

Editorial

## Special Issue “Anti-Aging Properties of Natural Compounds”

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Aging is defined as the progressive loss of an organism’s homeostatic balance. Both stochastic events and genetically programmed processes seem to contribute to this multifactorial phenomenon, and the same applies for cellular senescence, one of the hallmarks of aging. Especially skin, the most voluminous “organ” of the body, epitomizes aging due to damage accumulation, since it represents the interface between the organism and the environment. Accordingly, cosmetic science is focusing on the identification of compounds counteracting skin aging due to extrinsic and intrinsic causes, such as oxidative stress, photoaging due to ultraviolet radiation, etc. Natural products were always considered as a promising source for therapeutic compounds, but especially during the last decade a considerable amount of data on anti-aging effects of natural compounds has appeared. In view of that, this Special Issue of *Cosmetics* entitled “Anti-Aging Properties of Natural Compounds” aims at providing an overview of the current knowledge in the field through reviews, as well as presenting novel data on compounds of natural origin against skin aging through original papers and brief reports.

In particular, this Special Issue contains two very informative reviews. The first one by Francisco José González-Minero and Luis Bravo-Díaz offers a fascinating historical perspective on the way people have used plants for cosmetic applications over time, starting from the ancient Egyptians, Sumerians, Assyrians, and Babylonians and reaching up to our days [1]. It reminds us the ancient Greek origin of the word “cosmetics”, and shows examples of ancient plants used for personal care which are investigated with new scientific advances [1]. The second one by Małgorzata Miastkowska and Elzbieta Sikora focuses on the anti-aging properties of natural products extracted from plant stem cells, which—similarly to animal stem cells—are responsible for the growth and repair of damaged plant tissues [2]. The review covers a wide variety of plants but also draws our attention to a common ingredient present in most of these extracts, the plant hormone kinetin (6-furfuryladenine), whose very strong antioxidant activity may explain the observed anti-aging effects [2].

Beyond the above reviews, novel research findings regarding a variety of natural products are presented through five research articles and a brief report. Bino et al. report the synthesis of five novel derivatives of hesperidin, a natural flavonoid known for its beneficial properties, yet rarely used in the dermo-cosmetic field because of its poor solubility in both water and oil phases [3]. Some of the novel lipidized derivatives of hesperidin exhibit improved properties in terms of their stability in dermo-cosmetic formulations, as well as in their antioxidant and cytostatic activities, laying the groundwork for further structure–activity relationship studies [3]. Travasarou et al. in their article describe the isolation and structure elucidation of bioactive metabolites from the Amazonian plant *Strychnos aff. darienensis*, mostly known for its toxic alkaloids, traditionally used in the preparation of the deadly curare [4]. This novel approach, however, focuses on this plant’s flavonoids, which possess significant antioxidant activities for dermal cells, while two of them—luteolin and strychnobiflavone—confer also photoprotection; hence, they can be used as bioactive ingredients in the cosmetic industry [4]. Li et al., on the other hand, report on an extract from a completely different source, namely the marine brown seaweed *Sargassum glaucescens*, one of the most abundant species

of algae on the rocky coasts of Taiwan [5]. Their data support the use of this extract for cosmetic applications, based on its antioxidant and photoprotective activities on human dermal fibroblasts along with its proliferative effects on human epidermal keratinocytes, where it also up-regulates genes related to skin barrier function [5]. Using a similar approach, Hong et al. are choosing the extract of *Gardeniae fructus*—a traditional herb known for its anti-inflammatory, anti-neurotoxic, and antioxidant activities—to investigate its effects on skin cells [6]. They show that this extract can inhibit melanin production by melanocytes, as well as metalloproteinase expression in keratinocytes, while stimulating hyaluronic acid synthase-1 and filaggrin expression in fibroblasts; hence, it possesses skin whitening, anti-wrinkling, and moisturizing properties, which in combination with its antioxidant activity suggest its potential to be used as a natural component of functional cosmetics [6]. Lee et al. present an in-depth study of an isolated compound, 7,8-dimethoxycoumarin (DMC), a natural coumarin that can be isolated from a variety of medicinal plants [7]. They show that DMC may be used against skin inflammation, since it inhibits tumor necrosis factor- $\alpha$ -induced production of several pro-inflammatory cytokines by interfering with the activation of multiple signaling pathways, such as the ones of nuclear factor- $\kappa$ B, c-Jun N-terminal kinases, and extracellular-signal-regulated kinases [7]. Finally, a brief report by Ferri et al. is providing evidence on the antioxidant properties of the plant derivative N-acetyl-5-methoxytryptamine, known also as phytomelatonin [8]. The authors demonstrate that phytomelatonin promotes the survival of human keratinocytes while suppressing intracellular reactive oxygen species and, furthermore, it induces a microRNA—the hsa-miR-29a-3p—implicated in the control of cell-extracellular matrix, aging, and skin regeneration [8].

In conclusion, this Special Issue on anti-aging properties of natural compounds covers many representative topics in the field and supports the notion that nature's biodiversity and chemodiversity may provide us with the means to fight against aging and age-related disorders.

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