



Book Reviews

NMR Spectroscopy of Glycoconjugates

J. Jiménez-Barbero, T. Peters (Eds.); Wiley-VCH, Weinheim, 2003, xv + 320 pages, ISBN 3-527-30414-2, (£80.00)

NMR spectroscopy has been one of the major tools utilised in recent years for the advancement of natural polymer science, through studies into the structure, dynamics and function of many kinds of molecules, especially those pertaining to the fields of carbohydrate chemistry and biochemistry. In many glycoconjugates, such as glycolipids and glycoproteins, the carbohydrate portion is composed of carbohydrates containing two to twelve monosaccharide units, i.e. oligosaccharides. *NMR Spectroscopy of Glycoconjugates* details the application of techniques, developed mainly for the analysis of proteins and nucleic acids, to the analysis of glycostructures, and is divided into three sections.

The first section is comprised of five chapters which cover parameters, techniques and experiments. The opening chapter deals with relaxation and dynamics, covering topics such as oligosaccharide flexibility and dynamics, anisotropic motion, and rigidity versus flexibility. The second chapter covers residual dipolar couplings in bacterial polysaccharides, whilst the third chapter focuses on the detection of hydroxyl protons in both free and bound carbohydrates. The final two chapters in this section discuss 1D homonuclear selective methods, and experiments for large carbohydrates, i.e. polysaccharides, respectively. This latter chapter provides a brief comparison of the results obtainable by NMR techniques with classical chemical techniques, such as acid hydrolysis and HPAEC-PAD or GC-MS analysis to determine monosaccharide composition, and methylation analysis to determine linkage positions, etc.

The second section of the volume is also comprised of five chapters, which cover structural and conformational analysis of carbohydrate molecules. Specific topics discussed in this section include combination of NMR and simulation methods in oligosaccharide conformational analysis, the unique solution structure and immunochemistry of the *Candida albicans* β 1,2-mannopyranan cell wall antigen, NMR of sulphated oligo- and polysaccharides, structure and dynamics of glycolipids, and activated sugars. Sulphated derivatives are one of the most intensely studied groups of carbohydrates, due to their diversity and importance with respect to biological functions. The final section is composed of two chapters concerned with

interactions of carbohydrates with biomolecules. The first of these chapters focuses on NMR analysis of carbohydrate-carbohydrate interactions, whilst the second deals with the study of carbohydrate-protein interactions. Glycoconjugates are present on the surface of leukocytes and other migrating cells and selectively adhere to various other cell types or to the extracellular matrix as they journey through the body. Likewise, the recognition of oligosaccharides and glycoconjugates by enzymes, antibodies and lectins is also of major interest.

This volume excellently portrays the current status of NMR applications in the area of glycoconjugates, by bringing together the expertise of well known specialists in experimental, technical and applied aspects of NMR spectroscopy of carbohydrates. It is therefore highly recommended as being of particular value to both senior carbohydrate scientists and those relatively new to the field.

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Whole-grain Foods in Health and Disease

L. Marquart, J.L. Slavin, R.G. Fulcher (eds.); American Association of Cereal Chemists (AACC), St. Paul, MN, USA, 2002, x + 382 pages, ISBN 1-891127-29-2, \$139.00

All nondigestible carbohydrate becomes fermentable carbohydrate in the colon, and this fermentation process has protective physiological effects. Whole grains are the most significant source of dietary fibre and resistant starch. It is only in the last century that the majority of the population of the Western world has consumed refined grain products, and it is not coincidental that coronary heart disease, cancer and diabetes are more prevalent in the Western world.

The mechanisms responsible for the health benefits of whole grains are not clear, however, whole grains contain concentrated sources of dietary fibre, resistant starch, oligosaccharides, vitamins, trace minerals, phenolic compounds, phytate, and phytoestrogens such as lignan, and plant stanols and sterols. This informative volume explores how these components may work synergistically to mediate cholesterol, insulin and glucose response, decrease blood pressure, function as antioxidants, bind carcinogens and decrease colon transit time, reducing the risk of heart disease, cancer and type 2 diabetes. The emerging science of whole grains suggests that it is necessary to consume the entire fibre complex, i.e. bran, germ and endosperm, in order to benefit from these synergistic effects, rather than simply eating the fibre component.

This volume is a reference guide comprised of nineteen chapters written by internationally recognised experts in the areas of grains, whole grains, dietary fibre, heart disease, cancer and diabetes. The opening chapter provides the historical background on whole grains, whole wheat, and white flours. The second chapter covers the structure and organisation of whole grains, the starchy endosperm, bran and germ, and the effects of processing/fractionating on nutritional quality, which leads nicely into the third chapter on fractionation of wheat and barley. Overviews of whole grain oat products, whole wheat products, and whole wheat pasta are presented in the next three chapters, respectively. WHO data has shown that >50% of adult Americans are overweight or obese and consequently the incidence rate of type 2 diabetes mellitus is rapidly rising. Coronary heart disease is the major cause of death in most Western countries, accounting for ~40% of deaths. Specific chapters

are devoted to the effects of whole grain consumption on the risk of type 2 diabetes mellitus, glucose and insulin responses, the risk of coronary heart disease, cancer prevention (particularly colorectal cancer), and body weight regulation.

Information on consumer knowledge, attitudes and behaviour towards whole grain foods is also provided, along with discussion of the role of industry in creating and promoting great tasting whole grain products. In summary, this volume provides a comprehensive review of current whole grain science and technology, regulatory/policy issues, dietary intake, consumer interest and health promotion, including the latest information on health benefits and disease prevention resulting from consumption of whole grains. It is therefore highly recommended to nutritionists, food scientists and technologists and food industry professionals with interests in whole grain products.

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