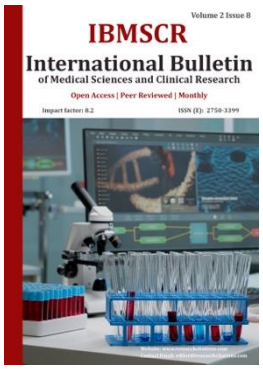

EXPLORING ALOPECIA: KEY INSIGHTS INTO HAIR LOSS AND ITS SOLUTIONS

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Abstract

A distinctive feature of human hair is the pattern of its distribution, with the highest concentration of hair follicles in the scalp. Complaints about hair loss and poor hair growth are the most common reasons for a patient to consult a doctor. Alopecia is the pathological loss of hair, leading to thinning or complete disappearance in specific areas of the head or body. Diffuse alopecia is characterized by pronounced, even hair loss across the entire surface of the scalp in both men and women, resulting from a disruption in the hair growth cycles. Currently, the molecular mechanisms of hair follicle growth control and initiation have been established, as well as the role of regulators in the transition of follicles from one phase to another. A unique complex system for controlling hair loss, "Sochesto," has been proposed, combining the therapeutic effects of the drug. The article presents the authors' own successful experience with the use of Sochesto.

Keywords: hair physiology; alopecia; treatment of diffuse alopecia; Sochesto. Complaints about hair loss and poor hair growth are the most common reasons for a patient to consult a doctor. Alopecia (from the Ancient Greek ἀλωπεκία via Latin alopecia – baldness, hair loss) is the pathological loss of hair, leading to thinning or complete disappearance in specific areas of the head or body [1].

An important feature of human hair is the pattern of its distribution, with the highest concentration of hair follicles in the scalp. Humans have several types of hair: lanugo (the primary hair covering, very fine hair covering the body of a 7-8-month-old fetus); vellus (fine, short, soft hair distributed over almost the entire body surface); long hair (thick, pigmented hair on the scalp); and bristly hair (short, thick, pigmented hair forming the eyebrows and eyelashes, as well as in the beard and mustache area, the pubic region, and the armpits) [2]. The total number of hairs on the body is several hundred thousand, with approximately 100,000 hairs on the head, and the average lifespan of each hair ranges from several months to several years [2]. The formation and growth of hair from the hair follicle occurs in several strictly sequential phases: anagen, telogen, and catagen [3]. The anagen phase of hair growth is the most active and includes the formation of the hair follicle and the start of hair growth, which occurs at a rate of approximately 0.3–0.4 mm per day [3]. The duration of the anagen phase ranges from 2 to 6 years. During this stage, up to 80% of the follicles on the scalp are in the anagen phase daily [4].

The transitional catagen phase lasts 2–3 weeks, during which protein synthesis in the hair ceases and the follicle moves toward the surface of the epidermis. The follicle shrinks in size by up to 70%, and by the end of the catagen period, the hair root, resembling a bulb, detaches from the papilla and moves outward [4].

The next phase, telogen, is a resting period that lasts from 2 to 4 months. During this phase, the follicle consists of a strand of dormant cells located above the densely packed fibroblasts of the papilla. The hair bulb with an unpigmented root may remain in the follicle until the end of the metanagen phase, the next hair cycle [4]. The follicle spontaneously enters the anagen phase again at the end of telogen. Mechanical removal of hairs in the telogen stage always leads to the onset of anagen, meaning the hair starts to grow again.

Recently, two new terms have emerged: exogen, referring to the process of hair shedding, and neogen, a short recovery phase that follows immediately after the telogen phase [5, 6].

The physiological cyclical activity of hair follicles is not the same for all, and normally, 85% of the follicles on the scalp are in the morphogenetic anagen phase, 14% in the telogen phase, and only 1% in the catagen phase. The duration of these phases depends on age, location, and the influence of endogenous and exogenous factors [7, 8].

Currently, the molecular mechanisms of control and initiation of hair follicle growth have been established, as well as the role of regulators in the transition of the follicle from one phase to another [4].

The types of influence of various hormones on the cyclic activity of hair follicles have been most thoroughly studied, as the structural components of the hair follicle have receptors for sex hormones, thyroid hormones, and glucocorticoids [4]. Special interest is given to androstendione and dehydrotestosterone – androgens produced in the adrenal glands and ovaries in the female body. Dihydrotestosterone initiates the synthesis of TGFβ2, which not only inhibits the proliferative activity of keratinocytes but also stimulates the synthesis of caspases, leading to the rapid transition of the hair follicle into the catagen phase [11]. A similar effect is exerted by glucocorticoids, which induce apoptosis of the keratinocytes of the hair follicle, stimulating the rapid transition through the physiological phases of anagen–catagen–telogen. As a result, the duration of catagen is significantly reduced, shortening the hair's life cycle. Estrogens have a stimulating effect on hair growth, accelerating the onset of anagen after telogen. A deficiency of thyroid hormones causes an increase in the number of hair follicles in the telogen phase, leading to hair loss [12].

The role of neuropeptides and neurotransmitters in the regulation of hair follicle morphogenesis has been established, and it has already been shown that neurotrophin-3 and brain-derived neurotrophic factor (BDNF) have a stimulating effect on the process of transitioning the hair follicle from the active growth phase to the regression phase [13].

A number of factors have a pronounced negative impact on the development of the hair follicle and hair quality, primarily improper hair care, stress, poor nutrition (diet), iron deficiency conditions, the use of certain medications, severe underlying diseases, prolonged breastfeeding, and so on [3]. The most common types of alopecia include androgenetic (androgenetic) diffuse or symptomatic (effluviums), focal or patchy (areata), and scarring (scarring) alopecia (Fig. 1) [15].

Androgenetic alopecia (also known as male-pattern baldness) is characterized by the thinning of hair, leading to baldness in the crown and frontal areas in men, and to hair thinning along the central part of the scalp, extending to the sides, in women. More than 95% of all cases of male baldness occur due to androgenetic alopecia. Data on the prevalence of androgenetic alopecia in women vary significantly, ranging from 20% to 90% of all cases of hair loss, which is associated with the less noticeable and more difficult-to-diagnose manifestation of this condition in women. The causes of androgenetic alopecia are genetic and involve the

damaging effect of the active form of the male sex hormone testosterone, dihydrotestosterone (DHT), on the hair follicles. DHT is produced under the influence of the enzyme 5-alpha reductase, which is present in the hair follicles [2]. DHT, penetrating the follicle cells, causes their dystrophy and, consequently, the dystrophy of the hair they produce [4]. Hair remains on the scalp, but it becomes thin, short, and colorless (vellus hair), unable to cover the scalp, resulting in bald patches. After 10–12 years of alopecia onset, the follicle openings become blocked with connective tissue, and they can no longer produce even vellus hair. The sensitivity of hair follicles to DHT largely depends on the human gene set, i.e., it is determined by heredity. It is believed that the tendency for hair loss is inherited in 73–75% of cases through the maternal line, in 20% through the paternal line, and only 5–7% of those predisposed to androgenetic alopecia are the first in their family. Recently, it has been possible to identify specific features in human DNA that are highly likely to cause hair loss, and these findings are already being used in practice to assess the likelihood of hereditary baldness in both men and women.

Diffuse alopecia is characterized by pronounced, even hair loss across the entire surface of the scalp in both men and women, resulting from a disruption in the hair growth cycles. Since diffuse alopecia is a consequence of disorders affecting the entire body, it is sometimes referred to as symptomatic alopecia. In terms of prevalence, diffuse alopecia ranks second after androgenetic alopecia. Women are more likely to be affected by it than men [16]. Diffuse alopecia is classified into telogen and anagen forms. In the telogen form of alopecia, nearly 80% of hair follicles prematurely enter the telogen (resting) phase, and the active hair growth process stops [16]. In most cases of this form of the condition, the lost hair fully recovers within 3–9 months, as, unlike androgenetic alopecia, the hair follicles do not undergo degeneration [3].

Alopecia areata (Latin: alopecia areata) is a pathological hair loss condition caused by immune system factors that damage the cells of the hair root system. It manifests as one or more round patches of hair loss. It progresses through stages based on morphological characteristics and is classified as focal, multifocal, subtotal, total, and universal alopecia. In the final stage, hair loss occurs all over the body, indicating the systemic and progressive nature of the autoimmune process. Nail damage (punctate onychodystrophy) often accompanies total and universal alopecia. The frequency of episodic alopecia areata manifestation among different populations ranges from 0.5% to 2.5%. Scarring alopecia is a type of baldness characterized by irreversible damage to the hair follicles and the appearance of connective (scar) tissue in their place. Scarring alopecia accounts for 1-2% of all types of alopecia. The causes of scarring alopecia may include infections (viral, bacterial, fungal), which cause inflammatory reactions around the hair follicles, ultimately leading to the development of connective tissue in the affected areas. If the infection is treated promptly, the hair may be preserved. Scarring alopecia often results from physical trauma, injuries, or thermal or chemical burns [3].

The treatment of alopecia of any origin presents a challenging task, requiring a comprehensive approach that includes several stages, particularly stopping hair loss and stabilizing the process, identifying and eliminating provoking factors, and treatment aimed at improving scalp microcirculation, nourishing the hair follicles, and stimulating the growth of new healthy hair. The key to the treatment and prevention of diffuse alopecia is the correction of the underlying causes and the use of various active substances to stimulate hair growth.

Sochesto is a combination of homeopathic agents that strengthen the hair follicles, protect them from external damage, and promote hair restoration. It has dermatotropic and seboregulating pharmacological effects, improves blood circulation to the hair follicles, stimulates new hair growth, and normalizes the process of nutrient supply to the scalp and hair roots. The product has a positive effect on nerve regulation, blood circulation, metabolism, and hormonal balance.

Hops, an ingredient in Sochesto, is an effective remedy for premature graying and thinning of hair, post-partum hair loss, and, due to its pronounced hepatoprotective effect, provides a high safety profile for this product. Bamboo extract is particularly effective in treating alopecia areata and premature hair loss. Magnesium is used for hair loss after systemic and severe debilitating diseases. Additionally, L-methionine, being a rapidly absorbed transport structure, provides a significant advantage over vitamin-based medicines by shortening the period until the effect of halting hair loss occurs. Vitamin B3 is recommended for hair loss, itching, numbness of the scalp, and nail deformation. Biotin is effective for seborrheic alopecia and pre- and post-natal hair loss. Vitamin B5 is used for hair diseases caused by general exhaustion, neurasthenia, and physical and mental weakness.

Biotin (Vitamin H) is essential for healthy hair growth as it participates in cell division and keratin production. It plays an important role in nourishing the follicles, promotes the restoration of the deep layers of the hair, reduces dryness, and increases elasticity, thereby preventing split ends.

Vitamin B3 improves the overall condition of the scalp, reduces excessive oiliness, promotes hair growth, makes hair more resilient, and protects it from harmful environmental factors. A deficiency in vitamin A can lead to hair loss, loss of shine, dandruff, and dryness or brittleness of the hair.

L-methionine is one of the primary sources of nutrition for hair. As an antioxidant, it improves blood circulation in the scalp, strengthens the hair follicles, provides moisturizing and softening effects, and protects the skin and hair from UV exposure and excessive moisture loss during hot styling. It also helps restore damaged and over-dried hair and prevents brittleness.

Panthenol (provitamin B5) contributes to the restoration of hair elasticity and healthy shine, protecting the hair structure from harmful external influences.

The plant extracts included in the Sochesto complex (bamboo, hops) provide significant effectiveness and safety when applied.

Bamboo extract is a powerful antioxidant that improves blood circulation, deeply penetrates tissues, and increases the permeability of other active ingredients into the deeper layers of the epidermis. It helps reduce hair oiliness, positively impacts thinning and dyed hair, and intensively nourishes hair follicles with vitamins and nutrients.

The hop cone extract is widely used in cosmetology and dermatology. It restores the lipid, vitamin, and trace element balance of the scalp, restores the hair structure, prevents excessive hair loss, and gives them a healthy appearance. Mint has a tonic and refreshing effect. Menthol, found in its leaves, helps relax the scalp and normalize the nourishment of hair follicles, strengthening the hair and giving it a healthy look.

The Sochesto cosmetic complex includes ingredients that care for the scalp, restore the hair structure, such as keratin, collagen hydrolysate, allantoin, and menthol.

A group of patients (26 women and 30 men) aged 19 to 46 with diffuse alopecia are under our observation. They are receiving a comprehensive treatment program with the "Sochesto" product. All patients were randomly divided into two groups:

The 1st group receives only active topical therapy, which includes shampoo twice a week, a mask once a week, and alternating use of stimulating and anti-hair loss sprays daily for 3 months.

The 2nd group, in addition to the same topical therapy, receives the homeopathic "Sochesto" product according to the standard scheme for 3 months.

Distribution of patients with alopecia by gender and age.

Patients age	Men		Women	
	Abs.	%	Abs.	%
18-29 years (N=19)	**4**	48,3	**15**	51,7
30-39 years (N=21)	**11**	53,7	**11**	46,3
40-46 years (N=16)	**2**	46,2	**13**	53,8
Total (N=56)	**17**	48,3	**39**	51,7

Within the first month, 18 patients (20 women and 12 men) showed positive dynamics, expressed in anoticeable reduction in hair loss during combing and while sleeping (hair left on the pillow). Most of these patients were from the second group, which received the drug Sotheso. Additionally, patients reported an improvement in hair quality – they were easier to style, had a healthier appearance, and more volume. By the end of the treatment course, positive dynamics were noted in all patients, characterized by the restoration of the physiological hair growth rhythm, as well as improved quality and quantity of hair. Patients from the second group, receiving the homeopathic drug Sotheso, showed more active recovery rates compared to those in the first group, with results becoming evident by the end of the first month of therapy (Fig. 6, a, b). After completing the active therapy course, all patients remain under our observation, and over a period of 2 to 6 months, they demonstrate sustained therapeutic effects and the absence of a withdrawal syndrome, which is often seen with a number of widely used treatments for alopecia. Thus, the comprehensive treatment system with "Sotheso" is an effective, innovative method for controlling hair loss and providing therapeutic care for the scalp. Sotheso is an optimal method for safe and radical restoration of quality hair growth in cases of diffuse alopecia. The composition of "Sotheso" products represents an optimal complex of non-hormonal natural active ingredients, combining scientific advancements with the power of nature, capable of achieving stable results.

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