

Maslinic Acid: A Component of Olive Oil on Growth and Protein-turnover Rates

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157.1 INTRODUCTION

157.1.1 Chemical and Biological Properties of Maslinic Acid and its Effects on Disease Prevention and General Health

Maslinic acid (2- α , 3- β -dihydroxyolean-12-en-28-oic acid) is a pentacyclic triterpene abundant in the cuticular lipid layer of olive fruits (Bianchi et al., 1994) (Table 157.1). It is a compound of 30 carbon atoms grouped in five cycles that have several substitutes (Figure 157.1). Maslinic acid presents two hydroxyl groups bound to carbons 2 and 3, one carboxyl group bound to carbon 17, and a double bond between carbons 12 and 13. It is a highly hydrophobic compound of low water solubility. Maslinic acid is synthesized in plants via the cytoplasmic acetate/mevalonate pathway that leads to oxidosqualene (Seo et al., 1988). Oxidosqualene is cycled by various oxidosqualene cyclases, among them β -amyrin synthase, which catalyzes the transformation of oxidosqualene into β -amyrin (olean-12-3n-3 β -ol). Afterwards, β -amyrin is converted by successive reactions into erythrodiol, oleanolic acid, and finally maslinic acid (Saimaru et al., 2007; Stiti et al., 2007).

Maslinic acid is a common element in the diet in which olive fruit and olive oil are included. The concentration of maslinic acid increases as the olive-oil quality decreases, from values of 38 mg kg⁻¹ for extra virgin to 227 mg kg⁻¹ for 9.3%-acidity virgin olive, and to 721 mg kg⁻¹ for crude pomace olive oils (Perez-Camino and Cert, 1999). Maslinic acid is also found in a high concentration (0.8% in weight) in the solid residues (called *orujo*) from olive-oil production (García-Granados et al., 2003). García-Granados (1998)

TABLE 157.1 Key features of maslinic acid.

- Maslinic acid (2- α , 3- β -dihydroxyolean-12-en-28-oic acid) is a pentacyclic triterpene abundant in the cuticular lipid layer of olive fruits
- Maslinic acid can be extracted in high amounts from the solid residues from olive-oil production
- Maslinic acid is a common element included in diets in which olive fruit and olive oil are present
- Maslinic acid has therapeutic properties related to health and disease, including antioxidant, anti-inflammatory, anti-hypertensive, antiviral and antitumor activities
- Maslinic acid can be used as a feed additive for trout diets
- Maslinic acid stimulates the growth rate of trout increasing the protein-turnover rates, hyperplasia level and liver-glycogen content

reported an extraction process of maslinic acid from these residues that renders large amounts of this compound for use in industry and research.

Recently, it has been reported that maslinic acid has many biological and therapeutic properties related to health and disease, including antioxidant (Montilla et al., 2003), anti-inflammatory (Márquez-Martín et al., 2006), antihypertensive (Rodríguez-Rodríguez et al., 2006), antiviral (Xu et al., 1996), and antitumor (Reyes et al., 2006) activities. Montilla et al. (2003) showed that maslinic acid lowers the susceptibility of the hepatocyte membranes to lipid peroxidation, offering advantages in the resistance to oxidative stress. Márquez-Martín et al. (2006) showed that maslinic acid inhibits the production of nitric oxide