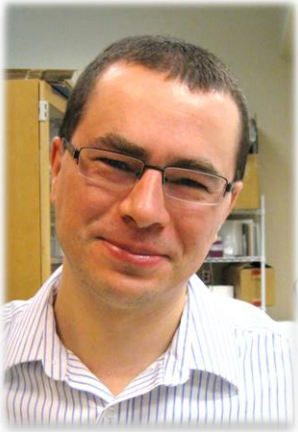


GLIC Seminar Series

Glycan Arrays

February 6, 2023



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GLIC Seminar Series

- Glycoinformatics Consortium (GLIC)
- List of Glycoinformatics
 - Software tools
 - Databases
 - Standards
- Form for submission requests for software/database
- Mailing list: glycoinformatics-consortium-glic@googlegroups.com

<https://glic.glycoinfo.org>

GLIC Seminar Series



02/06/2023	René Ranzinger and Akul Mehta	Introduction to glycan arrays
02/13/2023	Yukie Akune	CarbArrayART for glycan microarray data storage, presentation and reporting
02/27/2023	Akul Mehta	Using GLAD for exploratory glycan microarray data analysis and visualization
03/06/2023	Zachary Klamer	Using CarboGrove to guide experimental design and data interpretation
03/20/2023	René Ranzinger	The Glycan Array Data Repository
03/27/2023	Jon Lundstrøm	LectinOracle@glycowork: Lectin binding predictions & glycan sequence analysis in Python

GLIC Seminar Series

Introduction to Glycan Arrays



Akul Y. Mehta

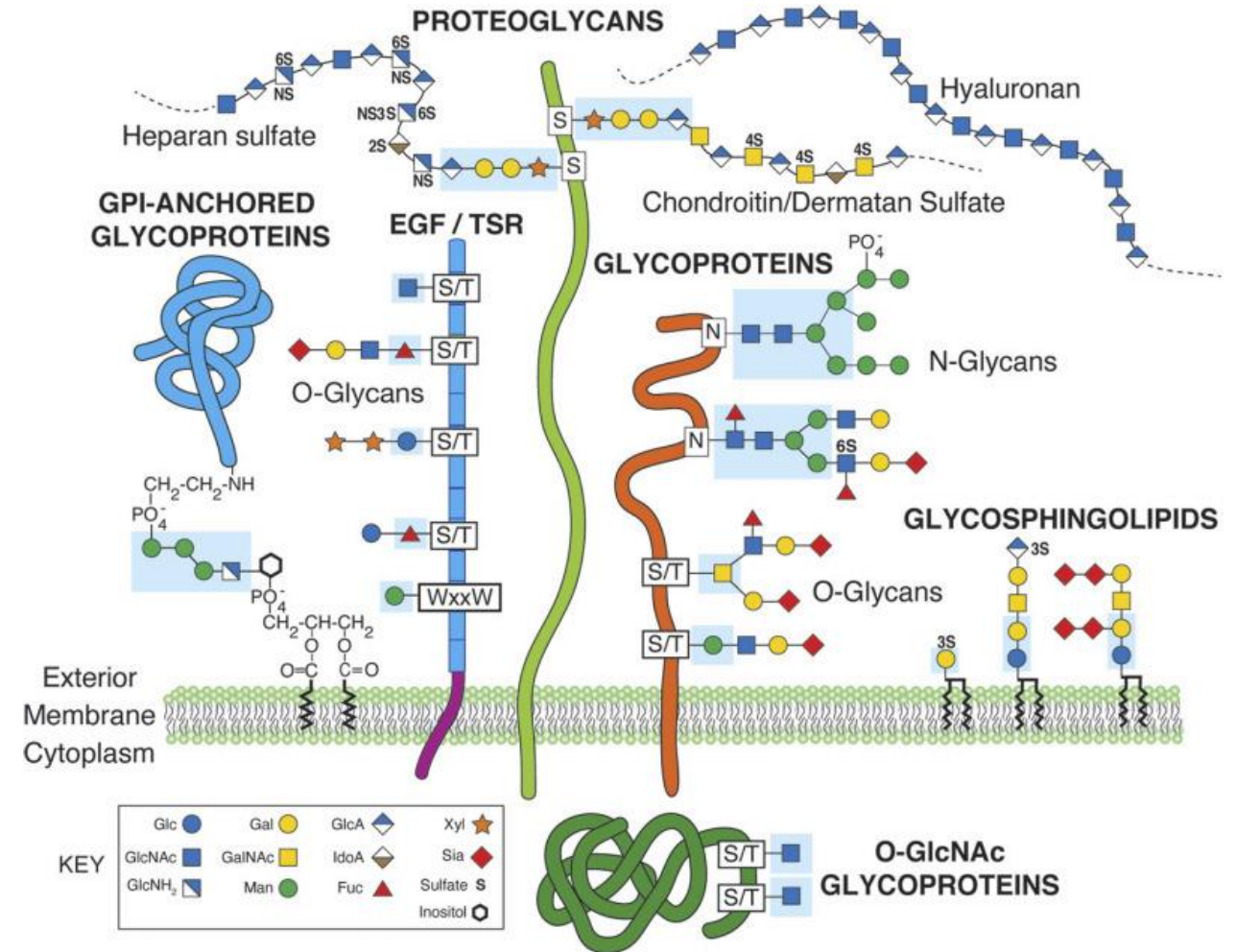
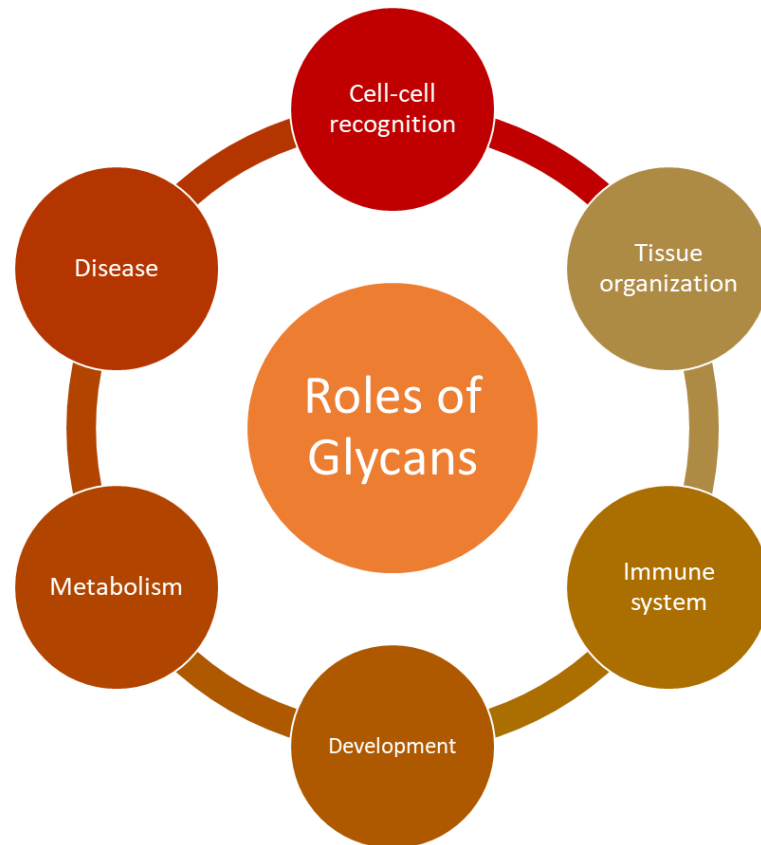
National Center for Functional Glycomics
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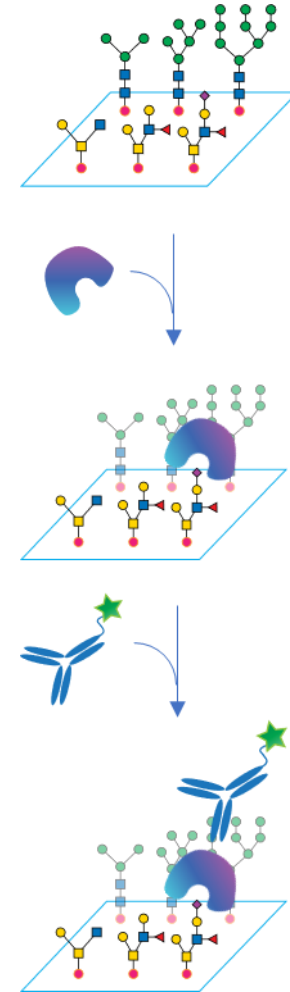
What are Glycans?

- Glycans are carbohydrate molecules often found attached to proteins or lipids or as free oligosaccharides in extracellular matrix.



Principle of Glycan Arrays

- Technique to investigate binding partners to glycans.
- Similar to ELISA but miniaturized.



Steps of Glycan Array Experiment

Highlighting Key Data In Each Step

Glycan Array Preparation

- Glycans usually conjugated to a linker.
- Glycoconjugates printed on slides with complimentary reactive surface.
- Printing performed either:
 - Piezo dispensing / contact-free printing
 - Pin dispensing / contact printing

Data:

- Glycan sequence information
- Linker metadata
- Pattern of printing

Linear

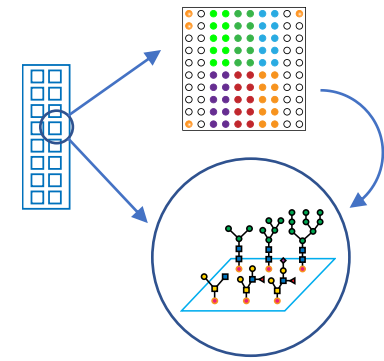
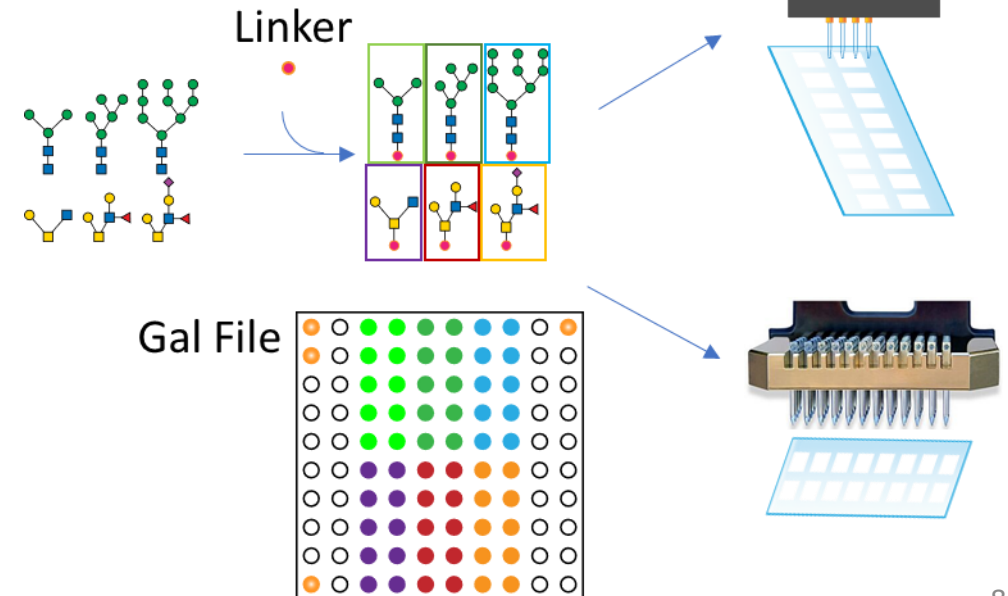
Mana1-6(Mana1-3)Manb1-4GlcNAcb1-4GlcNAcb1

Glytoucan ID

G22768VO

GlycoCT

RES	LIN
1b:b-dglc-HEX-1:5	1:1d(2+1)2n
2s:n-acetyl	2:1o(4+1)3d
3b:b-dglc-HEX-1:5	3:3d(2+1)4n
4s:n-acetyl	4:3o(4+1)5d
5b:b-dman-HEX-1:5	5:5o(3+1)6d
6b:a-dman-HEX-1:5	6:5o(6+1)7d
7b:a-dman-HEX-1:5	

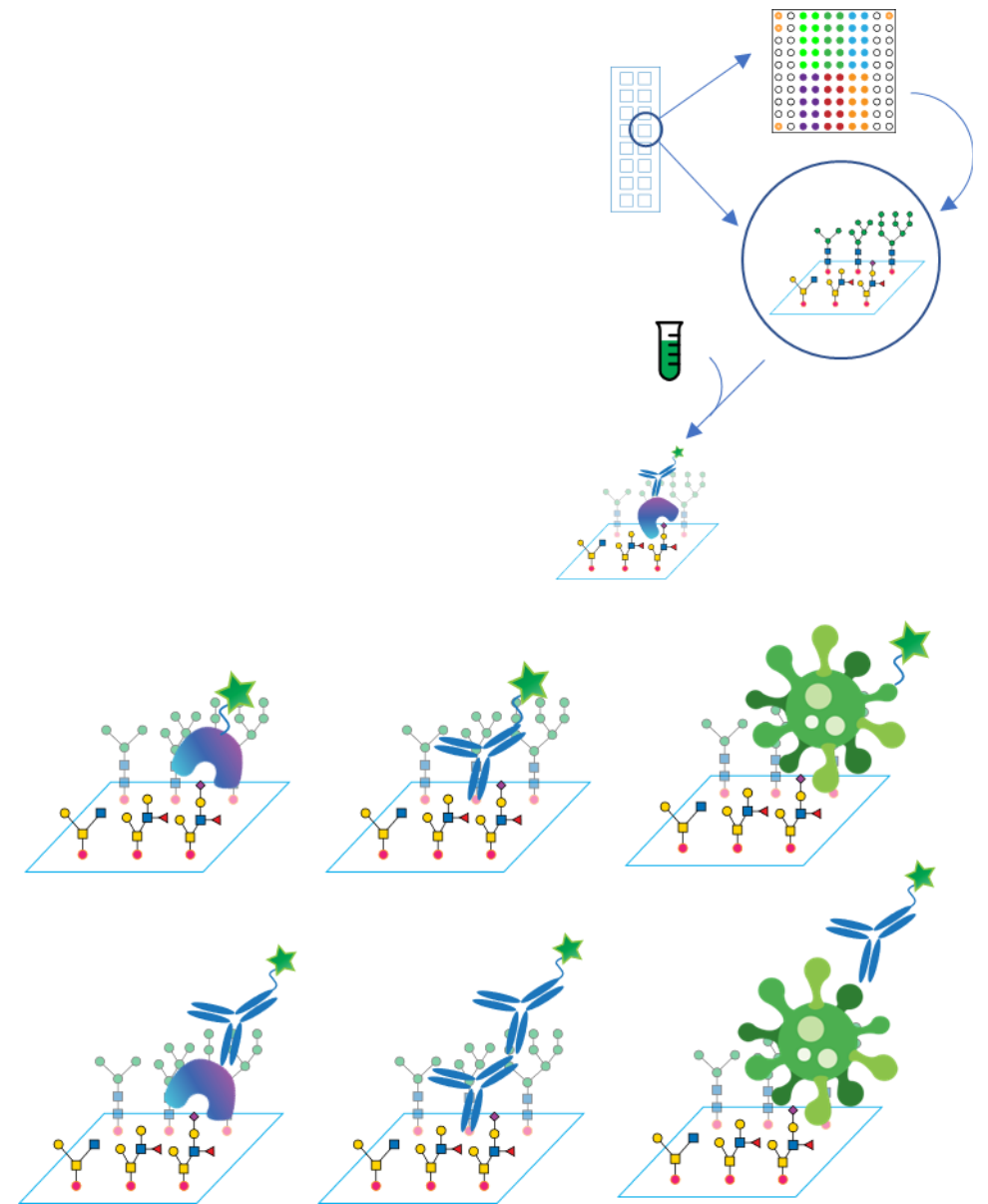


Sample Overlay

- Samples can be:
 - Proteins
 - Antibodies
 - Biospecimens
 - Serum
 - Viruses
 - Bacteria
- Samples need to be either
 - Directly fluorescently labelled
 - Fluorescent detection reagent

Data:

- Sample metadata e.g. purity, expression information, stability information etc.
- Assay metadata e.g. slide pretreatment, concentrations, buffers, incubation conditions etc.

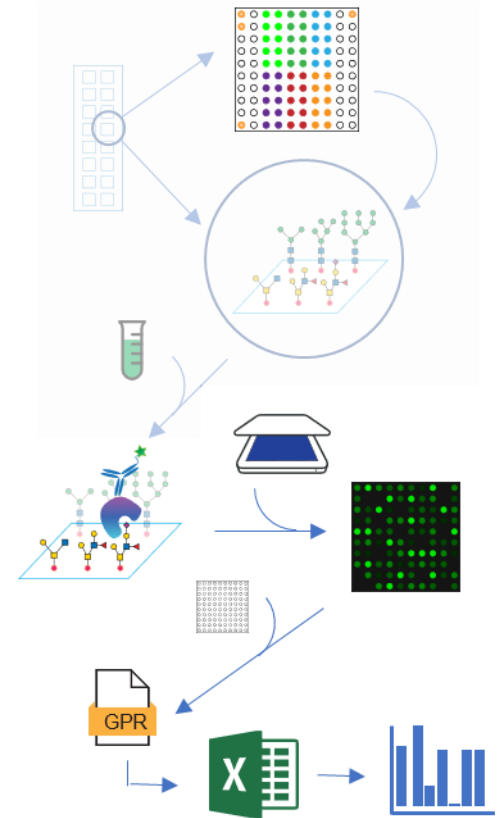


Acquisition and Processing

- Binding observed using scanners.
- Array list file overlayed over image and aligned to produce raw result - GPR file
- GPR file processed to produce final results for a single experiment.

Data:

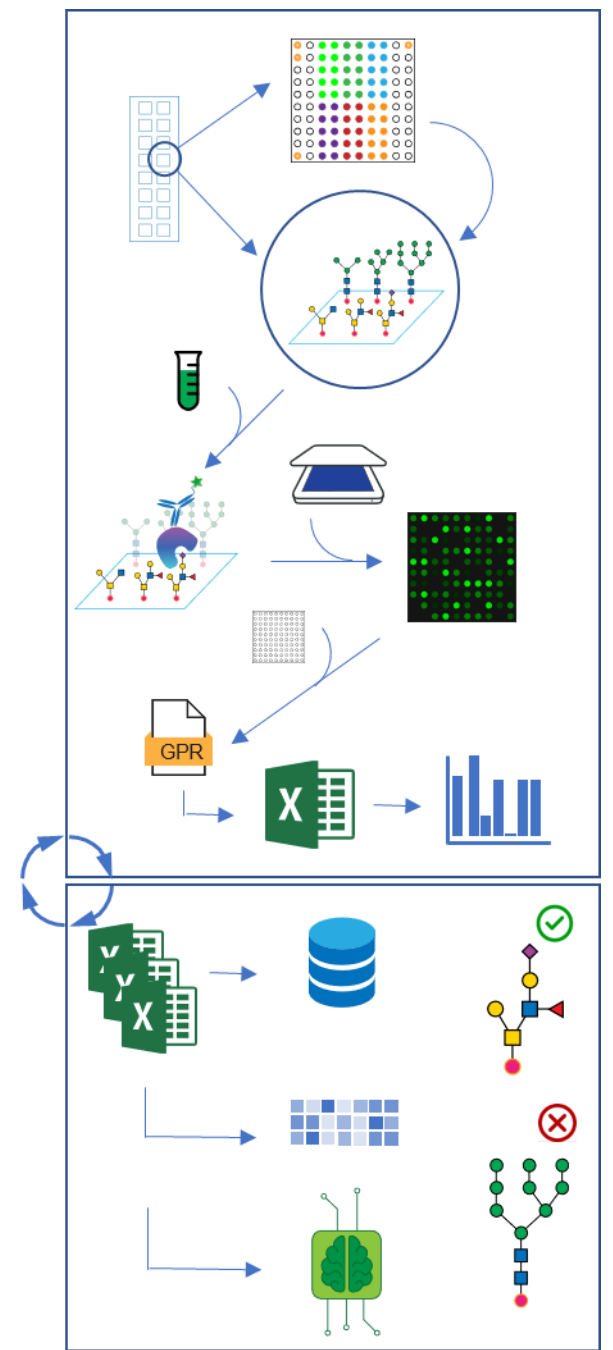
- Acquisition metadata e.g. scanner settings, region of scan.
- TIFF file
- GPR file
- Excel/processed data file



Array Datasets and Tools

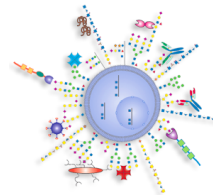
- Data Management Tools
- Data Repositories
- Manual Data Analysis/Visualization Tools
- Automated Data Analysis Tools

GLIC Seminar Series - Glycan Arrays



Resources for Investigators

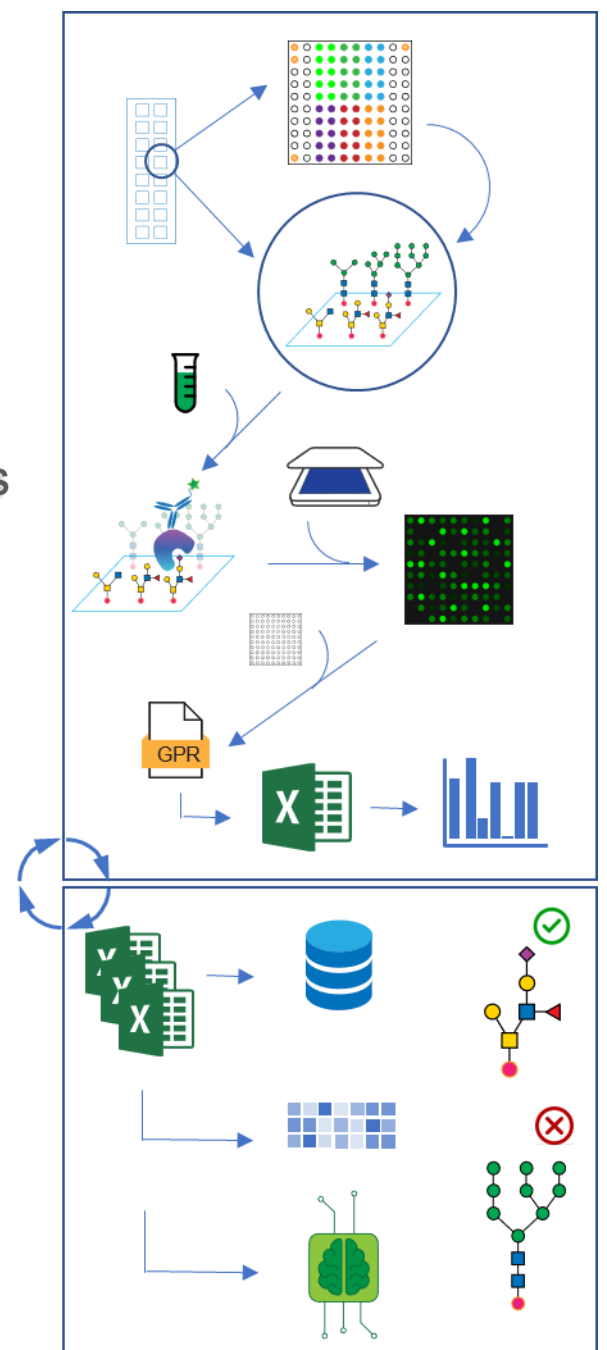
- Arrays as a Service
 - NCFG
 - ICL Carbohydrate Microarray Facility
- Custom Arrays
 - NCFG
 - ICL Carbohydrate Microarray Facility
- Request Slides to Perform Independently (only under special circumstances)
 - NCFG
 - ICL Carbohydrate Microarray Facility



National Center for
Functional Glycomics
NCFG



Imperial College
London





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MIRAGE
WIBVCE

MIRAGE

- Minimum Information Required for A Glycomics Experiment
- Consortium for the definition of minimum reporting guidelines for Glycomics
- Do not dictate how experiments should be performed
- List information that need to be reported for an experiment to make it
 - Understandable
 - Reproducible

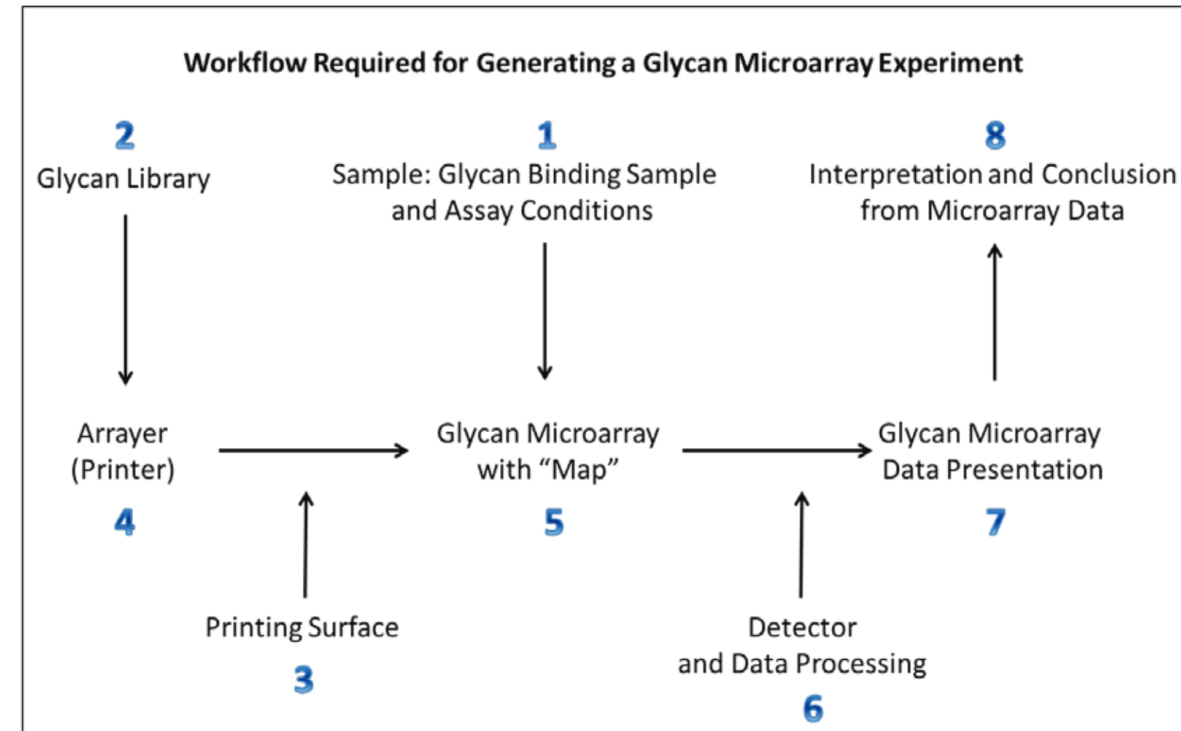
MIRAGE – glycan array

The minimum information required for a glycomics experiment (MIRAGE) project: improving the standards for reporting glycan microarray-based data.

Liu Y, McBride R, Stoll M, Palma AS, Silva L, Agravat S, Aoki-Kinoshita KF, Campbell MP, Costello CE, Dell A, Haslam SM, Karlsson NG, Khoo KH, Kolarich D, Novotny MV, Packer NH, Ranzinger R, Rapp E, Rudd PM, Struwe WB, Tiemeyer M, Wells L, York WS, Zaia J, Kettner C, Paulson JC, Feizi T, Smith DF.

Glycobiology. 2017 Apr;27(4):280-284.

PMID: 27993942



Next Event – 02/13/2023



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CarbArrayART for glycan microarray data storage, presentation and reporting

