

1. The role of Mass Spectrometry in Glycomics and Glycoproteomics
Prof. Ron Orlando, Complex Carbohydrate Research Center, University of Georgia

Glycosylation is one of the two most common post-translational modifications found on proteins. Glycan structures and sites of glycosylation have been shown to change with the state/condition of the cell in which the proteins are produced. For example, it has been known for over 40 years that cancerous cells attach different glycans than those of corresponding “normal” cells from the same tissue/organ. Since many glycoproteins are excreted, altered glycosylation has the potential to be used as a biomarker for cancer. Numerous other disease states, ranging from arthritis to alcoholism, are also characterized by altered glycoprotein glycans, as is normal cell growth, differentiation, and development. Identifying glycan structures and how these structures change as cells differentiate or as tumor cells progress, for example, is the focus of an emerging field called glycomics. This workshop will focus on the role of mass spectrometry in the emerging field of glycomics and glycoproteomics. An overview will be presented on the biosynthetic pathway that leads to protein glycosylation and how this, in turn, leads to diverse structures of glycoprotein glycans. Other topics that will be discussed include: the analytical challenges of characterizing glycoproteins and their glycans; the methods used to determine glycan structure, sites of glycosylation, and identify glycans present at individual glycosylation sites. Approaches used for comparative glycomic studies will also be covered. Many of the techniques discussed are applicable to both whole cell glycoprotein extracts (i.e., glycomics) as well as the characterization of purified glycoproteins. Although the emphasis of this workshop will be on N-linked glycosylation, the methodology discussed can be extrapolated to other types of glycosylation