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## Abstract

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## Identification of Ginkgo biloba supplements adulteration using high performance thin layer chromatography and ultra high performance liquid chromatography-diode array detector-quadrupole time of flight-mass spectrometry.

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### Abstract

**Ginkgo biloba** is one of the most widely sold herbal supplements and medicines in the world. Its popularity stems from having a positive effect on **memory** and the circulatory system in clinical studies. As **ginkgo** popularity increased, non-proprietary extracts were introduced claiming to have a similar phytochemical profile as the clinically tested extracts. The standardized commercial extracts of *G. biloba* leaf used in **ginkgo** supplements contain not less than 6% sesquiterpene lactones and 24% flavonol glycosides. While sesquiterpene lactones are unique constituents of **ginkgo** leaf, the flavonol glycosides are found in many other botanical extracts. Being a high value botanical, low quality **ginkgo** extracts may be subjected to adulteration with flavonoids to meet the requirement of 24% flavonol glycosides. Chemical analysis by ultra high performance liquid chromatography-mass spectrometry revealed that adulteration of **ginkgo** leaf extracts in many of these products is common, the naturally flavonol glycoside-rich extract being spiked with pure flavonoids or extracts made from another flavonoid-rich material, such as the fruit/flower of Japanese sophora (*Styphnolobium japonicum*), which also contains the isoflavone genistein. Recently, genistein has been proposed as an analytical marker for the detection of adulteration of **ginkgo** extracts with *S. japonicum*. This study confirms that botanically authenticated *G. biloba* leaf and extracts made therefrom do not contain genistein, and the presence of which even in trace amounts is suggestive of adulteration. In addition to the mass spectrometric approach, a high performance thin layer chromatography method was developed as a fast and economic method for chemical fingerprint analysis of **ginkgo** samples.

**KEYWORDS:** Dietary supplements; **Ginkgo biloba** L.; HPTLC; *Styphnolobium japonicum* (L.) Schott; UHPLC-DAD-QToF-MS

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