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As much as it is critical to discover novel secondary metabolites for new lead and drug findings in the treatment of neurodegenerative diseases, it is no-less important in understanding and deeply studying the chemical profiling of constituents or compositions found in the plants or animals of interest, through advanced technology approach. By utilizing UHPLC-ESI-Orbitrap MS, coupled with UHPLC-ESI-QqQ MS methods, a comprehensive chemical profiling analysis was achieved in this study to accurately quantify and qualify the constituents of Maca herb. In the evaluation of neuroprotective effects, the zebrafish embryos model and *in vitro* acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE) inhibition assays were performed to gain insight into Maca's corresponding active compounds and possible mechanism of neuroprotection.

Chemical profiling analysis of Maca using UHPLC-ESI-Orbitrap MS coupled with UHPLC-ESI-QqQ MS and the neuroprotective study on its active ingredients

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Abstract

Lepidium meyenii (Maca), originated from Peru, has been cultivated widely in China as a popular health care food. However, the chemical and effective studies of Maca were less in-depth, which restricted its application seriously. To ensure the quality of Maca, a feasible and accurate strategy was established. One hundred and sixty compounds including 30 reference standards were identified in 6 fractions of methanol extract of Maca by UHPLC-ESI-Orbitrap MS. Among them, 15 representative active compounds were simultaneously determined in 17 samples by UHPLC-ESI-QqQ MS. The results suggested that Maca from Yunnan province was the potential substitute for the one from Peru. Meanwhile, the neuroprotective effects of Maca were investigated. Three fractions and two pure compounds showed strong activities in the 1-methyl-4-phenyl-1, 2, 3, 6-tetrahydropyridine (MPTP)-induced zebrafish model. Among them, 80% methanol elution fraction (Fr5) showed significant neuroprotective activity, followed by 100% part (Fr6). The inhibition of acetylcholinesterase (AChE) and butyrylcholinesterase (BuChE) was a possible mechanism of its neuroprotective effect.