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Life Sciences Centre  
1003 (LSC3) & Zoom

## “ABO-Histocompatibility”: Organ Transplantation and ABO Blood Groups

**Dr. Lori West**

**Director**, Canadian Donation and Transplantation Research Program  
**Director**, Alberta Transplant Institute  
**Professor**, Departments of Pediatrics, Surgery, Medical Microbiology/Immunology and Laboratory Medicine/Pathology



Immune risk assessment in solid organ transplantation has been revolutionized by single antigen bead Luminex technology to detect HLA antibodies with specificities to donor antigens. Together with HLA typing, this information forms the basis for understanding HLA-histocompatibility, the cornerstone of safe transplantation, and is routine practice today. In contradistinction, ABO-incompatible (ABOi) organ transplantation, undertaken due to severe donor shortages, relies on detection of ABO antibodies using various iterations of the century-old hemagglutination assay, which is known to be plagued by inadequate reproducibility and variable sensitivity. Additionally, the hemagglutination assay is cumbersome for defining IgG vs IgM isotypes and it cannot detect A/B-glycan-subtype specificities of ABO antibodies. Moreover, current ABO typing at most centres detects only phenotype, in contrast to HLA typing for which genotyping is now routine.

The concept of ABO-histocompatibility seeks to quantify the presence, or equally important, confirm the absence, of recipient ABO antibodies in the setting of ABOi organ transplantation, as well as to define both donor and recipient ABH antigens. In immunohistochemistry studies using a panel of in-house monoclonal antibodies, we demonstrated that ABH-glycan antigens that are the targets of ABO antibodies in ABOi transplants are variably expressed from organ to organ. Reagent erythrocytes used as a surrogate for the target organ to measure ABO antibodies in hemagglutination assays do not reflect this tissue variability. Our interdisciplinary team has now synthesized all 18 ABH glycan-subtype antigens and related glycans and coupled these to individual beads. We have created a Luminex assay with these single antigen beads for assessment of serum ABO antibodies that are relevant to the antigens found in transplanted organs. Using fluorescently tagged secondary antibodies, this assay allows precise and highly reproducible measurement of ABH glycan-subtype-specific antibodies and discernment of IgG vs IgM isotypes. Together with ABO genotyping, we anticipate that these tools will allow improved and more precise risk assessment and clinical management of ABOi organ transplantation.