



Carbohydrate-based Biomarkers for Parasitic Infections

Katja Michael, PhD

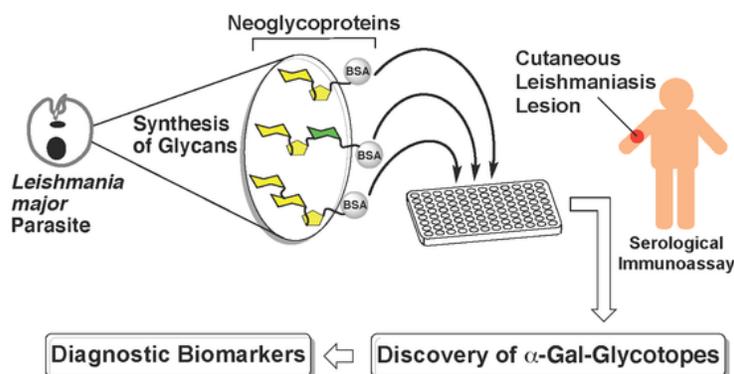
Associate Professor

Department of Chemistry & Biochemistry

University of Texas at El Paso

Abstract

*Chagas disease and leishmaniasis are parasitic diseases caused by the protozoa *Trypanosoma cruzi*, and different *Leishmania* spp., respectively. Patients with *T. cruzi* or *L. major* infections have specific anti- α -Gal antibodies elicited by glycans with terminal non-reducing α -galactopyranosyl (α -Gal) residues commonly present in the various glycoconjugates of the parasites' glycocalyx. Since α -Gal is completely absent or masked in human glycoconjugates, it is highly immunogenic. Identifying the α -Gal-containing glycotopes that elicit anti- α -Gal antibodies opens doors for the discovery of specific diagnostic and prognostic biomarkers. The trypomastigote form of *T. cruzi* expresses glycosylphosphatidylinositol (GPI) anchored mucin-like glycoproteins. Only one of the O-glycans, the linear trisaccharide Gala1,3Galb1,4GlcNAca, has been identified so far, but the majority of these glycans are branched, and their exact structures are still elusive. Chagas disease patients also have antibodies that specifically recognize glycans with terminal nonreducing β -galactofuranosyl (β -Gal_f) residues. They are components of *T. cruzi*'s major protein-free glycoinositolphospholipids (GIPLs) and are most likely also present in the parasite's GPI anchors. β -Gal_f is completely absent in humans, is also highly immunogenic, and β -Gal_f-containing glycotopes may therefore be attractive biomarker candidates for Chagas disease. *L. major* expresses galactose-rich type-2 GIPLs which contain both, α -Gal and β -Gal_f. Based on known type-2 GIPL structures, small oligosaccharides have been synthesized and identified as specific biomarkers for *L. major* infection, which are capable of the serological distinction from healthy individuals. We have applied reversed immunoglycomics, a bottom-up approach that combines the chemical synthesis of suspected glycotopes with serology, and identified specific glyco-biomarkers for *T. cruzi*, *L. major*, and *L. braziliensis* infections. Our data show that the entire glycoconjugates or large oligosaccharides are not necessary as biomarkers, but that small terminal oligosaccharides can be sufficient to achieve a high sensitivity and specificity for disease diagnosis by serology.*



All are welcome. Please join us!

September 22nd @ 2:00 pm - Lopez 106