

## Book Review

*Nonanticoagulant action of glycosaminoglycans, edited by J. Harenberg and B. Casu, Plenum Publishing Corporation, 1996, \$89.50, ISBN 0-306-452995 295pp.*

Heparin has been used for over 50 years as an anticoagulant and its activity depends on the presence of a specific pentasaccharide sequence that binds to antithrombin III and factor Xa. The active sequence makes up only a minor fraction of therapeutic heparin, which also displays other significant biological activities of clinical value, as well as having unfortunate side effects such as excessive bleeding and thrombocytopenia. This book focuses on these alternative and generally less well known properties of heparin and it makes very interesting reading. It describes efforts to make synthetic heparins and heparin-mimetics with minimal side effects and approaches to developing heparin-based therapies for other diseases. Although some chapters are essentially written as reviews of a particular topic the majority are research papers describing data which is often new, with in depth and critical analysis of findings. The contributions are largely based on talks presented at the 'Fourth Symposium on Glycosaminoglycan Research' in Lovenno at Lake Como, a spectacular venue where the scientific mind would be sharpened by delicious Italian food and wine.

The book is well presented and amongst the topics covered are techniques for structural analysis of heparin, including the new and more bio-available low molecular weight heparins, chemical and combined chemical/biotechnological methods for synthesis of heparins and heparin analogues, and effects (usually beneficial) of heparins on various cells and tissues including platelets, granulocytes, erythrocytes, smooth muscle cells, endothelial cells, NK cells and whole kidneys. There is particular interest in heparins in cardiovascular disease because of its ability to inhibit

smooth muscle cell growth; it could be useful for retarding restenosis after balloon angioplasty of blocked coronary vessels. I also learned that heparins block infection of erythrocytes by the malarial parasite, a potentially valuable application to combat a disease which is showing increased resistance to conventional drugs, and which is spreading beyond its normal endemic regions. Due consideration is also given to the important issues of the molecular basis of specific protein recognition by heparin and of the mechanisms of heparin-mediated protein activation, including discussion of the action of heparin and the chemically-related heparan sulphate in modulating the function of basic fibroblast growth factor. It also seems that a mixed preparation of glycosaminoglycans (mainly heparin, heparan sulphate and dermatan sulphate) is showing promise in slowing down the progress of Alzheimer's disease; this sent me searching for a bottle of heparin, if only I could remember where we keep it...!

In summary, this is a specialised book of good quality and very detailed. It will appeal more to the specialist than the casual observer of the heparin field. The book has a contemporary and progressive resonance that will ensure that it has more than a fleeting impact on an important aspect of complex carbohydrate studies; I hope the book fulfils for many the sentiments expressed in the penultimate chapter 'teach us how to number our days so that we can lead our heart to wisdom (Psalm 89).

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