

## J. Tiralongo (Australia) and I. Martinez-Duncker (Mexico) (eds): Sialobiology: structure, biosynthesis and function. Sialic acid glycoconjugates in health and disease

Bentham e-books, USA, (eISBN: 978-1-60805-386-5, ISBN: 978-1-60805-067-3)

Hans Vliegenthart

Published online: 12 February 2015  
© Springer Science+Business Media New York 2015

This multi-authored book presents in 14 chapters an overview of the occurrence of sialic acids as constituents of glycoconjugates and summarises many biological and chemical aspects of these compounds. Each chapter is extensively documented by references, allowing the reader to retrieve the background. This book is well suited for master and PhD students in (structural) biology and for scientists interested in sialic acids.

Here a short characterization of each chapter is given.

*J. Tiralongo* describes in a comprehensive introductory chapter the chemical structure of the various sialic acids and their natural occurrence. Some biological features are covered as well. Explicit attention is paid to sialic-acid-binding proteins. The different properties of these proteins are discussed. *C. Sato* gives a detailed, descriptive account of glycoconjugates bearing di-, oligo- or poly-sialic acid. Oligo/polysialoglycopolymers play essential roles in biological systems from bacteria to humans. They are involved *i.a.* in cell development, differentiation and cell adhesion. The importance of suitable antibodies for various purposes is indicated. Also the biosynthesis is discussed. *A. K. Münster-Kühnel* and *S. Hinderlich* cover well the sialic acid biosynthesis in vertebrates. The enzymes involved in sialic acid metabolism are discussed in detail. *A. Maggioni et al.* present the CMP-sialic acid transporter in depth. The structure-function relations are discussed as well as the molecular properties of this important protein. *A. Harduin-Lepers* discusses the vertebrate sialyl transferases necessary for creating  $\alpha(2-3)$ ,  $\alpha(2-6)$  or  $\alpha(2-8)$

linkages. There exists quite a diversity of these enzymes. The molecular biology of these transferases is well developed and discussed. *T. Suzuki* and *K. Yamaguchi* give an account of the four mammalian sialidases that have been well characterized. As shown these enzymes play essential roles in cell biology. The properties of each enzyme are summarised. *M. Mühlenhoff* and *A.K. Bergfeld* focus on the important process of acetylation of sialic acid. These structural modifications have a great impact on the biological properties. Here the bacterial sialate *O*-acetyltransferases are described. *C. J. Day* and *J. Tiralongo* emphasize the important role of the recognition of sialic acids in health and disease. Many pathogenic microbes (bacteria, viruses, fungi and protozoa) start their attack by specific adhesion to target cells. For this purpose, many of these microbes make use of sialic acids, which are recognized through adhesins. Several examples are reviewed. Other microbes act through toxins that might be specific for sialic acids. To the family of sialic acids belong also Kdo and Kdn, which are essential for almost all bacteria. *U. Hubl* and *E. Nekrasov* describe sialyloligosaccharides, their occurrence, isolation, application and possible biological significance. *E. Nekrasov* and *U. Hubl* present a short introduction to gangliosides, which form a huge class of compounds. The structure, occurrence and biological properties of these compounds are briefly summarized. Attention is also paid to the involvement in diseases, including cancer. *A. S. Stephens et al.* present sialic acids and the relation to cancer. This is a large subject with many different aspects. The discussed investigations show that it is not easy to generalise the role of sialic acids in malignancy. *S. Magesh* and *H. Ando* describe some of the complications in the chemosynthesis of sialyloligosaccharides. As illustrated, in addition to the

---

H. Vliegenthart (✉)  
Bijvoet Center, Utrecht University, Utrecht, The Netherlands  
e-mail: j.f.g.vliegenthart@uu.nl

classical approach, significant progress has been made thanks to the development of novel glycosylation methods. An interesting aspect is the development of sialomimetics to explore possible biological functions of sialic acids. *S.P. Galuska* deals with the analytical aspects of sialic acids and polysialic acids.

As emphasized, usually a combination of more or less advanced methods is needed to obtain unambiguous results. *J. Du et al.* present metabolic glycoengineering of sialic acids as an interesting, relatively new approach. In this overview different aspects of the applicability are presented.