Fundamental and Applied Vaccine Research: …and EPSCoR’s Role in Facilitating the Studies

Heather Desaire, University of Kansas
Dr. Eden Go
Mary Bandu
Dilusha Dalpathado
Janet Iruungu
Ying Zhang
Melinda Brethauer
Kathryn Watkins
Nathan Macon
Qing Chang

The first HIV vaccine to go to Phase III clinical trials was the env. glycoprotein gp120. It didn’t work.

• 50% gp120 mass = carbohydrate
• Carbohydrates in viral form: unknown.

A little Virology: Env. glycoproteins are used as vaccines Ex. Hepatitis B, SARS.

http://www.tulane.edu/~dmsander/WWW/335/335Structure.html
Difficulties in Developing an Analytical Method for Carbohydrate Analysis

Challenges:
1. Structures are complicated (Imagine doing NMR)
2. You can’t easily synthesize them, and they are in complex mixtures in nature.
3. Purification is very difficult.
4. Quantities are limited (Ex. 0.0001 mg for $200)
5. We’re interested in glycosylation on proteins

Strategy for Composition Analysis

FT-MS data of glycopeptide mixture (eFSH)

glycopeptide mass = 1543.579 to 1543.585 (2 ppm mass error)

(-) ESI-FTICR-MS Spectrum of eFSH

37 peaks assigned in 4 hours.
OBJECTIVES

1. Develop rapid methods for profiling glycan composition at each glycosylation site.

2. Develop methods specifically for identifying sites of electrostatic interaction

APPROACH

Use gonadotropin hormones as model compounds
Apply methods to gp120.

We are beginning to use these tools to study the glycan structure of gp120. We hope these studies will assist in the development of an HIV vaccine.