

# Antioxidant Food Supplements in Human Health



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## 32 Biological Effects of the Fermentation Product of *Carica papaya* (Immun'Age)

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### INTRODUCTION

Immun'Age (FPP) is a functional health food supplement sold in Japan, the United States, and in other countries. This product is made from *Carica papaya* Linn, yeast fermentation under strict quality control. Although ingredients of the product are still unknown in detail, carbohydrate (90%), protein, amino acids, and vitamins have been detected as main substances by chemical analysis (unpublished data). Immun'Age has been proposed as a free radical modulating agent (Osato *et al.*, 1995; Santiago *et al.*, 1991). In biological studies, Immun'Age has been found to scavenge hydroxyl radicals *in vitro* (Santiago *et al.*, 1991), and in animal studies it has been reported to protect the rat brain against oxidative damage caused by aging (Santiago *et al.*, 1993a), iron treatment (Santiago *et al.*, 1992), or ischemia-reperfusion (Santiago *et al.*, 1993b). From such reports,

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it has been proposed that beneficial effects of Immun'Age might be due to its free radical scavenging properties. However, Immun'Age has also been reported to upregulate phorbol ester-induced and zymosan-induced superoxide production in rat peritoneal macrophages (Osato *et al.*, 1995), natural killer cell activity (Okuda *et al.*, 1993), and the level of interferon (IFN- $\gamma$ ) in human blood (Santiago *et al.*, 1994). Such evidence suggests that FPP also possesses the ability to modulate immune effector cells in addition to its direct free radical scavenging activity. Despite accumulating data on the beneficial effects of Immun'Age, the biological mechanisms responsible for the therapeutic activity of Immun'Age are not well understood. The authors have evaluated its activity under various conditions in order to gain further insight into the biological mechanisms of Immun'Age action and new possibilities for therapeutic applications.