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Honey is a natural metatbiotic (postbiotic) product

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The antioxidant effects of honey can be primarily attributed to its phenolic constituents, which have been demonstrated to provide protection to human cells and the bloodstream when consumed [1]. Analogous to its antibacterial activity, the antioxidant capacity of honey varies considerably and is dependent on the floral source from which it is derived. Darker-colored honey has been shown to possess greater antioxidant activity compared to lighter-colored honey, as the color is influenced by the phenolic content [1]. Furthermore, the phenolic components of honey are also closely connected to its anti-inflammatory qualities. Extant research has revealed that honey has the ability to interrupt inflammatory mediators and decrease pro-inflammatory cytokine levels [1]. Consequently, the anti-inflammatory and antioxidant activities of honey appear to be intrinsically linked [2]. Certain honeys are frequently employed in the treatment of wounds, burns, and ulcers due to their documented anti-inflammatory, antioxidant, antibacterial, and wound-healing properties [3]. However, the systemic effects of honey when consumed orally remain relatively understudied. Here we aimed to investigate the beneficial properties of honey as a natural metabiotic (postbiotic), including its microbe metabolites, plant waste products, and the contributions of bees.

Honey, the primary product of beekeeping, has been a part of human consumption since ancient times [4]. In general, plant nectar is necessary for the production of honey. The glands in plant flowers create nectar, a tasty liquid fluid [5]. Through enzymatic characteristics, the productive microbiota of honey bees and their own enzyme, invertase, affect the conversion of nectar into honey [5]. The fermentation process turns honey into a postbiotic substance [6]. Honey bees stimulate the enzyme glucose oxidase, which converts glucose into gluconic acid and hydrogen peroxide, as honey replaces the nectar [3]. These elements play a crucial role in determining the taste and biological functions of honey [3]. Depending on the specific process used to convert the nectar, the presence and concentration of acids and other compounds may vary, resulting in some honeys exhibiting stronger antibacterial properties than others [3]. The co-fermentation of nectar and nectar modification by bee microbiota and stomach enzymes result in the production of honey [5]. In addition to the active ingredients, phytohormones, and polyphenols originating from plant nectar, such as phenolic acids, flavonoids, and other phytochemicals, honey also contains a number of compounds created by fermentation in the ventricle [7]. These compounds can influence antioxidant activity, neuromodulation, and inflammation [8]. Metabiotics (postbiotics) are defined as the compounds released by bacteria as a result of their metabolic activities, and they may also include dead bacteria that can be beneficial to the human body [6]. Considering these characteristics, honey should be recognized as a natural metabiotic (postbiotic) substance that can be utilized by humans to treat a variety of health conditions [4].

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