

Article

A Simple and Reliable Method for the Determination of Isorhapontigenin in Murine Biological Matrices: Application in a Tissue Distribution Study

Yuhui Yang ^{1,2,*}, Hongrui Jin ^{1,2,*}, Boyu Liao ^{1,2}, Feifei Gao ^{1,2}, Yihan Yang ^{1,2}, Xinyi Wang ^{1,2}, Zhang Liu ², Jingsi Liang ², Jingbo Wang ², Paul Chi-Lui Ho ³, Hui Liu ^{4,*} and Hai-Shu Lin ^{2,*}

¹ School of Pharmacy, Shenzhen University Medical School, Shenzhen University, Shenzhen 518055, China

² College of Pharmacy, Shenzhen Technology University, Shenzhen 518118, China

³ School of Pharmacy, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, Subang Jaya 47500, Malaysia

⁴ Quality and Standards Academy, Shenzhen Technology University, Shenzhen 518118, China

* Correspondence: liuhui@sztu.edu.cn (H.L.); linhaishu@sztu.edu.cn (H.S.L.)

[†] These authors contributed equally to this work.

Abstract

Isorhapontigenin (*trans*-3,5,4'-trihydroxy-3'-methoxystilbene; ISO), a dietary derivative of resveratrol (*trans*-3,5,4'-trihydroxystilbene; RES), exhibits diverse health-promoting properties. To facilitate its potential development as a nutraceutical, a simple and reliable high-performance liquid chromatography (HPLC) method was developed and validated for the quantification of ISO in various murine biological matrices. Chromatographic separation was achieved with a reversed-phase HPLC column through a 17 min gradient delivery of a mixture of acetonitrile and formic acid (0.1% *v/v*) at a flow rate of 1.5 mL/min at 50 °C. Quantification was performed using ultraviolet (UV) detection at 325 nm, with a lower limit of quantification (LLOQ) of 15 ng/mL in both plasma and tissue homogenate samples. The method demonstrated excellent selectivity, accuracy, and precision, and ISO remained stable under the tested conditions. This method was subsequently employed to investigate the tissue distribution of ISO in mice following oral administration at a dose of 200 µmol/kg (equivalent to 51.7 mg/kg). ISO was rapidly absorbed and extensively distributed across major pharmacologically relevant organs. Despite its limited aqueous solubility, its oral absorption was not significantly compromised. Given its oral bioavailability and broad tissue distribution, ISO represents a promising candidate for further nutraceutical development.

Keywords: isorhapontigenin; resveratrol; nutraceutical; bioavailability; biodistribution



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1. Introduction

Resveratrol (*trans*-3,5,4'-trihydroxystilbene; RES; Figure 1), one of the most well-known nutraceuticals, occurs naturally in dietary sources such as grapevine, red wine, cranberry, blueberry, bilberry, peanut, and various herbs [1–3]. Since the turn of the millennium, RES has attracted considerable attention in the biomedical research community due to its reported potential benefits in managing a wide range of medical conditions, including Alzheimer's disease, cancer, cardiovascular diseases, chronic kidney disease, diabetes, nonalcoholic fatty liver disease, obesity, and metabolic syndrome. Increasing interest is also being directed toward its naturally occurring dietary derivatives [4].

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