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Using capillary ion chromatography with high resolution accurate mass spectrometry for targeted metabolomic applications

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Ion chromatography (IC) has been used extensively to separate and determine ionic and charged small molecules. When coupled with High Resolution Accurate Mass (HR/AM) spectrometry, the combined techniques provide confirmatory identification, structural interpretation, and higher sensitivity in complex matrices. With its unique selectivity, IC has been successfully applied to the identification and quantification of targeted and untargeted charged metabolites in biological samples. Capillary IC-MS (Cap IC-MS) furthers the capability of IC with respect to metabolite identification and quantification by improving the system sensitivity and stability as well as reducing the amount of sample required.

Here we demonstrate the targeted analysis of metabolites. The analytes were separated on a capillary packed (0.4 mm ID) or monolith (0.25 mm ID) ion exchange column using an electrolytically generated hydroxide gradient by a Reagent-Free IC (RFIC) instrument. The analytes were detected in full scan mode and extracted in selected reaction monitoring mode (SRM) for selective and sensitive quantification. At the IC-MS interface, the mobile phase was continuously desalted online. Using this configuration, targeted metabolites can be quantified at fmol levels with a small number of µL sample consumption, and linearity can be maintained over two orders of magnitude.

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