

## SPRi-Based Lectin Array Chip

### For Glycoprotein Screening Applications

*An efficient, label-free, real-time SPRi solution. Plexera's Lectin Array Chip is ideal for screening complex biological samples, and for glycol-biomarker applications*

#### FEATURES

- High-throughput array format
- Label-free technology
- Quantitative kinetic result analysis
- Real time binding
- Minimal sample preparation
- Rapid experimental process

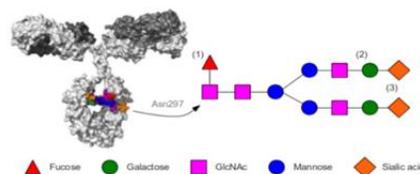
#### BENEFITS

- Ideal solution for glycol-biomarker discovery
- Allows for mixed glycoprotein screening
- Glycan structure identification
- Time and cost efficient
- Wide range of research applications

#### INTRODUCTION

Glycosylation is one of the most common post-translational protein modifications and can be a critical component in disease diagnosis and treatment. Dysregulation of glycosylation is associated with a wide range of diseases including diabetes, cardiovascular disease, and some cancers. Although aberrant glycosylation has been recognized as a hallmark for cancer biomarker discovery, the complexity of the glycome has been challenging comprehensive research in this field (**Fig.1**). Lectins are sugar-binding proteins that are highly specific for their respective glycoprotein conjugates. Their ability to bind to soluble extracellular and intercellular glycoproteins allows them to be an excellent glycoprotein screening agents. Plexera's Lectin Array Chip is a Surface Plasmon Resonance imaging (SPRi) technology developed for high-throughput glycoprotein biomarker discovery.

The Lectin Array Chip offers label-free identification of glycosylation changes in different types of biological samples.



**Fig.1. A typical human immunoglobulin IgG with a fixed glycosylation site and diverse structural motifs**

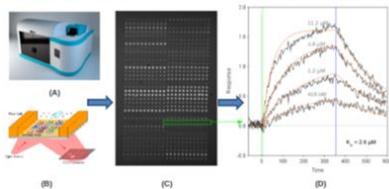
#### ASSAY OVERVIEW

The PlexArray® HT System offers a powerful platform for the high-throughput quantitative measurement of molecular interactions in real-time via SPRi. By utilizing the glycan recognition pathway, a spectrum of protein mixtures can be injected over the array. The glycan-lectin interaction is then recorded in real-time graphical form which can elucidate the functional glycol-component in the mixture (**Fig.2**). Plexera's Lectin Array Chip, coupled with Plexera's instrumentation and Data Analysis software, provides an efficient method to monitor and detect protein glycan structures.

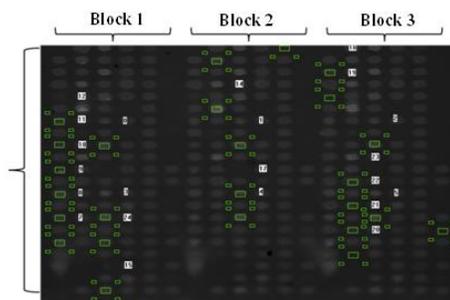
# APPLICATION NOTE

## SOLUTIONS FOR FUNCTIONAL PROTEOMICS

### Plexera's SPRi-Based PlexArray<sup>®</sup> Lectin Array Chip



**Fig.2.**Lectin-glycoprotein interaction analysis with SPRi-based array  
 (A) The Plexera SPRi system.  
 (B) SPRi flowcell containing a microarray.  
 (C) SPR image of a lectin and antibody array.  
 (D) SPR sensorgrams from a lectin-glycoprotein kinetic binding experiment.



**Fig. 3.** Lectin Array Chip containing 41 lectins and assay control spots

## LECTIN ARRAY CHIP

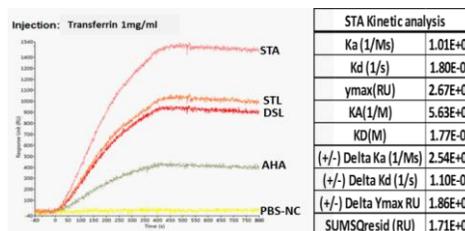
Plexera's Lectin Array Chip offers the largest throughput capacity for detecting glycan structures. On this SPRi array chip, 41 different lectins from seven different sugar binding moieties are immobilized on a single Nanocapture<sup>®</sup> chip: Acetylgalactosamiyl, Mannosyl, Galactosyl, Fucosyl, Sialic Acid, Acetylglucosamine, and Neu5Ac (**Table.1**). These spots are printed in triplicates for statistical reproducibility (**Fig. 3**). The Lectin Array Chip also provides advantages such as easy operation, decreased sample usage, and decreased experimental duration.

Spot position	Content on chip	Lectin name	Lectin Symbol	Source	MW(kDa)	Specificity/Sugar
A1	System control					
A2	Lectin-1	Agaricus bisporus	ABA	mushroom	58.5	$\alpha/\beta$ -D-Galactosyl/Galactose
A3	Lectin-2	Arachis hypogaea	AHA	groundnut, peanut	120	$\alpha/\beta$ -D-Galactosyl
A4	Lectin-3	Erythrina cristagalli	ECA	cockspur coral-tree	56.8	$\alpha/\beta$ -D-Galactosyl
A6	Lectin-5	Phytolacca americana	PAA	pokeberry, pokeweed, scock	32	$\alpha/\beta$ -D-Galactosyl
A8	Lectin-7	Artocarpus integrifolia	AIA	Jack, Jack fruit	42	D-N-Acetylgalactosamiyl
A9	Lectin-8	bovine serum albumin	BSA	bovine serum	114	D-N-Acetylgalactosamiyl
A16	Lectin-15	Agglutinin, RCA120	RCA	castor oil palm	120	D-N-Acetylgalactosamiyl
A17	Lectin-16	Pisum sativum	VAA	mistletoe	49	D-Mannosyl
A18	Lectin-17	Datura stramonium	DSA	jimson weed, datura	86	D-N-Acetylglucosamine
A22	Lectin-21	Lycopersicon esculentum	LSA	Tomato	71	D-N-Acetylglucosamine
A32	Lectin-31	Anguilla anguilla	AAA	european freshwater eel	40	$\alpha$ -L-Fucosyl
A33	Lectin-32	Aleuria Aurantia	AAL	orange peel mushroom	72	$\alpha$ -L-Fucosyl
A34	Lectin-33	Tetragonolobus purpureus	TPA	asparagus pea	58-120	$\alpha$ -L-Fucosyl
A35	Lectin-34	Ulex europaeus agglutinin	UEA1	gorse, furze, white	68	$\alpha$ -L-Fucosyl
A36	Lectin-35	Cicer arietinum	CAA	chick pea, chick pea	44	Neu5Ac
A37	Lectin-36	Limulus polyphemus	LPA	horseshoe crab	400	$\alpha$ -L-Fucosyl
A38	Lectin-37	Maackia amurensis	MAA	amur maackia	130	Neu5Ac
A39	Lectin-38	Sambucus nigra	SNA	elderberry	140	Neu5Ac
A41	Lectin-40	Phaseolus vulgaris-L	PHA-L	(red kidney bean)	126	Complex

**Table.1.** Lectins immobilized on the Lectin Array Chip

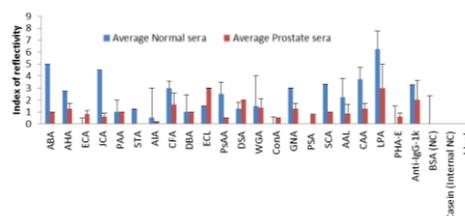
## APPLICATIONS

Here we present a study using the Lectin Array Chip to analyze glycoforms present in a complex cellular protein mixture (**Fig.4a**).



**Fig. 4a.** Interaction of glycosylated cellular proteins with multiple lectins. Kinetic fitting is performed with Plexera's analysis software.

Sera from both normal and cancer patients were injected over the Lectin Array. Their unique binding patterns to glycoforms present in the serum samples allow researchers to quickly identify disease-specific glycol-biomarkers (**Fig.4b**).



**Fig. 4b.** Glycosylated proteins in cancer sera captured by multiple lectins

# APPLICATION NOTE

## SOLUTIONS FOR FUNCTIONAL PROTEOMICS

Therefore, by arraying lectins on a chip and utilizing the PlexArray SPRi platform as demonstrated, users can easily characterize the glycosylation of proteins. PlexArray is a sensitive, high-throughput platform that is suitable for all phases of glycol-biomarker discovery. The Lectin Array Chip can be utilized for additional applications such as:

- Glycoform characterization
- Disease-relevant glycol-biomarkers
- Cell surface glycan profiling
- Pathogen detection
- Bacterial Tropism
- Cancer stem cell markers
- Altered glycan structure

## REFERENCES

Lausted C, et.al. Quantitative serum proteomics from surface plasmon resonance imaging. *Mol Cell Proteomics*. 2008;7(12):2464-74.

Hirabayashi J, et.al. Glyco-catch method: A lectin affinity technique for glycoproteomics. *J Biomol Tech*. 2002;13(4):205-18.