

Constituents from the Formosan apple reduce tyrosinase activity in human epidermal melanocytes.

Lin YP, Hsu FL, Chen CS, Chern JW, Lee MH.

Abstract

Tyrosinase is a copper-containing monooxygenase that catalyzes melanin synthesis in skin melanocytes. Herein, 13 compounds from the Formosan apple (*Malus doumeri* var. *formosana*), an indigenous Taiwanese plant, were isolated and identified. The active constituents were identified as 3-hydroxyphloretin (7) and catechol (9); they exhibited potent hydroxyl radical-scavenging (IC₅₀ values, 0.6 and 1.1 μM) and cellular tyrosinase-reducing activities (IC₅₀ values, 32 and 22 μM) in human epidermal melanocytes. In addition, we evaluated the level of several tyrosinase-related proteins by Western blot analysis. In contrast to 3-hydroxyphloretin (7), which showed no effect on the level of these proteins, catechol (9) reduced their activity and the expression of the respective genes, as determined by quantitative real-time PCR. In a kinetic analysis of mushroom tyrosinase, 3-hydroxyphloretin (7) was a competitive inhibitor. These two constituents exhibited metal-coordinating interactions with copper ions in a virtual model of molecular docking with human tyrosinase. Thus, 3-hydroxyphloretin (7) and catechol (9) were the most active constituents from the Formosan apple; they exhibited anti-oxidant and tyrosinase reducing activities, suggesting their possible use as cosmetic agents.