Propolis and Some of its Constituents Down-Regulate DNA Synthesis and Inflammatory Cytokine Production but Induce TGF-β1 Production of Human Immune Cells

Siegfried Ansorge,*a, Dirk Reinhold,b and Uwe Lendeckelc

a Institute of Medical Technology Magdeburg, IMTM. Fax: (49)3916117351.
E-mail: ansorge@imtm.de
b Institute of Immunology
c Institute of Experimental Internal Medicine, Otto-von-Guericke University Magdeburg, Leipziger Str. 44, D-39120 Magdeburg, Germany

* Author for correspondence and reprint requests

Z. Naturforsch. 58c, 580–589 (2003); received February 21, 2003

Propolis, the resinous product collected by honey bees from plants, is used as folk medicine since ancient time. Recently, immunoregulatory and anti-inflammatory properties of propolis have been published. The detailed mechanisms of actions of propolis and its components on immune cells, however, are still unknown. Therefore, we studied the effects of different propolis extracts, of the flavonoids hesperidin and quercetin as well as of caffeic acid phenethyl ester (CAPE) on basic human immune cell functions. In detail, we measured the effects on DNA synthesis and production of different types of cytokines, namely IL-1β, IL-12, IL-2, IL-4, IL-10 and TGF-β1, of mitogen-activated peripheral blood mononuclear cells (PBMC) as well as of purified T lymphocytes.

Our data clearly show that propolis as well as its constituents studied are capable of dose-dependently suppressing phytohemagglutinin (PHA)-induced DNA synthesis of PBMC and T cells. Moreover, cytokines produced by monocytes/macrophages (IL-1β, IL-12), by Th1 type (IL-2) as well as Th2 type (IL-4) lymphocytes were found to be also suppressed, whereas the production of TGF-β1 by T regulatory cells was ascertained to be increased. These data convincingly demonstrate that propolis has a direct regulatory effect on basic functional properties of immune cells which may be mediated by the Erk2 MAP-kinase signal pathway. Thus, the bee product propolis can be considered as a powerful natural anti-inflammatory medicine influencing different types of immune-responses probably via immunoregulatory T cells.

Key words: Propolis, Immune Cells, Cytokines