Glycomics, Glycoproteomics and Bioinformatics Tools for Data Interpretation of Mass Spectrometry of Glycoproteins

October 17-19, 2022

Course Overview:

The mass spectrometry and bioinformatics training course will focus specifically on glycomics and glycoproteomics analysis of glycoproteins using mass spectrometric techniques. The MS component will include lectures on glycomics and glycoproteins (including mapping the glycosylation sites in glycoproteins); determining the composition, sequencing, and branching points of N and O-linked oligosaccharides, quantitation of glycans and MS procedures used in these analyses. Virtual demonstrations will include matrix-assisted laser desorption ionization (MALDI), electrospray ionization (ESI), and tandem mass spectrometry (MS/MS). Experience with MS is beneficial but is not required.

The Bioinformatics component concentrates on the interpretation of mass spectrometric data and especially the application of bioinformatics tools for this purpose. The course includes lectures and hands-on exercises of:

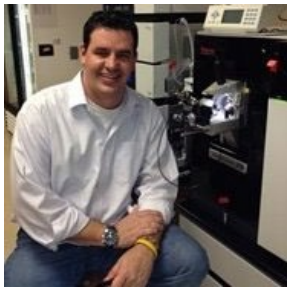
- Introduction to different domain databases (Glycomics and Glycoproteomics) and how they can be used to supplement analytical workflows.
- Introduction to the interpretation of mass spectrometric data
- A general overview of existing mass spectrometry software tools for glycomics and glycoproteomics data

Preparation:

- We will provide a link to the platform on the day of the class
- This class requires a computer and strong internet connection
- Participants should be familiar with basic fundamentals of chemistry and biochemistry.

Instructors:

Dr. Parastoo Azadi - Dr. Parastoo Azadi received her B.Sc. in Chemistry in 1987 from University of North London, UK and her Ph.D. degree in biochemistry in 1991 from Imperial College of Science and Technology, University of London, studying structural characterization of carbohydrates and glycoproteins by mass spectrometry under the supervision of Profs. A. Dell and H.R. Morris. Since 2001, Dr. Parastoo Azadi has been the Technical Director of Analytical Service and Training at the Complex Carbohydrate Research Center. The samples submitted for these types of analyses come from academic, government, non-profit organizations and private companies, throughout the United States and internationally.



Dr. Lance Wells – Dr. Wells received his B.S. in Chemistry, with a minor in Psychology, in 1991 from the Georgia Institute of Technology, and after spending two years working at the Microchemical Facility, his Ph.D. in Biochemistry and Molecular Biology in 1998 from the Emory University School of Medicine. A postdoctoral research fellowship at the Johns Hopkins School of Medicine in Biological Chemistry followed, which was supported by a National Research Service Award from the National Cancer Institute of the NIH. He is a professor in the Complex Carbohydrate Research Center, conducts research that provides a foundation for understanding O-glycans, which play a critical role in determining protein structure, function and stability.

Dr. René Ranzinger – Dr. Ranzinger received his Diploma in computer sciences in 2002, a master in computer science 2004 and his Ph. D in medical computer science in 2010. With the start of his Ph. D in 2005 Dr. Ranzinger focused his work on GlycoBioInformatics and the development of tools and databases to assist GlycoBiologist in their research. His Ph. D thesis was the development of GlycomeDB, a glycan structure database integrating the glycans of all major databases into a single resource that later became the seed for the glycan structure registry – GlyTouCan. During his work at the CCRC from 2010 on Dr. Ranzinger was involved in the design, implementation, and dissemination of multiple glycobioinformatics tools such as GRITS Toolbox and the GlyGen data repository.

Dr. Stephanie Archer-Hartmann – Dr. Stephanie Archer-Hartmann received her B.Sc. in Chemistry in 2006 and her Ph.D in Analytical Chemistry in 2012 from West Virginia University. She has spent more than 10 years working towards improvements for the analysis of carbohydrates, including the isolation, preparation, and analysis of glycosaminoglycans

Dr. Lauren Pepi - Dr. Lauren Pepi received her B.A. (ACS certified) in Chemistry and Biology in 2015 from Assumption University (Worcester, MA) and her Ph.D. in Analytical Chemistry in 2020 from the University of Georgia under the direction of Dr. Jon Amster. Her Ph.D. work focused on fundamental studies of tandem mass spectrometry of glycosaminoglycans. Lauren joined the Analytical Service and Training team at the end of 2020, where her research focuses on glycomic and glycoproteomic characterization of N- and O-glycans using mass spectrometry techniques. Lauren has experience using a wide range of mass spectrometers, including FT-ICR MS, Orbitrap MS, MALDI MS and Ion trap MS.

Monday, October 17, 2022

9:00 a.m. – 12:00 p.m.

Lecture: **"Glycomics and Glycoproteomics Lectures"**

Dr. Parastoo Azadi
Dr. Lance Wells

12:00 p.m. – 1:00 p.m. **- LUNCH**

1:00 p.m. – 2:00 p.m.

Demonstration: Glycomics Sample Preparation

Dr. Stephanie Archer-Hartmann
Dr. Lauren Pepi

2:00 p.m. – 3:00 p.m.

Demonstration: Analysis of Glycopeptites by LC-MS/MS
Software Data Analysis

Dr. Stephanie Archer-Hartmann
Dr. Lauren Pepi

4:00 p.m. – 5:00 p.m.

Lecture: **"Glycomics and Glycoproteomics Tools and Databases"**
Dr. Rene Ranzinger

Tuesday, October 18, 2022

9:00 a.m. – 12:00 a.m.

Glycan Analysis by Waters System

12:00 p.m. – 1:00 p.m. **- LUNCH**

1:00 p.m. – 5:00 p.m.

Glycoproteomics
Data Analysis and Software

Dr. Stephanie Archer-Hartmann
Dr. Lauren Pepi

Wednesday, October 19, 2022

9:00 a.m. – 10:00 a.m.
Glycomics Data Analysis

Dr. Stephanie Archer-Hartmann
Dr. Lauren Pepi

10:00 a.m. – 12:00 p.m.
Hands-on: "Software tools for glycomics Ms data interpretation"

Dr. Rene Ranzinger

12:00 p.m. - 1:00 p.m. – **LUNCH**

1:00 p.m. – 2:00 p.m.
Hands-on: "Software tools for glycomics Ms data interpretation"
Dr. Rene Ranzinger

2:00 p.m. – 3:00 p.m.
Questions and Answers