Original article

Polyphenolic composition and *in vitro* antioxidant activities of native- and tannase-treated green tea extracts

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Summary

The antioxidant activities of native- and tannase-treated green tea extracts along with their major polyphenol components were investigated. The polyphenolic content and composition of the tea before and after tannase treatment were determined by liquid chromatography coupled with mass spectrometry (LC-MS). Approximately 99% of the (−)-epigallocatechin gallate (EGCG) and (−)-epicatechin gallate (ECG) in green tea extract were converted by tannase to (−)-epigallocatechin (EGC) and (−)-epicatechin (EC), respectively, after 30 min. Biotransformed green tea exhibited a significantly higher DPPH· radical scavenging activities than native green tea (EC50 value of 0.024 ± 0.001 and 0.044 ± 0.001 mg mL⁻¹, respectively). Kinetic parameters such as scavenging rate and stoichiometry were calculated. The rate of DPPH· radical scavenging activities for tannase-treated green tea extract was shown to be higher than native green tea extract.

Keywords Antioxidants, biotransformation, catechins, green tea, tannase.

Introduction

Green tea (*Camellia sinensis*) is rich in polyphenols such as catechins or flavan-3-ols including (−)-epicatechin (EC), (−)-epigallocatechin (EGC), (−)-epicatechin gallate (ECG) and epigallocatechin gallate (EGCG), as well as the alkaloid caffeine (Budryn *et al.*, 2013; Zielinski *et al.*, 2015). Polyphenols are the most abundant compounds in green tea extract and considered as the major antioxidant in green tea (Bruno *et al.*, 2014). Antioxidant properties of polyphenols are manifested in their abilities to scavenge radicals, the most important one is catalysing the biotransformation of tea catechins, resulting in increased antioxidant activities (Baik *et al.*, 2014). Lu & Chen (2007) first reported that the tannase-mediated biotransformation on catechins inside green tea extract increased its scavenging activity towards radicals such as superoxide anions, hydrogen peroxide and 2,2-diphenyl-1-picrylhydrazyl (DPPH). However, kinetic studies on the scavenging activities of native- and tannase-treated green tea extracts are lacking. In addition, comparative studies between native green tea and tannase-treated