Y. Zick) analyzes galectins, a family of carbohydrate-binding proteins that are widely distributed in the animal kingdom from lower invertebrates to mammals. Special emphasis is on galectin-8 as a mediator of cell adhesion and apoptosis.

Chapter 11 (G. Lederkremer) contains data about the involvement of intracellular lectins in glycoprotein maturation and quality control in the secretory pathway.

The fifth section deals with carbohydrate-binding proteins. The section begins with chapter 12 (R. Schauer) devoted to the diversity of sialic acids and their interplay with lectins.

Chapter 13 (K. Sekar et al.) discusses structure and carbohydrate specificity of β -prism I fold lectins: jacalin, artocarpin, and banana lectin.

Chapter 14 (G. Rabinovich, M. Toscano) deals with protein-glycan interactions in immunoregulation: galectins as tuners of the inflammatory response. A central place in this chapter belongs to galectins, which are involved in cell homeostasis.

Chapter 15 (I. Ofek et al.) describes recognition of bacterial glycoepitopes by pulmonary C-type lectins as a branch of lung innate immunity.

Chapter 16 (R. Alon et al.) presents data related to affinity selectins and integrins.

The sixth section consists of chapters devoted to carbohydrate-modifying enzymes. The section is opened by chapter 17 (K. Loft, S. Williams), which deals with enzymes modifying complex carbohydrates. The special chapters of this section summarized sulfation of carbohydrate chains (sulfotransferases), desulfation (sulfatases), and involvement of both type of these enzymes in heparin

metabolism. Carbohydrate phosphorylation, and particularly the role of mannose-6-phosphate as a specific lysosomal targeting signal, is also discussed. The role of carbohydrate carboxylic acid esters in the mycobacterial cell wall also is highlighted in this chapter.

Chapter 18 (I. Brockhausen) deals with glycosyltransferases specific for the synthesis of mucin-type O-glycans. It is pointed out that sialyltransferases have been classified as enzymes that often stop chain growth and terminate carbohydrate molecule biosynthesis.

Chapter 19 (S. Shi, P. Stanley) devoted to glycosylation in development and includes oogenesis, spermatogenesis, pre-implantation development, implantation, and post-implantation development.

The seventh section includes discussion about glycobiology and medicine. Chapter 20 (A. Corfield) considers glycobiology of mucins in the human gastrointestinal tract. The mucosal barrier as a physical viscoelastic shield and intestinal microflora are important components and play important roles in the normal function and protection of the gastrointestinal tract.

Chapter 21 (B. Campbell et al.) discusses mucosal glycoconjugates in inflammatory bowel disease and colon cancer.

Chapter 22 (R. Kannagi et al.) deals with selectin-mediated metastasis of tumor cells. Changes of sialylated Lewis-antigen structure is considered as marker for some types of cancer.

Chapter 23 (S. Boldin-Adamatsky, A. Futerman) highlights the role of glycosphingolipids in health and disease. A significant part of this chapter details biochemical aspects of lysosomal storage diseases and their treatment with enzyme replacement or by inhibitors of biosynthetic storage products.

Chapter 24 (D. Mirelman, W. Petri, Jr.) deals with pathogen–host interactions in *Entamoeba histolytica*, an intestinal protozoan parasite of humans that causes amebic colitis and amebic liver abscesses, which are diseases

associated with significant levels of morbidity and mortality worldwide.

The eighth section, “Industrial Glycobiology”, opens with chapter 25 (B. Winchester) where the author is focused on iminosugars as drugs. Iminosugars are polyhydroxylated alkaloids that resemble monosaccharides, in which the ring oxygen has been replaced by nitrogen. This substitution renders them metabolically inert but does not prevent their interaction with proteins (lectins) that recognize carbohydrates. Iminosugars are potential therapeutic agents with antiviral, antitumor, antifungal, anticancer, and anti-infective drugs, and inhibitors of enzymes involved in DNA metabolism.

Chapter 26 (R. Jelinek, S. Kolusheva) summarizes data about biosensors developed on the basis of carbohydrates, lectins, and glycoproteins. There are descriptions of lectin-based biosensors, carbohydrate nano-biosensors, and biosensors utilizing protein–carbohydrate interactions.

Chapter 27 (R. Maya et al.) deals with glycoanalysis on lectin array.

Chapter 28 (G. Faiman, O. Markman) characterizes lectin chips and their application for the food industry.

The last part of the book, an afterword, is written by Professor Nathan Sharon. He highlighted the basic steps of his many years of professional career, mentioning his teachers, colleagues, and students. Special interest in this memoir is wide scientific collaboration with many scientists from different countries whose impact on the development and successes of glycobiology have been very significant.

The book will be a very useful source for many researchers in glycobiological fields. It should be recommended also to students and teachers of colleges and universities who specialized on glycobiology. I would like to mention that the book is well done, including references to each chapter, subject index, figures, and tables.

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