UPLC ION MOBILITY MASS SPECTROMETRY: A NEW APPROACH TO AUTHENTICATION AND ROUTINE SCREENING OF GINSENOCIDES ISOMERS IN FUNCTIONAL FOOD PRODUCTS

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Overview

The study performed in this project was a proof-of-concept targeting a non-targeted screening workflow to uniquely determine the presence of ginsenoside isomers including empirically isobaric pairs of ginsenosides. Ginsenoside marker isomer is shown, the spectra presented...

Introduction

The most abundant forms of ginsenoside markers (Ginseng Korean Ginseng (Panax ginseng) and American Ginseng) are commonly grown in North America. The Korean/ American ginseng markers are most frequently used for health-promoting and medicinal purposes. Ginsenosides have been used for thousands of years. Nowadays, the studies are the main source for ginsenosides treatment therapies. Several studies have been carried out to control central nervous system (CNS), antioxidant, anti-inflammatory and anti-aging effects of the plants. Ginsenosides and polyphenols are the main components of the leaves of green species. Functional food/nutraceuticals are illustrated in Figure 1. Figure 2 shows the structures of the ginsenosides. The possible etiological factors are share for a diverse group of steroidal saponins with a four ring aromatic, together with a pentose sugar residues. The main two groups include the panaxadiol, or Rb1, group that includes Rb1, Rb2, Rc, Rd, Rg3, Rh2, and Rh3; and the panaxatriol, or Rg1, group that includes Rg1, Re, Rf, Rg2, Rg4, and Rg5. American ginseng contains the Rf group whereas, Korean ginseng richer in the Rg1 group. The principle difference in the composition of Rh3 is the time of harvest, storage conditions and production processes.

Methods

The mainstay tree, Ginkgo biloba, is an ancient Chinese plant that has been cultivated for its health-promoting properties known as the maidenhair tree, Ginkgo biloba. Although the large part of Ginkgo biloba results from the Rc ginsenoside because chromatographically coeluting compounds are resolved using ion mobility. The ion mobility spectral cleanup makes it clear that the unknown marker at 8.8 and 9.0 mins has the same characteristic fragment ions as isomer Rc2. Instead it is possible to differentiate using lockmass and lockCCS: Leucine enkephalin, [M-H]^{-}.

Results and Discussion

A collision cross section (CCS) value is a robust and practical feature that allows for unambiguous and characteristic assignment for ginsenoside isomers. In the present study, UPLC-IM-MS has been utilised to generate collision cross section authentication profiles for an unknown empirically isobaric pair of isomers. A new approach has been developed to identify the presence of unknown ginsenosides using collision cross section measurements (CCS). The increased accuracy of CCS authentication profiling has the potential to provide routine screening. An illustration of rotating 3-dimensional ion conformation and average collision cross section (shadow) is shown in Figure 3.

Conclusion

UPLC ion mobility mass spectrometry can be used to routinely screen and authenticate ginsenoside phytochemical makeup in Korean ginseng, ginsenosides, and red ginseng extracts.

References


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