Overview

• An ion mobility spectrometry-mass spectrometry (IMS-MS) platform was applied to characterize/separate standard glycan isomers in both positive and negative ion modes.
• Metal ions were used to enhance isomer separations.
• This platform was applied to study biologically active O-glycans that are important during Chagas disease infection.

Methods

1. IMS profiling of standard glycans with different ion polarities
   - The observed IMS profile was different between positive ion mode and negative ion mode (Fig. 3A and B).
   - Trend lines of arrival time vs. m/z ratios for glycan standards (monosaccharides to tetrasaccharides) in both positive and negative ion modes were plotted. It was found that ions showed revealed different separation capabilities in each mode.

2. Separation of glycans with subtle structural differences
   - Standard glycan isomers with subtle structural differences, such as α versus β-linkages, 1→3 vs. 1→4 linkages, and linear vs. branched configurations, are separated with using IMS-MS platform (Fig. 4-A-C).
   - Using metal ions to enhance separation of KM6 and KM10 that were not separable in either positive or negative mode (Fig. 5).
   - Metal ions enable better separations of KM6 (GlcNAc-(CH2)3SH) and KM10 (Gal-(1,2)]-αGal-(1,3)βFuc-(CH2)3SH) and KM23, KM6 and KM24, Rha-(1,2)−O-glycans

3. Understanding biologically relevant O-Gal-glycans
   - Metal ion adduction can enable better separation of glycan isomers.
   - Application of IMS-MS can separate glycan isomers with subtle structural differences.
   - Metal ion adduction can enhance isomer separations for O-glycan isomers KM1, KM11 and KM23 could be partially separated using IMS-MS platform (Fig. 4-D).

Conclusions

• IMS separations can distinguish standard glycans with the use of both ionization modes.
• Application of IMS-MS can separate glycan isomers with subtle structural differences.
• Metal ion adduction can improve the understanding of biologically active O-gal-containing O-glycans.

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References


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