High quality Green (Brazilian) propolis extracts characterized for active biomolecules exert anti-inflammatory activity by epigenetic effects at low concentration able to have a positive influence on cell oxidative stress

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Study Objective(s). Recently, EFSA (European Food Safety Authority) provided negative responses on the substantiation of health claims related to propolis based on two main points: I) propolis is very heterogeneous and its main active components (bio)flavonoids are not well characterized and II) due to the absence of structural characterization of propolis and related products, no structure/composition and effect/activity relationship may be established. In this study, we demonstrates a strict structure-function relationship of green (Brazilian) propolis prepared according to proprietress and patented technology.

Method. High quality propolis extracts prepared from green propolis were manufactured by B Natural according to patented technology. Total polyphenols, phenolic acids and bioflavonoids, were characterized and quantified by HPLC-UV-ESI-MS (and tandem mass). The epigenetic effect of green propolis preparations was studied by evaluating the levels of two miRNA, miR-27a-3p and miR-19a-3p, able to modulate the expression of genes involved in oxidative stress and inflammation responses. Moreover, their validated targets, mRNA coding for nuclear factor (erythroid-derived 2)-like 2 (NFE2L2, involved in oxidative stress) and tumor necrosis factor alpha (TNF-alpha, a pro-inflammatory cytokine) were studied.

Results. miR-27a-3p expression levels increased in cells treated with growing concentrations of green propolis preparation (from 0.78 to 1.56 mg/mL) in comparison with untreated cell cultures. The study of the validated mRNA target expression levels revealed that mRNA coding for NFE2L2 decreased in cells treated with 0.78 mg/mL of propolis. As far as miR-19a-3p was concerned, its expression levels increased in propolis treated cells (0.78 - 1.56 mg/mL) compared to control culture. Nevertheless, mRNA coding for TNF-alpha did not change after propolis treatments.

Conclusions. Green propolis extracts with a well specific and characterized profile of active biomolecules is able to exert at low concentration epigenetic effects and to have a positive influence on the expression levels of mRNA coding for NFE2L2, a transcription factor sign of absence of cell oxidative stress. By this study, we can affirm that it is possible to characterize green propolis and its main active components to have a specific fingerprint related to products of different origin and preparations, in particular by using on-line HPLC-UV-ESI-MS analytical technique. Furthermore, green propolis (and its extracts) results a functional food as demonstrated by its in vitro capacity to reduce oxidative stress able to produce a beneficial effect in one or more physiological functions, to increase well-being and/or to decrease the risk of suffering from a particular medical condition.

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