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Profiling and Characterization of Polyphenol Polymers from Cinnamon Using an Ion Trap Mass Spectrometer

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Develop a rapid and rugged LC-MSⁿ method for high throughput characterization of the active components in cinnamon extract.

Type 2 diabetes is the most common metabolic disease worldwide. Although the prevention and control of it remains unclear, there is strong evidence that dietary factors play a role in the onset of this disease. Previous studies have indicated that cinnamon may mimic insulin effects and thus may improve glucose uptake (1,2).

In this application, profiling and structural elucidation of polyphenol polymers, the possible active compounds in cinnamon, are performed using an LC-MSⁿ methodology using the LCQ Fleet ion trap mass spectrometer.

Experimental Methods

An aliquot (0.5 g) of cinnamon was ground and extracted in 8 mL 0.1 N acetic acid using a sonic bath for 3 minutes. The supernatant liquid was cooled to room temperature and diluted in mobile phase. The final solution was filtered prior to HPLC separation. LC separation was performed using a C18 column and detected at 280 nm wavelength. Sample fractions CB4 with insulin enhancing activity were collected, and the powders were dissolved in water:MeOH:ACN 25:50:25 solvent for LC-MSⁿ analysis.

Results

A range of procyanidins from cinnamon extract fractions have been identified and characterized within a rapid ten-scan-event LC-MSⁿ analysis [Figure 1(a)]. The fast positive/negative switching the capability of the LCQ Fleet mass spectrometer ensured comprehensive structural information for compounds ionized in both positive and negative mode was collected in a single chromatographic analysis. Figure 1(b) and Figure 1(c) demonstrated the MSⁿ (up to MS⁵) data of one trimer procyanidin in both positive [Figure 1(b)] and negative [Figure 1(c)] polarities from fraction CB4. The ability to perform MSⁿ analysis on precursor ions (isolated using HRI) using the ion trap enables the structural elucidation of these compounds with less interference from the matrices. The presence of *m/z* 289 in negative MS-MS spectrum is considered to be specific for a C-O-C IFL in the polymers (4,5).

Conclusion

A rapid and rugged LC-MSⁿ method has been developed to characterize the various procyanidin oligomers in the Chinese cinnamon extract. Both A-type and B-type polymers were

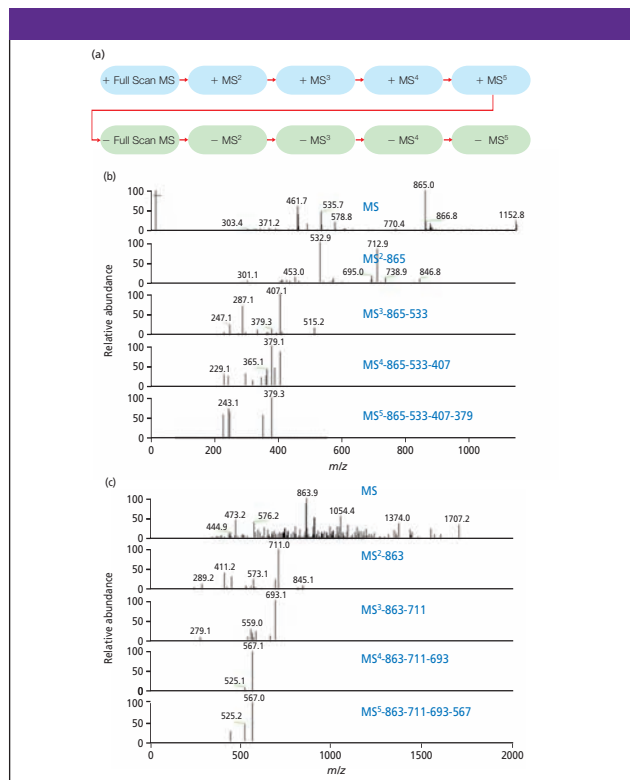


Figure 1: LC-MSⁿ analysis of doubly linked A-type procyanidin from cinnamon. (a) Ten-scan-event MSⁿ method set-up: MSⁿ was performed on the most abundant ions from the previous level of analysis; (b) MS to up to MS⁵ data for the target compound with *m/z* 865 in positive polarity; (c) MS to up to MS⁵ data for the target compound with *m/z* 863 in negative polarity. (The data was collected from fraction CB4.)

found. The fast cycle time and excellent MSⁿ capability of the LCQ Fleet enabled the confident identification of the components of interest.

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