

Title of proposed program: Glycomics: Understanding the “Glyco Code” will Lead to Improvements in Human Health

Submitting Source: Strategic Planning Meeting

What is the major obstacle/challenge/opportunity that the Common Fund should address?

For the past 20 years, discussion has centered on the importance of glycomes; however, new tools are needed to profile not only glycoproteins but the entire “glyco” utilizing an “omics” approach. The field of glycomics includes consideration of genetic, physiologic, pathologic, and other aspects of the glycome. Currently, such quantification is extremely difficult. Challenges, compared with other “omics,” are the complexity of sugars (including highly branched vs. linear structures), modifiability, a complex biosynthetic pathway, and high dynamicity. While several Web sites focusing on glycomics and glycomics databases exist (e.g., <http://www.functionalglycomics.org/>, <http://www.glycosciences.de/>, <http://www.glycome-db.org>, and <http://www.ebi.ac.uk/eurocarb/gwb/home.action>) that have detailed progress to date in the field, validated tools are needed for researchers to advance to a level that leads to the treatment of diseases.

What would the goals of the program be?

This program would have 3 goals:

- Develop tools to determine structural analysis of oligosaccharides
- Create chemical/biological tools
- Expand capacity for researchers to use these tools

Why is a trans-NIH strategy needed to achieve these goals?

Glycomics encompasses a complexity that transcends the study of a single disease. By understanding the role of all glycan structures at the cellular level through development of tools to manipulate the carbohydrate structure, all ICs will benefit from the knowledge gained.

What initiatives might form the strategic plan for this topic?

- Develop tools to determine structural analysis of oligosaccharides
 - Support development of new methods to systematize specific targets
 - Create chemical/genetic/biological tools
- Create informatics tools
 - Create database, and computational and modeling tools to share discoveries
- Expand capacity for researchers to use these tools

If a Common Fund program on this topic achieved its objectives, what would be the impact?

The ability to profile and quantitate the role of glycomes will lead to improved human health by providing an understanding of cell signaling pathways, leading to development of targets for novel agents and vaccines.