

# Skin Vitality Profile

## Hormones & Skin

Hormones are intrinsically involved with all processes affecting the maintenance of skin health, such as collagen content, skin lipid levels, elasticity, wound healing, moisture content, and facial hair patterns. Not only is skin a major target of hormone action, it is also a site of local hormone synthesis, as well as hormone activation and metabolism<sup>1</sup>. A major cause of skin thinning, wrinkling, and dryness is a deficiency in hormones such as estrogen and progesterone in women, and testosterone in men, while an excess of androgens can result in oiliness, acne, and either hirsutism or hair loss, and excess estrogen can cause a dark discoloration known as melasma. Thyroid dysfunction also has a big impact on skin health, resulting in conditions ranging from itching to myxedema. Whatever the hormonal imbalance, increasing numbers of patients are seeking help from dermatologists and estheticians for their skin problems. Hormone testing is a first step towards getting at the root of the problem instead of just treating symptoms.

## The Skin Vitality Profile

The range of hormones tested in the profile can help health care providers identify where patients might have hormone deficiencies or excesses that are contributing to their skin problems. This can lead to treatment of previously undiagnosed conditions such as a thyroid disorder or PCOS, or adjustment or initiation of hormone replacement therapy when hormone levels are either too high or too low.

Skin problems associated with hormonal imbalances can include:

- ▶ Acne/oily skin
- ▶ Hirsutism or hair loss
- ▶ Melasma (dark discoloration) or erythema (redness)
- ▶ Myxedema
- ▶ Skin dryness

## Available Tests

### Skin Vitality Profile

Tests: E2, E3, Pg, T, DS, Cx4 (saliva); TSH, Vitamin D2/D3 (blood spot)

Detection of hormone imbalances can lead to treatment of previously undiagnosed conditions such as a thyroid disorder or PCOS, or adjustment or initiation of hormone replacement therapy. Consider for patients with thinning skin, wrinkling, dryness, oiliness, acne, hirsutism, hair loss, melasma, itching, myxedema, or slow wound healing.



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# Hormone Testing

## Minimally-invasive home test kit

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- ▶ Decreased skin elasticity
- ▶ Thinning or rough, coarse skin
- ▶ Increased wrinkles
- ▶ Slow wound healing
- ▶ Increased or decreased sweating
- ▶ Skin rashes or eczema

### The Role of Hormones in Skin Health

#### Estrogens

Skin is one of the main sites of estrogen action, where it plays a role in maintaining skin glycosaminoglycan content, which retains moisture, and inhibits collagen degradation, maintaining skin thickness. Reduced availability of estrogens therefore affects skin health in a number of ways. These include wrinkling, dryness, skin thinning, slower wound healing, and loss of elasticity<sup>2-4</sup>. Because facial skin has much higher concentrations of estrogen receptors than the skin of the breast or the thigh, the effects of declining estrogen levels as women age are more obvious on the skin of the face than on the skin covering other parts of the body<sup>5</sup>.

High estrogen levels can also be problematic. Melasma is a dark discoloration of the skin that is associated with female hormone activity and exacerbated by exposure to sunlight. It is seen in up to 70% of women who are pregnant, when estradiol and progesterone levels are high, and in up to one third of women using oral contraceptive pills or postmenopausal hormone replacement therapy<sup>5</sup>. Expression of estrogen receptor  $\beta$  and progesterone receptors has been observed to be increased in biopsies of melasma-affected skin compared to neighboring, unaffected skin<sup>6</sup>.

Studies of estrogen replacement therapy have shown an improvement in skin properties affected by low estrogen levels, such as increased collagen content, skin thickness, and skin elasticity, as well as an increase in skin surface lipids, which

enhances the barrier function and may prevent dryness<sup>7-10</sup>. Estriol has weak estrogenic activity, but has anti-aging effects on skin when applied directly to the skin; topical estriol can be used alone or in combination with systemic estrogen replacement therapy, to maximize skin benefits<sup>8</sup>. Some topical preparations can contain excessive amounts of estriol, which can cause problems of estrogen excess as well as down-regulating receptors so that skin problems may actually worsen with continued treatment; it is therefore important to test estriol to ensure that levels are within a normal range.

#### Androgens - Testosterone and DHEA-S

Skin thinning, and other symptoms associated with estrogen deficiency, can also occur in people with androgen deficiency because there is less testosterone available for local conversion to estrogen through the action of aromatase present in the skin. Low testosterone in both women and men is associated with thinning skin and impaired wound healing<sup>11</sup>. Testosterone replacement in men has an anabolic effect, increasing tissue protein synthesis, and has been found to increase skin thickness<sup>11</sup>. In women, low testosterone and DHEA-S are associated with increasing age, but particularly low testosterone is found in women who have had a surgical menopause (removal of the ovaries) and this has an impact on overall health and vitality. DHEA-S is a precursor to testosterone and estradiol, so low levels of DHEA-S affect the availability of these hormones to carry out their functions.

While androgen deficiency is more often seen in older age groups, skin problems associated with androgen excess can occur in younger people and are seen around the time of puberty, in polycystic ovarian syndrome (PCOS), in patients with congenital adrenal hyperplasia, or in people using exogenous hormones<sup>12</sup>. Dihydrotestosterone (DHT) is the active metabolite of testosterone that, in excess, contributes to the development of acne in both men and women, and in the skin of the scalp it is responsible for "male pattern baldness". In androgen excess

conditions in women, hirsutism including unwanted facial hair growth is also seen. Progesterone reduces the activity of 5-alpha reductase<sup>13</sup>, which converts testosterone to DHT, therefore a progesterone deficiency may worsen unwanted effects of excess androgens on the skin. Test results showing high testosterone and DHEA-S levels, especially when estradiol levels are normal, can help diagnose PCOS in women presenting with skin disorders such as acne or hirsutism.

### **Progesterone**

Progesterone has been used in cosmetic skin creams as well as in hormone replacement therapy, and has been found to improve skin thickness and elasticity<sup>14</sup>.

Low progesterone levels are thought to increase the impact of androgens on sebaceous glands and body and head hair. This is because progesterone reduces 5-alpha reductase activity, which converts testosterone to its active metabolite dihydrotestosterone (DHT)<sup>13</sup>.

### **Cortisol**

The diurnal cortisol test is a good indicator of adrenal function and exposure to stressors, which results in dysregulation of the hypothalamic-pituitary-adrenal axis causing cortisol levels to remain low under chronic stress. Stress is known to affect the skin, causing acne breakouts and rashes, and low cortisol associated with chronic stress can exacerbate immune disorders affecting the skin such as psoriasis<sup>15</sup>. The emerging field of psychodermatology links many skin disorders with emotional and psychological problems<sup>16</sup>.

### **Thyroid Hormones**

Skin health is significantly affected in multiple ways by thyroid diseases<sup>17,18</sup>. Thyroid stimulating hormone (TSH) testing can indicate the presence of a thyroid disorder that may be contributing to skin problems.

Autoimmune thyroid disease can result in skin conditions such as urticaria (itching), rashes, including eczema, and scleroderma. Myxedema is a classic skin condition associated with hypothyroidism, and is caused by edema due to increased glycosaminoglycan deposition. Hypothyroidism can also be associated with skin dryness as a result of decreased sweating and reduced sebum production, pale skin color, and rough, scaly skin. Some hair loss can also be seen in hypothyroid individuals, notably in the eyebrows where the outer third of the eyebrow can disappear entirely.

Graves Disease, an autoimmune disease associated with enlargement of the thyroid gland and overproduction of thyroid hormones, is associated with thickening of the outer layers of the skin and increases in skin pigmentation, erythema (redness), smoothness, and sweating.

### **Vitamin D**

Adequate vitamin D is essential for proper immune system function. A compromised immune system can exacerbate skin disorders, and is linked to such conditions as psoriasis, acne, and slow wound healing. The active form of vitamin D, calcitriol (1,25-dihydroxyvitamin D), and some vitamin D analogs, are being used successfully in topical treatment of plaque psoriasis<sup>19</sup>. Vitamin D and its receptors in the skin are also involved in the regulation of epidermal proliferation and differentiation for the maintenance of skin structure and its barrier function, hair follicle cycling, and suppression of tumor cell formation<sup>20</sup>. Testing for adequate vitamin D levels can show whether vitamin D deficiency is contributing to skin problems.

### **Hormone-containing Cosmetic Creams**

Because of the efficiency of the skin in absorbing systemically-active hormones, topical hormone preparations, such as creams, gels, and patches, are widely used for hormone replacement in both postmenopausal women and men. Topical preparations can be dosed at much lower levels because of the avoidance of first-pass liver metabolism undergone by orally-administered hormones.

Cosmetic creams containing hormones, most commonly estriol, are both prescribed and sold over the counter as anti-aging products. Practitioners should be aware that hormones applied to the skin for cosmetic purposes, just like other hormone replacement products, have systemic effects, and should be monitored with saliva testing. Conventional blood tests do not reflect topical hormone usage<sup>21</sup>, because hormones applied to the skin are rapidly delivered to tissues and do not stay in the bloodstream; however, saliva testing can be used to show the extent of absorption of topically-delivered hormone<sup>22</sup>.

Excessive amounts of estriol and other estrogens can be dangerous, especially when exposure is inadvertent or unmonitored. There are published reports of young children with prepubertal gynecomastia and other pubertal changes as a result of inadvertent exposure to estrogen-containing products<sup>23-25</sup>, including custom-prescribed estrogen creams used by their mothers<sup>26</sup>.

Also, over-use of cosmetic products containing estrogens may result in estrogen-dependent cancers<sup>27,28</sup>. Saliva testing can indicate whether hormone exposure as a result of the use of cosmetic products is excessive, and it can ensure that hormone levels are kept within a physiological range after prescription of hormone-containing creams for cosmetic purposes.

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