NIH Common Fund Glycoscience Program

Participating Investigators Meeting

July 2-3, 2018

Natcher Conference Center

Agenda

July 2, 2018
Room E1/E2

8:00 a.m., **Welcome & Opening Remarks**
Martha Somerman, Director, NIDCR
Lawrence Tabak, Principal Deputy Director, NIH

Session I – Methods, Tools & Technologies
Chair, Dr. Pamela Marino, NIGMS

8:30 a.m., *Drug-Like Modulators Targeting O-Glycosylation by GalNAc Transferase-2/3*
Dr. Adam Linstedt, Carnegie Mellon University

8:40 a.m., *GlycoMIr: Mapping the miRNA-glycogene interactome*
Dr. Lara Mahal, New York University

8:50 a.m., *Photocrosslinking probes to discover glycan-dependent interactions*
Dr. Jennifer Kohler, UT South Western Medical Center

9:00 a.m., *Chemical Genetic Tools for the Spatial and Temporal Modulation of O-GlcNAcylation*
Dr. Natasha Zachara, Johns Hopkins University

9:10 a.m., *BapaFPs: Genetically Encoded Fluorescent Indicators to Image Live-cell Nucleotide Sugars*
Dr. Huiwang Ai, University of Virginia

9:15 a.m., *Metabolic carbohydrate cell wall probes for bacterial structure and immune recognition studies*
Dr. Catherine Leimkuhler Grimes, University of Delaware

9:25 a.m., *Enabling tools for protists pathogen glycobiology*
Dr. Christopher West* Dr. Rick Tarleton, Dr. Lance Wells, University of Georgia

9:35 a.m., *Mining the Oral Microbiome for Novel Glycan-Binding Molecules*
Dr. Stefan Ruhl, State University of New York Buffalo and Dr. Paul Sullam, University of California San Francisco & San Francisco Veterans Administration Medical Center

9:45 a.m., *Development of Multifunctional Probes for Profiling Microbial Glycans*
Dr. Laura Kiessling* and Dr. Barbara Imperiali, Massachusetts Institute of Technology

9:50 a.m., *Novel Methods and Technologies for Synthesis of Biomedically Relevant Carbohydrates*
Dr. David Crich, Wayne State University, Dr. Peter Andreana University of Toledo

10:00 a.m., *Chemoenzymatic synthesis of bacterial polysaccharides*
Dr. Hai Yu* University of California Davis, Dr. Laura Kiessling, Massachusetts Institute of Technology, Dr. Lei Li, Georgia State University

10:20 a.m., Picture

10:30 a.m., Break

Session II – Methods, Tools & Technologies
Glycosaminoglycans, Glycolipids & O-Glycomics
Chair, Dr. Karl Kruger, NCI

11:00 a.m., *Expedited Synthesis of Glycosaminoglycans Containing Defined Sulfation Domains*
Dr. Linda Hsieh-Wilson* California Institute of Technology, Dr. Xuefei Huang, Michigan State University

11:10 a.m., *Sequencing Glycosaminoglycans using Recognition Tunneling Nanopores*
Dr. Xu Wang, Arizona State University

11:20 a.m., *Detection and Histopathology Localization of O-Glycans and Glycosaminoglycans in Tissues*
Dr. Richard Drake, Medical University of South Carolina

11:30 p.m., *An Automated Platform for the CE-MS Analysis of Glycosaminoglycans*
Dr. Jonathan Amster, University of Georgia

11:40 a.m., *Software for automated interpretation of heparan sulfate tandem mass spectra*
Dr. Joseph Zaia, Boston University Medical Campus

11:45 p.m., *Manipulating Glycosaminoglycans Using Synthetic Xylosides to Regulate Angiogenesis*
Dr. Kuberan Balagurunathan, University of Utah

11:50 p.m., *Facile chemoenzymatic synthesis and purification of glycolipids*
Dr. Xi Chen* UC Davis; and Dr. George Peng Wang, Georgia State University

12:00 p.m., *Development of high-throughput workflow for glycosphingolipid analysis and annotation*
Dr. Rene Ranzinger, and Dr. Kazuhiro Aoki, University of Georgia

12:10 p.m., *Production of high affinity anti-glycan and anti-glycolipid antibodies*
Dr. Luc Teyton, Scripps Research Institute

12:20 p.m., *Novel Technologies for Quantitative O-glycomics and Amplification/Preparation of Cellular O-Glycans*
Dr. Zhonghua Li for Dr. David Smith, Emory University

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12:30 p.m., Working Lunch

Introductions of Staff, Synergistic CF Programs & Other Federal Opportunities:

Big Data & Glycoscience, Dr. Melissa St. Amand, DARPA
Human BioMolecular Atlas Program, Dr. Ananda Roy, OD
Human Milk Composition Data Base, Dr. Kellie Casavale, OS/OASH
Glycobiology of Alzheimer's, Dr. Austin Yang, NIA
Big Data to Knowledge, Dr. Susan Gregurick

CF-GSP Working Group Introductions:
Dr. Houmam Araj, NEI; Mr. Tony Casco, OD; Dr. Preethi Chander, NIDCR; Dr. Amy Krafft, NIAID; Dr. Karl Krueger, NCI; Dr. Angela Malaspina, NIAID; Dr. Pamela Marino, NIGMS; Dr. Amanda Melillo, NIGMS; Dr. Mercy Prabhudas, NIAID; Dr. Daniel Raiten, NICHD, Dr. Ananda Roy, OD; Dr. Rao Rapaka, NIDA; Dr. Rita Sarkar, NHLBI; Dr. Salvatore Sechi, NIDDK; Dr. Douglas Sheeley, NIGMS; Dr. Jill Beaver, OD; Dr. Bernadette Tyree, NIAMS; Dr. Austin Yang, NIA; Dr. Linda Duffy, NCCIH.

Session III – Methods, Tools & Technologies

Automation of Glycan Synthesis

Chair, Dr. Nicola Pohl Indiana University

1:50 p.m., *Sugar Building Blocks and Automated Synthesis of Biomedically-Relevant Glycans*
Dr. Nicola Pohl, Indiana University

2:00 p.m., *Streamlining the chemoenzymatic synthesis of asymmetrical glycans of biological importance*
Dr. Geert-Jan Boons, University of Georgia

2:10 p.m., *Refinement and implementation of the automated oligosaccharide synthesizer*
Dr. Alexei Demchenko* and Dr. Keith Stine, University of Missouri St Louis
Cristina De Meo Southern Illinois University-Edwardsville

2:20 p.m., *Facile Synthesis of O-Glycans and O-Glycopeptides*
Dr. George Peng Wang* and Dr. Lei Li, Georgia State University

2:30 p.m., Discussion of Automation: What are the key building blocks and enzymes needed for chemoenzymatic automation (bacterial vs human enzymes)? What new developments in artificial intelligence and deep learning could be applied to generate algorithms to predict what sequences can easily be made by automated synthesis?
What standard set of building blocks should be utilized for assessing rigor/reproducibility across chemical platforms? How are we cross validating?

Session IV – Methods, Tools & Technologies

Glycan Analysis: Progress Towards Facile Glycoproteomics

Chair, Dr. Karl Krueger, NCI

3:00 p.m., *Making glycoproteomics via mass spectrometry more accessible to the greater scientific community*
Dr. Marc Dreissen for Dr. Carolyn Bertozzi, Sharon Pitteri, Stanford University
Stanford University

3:10 a.m., *Multiplex Chemical Tags for High Throughput Glycan and Glycopeptide Quantitation and Characterization*
Dr. Lingjun Li, University of Wisconsin

3:20 p.m., *An open source software suite for processing glycomics and glycoproteomics mass spectral data*
Dr. Joseph Zaia, Boston University Medical Campus

3:30 p.m., Break

3:55 p.m., *Glycan linkage and sequence plus determination of site of glycosylation by permethylation of glycopeptides and MSn analysis in a one pot experiment*
Dr. Parastoo Azadi, University of Georgia

4:05 p.m., *LC-MS Analysis of Site Specific Protein Glycoforms*
Dr. Rado Goldman, Georgetown University

4:10 p.m., *Shaping MSn technology for high impact glycan sequencing*
Dr. Vernon Reinhold, University of New Hampshire

4:20 p.m., *Characterization of glycan isomers by trapped ion mobility spectrometry-electron activated dissociation tandem mass spectrometry*
Dr. Cheng Lin, Boston University Medical Campus

4:30 p.m., Discussion:

How do we democratize this?
Are inexpensive equipment add-ons available or can they be developed to assist with analysis of specialized classes of glycans?
What software requirements and spectral libraries are needed to assist in the analysis of glycans and their conjugates?
Will glycan standards or the ability to readily synthesize them facilitate entry of proteomic researchers into this field?
What are the major hurdles that prevent Proteomics laboratories utilizing MS to routinely analyze carbohydrates as well?

5:00 p.m., Adjourn to Dinner