

# Premature skin aging – a process that can be slowed down by appropriate prevention

## Przedwczesne starzenie się skóry – proces, który może być spowolniony przez odpowiednie działania profilaktyczne

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Starzenie się jest procesem ogólnoustrojowym o złożonej patogenezie. Zarówno czynniki wewnętrzne, jak i zewnętrzne, wpływają na proces starzenia się organizmu ludzkiego jako całości. Starzenie się skóry dzieli się na: 1. właściwe starzenie (zależne od genów, endogenne starzenie; fizjologiczne) i 2. niewłaściwe starzenie (zależne od czynników zewnętrznych, zewnętrzne starzenie, fotostarzenie; patologiczne). Endogenny proces starzenia (fizjologiczny) jest nieunikniony i jest naturalną konsekwencją upływu czasu, którego nie można zatrzymać, ale każdy z nas ma ogromny wpływ na zewnątrzpochodne starzenie, powszechnie znane jako foto-starzenie się ze względu głównie przez wpływ promienia UV (80%). W celu spowolnienia procesu starzenia się skóry należy przestrzegać podstawowych zasad profilaktyki: unikać promieniowania UV, nie korzystać z solarium, używać środków ochrony przed promieniowaniem UV przez cały rok, nie palić papierosów, stosować odpowiednią dietę, uprawiać sport, stosować nawilżające kosmetyki z retinolem i przeciwutleniacze, spożywać antyoksydanty (w postaciach naturalnych i syntetycznych), unikać stresu i stosować zabiegi medycyny estetycznej i anti-aging.

**Słowa kluczowe:** skóra, endogenne starzenie, fotostarzenie, zapobieganie, medycyna estetyczna

Aging is a universal process with a complex pathogenesis. Both internal and external factors affect aging of the human body as a whole. Skin aging is divided into: 1. proper aging (depends on genes, endogenous aging; physiological) and 2. improper aging (depends on external factors, extrinsic aging, photo-aging; pathological). The endogenous aging process (physiological) is inevitable and is a natural consequence of the passing time, however each of us has a tremendous impact on the extrinsic aging, commonly known as photo-aging due to the main impact of UV rays on this process (80%). In order to slow down the skin aging process the basic principles of prevention should be followed: one should avoid UV rays, not use tanning beds, use photo protection throughout the year, not smoke cigarettes, use an appropriate diet, practice sports, apply moisturizers and cosmetics with retinoid and antioxidants, ingest antioxidants (natural and synthetic), avoid stress and use aesthetic medicine and anti-aging treatments.

**Key words:** skin, endogenous aging, photo-aging, prevention, aesthetic medicine

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Pathogenesis of aging is a complex process. Both internal and external factors affect aging of the human body as a whole. The moment when the first signs of aging appear and the speed of the aging process is conditioned by genes. Skin aging is divided into physiological aging (dependent on genes, proper aging-endogenous) and inappropriate aging (extrinsic aging- because it depends on external factors, inappropriate aging, commonly referred to as photo-aging) [1, 2].

Physiological skin aging is a proper process, which is impossible to stop. A key role in aging at the cellular level is played by the telomeres which length shortens with age of the body. The shortening of the telomeres results in cell aging and tissue atrophy. Telomeres protect DNA in the chromosome ends from shortening in the divisions. This phenomenon prevents a systematic loss of valuable genetic material. Telomere shortening is one of the major causes of cell aging [3]. Endogenous aging is a process that progresses with

time, during which there occur unavoidable changes. However, the appearance of the skin is definitely better and healthier than during the improper aging. In the course of endogenous aging, facial skin is smooth and without any discoloration, with slightly sharpened facial mimic lines, however with a retained geometry. The skin which is about the same age but with no overt exposure to UV rays will always look younger and healthier than the skin subjected to photo-aging processes [4]. The extrinsic aging, which is improper, is always a premature process, independent of genes and affecting mainly the skin. This is a process which can be slowed down by adequate prevention [2].

The speed of aging is affected by many external factors such as climate, work, poor nutrition, smoking, drugs, alcohol and even excessive amounts of coffee, but the most significant is the exposure to UV rays. These factors above all contribute to 80% of skin aging of the face and other exposed body parts (such as the neckline, arms, neck, hands) [4-6]. Among the skin changes, apparent as a result of long-term exposure to UV rays, we can mention: a disorder of keratinization, pigmental changes, vascular changes, dry skin, wrinkles or furrows [1, 2].

In women the aging of skin is additionally dependent on menopause [7, 8] or hormonal factors, related to the disappearance of ovarian functions. During this process there is a decrease in the secretion of estrogen (to be exact 17 beta-estradiol), which contributes to changes within the epidermis, dermis and subcutaneous tissue. Estrogen deficiency leads to; collagen reduction (decrease in the thickness of the skin layer, loss of elasticity and tension) and decrease in the activity of the sebaceous glands and sweat glands (dry, rough skin) as well as a decrease in the level of hyaluronic acid, elastin fibers, capillaries and loss of subcutaneous tissue. Skin becomes even less flexible, less tense, dry, rough and poorly nourished, resulting in much faster deepening of the wrinkles, furrows and folds, while in the areas such as the dorsal part of hands and zygomatic area (cheeks) there is an even more significant decline of the subcutaneous tissue. As a result of hormonal deficiency there are also genital changes [9]. The labia become flaccid and less moisturized. The vagina loses its elasticity and as a result of the mucosal dryness it is more prone to injuries. These changes often affect women's sexual functions and during the sexual intercourse can cause pain.

As a result of internal and external factors, such as stress, smoking, drugs, UV rays and pollution, free radicals are formed which act on skin receptors, growth factors in skin cells and keratinocytes, and lead to induction of an inflammatory response, which is the cause of the degradation of collagen, hyaluronic acid and accumulation of elastin and therefore skin aging is

accelerated [4]. The endogenous aging process (physiological) is inevitable and is a natural consequence of the unstoppable passing of time, however each of us has a tremendous impact on the extrinsic aging, commonly known as photo-aging due to the main impact of UV rays on this process (80%). The way we care about our skin, our habits and our lifestyle have a most significant influence on the progress of skin aging [8].

Some of the initial signs of ageing are rough slackly fragile and more transparent skin, development of benign lesions. Skin becomes more easily bruised. As skin becomes lax, gravity causes drooping of the eyebrows and eyelids, looseness and fullness under the cheeks and jaw (jowls and „double chin”), and longer ear lobes. There is loss of fat below the skin in the cheeks, temples, chin, nose, and eye area. We can see sunken eyes, and a „skeletal” appearance. Bone loss around the mouth and chin becomes evident after 60 years of age. Eventually there is puckering of skin around the mouth area. Loss of cartilage in the nose causes a drop of the nasal tip.

### Prevention of premature skin aging

In order to slow down the aging process of skin the basic principles of prevention should be followed [2, 8, 10, 11]:

- avoid UV rays, especially between 11 and 3 pm, when exposure to UV radiation is greatest;
- do not use tanning beds (tanning salons);
- use photo protection throughout the year;
- do not smoke cigarettes;
- avoid all kinds of pollutants;
- use an appropriate diet (without stimulants, with lots of fruits and vegetables);
- practice sports;
- apply moisturizers;
- use cosmetics with retinoid and antioxidants;
- consume antioxidants (in the natural and artificial form, such as vitamins A, C, E, green tea, resveratrol, etc.);
- take advantage of the aesthetic medicine and anti-aging treatments (e.g. bio-revitalization treatments such as needle mesotherapy, chemical peels, laser therapy);
- avoid stress.

A good lifestyle is of prime importance in the concept of ageing, which is very often overlooked. A happy, stress-free, and a healthy lifestyle can slow down this genetic process to a great extent. A change in your lifestyle not only makes you look younger but can also prolong your life. A well balanced diet, high intake of water, quitting alcohol and smoking, having regular sleep patterns, regular exercise and a smile on the face helps in overcoming ageing in proportions we

would not expect. Facial expressions and sleep position are the secondary factors that contribute to skin changes.

The main factor responsible for premature aging is UV radiation [2, 8, 10, 11] (UVA and UVB), which is why it is so important to avoid them, both in the natural form (the sunrays-UVA and UVB) and artificial (tanning beds – UVA). In order to slow down the skin aging process it is recommended to avoid being outdoors during the hours when exposure to UV rays is greatest, i.e. between 11 and 3 pm. It is best to stay in the shade, in addition to wear sunglasses and appropriate clothing that will protect us from the sun (cotton fabrics, linen in bright colors). One should also keep in mind that excessive exposure to UV rays, regardless of whether the dosage is cumulative, or only a temporal skin exposure to the sunrays, leads not only to premature skin aging but above all poses a high risk of skin disease and precancerous states, most of which can lead to the formation of benign or malignant tumors (e.g.: actinic keratosis, Bowen's disease, keratoacanthoma, basal cell carcinoma, squamous-cell carcinoma, melanoma, solar elastosis, cheilitis, disseminated superficial actinic prokeratosis etc.) [12].

Everybody should use creams with protective filters every day, regardless of the time of year, just changing the filter strengths depending on needs. All types of birthmarks and scars should be treated with special care (in order to avoid the occurrence of skin diseases associated with exposure to the UV rays). In summer, SPF (Sun Protection Factor) 30-50 is recommended, during the winter months SPF between 20-30 should be used. It has not been proven that the use of filters helps to avoid occurrence of basal cell cancer and melanoma, presumably it protects only from squamous cell carcinoma. However even users of filters should be reminded to avoid long exposure to sunlight, because it has been proven that persons applying the filters show a tendency to extend the time spent in the sun. We are exposed to UVA rays throughout the year and at any time of the day. We often forget that neither clouds, nor windows or car windshields protect us from them [12].

Prevention is the best method to delay the process of premature skin aging [2, 5, 10-12]. Our lifestyle also affects our appearance, and delay the ageing process. To have a beautiful body, we must not only avoid the sun or tanning beds, apply moisturizing cosmetics, rich in antioxidants and retinoids, practice sports regularly to slow the aging process but also through proper nutrition – it is important not to be obese, sick with diabetes, have high blood pressure, hypercholesterolemia that leads to atherosclerosis and eventually to stroke, myocardial infarction, not to overload the

joints, etc. By regular practicing sports we can be fit, have better endurance, stamina, stronger joints and bone density, lower cholesterol and triglycerides, increased amount of HDL, reduced risk of heart attack and stroke, and improved mood and as a result of not smoking, we have a better chance to avoid the lung cancer, larynx cancer, mouth cancer, throat cancer, stomach cancer, pancreas cancer, kidney cancer, bladder cancer, stomach ulcers, gastro-esophageal reflux, diseases of the cardiovascular system, developing leukemia, a reduction in fertility and many, many other diseases [8].

Also thanks to the range of aesthetic medicine treatments, one slows down the process of premature skin aging (chemical peels, needle mesotherapy, and laser therapy leading to skin bio-revitalisation). In addition, we can improve our appearance in accordance with the modern canons of beauty. Application of Creams with Retinol is proven to be very efficient for removing already formed wrinkles. Although not as good as Retinol, creams with peptides significantly induce the skin to make new collagen. Aesthetic procedures like Microdermabrasion use tiny, fine particles or a very hard diamond-tipped wand to remove cells from the top skin layer and encourage new skin growth. This is a painless, comfortable procedure without a recovery period.

Laser resurfacing uses high-intensity light. These could be superficial or intermediate and deep, The effect of the treatment and recovery time varies. Redness may be seen from one day to two weeks. Chemical peels can be used for mild acne scars, age spots, dull skin texture, skin discoloration, or wrinkles around the eyes or mouth. They exfoliate the outer skin layers and encourage the growth of new, more evenly colored skin.

Lipolysis, which is a removal of topical excess of fat using phosphatidylcholine and sodium deoxycholate and the use of fillers, botulinum toxin type A with which everyone is familiar in the modern days helps in smoothing out wrinkles and fine lines. Fillers containing hyaluronic acid add volume to skin. They effectively plump the skin up. More advanced cosmetic surgeries like lifting the skin on the face, neck, eyelids, and forehead can give a tighter appearance. They are often done endoscopically, with smaller incisions carefully hidden in hard to detect areas.

Rejuvenating treatments (aesthetic medicine treatments) should be carried out in patients of both genders, because both women and men are afraid of old age-related loss of physical attractiveness. The use of aesthetic medicine treatments is recommended, if we desire good appearance and want to delay the effects of aging [2]. There is often a perception that certain treatments should be used only after the fortieth birth-

day (such as botulinum toxin, retinol creams). This is the wrong reasoning, because often the previously created furrows and wrinkles cannot not be removed as we had not protected our skin from aging and the wrinkles are too deep to completely disappear. A cosmetic doctor will appropriately select a treatment for

our age and skin, so that we can achieve the intended effect. The requirements of the society, our loved ones and even employers are forcing us to think how to stop the effects of time. This of course is impossible, however, aging processes can be significantly slowed down through adequate prevention.

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