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Sexual hormones in human skin

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Abstract

The skin locally synthesizes significant amounts of sexual hormones with intracrine or paracrine actions. The local level of each sexual steroid depends upon the expression of each of the androgen- and estrogen-synthesizing enzymes in each cell type, with sebaceous glands and sweat glands being the major contributors. Sebocytes express very little of the key enzyme, cytochrome P450c17, necessary for synthesis of the androgenic prohormones dehydroepiandrosterone and androstenedione, however, these prohormones can be converted by sebocytes and sweat glands, and probably also by dermal papilla cells, into more potent androgens like testosterone and dihydrotestosterone. Five major enzymes are involved in the activation and deactivation of androgens in skin. Androgens affect several functions of human skin, such as sebaceous gland growth and differentiation, hair growth, epidermal barrier homeostasis and wound healing. Their effects are mediated by binding to the nuclear androgen receptor. Changes of isoenzyme and/or androgen receptor levels may have important implications in the development of hyperandrogenism and the associated skin diseases such as acne, seborrhoea, hirsutism and androgenetic alopecia. On the other hand, estrogens have been implicated in skin aging, pigmentation, hair growth, sebum production and skin cancer. Estrogens exert their actions through intracellular receptors or via cell surface receptors, which activate specific second messenger signaling pathways. Recent studies suggest specific site-related distribution of ERalpha and ERbeta in human skin. In contrast, progestins play no role in the pathogenesis of skin disorders. However, they play a major role in the treatment of hirsutism and acne vulgaris, where they are prescribed as components of estrogen-progestin combination pills and as anti-androgens. These combinations enhance gonadotropin suppression of ovarian androgen production. Estrogen-progestin treatment can reduce the need for shaving by half and arrest progression of hirsutism of various etiologies, but do not necessarily reverse it. However, they reliably reduce acne. Cyproterone acetate and spironolactone are similarly effective as anti-androgens in reducing hirsutism, although there is wide variability in individual responses.

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