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Editorial

Could Ageing-Related Chronic Skin Problems be Attributed to Neuronal and Non-Neuronal Dysfunctions?

Abstract

The International League of Dermatological Societies (ILDS) has identified the consequences of skin ageing as one of the most important challenges in global skin health. As we get older, the skin undergoes indeed significant changes – many of which may be attributed to systemic, metabolic, hormonal and neuronal changes. As any other organ of the body, the skin is constituted of cells and systems that are, under physiological conditions, controlled by signals arising from the central, peripheral and autonomous nervous systems. Thus, several central nervous system (CNS) and non-CNS-mediated diseases and dysfunctions may lead secondarily to skin problems. The next-generation drugs and therapeutics for skin diseases will probably be increasingly acting upon central and peripheral mechanisms for superior efficacy which, in turn, shall force regulatory authorities to impose stricter regulations prior to approval of dermatological products.

Editorial

The skin is the largest organ (~2 m²) of our body and the first line of defense from pathogens. It prevents excessive water content losses and, as such, serves as a lipid-rich structure involved in regulating body temperature. It is composed of four layers – namely the epidermis, basement membrane, dermis and subcutaneous (hypodermis). None of the epidermis sublayers (e.g., the stratum corneum or SC) contains blood vessels per se although the deepest layers are ‘nourished’ so to speak by diffusion from blood capillaries extending to the upper layers of the dermis. [1]. The dermis provides strength and elasticity to the skin through an extracellular matrix composed of collagen fibrils, microfibrils, and elastic fibers, embedded in hyaluronan and proteoglycans [2]. It harbors blood vessels, mechanoreceptors, thermoreceptors and nociceptors that provide the sense of touch, pressure and heat as well as biological fluids released from sudoriferous and sebaceous glands [3].

Dysfunctional skin is in fact associated with several debilitating pathological conditions such as xerosis, atopic dermatitis, atopic dermatitis, skin cancer, hemangioma, cold sore, acne vulgaris, sebaceous cyst, seborrheic keratosis, pilonidal sinus, ichthyosis vulgaris, psoriasis, rosacea, hives, vitiligo, lupus, eczema, impetigo, decubitus ulcer, bullous pemphigoid, epithelial skin cancer and pruritus, to name a few [4]. The ILDS has clearly reported that ageing-related

skin problem is currently one of the most significant challenges in global skin health [5]. As we get older, the skin undergoes significant changes – many of which may be attributed to systemic, metabolic, hormonal, lifestyle, neuronal and non-neuronal diseases and dysfunctions. For instance, ageing-related nerve degeneration has been found to affect sweat gland function (e.g., lower density, less cholinergic terminals, etc.) in rats [6] whereas, in humans, impaired neural control of mechanobiological processes altering skin function has been associated with ageing [7,8]. According to the World Health Organization, the number of people aged 65 or older is projected to grow from 524 million (2010) to nearly 1.5 billion in 2050 (who.int/ageing) but, the incidence of those who will be dealing with skin problems remains unknown.

Ageing is itself associated with so-called ageing diseases such as andropause, menopause, cancer, stroke, mobility impairment, paralysis, arthritis, Alzheimer’s disease and dementia. Consequently, these conditions can also lead to skin problems – often chronic dry skin problems and itching (xerosis and pruritus, respectively) with or without inflammation and infection-contributing factors. In fact, associations have clearly been established between andropause, menopause, cancer, related-anabolic/sexual hormone dysregulations (e.g., estradiol, testosterone, dehydroepiandrosterone, growth hormone, insulin-like growth factor 1) and skin problems [9]. Other conditions that may lead, secondarily to skin problems include environment (pollution), climatic conditions (dry and



cold air), lifestyle (low physical activity level), epigenetics, drug abuse, obesity, type II diabetes, pharmaceutical drugs, depression, paralysis, etc [6–13]. Regarding prevalence, according to data from NIAMS (National Institute of Arthritis and Musculoskeletal and Skin Disease), more than 5.5 million people in the U.S. suffer of psoriasis, 17 million live with acne and 5 million with vitiligo whereas, according to the British Skin Foundation, 8 million people in the U.K. are currently living with one of the skin diseases associated or not with ageing.

Unfortunately, most related mechanisms are, as of now, only considered as future cellular targets for next-generation CNS or non-CNS products against specific skin disease or dry skin problems. It will be pivotal for scientists to rapidly identify and develop potent therapies adapted to each condition for ensuring that skin and dry skin problems could, one day, be efficiently and safely treated.

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