

Suppression of Tumor Angiogenesis by Uruguayan and Brazilian Propolis

Kazuhiro Kunimasa

*Department of Food and Nutritional Sciences, Graduate School of Nutritional and
Environmental Sciences*

Propolis is a resinous substance collected by honeybees from buds and exudates of certain trees and plants. The chemical composition of propolis depends on vegetation at the site of its collection. Uruguayan propolis contains flavonoids and phenolic acid esters, while Brazilian propolis contains terpenoids and prenylated derivatives of *p*-coumaric acids. In this study, we assessed and compared antiangiogenic effects of Uruguayan and Brazilian propolis using *in vivo* and *in vitro* angiogenesis models. In a mouse dorsal air sac assay, Uruguayan propolis suppressed S180 sarcoma-induced *in vivo* angiogenesis more potently than Brazilian propolis. These propolis also inhibited *in vitro* tube formation of human umbilical vein endothelial cells in collagen matrices. Consistent with the *in vivo* experiment, inhibitory activity of Uruguayan propolis was approximately twofold stronger than that of Brazilian propolis. When inhibitory effects of these propolis on tube formation were investigated at molecular level with Western blotting, they were shown to be mediated by similar mechanisms; 1) induction of apoptosis through inactivation of ERK 1/2, 2) inhibition of migration through inactivation of FAK and 3) decrease of VE-cadherin and PECAM-1. These results suggest that propolis is a promising food factor with antiangiogenic properties for cancer prevention, but its antiangiogenic activity may differ depending on its chemical composition.