Minisymposion on the occasion of the 85th Birthday of Prof. Dr. rer. nat. Hans Paulsen

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1 Glycochemistry and Glycobiology: Synthesis, Structural Studies and Medical Applications

- Organisation: Hans Paulsen, Joachim Thiem, Universität Hamburg, LANEXESS AG, Leverkusen
- Chair: Joachim Thiem, Department of Chemistry, University Hamburg
- Introduction for Hans Paulsen: Chris Meier, Dean, Department of Chemistry, University Hamburg: read the introduction [here (german version, pdf)]
- University of Hamburg, Friday, June 1, 2007
Genomics vs Proteomics vs Glycomics

Why is Glycomics so ignored?

DNA/RNA

PROTEIN

GLYcoprotein

Four Bases

20 Amino Acids

9 monosaccharides

translation

post-translational

Genomics

Proteomics

Glycomics

PubMed

May 30

2007:

20,248

10,818

176

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2 Handselected Speakers by Hans Paulsen

Video lectures and powerpoint slides will be available soon after corrections.

2.1 Manuel Martin-Lomas

CIC Bioscience Cooperative Research Centre, San Sebastian, Spain Recent Studies on the Molecular Basis of the Activation of Fibroblast Growth Factores by Glycosaminoglycans
THE MOLECULAR BASIS OF THE ACTIVATION OF FIBROBLAST GROWTH FACTORS BY GLYCOSAMINOGLYCANS

FESTKOLLOQUIUM
on the occasion of the 85th Birthday of
Prof. Dr. rer. nat. Hans Paulsen, Hamburg 2007

copyright: Manuel Martin-Lomas
CONCLUSIONS

- A completely stereoselective modular strategy has been developed which allows for the synthesis of heparin-like hexasaccharides both in solution and in the solid state. This strategy permits to control the size and the negative charge distribution along the oligosaccharide chain.
- These synthetic oligosaccharides present a heparin-like three dimensional structure and a well defined spatial distribution and orientation of negative charge in solution.
- The distribution of negative charge along the synthetic oligosaccharides plays an essential role in the activation of FGF-1. It has been found that oligosaccharides which display the sulfate groups only on one side of their three dimensional structures stimulate FGF-1 more efficiently than those with the structure of the regular region of heparin.
- FGF dimerization does not seem to be an absolute requirement for the activation of FGF-1.
- The solution structure of a complex of FGF-1 with a biologically active hexasaccharide reveals that the iduronate rings of the bound oligosaccharide display a conformational
equilibrium between the 1C4 and the 2SO forms. This indicates that, in contrast to AT-III, FGF-1 does not induce conformer selection of the bound oligosaccharide molecules.

2.2 Joyce Taylor-Papadimitriou

Cancer Research Center UK, London, UK Changes in Mucin-type O-Glycosylation in Cancer

2.3 Inka Brockhausen

Queens University, Kingston, Canada Glykobiology without Chemestry is Like a Bug without GlcNAc
Topics

Contribution of synthetic chemistry to
- Development of glycosyltransferase inhibitors
  biomedical applications
  inflammation
- Site directed processing of mucin type O-glycans
- Bacterial O-chain synthesis

2.4 Ole Hindsgaul

Carlsberg Laboratory, Copenhagen, Denmark Simple New Tools for Glycomics
2.5 Peter H. Seeberger
Swiss Federal Institute of Technology (ETH) Zurich, Switzerland Automated Oligosacharide Synthesis

2.6 Johannes F.G. Vliegenthart
Utrecht University, Germany Structural Studies on Carbohydrate

2.7 Thomas Peters
Lübeck University, Germany Why Virus Like Sugars-Answers from NMR
Why Viruses Like Sugars
Answers from NMR

Festkolloquium on the occasion of Hans Paulsen’s 85th birthday

Thomas Peters, Institute of Chemistry, University of Lübeck
Options for defeating viral infections

• Vaccination
• Target essential steps of the viral life cycle
• Inhibit viral proteases, polymerases, transferases etc.
• Inhibit the attachment of virus to host cells:
  Entry Inhibitors

Copyright: Thomas Peters
How does a virus bind to a carbohydrate?

• Crystallography
• NMR
• Microcalorimetry
• Surface plasmon resonance
• Single molecule spectroscopy
• Atomic force microscopy
• ...

copyright: Thomas Peters
STD NMR

Reference spectrum

Selective protein saturation

Ligand signals

PROTEIN

copyright: Thomas Peters

2.8 Klaus Bock

Carlsberg Laboratory Copenhagen, Denmark 40 years of NMR Spectroscopic Analysis of Carbohydrate Structures
40 years of NMR Spectroscopic Analysis of Carbohydrate Structures

copyright: Klaus Bock
NMR Spectroscopy for Carbohydrate Structural Assignments

Varian A-60 NMR Spectrometer, 1966

copyright: Klaus Bock
Danish Instrument Center for NMR Spectroscopy of Biological Macromolecules

copyright: Klaus Bock
Recent methods for the determination of polysaccharide structure: Pulse sequences and high resolution magic angle spinning NMR

New NMR method, H2BC on Bacterial Endotoxins

Danish Instrument Center for NMR Spectroscopy of Biological Macromolecules

Copyright: Klaus Bock

3 Talks (Video and Audio)

Note:
Be careful: the audio talks are much louder than the movies, but in better quality.

Get the Flash Player to see this player.
You need at least Flash Player 8 to see the movies.

4 Slides
4.1 Manuel Martin-Lomas: Recent Studies on the Molecular Basis of the Activation of Fibroblast Growth Factors by Glycosaminoglycans

(slides (pdf))

4.2 Inka Brockhausen: Glykobiology without Chemistry is Like a Bug without GlcNAc

(slides (pdf))

4.3 Peter H. Seeberger: Automated Oligosacharide Synthesis

(slides (pdf))