Team develops rapid authentication method of Chinese medicines

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PolyU's research team led by Dr Yao Zhongping, Associate Professor of the Department of Applied Biology and Chemical Technology, has developed a new method for rapid authentication of Chinese herbal medicines, including Lingzhi, and Tianma. Credit: The Hong Kong Polytechnic University

The Food Safety and Technology Research Centre under the Department of Applied Biology and Chemical Technology of The Hong Kong Polytechnic University (PolyU) has developed a new method for rapid authentication of Chinese herbal medicines, including Ganoderma (known as Lingzhi in Chinese), and Gastrodiae Rhizoma (known as Tianma in Chinese). The new method is quick and simple, taking around 10 minutes to analyse one raw sample, achieving authentication of genuine and counterfeit species, classification of wild types and cultivated types, as well as differentiation of geographical origins. This method can be further applied to other herbal medicines.

Lingzhi and Tianma are two of the most popular and valuable Chinese medicines. Due to their high commercial values, counterfeiting, adulterating and conflating Lingzhi and Tianma species is common in the market. Conventionally, fingerprint chromatography is adopted to authenticate and differentiate the species, as it can provide comprehensive chemical composition of a sample. However, it is a labor-intensive and time-consuming method, requiring several hours for sample preparation and the separation process for one sample.

Recently, the PolyU research team used direct ionization mass spectrometry (DI-MS) to detect the major active components of Lingzhi (ganoderic acids) and Tianma (gastrodin, parishin B/parishin C/and parishin). By directly applying a high voltage on a raw sample loaded with solvents, spray ionization could be induced at the tip of the sample to generate corresponding mass spectra within minutes. The presence of major active components in the DI-MS spectra authenticates genuine samples from counterfeit ones. Moreover, with Principal Component Analysis (PCA), a commonly used dataset analytic tool, wild and cultivated types can be classified, while geographical origins could be differentiated.

Credit: Hong Kong Polytechnic University

There are approximately 80 Lingzhi species. Only two of them, Chizhi and Zizhi, are described in Chinese Pharmacopeia. Some other Lingzhi species with similar appearances are commonly confused with the official species. On the other hand, Tianma is easily confused with two counterfeit species, namely Cacalia davidii (Franch.) Hand.-Mazz. and Canna edulis Ker.

Both wild Lingzhi and Tianma are very rare, and farm cultivation has become the primary source. In general, wild types have higher contents of major active components and thus better curative effects. Samples from different geographical locations also have variations in components due to varying cultivation conditions.

The method developed by PolyU is simple, rapid, reproducible and can

be easily adopted by researchers in relevant fields as no additional specialized device is required. It has the potential to be further expanded for analysis of other herbal medicines, for example, Heshouwu and Wuweizi, and is therefore expected to have a positive impact on the Chinese herbal medicine industry.

The research findings were published in *Analytica Chimica Acta*, a leading journal in analytical science.

More information: Wong, H. Y. et al. Rapid Differentiation of Ganoderma Species by Direct Ionization Mass Spectrometry, *Anal. Chim. Acta* 2018, 999, 99-106.

Wong, H. Y. et al. Rapid Authentication of Gastrodiae Rhizoma by Direct Ionization Mass Spectrometry, *Anal. Chim. Acta* 2016, 938, 90-97.

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