Hormones control puberty, pregnancy and menopause – can we control their impact?

published in Kosmetik International 2018 (10), 148-150

Hormones have direct impact on the skin. Individual, age-dependent processes but also long-term and temporary alterations come into play.

Meanwhile there are plenty of insights and theories available on the molecular interaction of hormones and hormone-dependent substances in the bodily network. Hardly a day goes by without the publication of new studies on biochemical processes and their relevance for the skin as an organ or without invalidation of old studies. More important for the daily cosmetic practice, however, is that visible and measurable appearances in and on the skin are adequately identified and causally treated. The principal activity areas of sexual hormones are the dermal glands: sebaceous glands, sweat glands, mammary glands and mucous glands. Hormone-controlled over- and underproductions are inconvenient for the individual on the one hand but also can have pathological effects on the other hand.

Acne

Most frequent skin appearance during puberty, before menstruation and after pregnancy is acne while acne tarda can have its onset around the 30th year of life. In cases of pubertal and premenstrual acne, the skin is moist and fatty but dry and scaly with acne tarda. Accordingly, the skin care consists of low-fat preparations or of active agent sera only. If lipid substances are needed it is advisable to use preparations that are high in essential omega-3 and omega-6 fatty acids – this particularly applies for acne tarda and aging skin (in men).
Reducing surplus weight and carbohydrates in the daily nutrition, a controlled use of comedogenic substances in cosmetic products (INCI!), avoiding surplus skin care, keeping a mental balance as well as eliminating adverse effects of medical drugs are important measures to get a grip on the problem. The selection of active agents depends on the specific form of acne:

- **Keratolytic** effects: salicylic acid and willow bark extracts, high doses of urea, AHA fruit acids (only to be used if necessary and not on a routine base) and enzyme peelings.
- **Anti-inflammatory** effects: boswellic acids because of their protease inhibition. The dermal 15-lipoxygenase transfers essential fatty acids of several herbal oils such as linoleic acid, alpha- and gamma-linolenic acid into anti-inflammatory metabolites. Additional active agents are phosphatidylcholine, buckhorn (alias ribwort, ribgrass) extract, berberine, active agents of chamomile, astringent extracts of hamamelis (witch hazel) and green tea as well as zinc salts.
- **Antimicrobial** effects: azelaic acid (5-alpha-reductase inhibitor up to 1 %), algae extracts and -masks, betulinic acid.
- **Regeneration-supporting** effects: vitamin A and derivatives, niacinamide (Vitamin B_3), yeast extracts (B vitamins), D-panthenol (provitamin B_5), sodium ascorbyl phosphate (vitamin C), vitamin E and its esters, echinacea (alias coneflower, sun bonnet) extract and phytohormones (soya, red clover) with their high content of isoflavonoids.

A high penetration of active agents can be achieved with liposomal sera or with sera containing biodegradable nanodispersions. This is advantageous as already low substance concentrations are highly efficient in this context.
Care should be taken that skin and hair cleansing preparations (shampoos) contain mild tensides and are free of re-fattening substances. Hair gels frequently are counterproductive since they can trigger pimples below the hair line because of their specific composition.

Sweat

Hormone fluctuations involve alterations of the body odour. The smell of perspiration often is apparent in pubertal young men. The main component in this case is androstenone which is a metabolic product of testosterone. Adult women and men exude gender-specific sub-

stances that are modified by the microbiome of the skin and either have attracting or repelling scents. Also the mental condition has its effects on the secretions of the apocrine sweat glands. Contraceptive pills and pregnancy lead to alterations in the body odour on mamilla and in the genital area. The volatile vaginal copulins vary during the menstrual cycle; they increase the testosterone balance in men during receptivity and synchronise the female menstrual cycle when women spend longer periods of time in close proximity.
Perfumed deodorants are available to cover the individual scents. Caution should be exercised, though: they can have counterproductive effects due to the allergenic components in the essential oils contained. Other less appropriate ingredients are alcohol which was denatured with diethylphthalate (Alcohol denat.), and non-biodegradable silicones.
The increased sweat formation involved with the hot flushes experienced during menopause can be met with antiperspirants. The most effective agents still are aluminium chlorohydrate, aluminium sulphate and aluminium potassium sulphate (alum). There still are no reliable studies on the assumption that they involve a higher risk for Alzheimer's disease and breast cancer. The German Federal Institute for Risk Assessment (Bundesinstitut für Risikobewertung – BfR) however recommends avoiding the use of aluminium salt preparations on a pre-damaged axillary skin.
Herbal tannins also are used. The tannins react with proteins and have astringent effects. Herbal tannins are e.g. birch bark-, oak bark- and hamamelis (alias witch hazel) extracts as well as gallic acid and their derivatives. Sage extracts are available as topical preparations and in the form of tea.

Pregnancy

While the female breast and its glands develop during puberty through hormonal influence, hormonal fluctuations during menstrual period and pregnancy lead to alterations in size and form. Cosmetic skin care preparations for breast and décolleté should be used with caution during pregnancy. This applies for specific active agents but also for preparations in general. It is essential to avoid substances that can be assimilated by the unborn child or during lactation period by the newly born baby:

- **Essential oils** easily pass through the skin and find their way into the circulatory system. They contain allergenic components. Additional allergenic components form through oxidation during storage and application.
- 200 mg of **caffeine** per day, either as a pure substance or as component of tea extracts is considered as harmless for pregnant women. The mentioned amount cannot be reached with cosmetic products.
- All the **preservatives** listed in the annex of the German Cosmetic Regulation (KVO) have allergenic potential. It is difficult to forecast whether sensitizations can occur in the unborn child. One thing is for sure, preservatives have been found in breast milk and some of them belong to the endocrine disruptors that interfere with the hormonal balance.
- **Phthalates** (see above) have been found in the urine of toddlers.
- Some of the prior UV filters also belong to the **endocrine disruptors**.
- While a twice daily application of 0.3 % of **vitamin A** in facial creams, 0.05 % in body lotions, still was considered as safe by the German Federal Institute for Risk Assessment, the statement no. 005/2014, issued 31 January 2014, recommends to limit the application of vitamin A to the facial- and hand care.

The appealing the breast may be and the readily it may be show-cased, the skin and tissue are sensitive to the UV- and infrared radiation of the sun. Sun screens are a poor solution though and only effective for a short period of time. A good decision is to provide for textile protection.
In summary it can be said that the skin usually undergoes positive alterations during pregnancy. The skin is better hydrated. Sebum (see above) and skin elasticity increase, the breasts become tighter, micro circulation is more intense and the surface temperature of the skin is increased.
Disadvantageous is that couperosis can be triggered and pigment spots can show due to increased melanin formation, possibly also stretch marks (striae); their treatment however is another subject.

Mucous- and other glands

The genital area in general does not need any additional skin care due to the abundance of sebaceous glands. Women however have to adapt themselves continuously to different phenomena such as puberty, menstrual period, pregnancy, lactation period, menopause and subsequent symptoms of old age. In the case

of hormone-related vaginal dryness the following remedies are helpful:

- Small amounts of paraffin- and silicone free oleogels or avocado oil are adequate lubricants.
- An alternative are aqueous, condom-compatible xanthan gels freshly mixed in water (hand mixer, concentration 2-3%).
- Another alternative are preservative free hyaluronic acid preparations.

The genital area is well protected by its specific microbiome and its secretions. The mucous of the cervical glands in the uterine cervix with its low alkaline pH, the acidic vaginal secretion with a pH level of about 4 and the sebaceous glands of the vulva provide an environment which is hostile to external germs. In interaction with the secretions from the Bartholin-, Scene- and sweat glands of the vulva there are specific local conditions which undergo hormone-, menstrual period- and sexual activities-related alterations. The volatile substances of the secretions produce an individual and typical body odour. Topically applied fragrances and bactericides in the form of intimate sprays, deodorants, liners and hygiene tissues in general are counterproductive.

Some additional facts....

Similar to the skin, also the hair growth is hormone-related. About 20 % of men lose their scalp hair because of their testosterone balance whereas their hair growth in the breast- and genital area is intensified. There are efforts to stop the hair loss by inhibiting the steroid-5α-reductase and by applying PGD_2- and testosterone antagonists. 17ß-estradiol, cyproterone (testosterone antagonist) and other synthetic gestagens are used in the case of androgenic alopecia in women.
Herbal isoflavones are structurally related to estrogens. Their effects, however, are far less intense than those of the bodily hormones. The influence of phytohormones however becomes apparent after continued intake of appropriate food. It is presumed though that the systematic intake of soya products can ease the side effects during menopause, in particular sweat attacks and hot flushes. Isoflavones, among others, stimulate the collagen synthesis and have skin-tightening effects in general.

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