

# ***DRY AND OILY SKIN TYPES. OVERVIEW OF THEIR MAIN CONDITIONS AND CARE: A THEORETICAL SYNTHESIS***

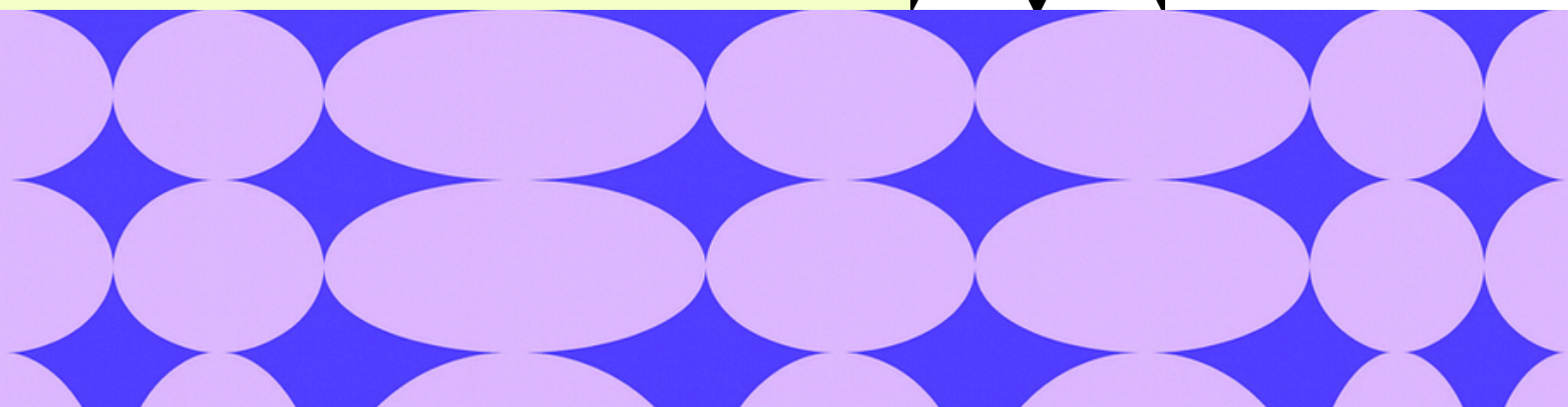
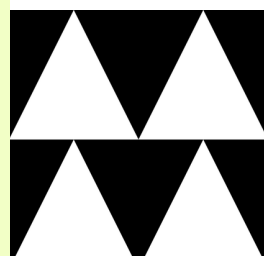
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THEIR MAIN CONDITIONS AND CARE: A  
THEORETICAL SYNTHESIS**

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## **ABSTRACT**

Cosmetology professionals still face a challenge in accurately identifying skin types and/or specific skin conditions and recommending appropriate skin care. The scientific literature lacks a detailed theoretical synthesis that combines dry and oily skin types, their main conditions, their identification, identification, and recommended targeted care strategies. This theoretical scientific study, which includes 135 publications from PubMed and EBSCOhost databases (2015-2025), was conducted using the PRISMA method and the principles of systematic literature analysis. The theoretical synthesis reveals how the physiology of dry and oily skin types determines the main skin conditions associated with them and what skin care principles are effective in improving the health and aesthetic appearance of these types.

**Keywords:** skin type classification, dry skin type, dry skin ingredients, dry skin dermatitis, dry skin psoriasis, oily skin type, oily skin ingredients, acne, seborrheic dermatitis.

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## INTRODUCTION

**Relevance of the topic.** People are born with unique skin characteristics, which are later accompanied by various skin conditions that may change depending on circumstances. Different authors classify skin types differently. Some authors distinguish three main types of facial skin: normal, dry and oily skin (Saiwaeo et al., 2023). Other authors distinguish an additional skin type, which is characterised by varying degrees of dryness and oiliness in different areas of the face, namely mixed/combination skin (Diržaitė et al., 2024; Parraga et al., 2024; Thadanipon et al., 2024). The Baumann system divides skin types into 16 combinations, but essentially there are only two skin types – dry or oily skin, with the remaining parameters being an assessment of skin condition (Brzozowska, 2025; Kuang et al., 2025).

Another important skin classification system is the Fitzpatrick skin phototype scale, which focuses on the skin's reaction to UV radiation, related to sunburn, pigmentation tendency, and cancer risk (Ahn et al., 2017). In addition to these risks, the Fitzpatrick skin phototype classification is also used to predict the risk of dermatological complications arising from invasive procedures and to determine the effectiveness and safety of cosmetic procedures (Bhanot et al., 2024; Sharma et al., 2025a).

Proper identification of skin types is important for people who want to have or maintain healthy skin (Kim et al., 2022). Individual skin type classification helps both consumers and specialists (doctors, cosmetologists) to choose the most suitable skin care products, methods and protocols for each skin type according to its needs (Brzozowska, 2025; Pashkovska, 2024). Studies have revealed that consumers often misjudge their skin type and, in some cases, believe their skin to be oily when it is actually dry, or vice versa (Brzozowska, 2025).

Dry skin is characterised by a reduced lipid content in the stratum corneum and impaired epidermal differentiation, which disrupts the skin's barrier function, reduces the NMF content in the skin and alters the pH (Augustin et al., 2024). Dry skin can be a symptom of other skin conditions, such as atopic, contact or perioral dermatitis, psoriasis (Augustin et al., 2024, Fujita et al., 2025). Given the physiology of dry skin, the main active ingredients for dry skin types should improve skin hydration, replenish barrier lipids, improve and restore the skin's natural barrier (Kang et al., 2022). Most emollients are complex formulations that typically combine a water-binding moisturiser (e.g., glycerol, urea, lactic acid) with a film-forming occlusive (e.g., paraffin, petrolatum) (Wollenberg et al., 2025), but it is also important to supplement the intercellular lipid layer with substances that mimic natural lipids (ceramides, cholesterol, fatty acids) (Kang et al., 2022; Wollenberg et al., 2025).

Unlike dry skin type, oily skin type is characterised by excessive sebum production (Brzozowska, 2025). Although sebum protects the skin from external sources of infection, such as

bacteria and fungi, reduces trans-epidermal water loss, and transports antioxidants (Jo, Shin, Na, 2022), oily skin is often considered a problem because excess sebum can clog pores and cause bacteria to multiply (Kim et al., 2022). All of this can cause social discomfort and affect self-esteem (Kakuda et al., 2022), as well as correlate with skin conditions such as seborrheic dermatitis or acne (Jo et al., 2022; Liu et al., 2023; Saiwaeo et al., 2023). It is very important for oily skin to maintain a balanced skincare routine tailored to inflammation-prone skin to prevent breakouts and reduce irritation (Secchi et al., 2025). According to various authors, active ingredients should specifically target different aspects, including sebum control (e.g. niacinamide, retinoids), hyperkeratinisation control (e.g. salicylic acid, uric acid), control of microbiome imbalance and reduction of inflammation (e.g. azelaic acid, bakuchiol, probiotics) and restoration of the epidermal barrier function (e.g. panthenol, ceramides).

Therefore, it is particularly important to correctly understand and assess skin type, phototype, possible complications and the appropriate individual care for each skin type. *The relevance of this study* is since there is no scientific work of this kind that would combine and clearly detail the care of dry and oily skin types, which would contribute to the identification of the main conditions of dry and oily skin types that can be diagnosed as skin diseases. This scientific work is focused on a systematic analysis of scientific sources, which will help current and future specialists in the field of cosmetology and dermatology to more accurately determine, identify and diagnose skin types and conditions, and select appropriate skin care products with suitable active ingredients. Therefore, **the problem question** is raised: how the physiology of dry and oily skin types determines the main skin conditions associated with them, and what skin care principles are effective in ensuring the health and aesthetic appearance of these skin types?

**The aim of the study** is to analyse the physiology of dry and oily skin types, their main conditions, providing the theoretical foundations of appropriate care to ensure skin health and good appearance.

Research objectives:

1. To analyse the classification of facial skin types and their physiological characteristics.
2. To substantiate the effect of the main active ingredients in solving the problems of dry and oily facial skin types.
3. To identify the clinical, etiological, and preventive aspects of the main conditions of dry and oily facial skin types.

Research methods:

An analysis of scientific literature sources was performed using the PRISMA method. The literature search was conducted in the main databases PubMed and EBSCOhost, using predefined keyword combinations and filters. Duplicates and irrelevant sources were excluded according to

inclusion and exclusion criteria. The selected literature was analysed and synthesised in accordance with the research questions.

## METHODOLOGICAL BASIS

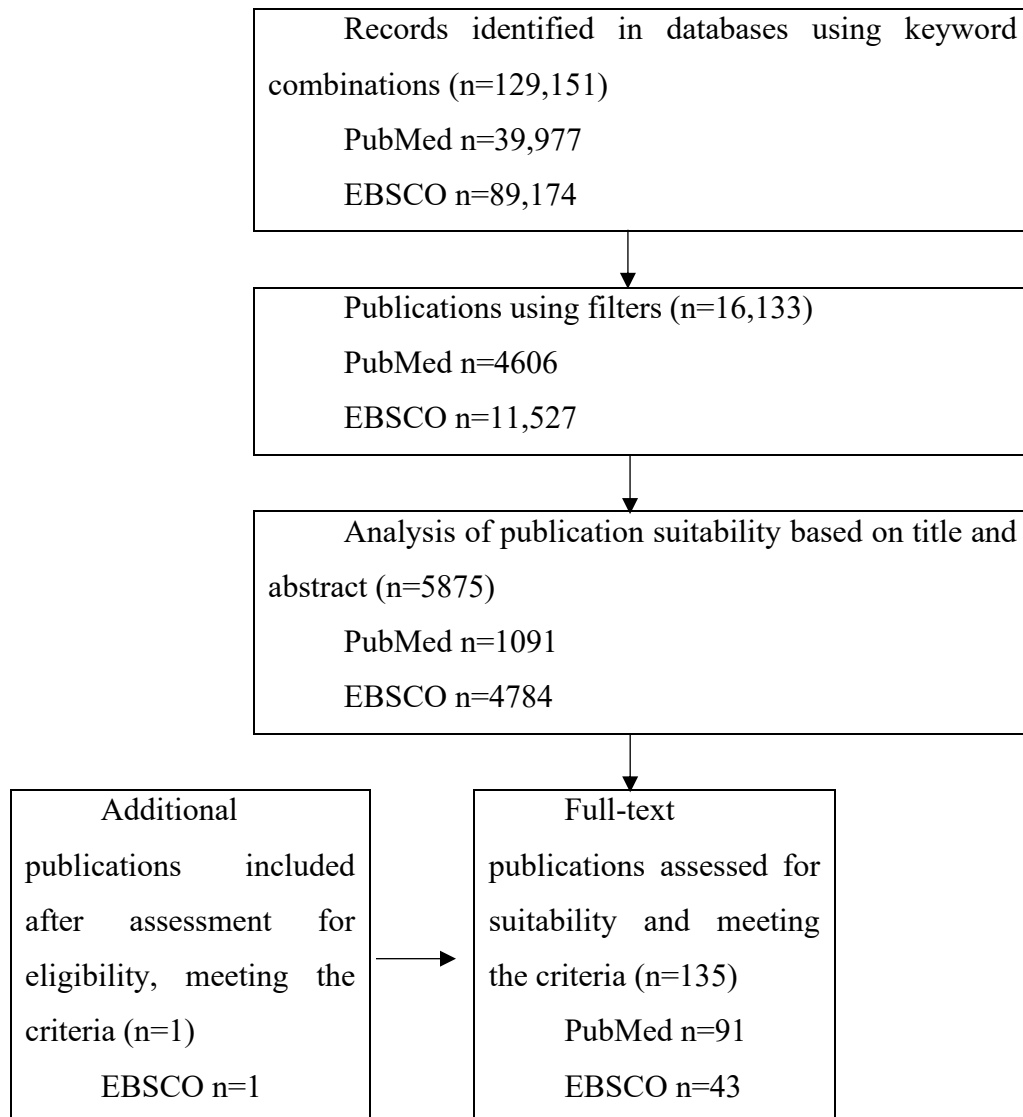
To analyse the physiology of dry and oily skin types, their main conditions, and to provide a theoretical basis for proper care to ensure skin health and good appearance, the study was conducted using the principles of systematic literature analysis. The literature search was conducted until 24 October 2025 in the PubMed and EBSCOhost databases, using predefined keyword combinations: "Skin type classification", "Dry skin type", "Dry skin ingredients", "Dry skin dermatitis", "Dry skin psoriasis", "Oily skin type", "Oily skin ingredients", "Acne", "Seborrheic dermatitis". A total of 129,151 publications were obtained, which were selected using filters according to predefined inclusion and exclusion criteria, which are presented in Table 1.

**Table 1. Publication inclusion and exclusion criteria**

<b>Publication criteria</b>	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Type</b>	Scientific articles, reviews, case studies, systematic literature reviews, dissertations, books, etc.	Final theses, conference reports, professional or news publications, other non-scientific literature.
<b>Accessibility</b>	Free full-text access	Restricted access
<b>Language</b>	English	Other
<b>Year</b>	Published in 2015 or later until June 2025.	Prior to 2015

Source: compiled by the author

Thus, the initial search results were limited by specific criteria: publication type, free access, English language and year of publication (no older than 10 years). After the initial selection of publications, publications that did not meet the predefined inclusion criteria, such as inappropriate publication type (n= 37,891), were first removed, followed by publications with restricted access (n= 65,063), then publications not in English (n=1,245), and finally publications that did not meet the year filter (8,819), leaving a total of n= 5,875 publications. The search process was documented using the PRISMA model (Figure 1) (Haddaway et al., 2022). Secondary evaluation was performed based on the title and abstract of potential publications (n=5875), and the final suitability of the publication was selected after reading the full text (one publication in Lithuanian was additionally included) (n=135).



**Figure 1. Publication selection scheme**

Source: compiled by the author based on the PRISMA model (Haddaway et al., 2022)

The PRISMA method used is based on strict international guidelines that ensure a systematic, transparent and reliable literature review, which reduces bias and increases the objectivity of the study (Haddaway et al., 2022). A literature search in various major databases, using keywords and strict inclusion and exclusion criteria, allowed for the objective and high-quality identification of relevant scientific sources. In the theoretical synthesis, 135 publications are reviewed to analyse the physiology of dry and oily skin types, their main conditions, and to present the theoretical basis for proper care to ensure skin health and good appearance.

The work examines the classification of skin types and phototypes, distinguishing the physiology, symptoms, main causes, possible complications and recommended care for dry and oily skin types. The most effective active ingredients for each skin type are presented, and the most common skin conditions are analysed according to skin type. Each chapter is based on scientific sources and focuses on theoretical synthesis.

# 1. CLASSIFICATION OF FACIAL SKIN TYPES

Each person is born with unique skin characteristics based on their unique skin structure (Thadanipon, Kitsongsermthon, 2020). Although the skin structure of each person's face is different, Helena Rubinstein proposed the first classification of skin types back in 1910: dry, oily, combination, and sensitive (Brzozowska, 2025). However, these terms are not based on dermatological definitions and usually include subjective and psychological characteristics (Park et al., 2019). The classification of skin types is important for people who want to have or maintain healthy skin (Kim et al., 2022). In the cosmetics market, products are usually classified according to skin type: oily, dry or normal. Normal skin is defined as a skin type that maintains a healthy balance of moisture and sebum production (Drozdova-Statkevičienė, Rauluševičienė, Almuqarrab, 2025). Although there is no precise classification of skin types (Parraga et al., 2024), according to Saiwaeo and other authors (2023), it is most appropriate to divide skin types into three main groups: normal, dry and oily skin. The external appearance of different skin types is shown in Figure 2.



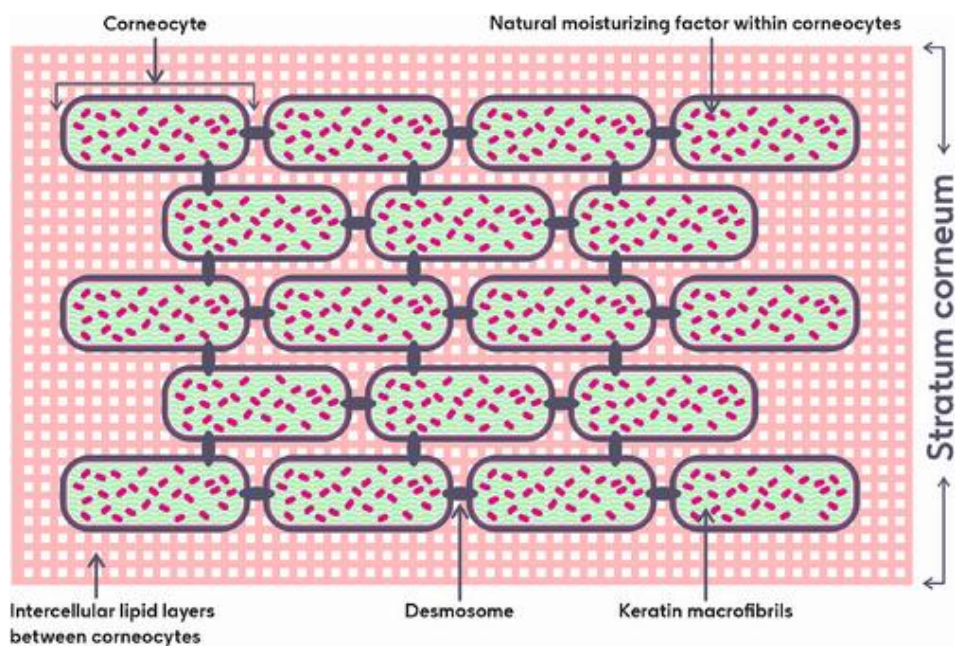
**Figure 2. Main skin types**

Source: Saiwaeo et al., 2023

The photographs show different skin structures, each skin type having its own unique characteristics (Saiwaeo et al., 2023). In normal skin, the stratum corneum of the epidermis acts as a permeability barrier, preventing infection, the invasion of allergens and chemicals, and moisture loss (Li et al., 2022). The slightly acidic pH of the barrier promotes the growth of certain beneficial bacteria that help defend against pathogens (Prajapati et al., 2025). According to the authors, the diverse community of microorganisms living in the epidermis consists mainly of bacteria, fungi and viruses, with the main species being *Staphylococcus epidermidis*, *Propionibacterium*, *Corynebacterium*, *Micrococcus* and *Malassezia*. Skin hydration is also closely related to the skin's barrier function, and the protein filaggrin is the best-known factor associated with skin barrier integrity (Kim et al., 2022). The authors' study confirms that filaggrin expression was positively correlated with the level of hydration in the stratum corneum and negatively correlated with

transepidermal water loss (TEWL). TEWL is a direct indicator of skin barrier function (Ha et al., 2025).

In normal skin, the lipids (ceramides, cholesterol, fatty acids) of the stratum corneum surround protein-enriched keratinocytes, which, due to the natural moisturising factor (NMF) – amino acids, inorganic ions, PCA, lactic acid, sugars and urea, have sufficient moisture and prevent it from evaporating easily (Kang et al., 2022; Madnani et al., 2024). The proper structure of the stratum corneum (Figure 3) is also known as the "brick and mortar" structure, where corneocytes (nucleated epidermal cells) act as bricks, and lipids act as cement mortar, is vital for protecting the body from physical, chemical and biological irritants and moisture loss (Madnani et al., 2024; Voegeli, Rawlings, 2023). Desmosomes, specific connections between corneocytes that act as "pins between bricks," also contribute significantly to intercellular cohesion (Voegeli et al., 2023).



**Figure 3. Structure of the stratum corneum**

Source: Madnani et al., 2024

The permeability function of the skin barrier depends mainly on the structure and composition of the lipid plates (Madnani et al., 2024). The lipid layer in healthy skin accounts for about 20% of the volume of the stratum corneum, of which 40-50% is ceramides, 25% is cholesterol and 10-15% is free fatty acids (Draelos, Nelson, 2025). Dry skin is genetically deficient in moisture and lipids, with noticeable flaking and roughness, while normal skin has a smooth texture and maintains moisture balance, and oily skin is characterised by large pores and excess sebum production (Saiwaeo et al., 2023). Sebum, which is rich in triglycerides, wax esters and squalene, is produced by the sebaceous glands, which also secrete glycerol and vitamin E to maintain the moisturising function of the stratum corneum (Li et al., 2022). Therefore, people with normal skin types have few skin problems because

their skin is neither too oily nor too dry – it is healthy and well balanced with normal moisture and lipid levels.

Other authors distinguish another skin type – mixed or combination skin. This is a skin type characterised by varying degrees of dryness and oiliness in different areas of the face (Parraga et al., 2024; Saiwaeo et al., 2023). This skin type can be identified by observing more differences in characteristics in different areas (Figure 4). According to Thadanipon et al. (2020), combination skin is most often described when there is more sebum in the T-zone (forehead, nose, chin) than in the U-zone (cheeks). However, there may be other differences characteristic of combination skin, such as an oily forehead area but dryness around the eyes (Parraga et al., 2024).

Symptoms	Skin type			
	Normal	Oily	Dry	Mixed
<b>Pore size and localization</b>	Pores in the T-zone are small or barely noticeable	Pores are large and dilated all over the face	Pores are small or unnoticeable	T-zone: large In the U-zone: small or imperceptible
<b>Rash elements</b>	None	Single or multiple throughout the face	None	Absent or isolated in the T-zone
<b>Sebaceous gland secretion</b>	Unchanged	Hypersecretion	Hyposecretion	Hypersecretion in the T-zone, unchanged or hyposecretion in the U-zone
<b>Consistency of sebum</b>	Unchanged	Liquid or thick	Unchanged	Changes in the T-zone
<b>Keratinization (epidermal cell dystrophy)</b>	Does not occur	Does not occur	Occurs	Occurs in the U-zone
<b>Skin thickness</b>	Medium	Thick	Thin	Different in zones
<b>Skin color</b>	Pink	Greyed out due to contamination	Pale, yellowish	Different in zones
<b>Skin pH</b>	5-5.5	5.8-6.2	4-4.5	Different in zones

**Figure 4. Classification of skin types and their characteristics**

Source: Diržaitė, Krasauskė, Bileckaja, 2023

Although dividing skin into oily and dry types can help simplify skin care, many people complain of combination skin (Park et al., 2019). In summary, combination skin is characterised by larger pores, breakouts, increased sebum production and shine, mainly in the T-zone (Diržaitė et al., 2023). The authors' analysis suggests that the most common type of facial skin is combination skin.

According to the Baumann system, skin can be classified into 16 types (Kuang et al., 2025). According to Leslie Baumann, by assessing the skin according to these parameters (subtypes) – dry or oily, sensitive or resistant, pigmented or non-pigmented, wrinkled or unwrinkled – we can more accurately describe skin types (Brzozowska, 2025). By others, essentially all parameters are an assessment of skin condition, and there are only two skin types – dry or oily skin. Each person's skin will tend to be more inclined towards one skin type or the other (Brzozowska, 2025). The main factors

used to determine skin type are sebum content and pore size (Thadanipon et al., 2020). However, according to the authors, these are not the only factors – various skin disorders or diseases, and ageing of the body can upset the balance of the sebaceous glands, so more skin parameters need to be considered. When observing the composition of the skin microbiome, different bacteria dominate depending on the skin type – *Cutibacterium acnes*, a bacterium associated with sebum metabolism and acne pathogenesis, prevails in oily areas, while dry skin is more prone to *Staphylococcus epidermidis* bacteria, which can thrive in a less lipid-rich environment (Prajapati et al., 2025).

Statistically, more than one in four people have dry skin (Augustin et al., 2024). A study by Lee et al. (2019) states that, according to the Baumann method, oily skin type slightly dominates in the Korean male population – 53.5%. Meanwhile, dry skin type slightly dominates among Korean women, accounting for 53.4% (Ahn et al., 2017). Dry skin often dominates in older age because the skin's barrier function decreases and its structure changes with ageing (Aoki, Hata, Yotsuya, 2023). The skin becomes drier due to reduced secretion of sebaceous and sweat glands, although unsaturated fatty acids, such as oleic acid, differentiation disorders, together with a decrease in collagen content, contribute to the enlargement of pores (Drozdova-Statkevičienė et al., 2025). The lipid composition of the stratum corneum, sebum secretion, bacterial diversity and natural moisturising factors have a complex influence on changes in oily/dry skin types (Lee et al., 2019). Also, according to the authors, it can be assumed that lifestyle factors can exacerbate changes in innate skin characteristics. In particular, Baumann's skin types are not always static and often changeable; they can vary due to hormonal fluctuations, pregnancy, menopause, stress, medication, lifestyle changes and climate (Brzozowska, 2025).

Studies have revealed that consumers often misjudge their sebum secretion levels and, in some cases, believe their skin to be oily when it is actually dry, or vice versa (Brzozowska, 2025). Interest in beauty (and health) is constantly growing, and the use and demand for cosmetics among women and men is rapidly increasing (Kang et al., 2022). Many manufacturers are responding to the growing demand for skin care products by offering a wide range of cosmetics, but to use them effectively, it is necessary to understand skin type (Saiwaeo et al., 2023). Individual skin type classification is important because it helps both consumers and specialists (doctors, cosmetologists) to choose the most suitable skin care products for each individual skin type (Brzozowska, 2025). It also helps dermatologists and cosmetologists to select the most effective skin care methods, protocols, aesthetic and cosmetic procedures (Brzozowska, 2025; Pashkovska, 2024). Targeted skin care improves appearance, rejuvenates the skin and thus increases self-confidence (Saiwaeo et al., 2023). With ageing and exposure to harmful environmental stimuli, especially ultraviolet (UV) radiation, the skin loses its functional integrity and gradually becomes damaged (Ahn et al., 2017). The Fitzpatrick skin phototype scale, which focuses on the skin's reaction to UV radiation, is related to sunburn,

pigmentation tendency and cancer risk. According to the authors, the Fitzpatrick scale is so popular among dermatologists that it is almost considered synonymous with skin type itself.

#### Fitzpatrick skin phototypes

In 1972, Thomas B. Fitzpatrick described skin phototypes I-IV, which were developed based on human skin colour (melanin content) and susceptibility to sunburn or tanning when exposed to sunlight (Sharma, Patel, 2025a). Since 1975, phototypes have been classified as I-VI, from the lightest to the darkest constitutional skin colour (Agrawal et al., 2024) (Figure 5). It is important to note that the Fitzpatrick skin type is a classification designed to assess skin sensitivity to UV rays, but it should not be used as a substitute for describing racial or phenotypic characteristics (Sharma et al., 2025a).



**Figure 5. Fitzpatrick skin phototype classification based on skin colour**

Source: Akbar et al., 2024

A lower Fitzpatrick skin type classification indicates that the skin burns more easily than it tans, while a higher Fitzpatrick skin type classification indicates the opposite (Table 2).

**Table 2. Descriptions of Fitzpatrick skin phototypes**

Fitzpatrick Skin Type	Description
I	Always burns, never tans
II	Burns easily, tans minimally
III	Burns moderately, tans to light brown
IV	Burns minimally, tans to moderate brown
V	Rarely burns, tans to a dark
VI	Never burns, least sensitive to changes

Source: Sharma et al. (2025a), \*adapted from the U.S. Department of Health and Human Services

After developing this scale, Dr. Thomas B. Fitzpatrick was able to assess the initial UV dose when treating patients with psoriasis and atopic dermatitis (Bhanot, Bassue, Ademola, Sallee, Allen, 2024). Later, phototypes were adapted for other clinical purposes, including the assessment of skin melanoma risk by dermatologists, who found that most patients with skin melanoma are phototype I or II (Agrawal et al., 2024). Today, the Fitzpatrick skin phototype classification is used to determine sun sensitivity, assess the risk of tanning and sunburn, the risk of cancer and cancer recurrence, as well as to predict the risk of dermatological complications arising from invasive procedures and, also, the effectiveness and safety of cosmetic procedures (Bhanot et al., 2024; Sharma et al., 2025a).

Darker skin phototypes are characterised by increased epidermal melanin content, larger and more widely distributed melanosomes, and reactive fibroblasts, so the naturally increased melanin concentration in higher Fitzpatrick skin phototypes provides better protection for the skin against UV

rays, as a result, signs of photoaging are less pronounced and delayed, but due to reactive fibroblasts, the skin is prone to trauma or inflammation, which can alter (significantly reduce or increase) pigment production (Sharma et al., 2025a). When performing cosmetic or dermatological procedures, it is very important to correctly determine the skin phototype not only based on the skin phenotype (general skin pigmentation), but also to interview the client/patient and assess the effect of the sun on the skin and the skin's reaction to the sun (Bhanot et al., 2024). The questionnaire consists of 10 questions divided into three groups (Sharma et al., 2025a):

- Genetics (eye colour, hair colour, non-tanned skin colour, number of freckles);
- Reaction to sun exposure;
- Tanning habits.

The questions are accompanied by answer options, a total score is calculated, and a phototype is determined (Appendix 1 and 2). A study by Bhanot et al. (2024) reveals that specialists often rely solely on skin phenotype (colour), which is not sufficiently accurate and objective for assessing phototype, creating a risk of selecting inappropriate procedures and increasing the risk of skin damage and disease. In order to objectively and impartially assess skin colour, general type or phototype, artificial intelligence can be used to develop various computerised skin analysis systems (Saiwaeo et al., 2023). Mohamed et al. (2023) have developed a digital application that aims to objectively determine skin colour from photographs. In the authors' study, this technique showed 80% accuracy for all skin phototypes under various lighting conditions in a hospital environment. Saiwaeo et al. (2023) developed a skin type classification model using deep learning algorithms based on convolutional neural networks (CNN). After further refinement of the model, the study achieved an accuracy of 94.57%. Authors Kim et al. (2022) propose another innovative and alternative method for classifying skin types using microdata that penetrates the dermis layer of the skin, thus extracting RNA directly from the skin and using it for analysis. Thus, based on biomechanical principles, various devices provide quantitatively assessable results and are mainly used to evaluate skin condition, ingredients, cosmetics and the effectiveness of procedures (Kim et al., 2022).

Summarising the scientific information from various authors, it can be said that there are four skin types: oily, dry, normal and combination. Two of these are the main skin types – dry and oily skin, with normal skin being an additional type, and a combination of all skin types being classified as mixed/combination skin. Proper skin type determination is important for both consumers and specialists to select the appropriate measures and procedures and develop individual methods and protocols to maintain healthy skin. The classification into VI Fitzpatrick skin phototypes is essential for specialists to select safe procedures or even determine the risk of skin cancer and choose appropriate sun protection. Therefore, understanding and correctly determining skin type and phototype is important to choose the right skin care and maintain or create healthy skin harmony.

## 2. DRY SKIN TYPE, CARE AND MAIN DRY SKIN CONDITIONS

### 2.1. Justification of Dry Skin Type

Dry skin is characterised by a reduced lipid content in the stratum corneum and impaired epidermal differentiation, which disrupts the skin's barrier function, reduces the amount of NMF in the skin and alters the pH (Augustin et al., 2024). All of this contributes to a cyclical deterioration of skin balance – dry skin damages the multilayered structure of the lipid membrane, increases the amount of fatty acids and decreases the amount of ceramides, and this damage to the lipid membrane increases trans-epidermal water loss (Kang et al., 2022). People with dry skin are more prone to wrinkles than those with oily skin (Nanzadsuren et al., 2022). According to the authors' study, very low skin surface moisture levels in the T and U zones were significantly associated with a higher probability of skin ageing. In addition, reduced microbial diversity in dry skin can make it more sensitive to irritation and inflammation (Prajapati et al., 2025).

**SYMPTOMS OF DRY SKIN.** The main symptoms of dry skin are thin, rough, flaky skin (Murphy et al., 2022). Such skin is characterised by a feeling of tightness, tingling, reduced shine, and pale but at the same time itchy skin (Voegeli et al., 2023). Very dry skin causes itching, and chronic itching can have a negative impact on quality of life, while scratching can cause wounds or infection (Aoki et al., 2023).

**THE MAIN CAUSES** that can cause or worsen the symptoms of dry skin are divided into exogenous (external) and endogenous (internal) factors (Augustin et al., 2024):

Exogenous factors:

- Environmental factors (cold and dry weather conditions, UV radiation, air pollution);
- Excessive skin cleansing/washing or washing with alkaline soaps and cleansers;
- Occupational factors and hobbies.

Endogenous factors:

- Genetics;
- Ageing;
- Dermatological, internal and mental illnesses;
- Nutrition;
- Harmful habits (excessive alcohol consumption, smoking);
- Chronic stress;
- Pharmacological therapy.

In recent years, climate change has led to an increased risk of skin deterioration due to environmental factors such as UV radiation, air pollution and pollen variability, which directly affect skin health (Rajini et al., 2025).

**COMPLICATIONS.** Research data shows that a compromised skin barrier can increase systemic inflammation (Murphy et al., 2022). Loss of skin lipid barrier integrity is a key factor in the development of dry skin conditions, and restoration of barrier function is essential for their treatment (August et al., 2021). Dry skin can be a symptom of other skin conditions, such as atopic, contact or perioral dermatitis, and psoriasis (Augustin et al., 2024; Fujita et al., 2025).

#### CARE AND PREVENTION:

**Cleansing.** As with all skin types, including dry skin, it is necessary to use cleansing products that effectively remove the layer of dirt, make-up, sebum and microorganisms that has formed on the skin's surface (Bogdan et al., 2024). However, according to the authors, it is particularly important for dry skin, due to the damaged stratum corneum, to use cleansers with minimal sebum-removing activity and a neutral or slightly acidic pH. Skin care products with a high pH (>7) can disrupt the processes of desquamation, the balance of the microbiome and lipid production, which are essential for maintaining skin health and integrity (Bogdan et al., 2024).

To improve dry skin, it is not enough to use only emollient, oil-based ingredients – such products provide temporary improvement and smooth the skin, but only while the product is on the skin (Draelos et al., 2020). It has been proven that moisturising the skin and using moisturising products can help improve the condition of dry skin (Aoki et al., 2023; Madnani et al., 2024). According to Draelos et al. (2020), moisturisers increase hydration in keratinocytes, improving the ability of natural enzymes to exfoliate the thickened stratum corneum of dry skin. However, the use of moisturisers alone is not sufficient; it is also necessary to use physiological lipids (ceramides, fatty acids, cholesterol) and/or occlusive agents to retain moisture-binding water in the surface layers of the stratum corneum (Draelos et al., 2020; Madnani et al., 2024). Regular use of these substances is particularly important for restoring barrier integrity (Murphy et al., 2022).

To summarize, dry skin is a skin type characterized by a reduced amount of natural lipids, resulting in thin skin that tends to flake and is associated with a sensation of tightness. Due to impaired skin barrier function, dry skin responds more frequently to both exogenous and endogenous factors and may be prone to accelerated wrinkle formation. Inappropriate care and other factors can lead to various complications such as atopic, contact, or perioral dermatitis, and psoriasis. Individualized skin care based on intensive hydration and lipid restoration is essential for improving skin condition and maintaining healthy skin.

## **2.2. Key Active Ingredients for Dry Skin Type Care**

Emollients are part of daily skin care and have become indispensable aids in improving the condition of dry skin (Huber et al., 2025). The term "emollient" comes from Latin and refers to a substance that moisturises, softens and smoothes the skin (Huber et al., 2025). Considering the physiology of dry skin, the main active ingredients for dry skin types should improve skin hydration, replenish the deficiency of barrier lipids, and improve and restore the natural skin barrier (Kang et al., 2022). Ingredients that are physiologically similar to the skin structure mimic and/or supplement it (Spada, Barnes, Greive, 2018). The lower the lipid content of the stratum corneum, the better local lipid-rich substances can penetrate the skin, so creams with a higher lipid base can quickly relieve symptoms of dryness by inhibiting moisture loss (Kang et al., 2022). There are three classes of chemical ingredients that regularly perform a moisturising function: humectants, emollients and occlusive agents (Spada et al., 2018).

**Components similar to the lipids in the stratum corneum** supplement the intercellular lipid layer in the stratum corneum, maintaining moisture levels in the epidermis (protecting against water loss) and improving the skin's barrier function (Kang et al., 2022; Wollenberg, Barbarot, Torrelo, 2025). The optimal ratio that mimics the natural lipid balance of the skin is 3:1:1 (ceramides:cholesterol:fatty acids) (Kang et al., 2022). It has been proven that these ingredients must be present in a cosmetic product in the right ratio to have a positive effect on the integrity of the skin barrier (Spada et al., 2018).

- **Ceramides** are a particularly important component of intercellular lipids – they are the first substance produced by the skin after a barrier breach (Draeos et al., 2020). In cosmetics, ceramides form a protective barrier against moisture loss (Morgan et al., 2024).
- **Cholesterol** increases the flexibility of the skin's lipid bilayer, improving skin homeostasis and accelerating skin regeneration (Sroczyk et al., 2024). According to the authors, cholesterol plays an important role in maintaining and restoring the skin barrier, preventing water loss and improving skin moisture levels.
- **Fatty acids** protect, regenerate and soften the stratum corneum, soothe inflammation and ensure the proper structure of the skin's intercellular cement – they create an occlusive film on the skin that reduces transepidermal water loss (TEWL) and thus contributes to proper epidermal hydration (Zielińska, Nowak, 2017).

**The active ingredients in the NMF structure** help maintain water balance – the components are highly effective moisturisers that attract and bind water from the atmosphere, incorporating it into the corneocytes (Spada et al., 2018).

- **Amino acids** are the main component of NMF, accounting for the largest part of NMF, about 40% of total NMF (Kahsay et al., 2021). Amino acids play an important role in

maintaining skin health – they regulate moisture and pH in the skin and act as antioxidants (Jeon et al., 2024).

- **Inorganic ions** such as sodium, potassium, calcium and chloride all contribute to epidermal hydration (Baumann, 2015).
- **Pyrrolidone carboxylic acid (sodium PCA)** has an optimal moisturising effect at a concentration of at least 4% (Kang et al., 2022). There are numerous reports that topical application of PCA effectively reduces the symptoms of dry skin (Bogdan et al., 2024).
- **Lactic acid**, in addition to its moisturising properties, maintains the acidic pH of the stratum corneum, which helps to ensure the integrity of this layer (Coirier et al., 2023). Lactic acid also inhibits melanin formation by directly inhibiting tyrosinase activity (Lee et al., 2020).
- **Sugars** and sugar-related substances are powerful moisturisers in cosmetics, regulate the level of hydration and barrier function of keratinocytes, and have depigmenting properties (Lee et al., 2020).
- **Urea (carbamide)** is a common ingredient in cosmetics and has moisturising, keratolytic and anti-itching effects, depending on the concentration used (Wollenberg et al., 2025). Urea (carbamide) is considered both a moisturising agent (it draws water from the dermis to the epidermis, as well as from the external environment in humid conditions) and an emollient (it fills the spaces between flaking corneocytes) (Augustin et al., 2024, Lacarrubba, Verzi, Dinotta, Micali, 2021). In low doses ( $\leq 10\%$ ) in topical products, urea acts as a skin moisturiser, while in higher concentrations ( $>10\%$ ), it has a keratolytic effect and can facilitate the transport of molecules through the skin, but this can cause irritation (Augustin et al., 2024). In a study involving elderly patients with very dry skin, a cream containing 10% urea was well tolerated and showed clinical improvement in dry skin after 7 days (Lacarrubba et al., 2021). According to the authors, urea-based products regulate TEWL and restore the stratum corneum's ability to attract and retain moisture in the skin.

**Other moisturising, moisture-retaining substances**, when applied to the skin surface, attract moisture from the environment (when atmospheric humidity is  $>80\%$ ) and moisture from under the stratum corneum towards the stratum corneum (Kang et al., 2022). Moisturising agents are hygroscopic substances that behave similarly to NMF (Barnes et al., 2021).

- **Glycerin (synonym glycerol)** is a trihydroxy alcohol and a common ingredient in cosmetics due to its hygroscopic properties, which improve skin hydration and barrier function (Wollenberg et al., 2025). It is a powerful moisturiser that helps protect the skin barrier and, once it reaches the deeper layers of the skin, restores water content, mimicking the function of NMF (Kang et al., 2022). It is one of the most effective and

widely used moisturisers, not only capable of retaining water, but also modulating aquaporins – proteins involved in water transport between cells (Draelos et al., 2020).

- **Hyaluronic acid** is the main structural component of the skin's intercellular matrix, consisting of long, hygroscopic polysaccharide chains (Wollenberg et al., 2025). Hyaluronic acid is a natural biopolymer from the glycosaminoglycan family, found in many tissues, which accelerates wound healing by promoting the development of fibroblasts and fibrin (Kondziołka, Wilczyński, 2021). It also has excellent viscosity, hygroscopicity, excellent moisture retention capacity, high biological compatibility and hygroscopic properties (Ha et al., 2025). It can bind 1000 times its own weight in water and retain water molecules in the dermis and epidermis (Draelos et al., 2025). Its physical and chemical properties depend on factors such as molecular weight and concentration (Rao et al., 2025).
- **Alpha hydroxy acids (AHAs)** are natural organic acids that not only moisturise the stratum corneum, but also break down keratinocytes, removing dead skin cells, thus increasing skin elasticity and reducing flaking on the skin's surface, giving a feeling of smoothness (Kang et al., 2022).
- **Panthenol (chemical name is D-panthenol (dexpanthenol))**. Dexpanthenol moisturises the skin barrier, reduces TEWL, has anti-itching properties and increases the elasticity of the stratum corneum (Augustin et al., 2024). A review of studies conducted by the authors found that skin care products containing D-panthenol are well tolerated not only by healthy patients but also by patients with dry skin due to diabetes, with a significant improvement in skin hydration and barrier function, and a reduction in skin tightness, itching and dryness.
- **Aloe vera** moisturises and retains moisture in the skin, creating a protective barrier, and has anti-inflammatory properties – different parts of the plant contain around 200 active phytochemicals – amino acids, polysaccharides, enzymes, vitamins, minerals, saponins, anthraquinones, lignin and salicylic acid (Bogdan et al., 2024). It is one of the most popular soothing ingredients used in cosmetics, with antibacterial, antiviral and antioxidant effects (Kondziołka et al., 2021).
- **Propylene glycol** has a moisturising effect at concentrations of 10% or less and a keratolytic effect at concentrations of 40% or more (Kang et al., 2022).

**Skin softeners.** The biological effects of emollients can improve the skin's barrier function, maintain a healthy skin microbiome, and provide essential lipid functions (Augustin et al., 2024). These are protective ingredients that fill the gaps between corneocytes in the stratum corneum and provide a feeling of softness and increased elasticity (Kang et al., 2022; Prakoeswa et al., 2024).

- **Squalene** is a natural organic compound, a good moisturiser, found mainly in plant sources, which retains moisture in the skin and maintains its elasticity (Morgan et al., 2024). According to the authors, previous studies have shown that squalene improves skin health due to its antioxidant, moisturising, softening, anti-inflammatory and wound-healing properties, making it a valuable ingredient in many skin care products.
- **Natural vegetable oils**, such as castor oil, olive oil, macadamia nut oil, grape seed oil, shea butter, etc., have moisturising and barrier-strengthening properties (Kang et al., 2022). Sroczyk et al. (2024) add that natural oils soothe the skin and create an occlusive layer that protects against excessive TEWL.
- **Cetyl alcohol** and **stearyl alcohol** are long-chain alcohols that fill the gaps between corneocytes and improve the skin's barrier function (Madnani et al., 2024).

**Occlusive agents** are oily substances that cover the stratum corneum with an airtight film and block transepidermal water loss from the epidermis (Prakoewa et al., 2024). That's substances are effective only when applied to the skin, and once removed from the skin, the moisture-retaining effect disappears (Kang et al., 2022).

- **Petrolatum** is a hydrocarbon derived from petroleum that is tasteless and odourless, non-comedogenic and low-irritant, and does not cause allergies (Kang et al., 2022). According to the authors, petroleum jelly is an excellent occlusive agent that reduces moisture loss through the epidermis by 99% and inhibits moisture loss 170 times more effectively than vegetable oil. It is one of the most effective barrier-strengthening and moisture-retaining ingredients, therefore it is widely used for skin protection, especially for dry, damaged or sensitive skin (Wollenberg et al., 2025).
- **Mineral oil or liquid paraffin** is extracted from petroleum, like petroleum jelly, and has similar properties – it is tasteless and odourless, a low-irritant occlusive ingredient, but the degree of reduction in transdermal moisture loss is lower (approximately 20-30%) and is considered to be a more comedogenic substance (Barnes et al., 2021; Kang et al., 2022).
- **Silicone (dimethicone, etc.)** – non-sticky (unlike oil), a well-tolerated moisturising and softening agent that improves the stability of cosmetic products (Kang et al., 2022).

Different bases affect the skin and its hydration, lipid barrier, or absorption of active ingredients in different ways (Kondziolka et al., 2021). Most emollients are complex formulations that typically combine a water-binding moisturiser (e.g. glycerol, urea, lactic acid) with a film-forming occlusive (e.g. paraffin, petrolatum), thus exploiting the biophysical properties of the individual components (Wollenberg et al., 2025). Since various skin diseases are accompanied by disturbances in the skin's barrier function, moisturising components act as an adjunct to "prevent" skin diseases or even treat them by alleviating symptoms such as itching and stinging (Kang et al., 2022). Therefore, regular

moisturising of dry skin is very important to replenish moisture and maintain a healthy skin barrier, as severe skin dryness activates eczema, dermatitis, psoriasis and other skin diseases (Saiwaeo et al., 2023).

In summary, it is very important to include both moisturizing agents and lipids in the care of dry skin types, to improve and restore the natural protective barrier of the skin. It is recommended to protect the skin with components analogous to the lipids of the stratum corneum, such as ceramides, cholesterol and fatty acids. Additionally, maintaining water balance with substances following the NMF (natural moisturizing factor) structure – amino acids, lactic acid, urea, or other moisturizers like glycerin, hyaluronic acid etc. – is essential. Occlusive agents, such as petroleum, silicones, when applied to the skin, can reduce transepidermal water loss by up to 99%. Consistency and regular use of appropriate active ingredients can significantly reduce the risk of complications associated with dry skin.

## 2.3. Common Skin Conditions in Dry Skin Type

### 2.3.1. *Dermatitis: Atopic Dermatitis, Contact Dermatitis, Perioral Dermatitis*

- Atopic Dermatitis (Eczema)

Eczema is a group of inflammatory skin diseases that affect people of all ages and backgrounds, with atopic dermatitis being the most common type of eczema (Rao, Tan, 2025). Atopic dermatitis is a chronic, recurrent, inflammatory skin disorder that can be localised or spread throughout the body (Ha et al., 2025; Rao et al., 2025). This dermatological disease significantly impairs patients' quality of life and is associated with a number of comorbidities, including asthma, allergies, anxiety, sleep disorders, fatigue, depression, autoimmune diseases, and cardiovascular diseases (Silverberg et al., 2025). The pathogenesis of atopic dermatitis involves a complex multifactorial interaction of multiple cellular, genetic, and environmental factors and is not fully understood (Zhang, Lin, Chen, Zhu, Hu, 2025).

**CLINICAL FEATURES.** Atopic dermatitis is a chronic, inflammatory skin disease characterised by eczematous lesions and dry, red, itchy skin (Herrmann et al., 2025; Silverberg et al., 2025). Itching has a significant impact on patients' quality of life and mental health and is associated with disturbances in work, sleep and daily activities (Soares et al., 2025). According to the authors, chronic itching, defined as itching lasting longer than 6 weeks, is one of the predominant and most distressing symptoms of atopic dermatitis. Mechanical damage to the skin caused by scratching further impairs the skin's barrier function, causing the skin to become extremely dry and release cytokines that stimulate the immune response (Luo et al., 2024). Scratching also causes abrasions,

which leave superficial scars (Prakoeswa et al., 2024). Acute phase lesions are characterised by intensely itchy, erythematous papules, with histopathology revealing mild epidermal hyperplasia, lymphocyte and macrophage infiltration in the dermis, and intercellular epidermal oedema (Nemeth, Syed, Evans, 2024). According to the authors, the location of symptoms changes with age:

- Infants usually develop widely scattered, dry, scaly, and erythematous patches with minor scratches, often with lesions on the face, especially the cheeks.
- In children, the rash becomes more localised, affecting straight surfaces such as the wrists, elbows, ankles and knees.
- School-age children usually follow the adult pattern: the most commonly affected areas are the flexural surfaces – elbows and knees (Figure 6).



**Figure 6. Clinical signs of atopic dermatitis**

Source: Kolb, Ferrer-Bruker, 2023

In the acute phase, thickening of the epidermis and infiltration of skin leukocytes are observed, and the degree of skin barrier dysfunction in patients with atopic dermatitis correlates with the severity of the disease (Luo et al., 2024). According to the authors, defects in the epidermal lipid barrier increase susceptibility to *Staphylococcus aureus* bacterial infection in skin lesions.

**EPIDEMIOLOGY.** Atopic dermatitis can occur at any age, with most cases beginning in infancy or childhood, most commonly in children aged 3–6 months (Wang, Gao, Zhang, 2024). Some patients outgrow the condition during adolescence, while others experience localised flare-ups during adulthood after longer periods of remission. In rare cases, atopic dermatitis can develop later in adulthood (Jeskey et al., 2024). In the United States, the prevalence is 4.9–10.2% among adults and 14.8–24% among children (<18 years) (Silverberg et al., 2025). The prevalence of this disease is increasing worldwide, with more than 200 million people currently affected (Herrmann et al., 2025). The lifetime prevalence is reported to be as high as 20% and it often occurs in conjunction with other allergic diseases such as asthma and allergic rhinitis and is therefore recognised as a systemic disorder (Shi et al., 2025).

**CAUSES AND RISK FACTORS.** The aetiology, which is not yet fully understood, includes genetic predisposition, immune system disorders, impaired skin barrier function, skin microbiota imbalance, neuroendocrine changes and environmental factors (Shi et al., 2025). Atopic dermatitis is thought to result from an excessive immune response to allergens or insufficient protection against environmental toxins (Akbar et al., 2024). Studies show that airborne allergens (e.g., dust mites, pollen, environmental pollutants, climate change (e.g. dry or extreme temperatures), chemical irritants and microbial exposure can cause or worsen the symptoms of atopic dermatitis (Shi et al., 2025). The pathogenesis of atopic dermatitis is greatly influenced by genetic factors – mutations in filaggrin (a protein important for skin structure and moisture) disrupt the functioning of the epidermal barrier, resulting in increased trans-epidermal water loss, increased contact with allergens and increased bacterial colonisation (especially *Staphylococcus aureus*) (Rao et al., 2025). Bacteria such as *Staphylococcus aureus* can penetrate the damaged skin barrier, release toxins and cause inflammatory reactions, exacerbating skin inflammation and itching (Shi et al., 2025).

Thus, the main pathophysiological feature of atopic dermatitis symptoms is impaired skin barrier integrity, which contributes to itching and manifests itself in various physiological changes (Herrmann et al., 2025). Changes in the neuroendocrine system (emotional stress and psychological factors) can directly or indirectly affect skin function and immune response and can influence skin inflammation and itching by modulating neurotransmitters and hormones (Shi et al., 2025). The authors emphasise the importance of the psycho-neuroendocrine and skin axis in atopic dermatitis, highlighting the interaction between psychosocial factors and neuroendocrine mechanisms in the onset and progression of the disease. In recent years, the concept of the "gut-skin" axis and gut microbiota imbalance has been considered another important factor in the development of atopic dermatitis (Zhang et al., 2025). According to a study by Lim et al. (2024), a fibre-rich diet combined with moderate fat and protein intake may be a practical and effective way to reduce the risk of developing the disease.

#### CARE AND PREVENTION:

The complex nature of atopic dermatitis suggests that the disease is influenced by multiple factors rather than a single cause, and this multifactorial aspect requires a comprehensive treatment approach that addresses the various contributing elements (Shi et al., 2025). It is recommended to wear soft clothing, preferably cotton, avoid wool, and wash with a mild detergent without fabric softener or bleach; the temperature in the home should be low, as heat can cause sweating and increase irritation; to avoid dryness in the home, a humidifier should be used; when going outside, apply moisturising cream and sunscreen generously (Kolb et al., 2023). The authors also recommend keeping a diary of all foods consumed and avoiding foods that cause skin reactions.

It is very important to avoid factors that worsen the condition, while additionally strengthening the skin barrier and reducing inflammation with proper skin care (Ha et al., 2025). Many different methods of treating atopic dermatitis have been developed, including promoting skin hydration, using emollients, avoiding allergens, and using antihistamines or corticosteroids during flare-ups (Prakoeswa et al., 2024). Topical glucocorticoid treatment is the mainstay of atopic dermatitis treatment, but glucocorticoids have significant side effects and can worsen symptoms when discontinued, making them unsuitable for long-term use (Ha et al., 2025). The use of basic emollients is the cornerstone of long-term treatment for atopic dermatitis (Herrmann et al., 2025). The goal is to prevent the recurrence of dermatitis, improve the skin barrier, maintain the hydration of the stratum corneum, and reduce inflammation (Prakoeswa et al., 2024). Herrmann et al. (2025) add that one of the most distressing symptoms is itching, so itch control should be one of the main therapeutic goals (Herrmann et al., 2025).

- 1) Cleaning – showering or bathing (not with hot water) once a day or every other day, using a mildly acidic, hypoallergenic cleanser (Kang et al., 2022). According to the authors, the use of appropriate cleansers is necessary for two reasons: to remove harmful irritants or allergens and various pathogens (bacteria/viruses) from the skin surface and to promote temporary skin hydration. After bathing, it is recommended to apply a moisturising cream within 3 minutes to strengthen the skin barrier and reduce transepidermal water loss (Jeskey et al., 2024).
- 2) Moisturising creams and hydrogels reduce itching, restore the damaged barrier function – the main pathophysiology of atopic dermatitis – and help prevent flare-ups (Rao et al., 2025).
- 3) Emollient creams typically contain a moisturizer that promotes hydration of the stratum corneum, such as urea or glycerin, and an occlusive component, such as lipids or petrolatum, which reduces moisture evaporation (Prakoeswa et al., 2024). Based on the latest qualitative review, it has been found that topical use of products containing ceramides can strengthen the skin barrier function and alleviate dry and flaky skin conditions in individuals with dermatitis (Morgan et al., 2024).
- 4) Nanofibrillar patches rich in cholesterol and gamma-linolenic acid provide long-lasting skin hydration, which is more effective than applying oil directly to the skin surface (Sroczyk et al., 2024).
- 5) The addition of anti-inflammatory ingredients to moisturising creams improves skin hydration and barrier function and may also reduce inflammation in patients with mild to moderate atopic dermatitis (Prakoeswa et al., 2024). Emollients with active cosmetic ingredients have become effective treatment options that surpass simple moisturising and occlusive creams (Herrmann et al., 2025).

A study by Herrmann et al. (2025) found that regular use of emulsions with active ingredients (ginger extract and cannabidiol) for 12 weeks significantly improved eczema control, skin-related quality of life, long-term improvement in objective symptoms of atopic dermatitis, relief of skin dryness, flaking, erythema and itching, and stabilisation of the epidermal permeability barrier. Polideoxynucleotides (PDRN), DNA-based polynucleotides, stimulate skin regeneration and repair by facilitating cell proliferation, differentiation and migration, which are essential for maintaining skin barrier integrity (Ha et al., 2025). The authors' research data show that peptideptides can help develop more reliable therapeutic strategies for patients with atopic dermatitis. Data from eight high-quality randomised placebo-controlled trials show that Chinese herbal preparations can reduce the size and severity of skin lesions and improve sleep quality (Shi et al., 2025).

In cases of atopic dermatitis, it is recommended to identify possible allergens by performing allergy tests (Rao et al., 2025). The case study presented by the authors describes a four-month-old infant with atopic dermatitis who developed severe inflammatory and necrotic skin lesions after using a mixture of ground fresh walnuts and olive oil on the affected areas of the face and limbs (Abtahi-Naeini et al., 2023). It is particularly important to choose products with safe ingredients and safe concentrations, as the absorption of cosmetic ingredients may increase if the skin barrier is damaged (Kang et al., 2022).

- Contact Dermatitis

Contact dermatitis is an inflammatory skin disease caused by acute or chronic damage to the stratum corneum due to skin contact with an irritant, resulting in impaired barrier function (Kang et al., 2022). Contact dermatitis is caused by an excessive reaction of the immune system to a foreign body (Jaber, Prasad, 2023). This disease accounts for a large proportion of occupational dermatoses and has significant social and economic implications, especially in developed countries (Bueno, Aguzzoli, Bonamigo, 2025). There are two types of contact dermatitis:

1) Allergic – defined as a localised, delayed immune response that usually occurs in skin that comes into contact with a specific allergen (Aljohani et al., 2025). Irritation may not appear until 24–36 hours after contact with the allergen (Jaber et al., 2023). Once contact with the allergen is discontinued, the symptoms disappear (Kang et al., 2022). Dermatitis usually heals within a week after removal of the allergen, sometimes leaving post-inflammatory hyperpigmentation (de Groot ir kt., 2025).

2) Irritant – caused by the direct toxic and inflammatory effects of certain substances (Bueno et al., 2025). This type of contact dermatitis is an inflammatory reaction to an irritant that is not immunological in nature (Krithika et al., 2025). Chemical or physical factors and microtrauma can cause skin irritation and thus lead to irritant contact dermatitis (Litchman, Nair, Atwater, Bhutta, 2023). The skin reaction may occur suddenly after a single exposure to the irritant or gradually due

to repeated contact with the substance (Krithika et al., 2025). Patients with atopic dermatitis are particularly susceptible to this type of reaction because their existing skin barrier dysfunction makes them more vulnerable to exogenous irritants (Mense, Maher, Chovatiya, 2025).

**CLINICAL FEATURES.** The clinical presentation of allergic reactions may depend on the nature of the allergen, its concentration, the intensity of sensitisation, the duration of contact with the skin, and the degree of pre-existing skin damage (de Groot et al., 2025). Clinically, allergic and irritant types of dermatitis are often indistinguishable (Krithika et al., 2025). Several examples of allergic contact dermatitis in the workplace are shown in Figure 7.



**Figure 7. Clinical signs of allergic contact dermatitis. (A) Yoga instructor with periorbital dermatitis caused by essential oils; (B) soldier with dermatitis caused by adhesive tape used to prevent chafing while marching; (C) medical staff member; (D) patient with diabetes mellitus who developed dermatitis after glucose sensors.**

Source: Sukakul, Bruze, Svedman, 2024

Allergic contact dermatitis is characterised by erythematous, desquamative and itchy vesicles, papules or plaques, often accompanied by lichenification (Bueno et al., 2025). Meanwhile, irritant contact dermatitis more often manifests as acute burning (Figure 8). Chronic irritant contact dermatitis, after its initial manifestation, may be characterised by lichenification and hyperkeratosis (Mense et al., 2025). The severity of irritant contact dermatitis is determined by the amount and concentration of the irritant, the duration and frequency of contact, skin type, predisposition to atopy, and environmental factors such as high or low temperature and humidity (Litchman et al., 2023).



**Figure 8. Clinical signs of irritant contact dermatitis**

Source: Shi et al., 2021

When diagnosing contact dermatitis, it is important to obtain information about the patient's occupation, hobbies, and any topical or oral medications (Litchman et al., 2023). Although the diagnosis of allergic contact dermatitis is based primarily on clinical evaluation, patch testing is the main additional diagnostic method for confirming this condition (Bueno et al., 2025). In some cases, the concentration used in the test is too low and does not detect some sensitisation cases (de Groot et al., 2025). It is also not always worth waiting for the results of patch testing, especially if the symptoms are severe – it is more important to start appropriate treatment in a timely manner (Mense et al., 2025).

**EPIDEMIOLOGY.** Everyone is at risk of developing allergic contact dermatitis (Litchman et al., 2023). At least 20% of the population has skin sensitivity to common environmental allergens (Augustin et al., 2024). In European population reports, sensitivity to nickel (based on global literature, nickel has been identified as the main sensitising substance) has been found in approximately 13–17% of adults, about 10% of adolescents and 7–9% of children (Bueno et al., 2025). Women, infants, the elderly and people with a predisposition to atopy are more susceptible to irritant contact dermatitis (Litchman et al., 2023). According to the authors, up to 80% of cases of occupational dermatitis are irritant contact dermatitis.

**CAUSES AND RISK FACTORS.** Irritant contact dermatitis is often caused by repeated exposure to chemicals such as soap, detergents, fabric softeners, solvents or other chemicals (Xiong et al., 2018). Allergic contact dermatitis, on the other hand, is caused by a reaction to allergenic molecules such as nickel, preservatives, fragrances or occupational chemicals (Mense et al., 2025). Nickel and other metals are among the main allergens found in jewellery and cosmetics (Sharma et al., 2025b). According to the authors, allergens in jewellery can be in the form of dyes, metals, beads or other raw materials. In the European population, apart from nickel sulphate, the most common

sensitising substances are thimerosal and fragrances (Bueno et al., 2025). The authors highlight its presence in medicines, vaccine preservatives, contact lens solutions and tattoo inks, which may contribute to the high prevalence of sensitivity to this substance. Fragrances are among the most common contact allergens – it is reported that most patients who are allergic to fragrances due to their professional activities suffer from hand dermatitis due to direct contact, for example: massage therapists, physiotherapists, hairdressers, cosmetologist, healthcare workers (Sukakul et al., 2024).

Occupations involving prolonged contact with water, chemicals, sweat, or prolonged wearing of rubber gloves are often associated with the development of contact dermatitis (Augustin et al., 2024). In dentistry, several commonly used materials can cause contact dermatitis, such as antimicrobial agents, rubber additives, preservatives, and methacrylates (Aljohani et al., 2025). According to a study by Jaber et al. (2023), the most common allergies among dentists are to formaldehyde, acrylates and latex. The incidence of irritant contact dermatitis among healthcare workers in the United States during the COVID-19 pandemic, most commonly affecting the skin of the hands, was observed due to increased hand-washing frequency (Kiely et al., 2021).

A case study by Shi et al. (2021) describes a rare case in which a patient developed irritant contact dermatitis after extracorporeal shock wave therapy (ESWT) for osteonecrosis of the femoral head, the patient developed irritant contact dermatitis, with an itchy, painful area of redness corresponding to the contact site of the treatment equipment, which later developed into erosions and scabs. One patient, who was allergic to nickel, developed painful dermatitis with an itchy vesicular rash at the needle insertion site, while another patient who was allergic to nickel developed itchy papules around the needle insertion site, which grew larger and later spread to the abdomen and buttocks, with severe itching, possibly due to nickel entering the bloodstream from the needle (de Groot et al., 2025).

#### CARE AND PREVENTION:

In all cases, the first line of treatment is to stop exposure to the allergen (Aljohani et al., 2025). In the case of pollen allergy, it is difficult to avoid contact, but Rajini et al. (2025) recommend avoiding the use of products that are difficult to wash off or are oily, which can "attract" or trap pollen on the skin on days when pollen counts are high. Optimal skin care includes maintaining water content in the epidermis, restoring NMF and skin barrier lipids, and preventing TEWL (Augustin et al., 2024). The intact skin of patients with contact dermatitis is characterised by a slow rate of barrier recovery and a significantly reduced ceramide content, indicating a barrier defect similar to that seen in atopic dermatitis. The principle of using cleansers and moisturisers in contact dermatitis is similar to skin care for atopic dermatitis, and it is particularly important to choose a moisturiser with the right proportion of occlusive and moisture-retaining ingredients (Kang et al., 2022). A case study described

by Aljohani et al. (2025) states that when moisturising creams were applied to the affected areas, the symptoms disappeared within one to three weeks in the reported cases.

The main substances in cosmetics that cause contact dermatitis are preservatives, fragrances and other additives, and their concentration and type are important indicators (Kang et al., 2022; Sukakul et al., 2024). Several authors highlight the following examples of potential allergens:

- Propylene glycol, which is a moisturiser and preservative, often causes irritation at concentrations above 20% (when used as a moisturiser), but causes little irritation at concentrations of 2-3% (when used as a preservative);
- Linalool is a fragrance found in plants and known as the substance that gives lavender its scent. Linalool itself is not allergenic or is only slightly allergenic, but it can be oxidised by exposure to air and become a potential allergen;
- Limonene is a fragrance known as the scent of citrus fruits, which can also oxidise in the air in a similar way to linalool;
- Essential oils are often used as fragrances to create the image of "natural cosmetics". Consumers may mistakenly believe that the INCI names of essential oils are "plant" extracts rather than fragrances, which in many cases may contain fragrance allergens.

According to the EU Cosmetics Regulation (European Parliament and Council, 2009), the names of 24 fragrances according to the International Nomenclature of Cosmetic Ingredients (INCI) had to be declared in the list of ingredients if the content of individual substances exceeded the limits (if the amount of fragrances used is less than specified and/or the products contain other substances that are perfumes and aromatic compositions, they should be declared as "perfume" or "aroma" in the list of ingredients). In June 2023, the European Commission added 56 new fragrance names to the annex, which must be indicated on products according to INCI (European Commission, 2023). Among the 24 primary substances were substances commonly used in cosmetics, such as Limonene and Linalool (30% of the 2,044 products analysed, 90% of which were oral care products (Sukakul et al., 2024)), and among the 56 new ones, more popular ingredients such as Menthol, Eucalyptus Globulus Oil, Lavandula Oil/Extract, Rose Flower Oil/Extract, etc. can be found. The aim of this change is to help patients diagnosed with contact dermatitis avoid allergens in cosmetics (Sukakul et al., 2024).

#### ▪ Perioral Dermatitis

Perioral dermatitis is a rash that most commonly affects young adult women (Tolaymat, Hall, 2023). It is a chronic, inflammatory disease whose etiopathogenesis is not sufficiently clear (Ferček et al., 2021). Perioral dermatitis often responds well to treatment, but can be chronic and recurrent (Tolaymat et al., 2023).

**CLINICAL FEATURES.** Perioral dermatitis is characterised by small, inflammatory papules that appear on the skin around the mouth and may also affect the area around the eyes and nose (Ferček et al., 2021). Tolaymat et al. (2023) add that, in addition to papules, small inflammatory pustules or reddish, scaly patches may appear, as well as scaling, most commonly around the mouth (Figure 9).



**Figure 9. Clinical signs of perioral dermatitis**

Source: Schaller et al., 2025; Tolaymat et al., 2023

Tingling, burning, itching and often bilateral erythematous papulopustules are also characteristic, which may persist for several weeks or months (Schaller, Lenders, Handgretinger, Gawaz, 2025). The rash usually appears symmetrically on both sides, but not necessarily, and the lips and contour are usually unaffected (Tolaymat et al., 2023).

**EPIDEMIOLOGY.** Most patients (approximately 90% of cases) are women aged 20–45 years (Schaller et al., 2025). It also occurs in children, but there is no significant difference in the incidence of perioral dermatitis between genders or races in the paediatric population (Tolaymat et al., 2023).

**CAUSES AND RISK FACTORS.** The aetiology remains unclear, but it is thought to be determined by many factors (Schaller et al., 2025). The cause is likely to be multifactorial, including genetic, hormonal and environmental factors (Tolaymat et al., 2023). One of the causes may be epidermal barrier dysfunction and a predisposition to atopy (Ferček et al., 2021). The authors also highlight the use of topical corticosteroids and other irritants such as make-up, moisturisers, sunscreens, toners, etc. Excessive skin care, especially long-term use of face creams, which disrupts the barrier function of the epidermis, as well as fluoride toothpaste, are suspected to be possible causes of perioral dermatitis (Schaller et al., 2025). The authors also discuss the role of pathogenic microbial factors such as *Fusobacterium* spp., *Candida albicans* and *Demodex folliculorum*.

#### CARE AND PREVENTION:

Therapeutic options primarily include strict avoidance of all topical steroids, cosmetics and ointments, also known as zero therapy (Schaller et al., 2025). According to the authors, another option is local anti-inflammatory and antimicrobial treatment, e.g. erythromycin, metronidazole, azelaic acid

or pimecrolimus cream and/or systemic antibiotics (minocycline, tetracycline, doxycycline). If local treatment is ineffective or in cases of severe perioral dermatitis, oral antibiotics are prescribed (Tolaymat et al., 2023).

Upon examining the three types of dermatitis typically observed in dry facial skin, it can be stated that atopic, contact, and perioral dermatitis are inflammatory skin conditions that differ in their etiologies, clinical features, and treatment principles. Atopic dermatitis is most often a chronic, relapsing disease associated with genetic predisposition and immune system dysregulation, characterized by dry, itchy skin with lesion localization dependent on age. Contact dermatitis arises from direct skin contact with irritants or allergens, presenting with localized erythema, pruritus, and vesicles, commonly limited to the contact area, and it can be either allergic or irritant. Perioral dermatitis is an inflammatory condition that typically manifests as small papules around the mouth, nasal folds, and eyes, associated with genetic, hormonal, or environmental factors, often related to the use of steroid creams or irritating cosmetic products. All these skin conditions impair the skin barrier and cause inflammation and discomfort; however, they differ in symptomatology, location, etiology, and management strategies, making it essential to accurately recognize, diagnose, and apply individualized care or treatment. *Seborrheic dermatitis is the most common condition affecting oily facial skin, see section 3.2.2.*

### 2.3.2. Psoriasis

Psoriasis is an immune-mediated disease that can affect not only the skin but also the nails and joints (Young et al., 2024). It is a common, chronic, immune-mediated inflammatory skin disease influenced by both genetic and environmental factors (Teyateeti et al., 2025). The proliferation of skin cells in the skin accelerates, resulting in scaly, itchy areas of skin covered with silvery plaques (Prajapat et al., 2025; Wang et al., 2025). This disorder can develop at any stage of life, usually first appearing in people aged 20-30, with a second peak occurring around the age of 50 to 60 (Radu et al., 2025). It most often manifests itself in recurrent flare-ups and remissions, which can be triggered or exacerbated by various factors (Arango et al., 2024). The World Health Organisation has recognised this disease as a global problem that significantly disrupts patients' normal social interactions, increases their economic burden and reduces their quality of life (Minghui et al., 2024).

**CLINICAL FEATURES.** Psoriasis manifests itself in several forms, but the main type is plaque psoriasis (*psoriasis vulgaris*), which affects the scalp and extensor surfaces such as the elbows and knees, with well-defined, symmetrical, erythematous, silvery, scaly plaques (Nguyen et al., 2024; Radu et al., 2025) (Figure 10). It is an autoimmune disease that causes scaly, itchy areas of skin

(Prajapat et al., 2025). Data showed that the prevalence of itching in patients with psoriasis ranges from 64% to 97% (Teyateeti et al., 2025).



**Figure 10. Clinical signs of plaque psoriasis**

Source: Nguyen et al., 2024

For individuals with psoriasis, the disease can manifest itself in different ways, with unique symptoms and skin patterns (Arango et al., 2024). Many sufferers experience periodic flare-ups, which in some cases can develop into more aggressive forms, such as pustular psoriasis (Radu et al., 2025). In more severe cases, psoriasis affects not only the skin, but can also cause other inflammatory diseases such as arthritis, metabolic syndrome, cardiovascular disease, inflammatory bowel disease and depression (Teyateeti et al., 2025). Oral psoriasis is a rare type of psoriasis that can occur alongside plaque psoriasis and is usually asymptomatic, but some patients complain of discomfort, dry mouth, tingling, and even a burning sensation, which can also affect the patient's quality of life (Novianti, Hidayat, Rosa, 2024).

**EPIDEMIOLOGY.** The prevalence of psoriasis worldwide ranges from 0.91% to 8.5%, with people living closer to the equator tending to have psoriasis less than people living in more remote countries (Teyateeti et al., 2025). The average prevalence rate is 2% (Minghui et al., 2024). Approximately eight million adults in the United States suffer from this chronic disease (Arango et al., 2024). Plaque psoriasis is the most common type of psoriasis, affecting 90% of patients, while up to 40% of patients experience extra-cutaneous psoriasis (a form of psoriasis that affects tissues other than the skin), which develops as arthritis (Novianti et al., 2024).

**CAUSES AND RISK FACTORS.** The exact aetiology of psoriasis remains unclear (Arango et al., 2024). It is an immune-mediated condition involving both genetic predisposition and

environmental factors (Radu et al., 2025). In an activated immune system, an inflammatory reaction occurs randomly, and the immune system attacks healthy cells as if they were foreign bodies or harmful pathogens (Dhabale et al., 2022). The hyperactivation of the immune system increases the proliferation of skin cells (Prajapat et al., 2025). The skin renewal cycle, which normally lasts 21-28 days, lasts only a few days in psoriasis, resulting in a thick layer of skin with redness, scales and plaques (Dhabale et al., 2022; Young et al., 2024). In general, psoriasis is characterised by epidermal hyperproliferation with impaired keratinocyte differentiation, increased dermal vascularisation and inflammatory cell infiltration, mainly caused by T cells (Wang et al., 2025).

The chronic inflammatory process is sustained by innate, adaptive, and resident immune cells in the skin (Arango et al., 2024). Although psoriasis has a strong genetic component, environmental factors, including microbial dysbiosis, play an important role in its pathogenesis (Prajapat et al., 2025). Infections, gut microbiome dysbiosis (diet), medications, weather conditions, and psychological stress are also common risk factors for psoriasis (Minghui et al., 2024). The relationship between psoriasis and stress is complex, as stress acts as both a potential trigger and a consequence of psoriasis flare-ups (Radu et al., 2025). The pathogenesis of itching in psoriasis also remains unclear due to the complex interaction of the nervous, immune, neuroendocrine, and vascular systems (Teyateeti et al., 2025).

#### CARE AND PREVENTION:

The mechanism of psoriasis care and symptom suppression is based on anti-inflammatory effects and inhibition of epidermal proliferation, with retinoids, vitamin D3 derivatives, glucocorticoids, cyclosporine, methotrexate, and biological preparations being the main therapeutic agents (Wang et al., 2025). According to scientific studies, the improvement in psoriasis symptoms was significantly greater when an emollient was used in combination with steroids than when steroids were used alone (Kang et al., 2022). Data from patients with psoriasis show that moisturisers significantly reduce skin problems and improve quality of life (Dhabale et al., 2022). To alleviate psoriatic hyperkeratosis, a moisturising cream containing AHA, salicylic acid (BHA), urea or glycolic acid, which have a keratolytic effect, can be used (Kang et al., 2022). The use of plant-based compounds and other natural resources has led to the emergence of phytopharmaceutical preparations, which are increasingly recognised as a complementary and alternative therapy for managing the symptoms of psoriasis vulgaris (Radu et al., 2025).

Studies show that individuals who have experienced stressful events in recent years are more prone to developing psoriasis, so it is important to include stress management strategies in the treatment plan (Radu et al., 2025). UVB phototherapy is also an effective means of managing psoriasis, allowing the symptoms of the disease to be controlled in both the short and long term (Dhabale et al., 2022). External monotherapy with magnesium ions has a similar anti-inflammatory

and highly effective effect, so patients with psoriasis or atopic dermatitis may benefit from bathing in seawater with a high salt content (Philipp-Dormston et al., 2023). Previous studies have shown that low-calorie diets, intermittent fasting, Mediterranean diets, and restricted protein/vegetarian diets may be beneficial dietary patterns for improving psoriasis symptoms (Minghui et al., 2024). For best results, a holistic approach to the treatment of psoriasis patients is needed, with attention to risk factors (Teyateeti et al., 2025; Radu et al., 2025).

In summary, psoriasis is a chronic autoimmune inflammatory disease characterized by accelerated proliferation and accumulation of skin cells, resulting in well-defined, symmetrical, erythematous plaques covered with silvery scales. This disease often presents with itching, skin dryness, and discomfort, with its course influenced by genetic and immune factors as well as environmental triggers. Psoriasis can affect not only the skin but also joints, causing psoriatic arthritis. Although the disease is incurable, appropriate care and a holistic approach can help manage symptoms, reduce inflammation, and improve patients' quality of life.

### 3. OILY SKIN TYPE, CARE AND MAIN OILY SKIN CONDITIONS

#### 3.1. Justification of Oily Skin Type

Oily skin has different characteristics than normal or dry skin in terms of sebum content, micro-relief parameters and dermis thickness (Kakuda, Melo, Campos, 2022). One of the most common cosmetic complaints is excessive sebum production (Brzozowska, 2025). Although sebum protects the skin from external sources of infection, such as bacteria and fungi, reduces transepidermal water loss, and transports antioxidants (Jo, Shin, Na, 2022), oily skin is often considered a problem because excess sebum can clog pores and cause bacteria to multiply (Kim et al., 2022). Excessive (as well as insufficient) sebum content can also damage the hydrolipidic mantle (due to sebum imbalance) and impair the skin's barrier function (Kakuda et al., 2022).

Sebum consists of a mixture of triacylglycerols, diacylglycerols and free fatty acids (together accounting for 50-60%), wax esters (20-30%), squalene (10-16%), cholesterol esters (2–4%) and metabolites and residues of sebocytes (cells that promote sebum production) (Brami-Cherrier et al., 2022). They are secreted by sebaceous glands, which are most abundant on the face, with a density of 400-800 glands/cm<sup>3</sup> (Ibišević et al., 2024). The T-zone has the highest number of sebaceous follicles (de Melo, Maia Campos, 2018). Sebaceous glands together with hair follicles form a pilosebaceous unit (Brami-Cherrier et al., 2022).

Androgens, insulin-like growth factor-1 (IGF-1), neurotransmitters and fatty acids regulate lipogenesis in the sebaceous glands of the skin (Fujita et al., 2025; Kim et al., 2022). The skin often appears shiny, especially in the T-zone (forehead, nose and chin) (Saiwaeo et al., 2023). Sebum production peaks between the ages of 17 and 20 and gradually decreases with age (Fujita et al., 2025, Kakuda et al., 2022). Although the activity of the sebaceous glands decreases, the size of the pores increases with age due to reduced cell turnover and elasticity (de Melo et al., 2018).

**SYMPTOMS OF OILY SKIN.** The main symptoms of oily skin are shiny skin, enlarged pores, increased skin thickness and a higher tendency to blemishes or rashes (Kakuda et al., 2022). However, oily skin ages more slowly and has natural protection against fine wrinkles (Saiwaeo et al., 2023).

**THE MAIN CAUSES** that can trigger or worsen the symptoms of oily skin are divided into exogenous (external) and endogenous (internal) factors (Brami-Cherrier et al., 2022; Shuo et al., 2019):

Exogenous factors:

- Environmental factors (humidity, UV rays, seasonal fluctuations);
- Diet rich in dairy products and sugar;

- Bacterial infection;
- Smoking.

Endogenous factors:

- Age;
- Genetics;
- Hormones (oestrogens, androgens, growth hormones, melanocyte-stimulating hormone);
- Growth factors (epidermal growth factor (EGF), fibroblast growth factor 1 (FGF1), insulin-like growth factor 1 (IGF-1),
- Neuropeptides,
- Hypothalamic-pituitary-adrenal axis activity (i.e., stress) and acetylcholine.

According to a study by Yang et al. (2021), a BMI greater than 24 kg/m<sup>2</sup> (overweight and obesity) may increase the risk of oily skin in young women. Obesity affects androgen changes in peripheral blood through metabolism, and sebum secretion is actively controlled by androgens (Yang et al., 2021). Sebum production can change rapidly even with minor environmental changes, for example people who exercise or are exposed to sunlight outdoors may secrete more skin sebum, wipe sweat and cleaning the skin surface can significantly reduce the amount of lipids on the skin, the secretion of which varies even within a single day (Liu et al., 2023). The rate of sebum secretion increases by 10% with each 1°C rises in temperature (Shuo et al., 2019).

**COMPLICATIONS.** Enlarged pores and an oily, shiny appearance cause social discomfort and affect self-esteem, especially in women (Kakuda et al., 2022). Oily facial skin, characterised by excessive sebum production, is associated with various dermatological problems (Alexis et al., 2024). Excessive sebum production causes enlarged pores, clogged pores, promotes the formation of comedones and bacterial growth, all of which can lead to seborrheic dermatitis (Jo et al., 2022; Saiwaeo et al., 2023). Increased sebum secretion and changes in sebum composition are also strongly correlated with acne and skin inflammation (Liu et al., 2023). Acne is one of the most common dermatological conditions, and its impact on patients' personal and social well-being is particularly significant and requires a multidisciplinary approach to its management (Secchi et al., 2025).

**CARE AND PREVENTION:**

Controlling sebum secretion is one of the main principles of oily skin care (Jo et al., 2022). The authors' study found that sebum secretion and pore size in oily skin increase significantly after 4 hours of sleep, so skin care is very important both in the morning and in the evening. Cleansers remove excess sebum, which eventually clogs hair follicles (De Cruz et al., 2025). To avoid skin irritation, cleansers should be soap-free, and pH-balanced or acidic cleansers are suitable for skin prone to rashes (De Cruz et al., 2025). Cleansing foams for oily skin are designed to reduce excess sebum on

the skin's surface and can be applied to all areas of the skin, including those covered with hair (Ibišević et al., 2024).

In the morning and evening, after washing your face, it is recommended to use products containing active ingredients that regulate the activity of the sebaceous glands (Conforti et al., 2021). Stronger active ingredients such as retinoids, glycolic acid and salicylic acid can be used in the evening routine, and after application, it is recommended to wait a few minutes and use a moisturiser (Conforti et al., 2021). Moisturisers for oily skin are usually oil-free, composed of water and dimethicone, non-comedogenic and hypoallergenic (Barnes et al., 2021). Although UVA rays can have an anti-inflammatory effect, UVB rays cause inflammation, increase sebum production and keratinocyte proliferation, so it is especially important for oily skin, as for any other skin type, to use a protective sunscreen in the morning (Conforti et al., 2021; De Cruz et al., 2025).

In summary, oily skin is a skin type characterized by increased sebum production, shiny skin, enlarged pores, and a tendency to develop both inflammatory and non-inflammatory lesions. These symptoms can affect self-esteem, cause social discomfort, and contribute to skin issues such as acne or seborrheic dermatitis. Despite excess oiliness, it is important to keep oily skin well-hydrated, as dryness can trigger even more sebum production as a protective mechanism. Oily skin is sensitive and requires specialized care to regulate oil production and maintain skin health.

### 3.2. Key Active Ingredients for Oily Skin Type Care

It is very important for oily skin to maintain a balanced skincare routine tailored to inflammation-prone skin to prevent blemishes, rashes and reduce irritation (Secchi et al., 2025), as oily skin is associated with the development of acne and a more severe form of this disease (Veldi et al., 2025). Given the pathophysiological mechanisms of rashes, it is becoming increasingly important to develop an oily skin care routine that prevents the formation of comedones and normalises the balance of microorganisms (Leti et al., 2025). Cosmetics for oily skin have special requirements, as they not only normalise sebum secretion, but also moisturise and brighten the skin, maintain the proper pH of the skin, and must not have a comedogenic effect or contribute to the formation of new changes (Zdrada et al., 2022). Active ingredients specifically target different aspects, including sebum production, keratinization, microbiome imbalance, inflammation and epidermal barrier function (De Cruz et al., 2025).

**Control of sebum secretion.** A balanced amount of sebum secretion is a key indicator of a healthy skin barrier (De Cruz et al., 2025). Sebaceous gland hyperplasia, increased sebum secretion and changes in sebum composition compromise the skin barrier in patients, while skin with increased sebum secretion is more prone to rashes (Zhao et al., 2020).

- **Niacinamide** is a physiologically active form of **vitamin B3** that has various dermatological therapeutic effects, including sebum-regulating effects (De Cruz et al., 2025). A placebo-controlled study showed that 2% niacinamide significantly reduced sebum secretion after 4 weeks of use (Alexis et al., 2024).
- **Retinoids (retinol derivatives)** are form of **vitamin A** with multifunctional effects, one is to reduce sebum production in the skin, thereby inhibiting the growth of *Cutibacterium acnes* bacteria by altering the microenvironment of the hair follicles (Khalil et al., 2017).
- **White willow bark extract**, a natural ingredient rich in salicin, has the ability to reduce sebum production (Yang et al., 2024). Salicin can be converted into salicylic acid by hydrolysis, and this conversion process allows for more controlled release of salicylic acid and a longer-lasting effect, while reducing the risk of excessive exfoliation and skin irritation (Yang et al., 2024).
- **Tea tree oil** inhibits the secretion of cytokines, which are involved in inflammatory processes associated with increased sebum production (Zdrada et al., 2022).
- **Green tea extracts** 3% reduced sebum content after 8 weeks of external use (Chilicka, Rusztowicz, Dzieńdziora, 2021).

**Restoration of the skin barrier.** Not only physiologically, but also due to various endogenous and exogenous factors, the protective barrier of oily skin is disrupted, and the skin becomes dehydrated (Secchi et al., 2025). Some aggressive oily skin care methods can affect the intact skin barrier, causing irritation and dryness (De Cruz et al., 2025). It is necessary to maintain skin hydration and restore the damaged barrier to improve overall skin health (Liu et al., 2025). The results of studies show that after 60 days of using moisturising skin care products designed for adults prone to acne, epidermal hydration increased by approximately 40% and sebum production decreased by 33.4% (Zdrada et al., 2022). Active ingredients such as panthenol, ceramides, glycerin, niacinamide, and shea butter contribute to the restoration of the skin barrier (Secchi et al., 2025). Probiotics (most commonly *Lactobacillus* in cosmetics) also have a deep moisturising effect, stimulate lipid production and restoration processes in the epidermis, promote the regeneration of damaged skin, and have a positive effect on skin pH regulation (Chilicka et al., 2022). *More information about moisturising agents can be found in section 2.2.*

**Control of epithelial cell hyperkeratinization.** Comedones arise from a disturbance in homeostasis (hyperkeratinisation) in the upper part of the sebaceous gland, as the first step in the pathogenesis of acne (De Cruz et al., 2025; Oulès, Saurat, 2025). Keratolytic agents can support the epithelial barrier function by promoting epidermal thickening and regulating hyperkeratinisation (Secchi et al., 2025). When corneocytes are systematically removed from the surface, the likelihood of rash elements is reduced (Zdrada et al., 2022).

- **Salicylic acid** is a potent keratolytic agent (Keow, Xiong, Abu-Hilal, 2025). It is a beta-hydroxy acid (BHA) widely used in the treatment of acne due to its ability to penetrate oil-saturated follicles, dissolve keratinized residues and reduce comedogenic activity (Liu et al., 2025). A study in which acne patients used a 2% salicylic acid cleanser for 2 weeks showed a significant effect in reducing the number of comedones (De Cruz et al., 2025).
- **Urea** is not only a moisturising agent, but also a keratolytic agent with antifungal properties (Xu, Tong, 2025).
- **Retinoids (retinol derivatives)** are vitamin A derivatives with multifunctional effects, one of which is to normalise follicular keratinization (Khalil et al., 2017).
- **Alpha hydroxy acids**, such as **lactic acid** and **glycolic acid**, limit follicle clogging, promote skin exfoliation and reduce increased keratinization (De Cruz et al., 2025).
- **Azelaic acid**, as a chemical exfoliant, gently removes dead skin cells and reduces the risk of clogged pores (Drozdova-Statkevičienė et al., 2025). The authors point out that azelaic acid is gentler than most other exfoliants, making it suitable for sensitive skin without causing excessive irritation.

**Control of bacterial infections and reduction of inflammation.** Antimicrobial substances are often found in cosmetics and help to reduce the number of microbes that cause rashes (De Cruz et al., 2025). A positive effect of panthenol, centella asiatica and bisabolol on the condition of oily skin has been observed through their anti-inflammatory properties that help soothe the skin and reduce redness (Zhang et al., 2024).

- **Niacinamide (vitamin B3)**, in addition to its sebum-regulating effect, is distinguished by its anti-inflammatory and antibacterial properties (De Cruz et al., 2025). Topical 4% niacinamide has been shown to reduce inflammatory papules by up to 60% (De Cruz et al., 2025).
- **Azelaic acid** – in addition to its keratolytic effect, it has anti-inflammatory and antioxidant properties and a bactericidal effect against *Cutibacterium acnes*, *Staphylococcus aureus* and *Staphylococcus epidermidis* (Keow et al., 2025).
- **Salicylic acid** has mild anti-inflammatory properties, making it suitable for treating inflammatory lesions such as papules and pustules (Liu et al., 2025).
- **Bakuchiol** is a retinoid-type ingredient with anti-inflammatory, antibacterial and antioxidant properties (Leti et al., 2025). According to the authors, several recent reviews suggest that this plant extract could be a natural alternative to retinoid treatment, with a more acceptable tolerance profile than conventional preparations.
- **Tea tree oil/tea tree leaf extract** has broad-spectrum antimicrobial properties and effectively reduces inflammation (De Cruz et al., 2025).

- **Probiotics (*Lactobacillus*)** work by restoring the skin microbiome, reducing the balance of *Cutibacterium acnes*, thereby inhibiting inflammation (Maasarji et al., 2025).
- **Oat leaf/sprout extracts** have several properties, including anti-inflammatory, microbe-balancing and skin barrier-protecting effects (Leti et al., 2025).
- **Zinc** – a systematic review and meta-analysis examining the efficacy of both topical and oral zinc in reducing acne found that treatment with oral or topical zinc (both as monotherapy and as adjunctive therapy) significantly reduced the mean number of inflammatory papules compared to those who did not use zinc (De Cruz et al., 2025).
- **Aloe leaf extracts** used for topical acne treatment showed antimicrobial activity against *C. acnes* and *Staphylococcus epidermidis* (Leti et al., 2025).
- **Green tea extract** has anti-inflammatory and antimicrobial properties against many bacteria (Leti et al., 2025).
- **Resveratrol** demonstrates multiple mechanisms of action in the treatment of rashes due to its antimicrobial and anti-inflammatory properties – it exhibits strong antibacterial activity against *Cutibacterium acne* by disrupting the integrity of bacterial membranes and intercellular structures (Cui, Wang, 2025).

Special aspects:

- **Sun protection.** Sun exposure does not improve oily skin or rashes; on the contrary, it can worsen skin condition (Secchi et al., 2025). According to the authors, this has a significant impact on the progression of the disease in patients with acne, as it can promote bacterial growth and reduce the immune response, causing inflammation. UVB radiation increases the expression of pro-inflammatory cytokines such as IL-8 and IL-1 $\beta$ , which causes keratinocyte proliferation and sebum production (De Cruz et al., 2025).
- **Pregnancy:** the safety and efficacy of most ingredients during pregnancy and breastfeeding cannot be confirmed, as these populations are often excluded from clinical trials (Keow et al., 2025).
- **III-VI Fitzpatrick phototype:** increased risk of post-inflammatory hyperpigmentation after treatment of inflammatory lesions (Keow et al., 2025).

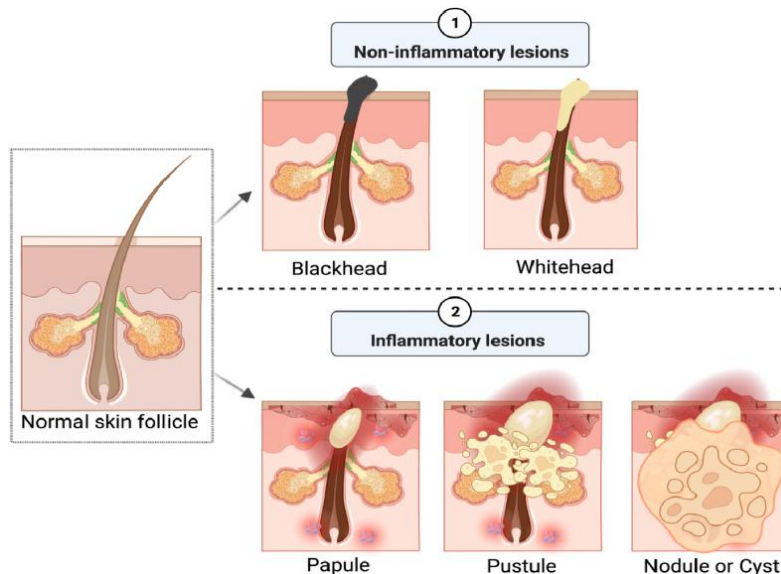
Analysing the scientific basis of active ingredients for oily skin, it can be confirmed that it is important to balance that type of skin – regulate the activity of sebaceous gland and sebum production, but do not forget to moisturize and maintain a healthy protective barrier of the epidermis. Additionally, supporting proper regeneration by controlling hyperkeratinisation of oily skin and including anti-inflammatory agents that restore microbiota balance is important. Also protective measures against sun exposure should be included in a balanced skincare routine.

### 3.3. Common Skin Conditions in Oily Skin Type

#### 3.3.1. Acne

Acne (*Latin: acne vulgaris*) is a skin disease that is particularly common among adolescents and young adults, but can affect people of all ages, not necessarily those with oily skin (Akbar et al., 2024). Adult acne (*Latin: acne tarda*) most commonly affects women over the age of 25 and often manifests as persistent, mild to moderate acne (Li et al., 2024). In general, acne is a common chronic inflammatory dysfunction of the pilosebaceous unit, usually occurring in adolescence due to *Cutibacterium acnes* and fluctuating levels of dehydroepiandrosterone (DHEA) (Veldi et al., 2025). According to the authors' study, oily skin is associated with a more severe form of acne. The chronic course of acne causes psychological and economic burdens for patients, which greatly impairs their quality of life (Maden, 2024). It is associated with a higher risk of stigmatisation, bullying, low self-esteem, depression, anxiety and suicidal thoughts (Kemény, Degovics, Szabó, 2025).

**CLINICAL FEATURES.** Acne is characterised by the formation of various lesions, such as open and closed comedones, papules, pustules, and in some cases cysts, mainly on the face, chest, and back (Prajapati et al., 2025). The main elements of the rash are shown in Figure 11:



**Figure 11. Types of rash elements**

Source: Vasam, Korutla, Bohara, 2023

Acne lesions are classified into two types: non-inflammatory (open and closed comedones) and inflammatory (papules, pustules, nodules, and cysts) (Vasam et al., 2023; Veldi et al., 2025):

- **Open comedones** appear on the skin due to excess oil in the pores and dead skin cells. The surface of the skin above the lesion is open and dark in colour.

- **Closed comedones** occur when skin cells block the opening of a hair follicle. The skin above the comedones is closed and light in colour.
- **Papules** on the skin look like small reddish bumps, usually less than 5 mm in diameter and not filled with secretions. Inflammation of the skin (swelling, heat, redness and pain) is the reaction of healthy tissue to bacterial imbalance.
- **Pustules** appear as white spots (filled with secretion) surrounded by red, inflamed skin.
- **Nodules** are a severe form of inflammatory rash where the infection penetrates beneath the skin and affects not only the pores but also the surrounding area. Nodular rashes are like papules, but their diameter is bigger than 5–10 mm.
- **Cysts** usually appear as particularly large, deep pustules. Cystic acne is a severe form of inflammatory acne.

The Global Acne Grading System (GAGS) is an internationally recognised grading system (Table 3) that divides the face, chest and back into six areas (forehead, both cheeks, nose, chin and chest/upper back), and the severity of each area is assessed on a scale from 0 to 4 according to the most severe lesion (0 – no lesions; 1 – comedones; 2 – papules; 3 – pustules; and 4 – nodules) (De Cruz et al., 2025). Each area is also assigned a coefficient: the forehead, left cheek and right cheek are assigned a coefficient of 2; the nose and chin are assigned a coefficient of 1; the chest and upper back are assigned a coefficient of 3 (Ling et al., 2023). The total score for all six areas is then calculated, and the severity of acne is classified as mild (1-18), moderate (19-30), severe (31-38) or very severe (>39) (De Cruz et al., 2025).

**Table 3. Global Acne Grading System (GAGS)**

Location	Factor	Grade (0-4)	Score (forehead factor x grade + right cheek .... etc.)
Forehead	2	0 – no change 1 – $\geq$ 1 blackhead 2 – $\geq$ 1 papule 3 – $\geq$ 1 pustule 4 – $\geq$ 1 nodule	0 – no acne 1-18 – mild acne 19-30 – moderate acne 31-38 – severe acne 39 – very severe acne
Right cheek	2		
Left cheek	2		
Nose	1		
Chin	1		
Chest and upper back	3		

Source: compiled by the author based on De Cruz et al., 2025; Ling et al., 2023

Li et al. (2024) and Sutaria et al. (2023) present a classification of acne according to its severity in grades (Figure 12).



**Figure 12. Classification of acne according to severity**

Source: Li et al., 2024

Grade I – open and closed comedones, papules, isolated pustules; Grade II – possible open and closed comedones, inflammatory papules; Grade III – additional inflammatory pustules; Grade IV – nodules, cysts (Li et al., 2024). Comedones are precursors of eruptions, gradually evolving into inflammatory papules, pustules and nodules (Oulès et al., 2025). Acne-prone skin may show signs of not only inflammation and erythema, but also hyperpigmentation (Secchi et al., 2025). Severe acne can leave permanent scars (Van Steensel, 2025). Although acne has traditionally been considered only a cosmetic problem, studies have confirmed its significant negative psychosocial consequences, such as reduced self-esteem and increased social anxiety (Veldi et al., 2025).

**EPIDEMIOLOGY.** Acne is the most common skin disease, especially among adolescents, affecting up to 85% of people at some point in their lives (Prajapati et al., 2025). The peak incidence is among girls aged 14–17 and boys aged 16–19 (Li et al., 2024). A study by Veldi et al. (2025) found that acne has more negative impact on younger patients, especially those aged 15–20, most likely due to the social pressure and psychological stress associated with adolescence. Among women over the age of 25, the prevalence of acne is 12% (Van Steensel, 2025). According to other authors, approximately 25% and 12% of women and men in their forties report acne, which is usually accompanied by significant stigmatisation and a deterioration in quality of life (Ghazanfar et al., 2025).

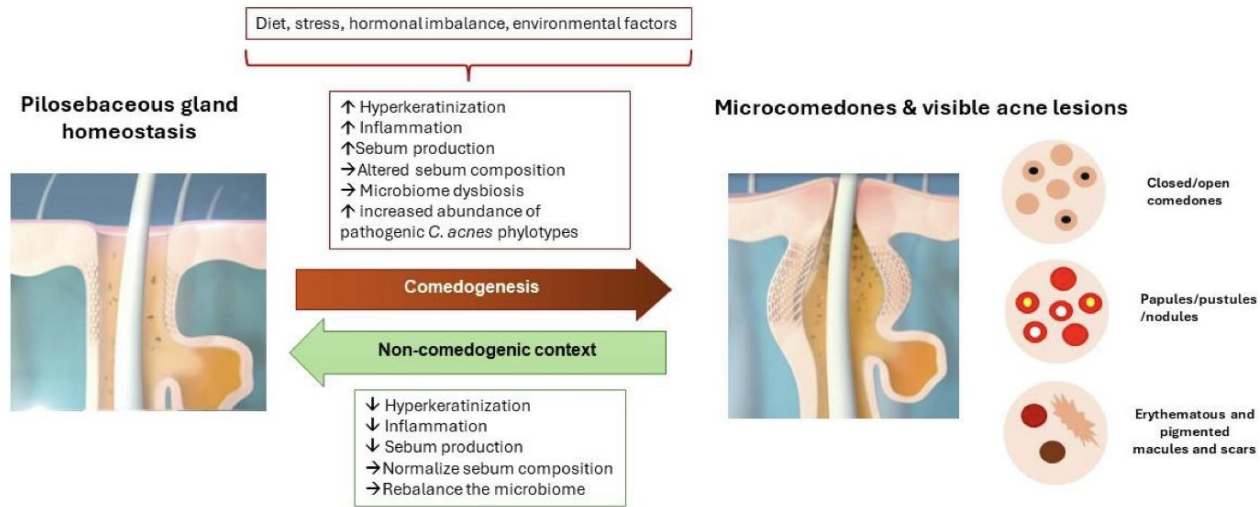
**CAUSES AND RISK FACTORS.** Acne is recognised as a disorder that disrupts the function of the pilosebaceous unit, resulting in the formation of microcomedones and the hair follicle entering a recurrent cycle of inflammation (Leti et al., 2025). The pathogenesis of acne involves multiple underlying processes (Leti et al., 2025; Maden, 2024):

- 1) Increased sebum production and altered composition.
- 2) Follicular hyperkeratinisation.

3) Microbiota dysbiosis and increased *Cutibacterium acnes* colonisation.

4) Chronic inflammation.

All of this is summarised in Figure 13:



**Figure 13. Summary of the main pathophysiological mechanisms of acne development**

Source: Leti et al., 2025

This skin disease mainly affects the sebaceous glands, which produce sebum, which transports dead skin cells to the surface of the skin (Akbar et al., 2024). Follicle blockage causes the formation of pimples, which are further aggravated by bacterial growth (Akbar et al., 2024). The resulting anaerobic conditions promote the growth of bacteria such as *Cutibacterium acnes*, which is often associated with acne (Prajapati et al., 2025). *Cutibacterium acnes* (formerly known as *Propionibacterium acnes*) is the main bacterium associated with the development of acne, which multiplies in the oily environment of the sebaceous glands and causes inflammation by interacting with TLR receptors on keratinocytes, resulting in the release of pro-inflammatory cytokines such as IL-6, IL-1 $\beta$ , and TNF- $\alpha$  (Prajapati et al., 2025).

Genetics, hormonal changes, stress, certain medications, and oily cosmetics can all play a role in triggering these processes (Akbar et al., 2024). Maden (2024) highlights the influence of hormones and changes in the skin microbiome. According to the authors, clinical observations show that the sebaceous glands are also affected by neurological factors. Skin type, sensitivity, use of cosmetics, diet, body mass index (BMI), premenstrual exacerbation, hyperandrogenism, genetics, urbanisation, seasons, and even altitude above sea level all influence the onset and exacerbation of acne (Li et al., 2024). This skin disease is most common in developed countries, which is associated with Western diets and lifestyles, which, together with increased prosperity, cause acne (Van Steensel, 2025).

#### CARE AND PREVENTION:

Treatment of acne vulgaris, regardless of its severity, should begin with a thorough consultation with the patient, including discussions about the nature of the disease, proper skin care practices, and

realistic treatment expectations (Sutaria et al., 2023). Medications for acne are available in both topical and systemic forms (Akbar et al., 2024). The most commonly used medications are anti-inflammatory drugs, bactericidal drugs, and agents designed to control keratinization (Secchi et al., 2025). The main treatments are antibiotics and retinoids (synthetic vitamin A derivatives) (Van Steensel, 2025). Topical treatment regimens typically include treatments such as topical retinoids, benzoyl peroxide, azelaic acid, adapalene, and tretinoin (Maden, 2024). Systemic antibiotics for the treatment of acne include oral doxycycline, minocycline, erythromycin, azithromycin, and isotretinoin (before starting treatment with isotretinoin, women of childbearing age should receive information about contraception). Hormonal treatments such as spironolactone and combined oral contraceptives are also used (Maden, 2024). Although these treatments are generally effective, they often cause side effects such as dryness and irritation of the skin, which negatively affect treatment outcomes (Leti et al., 2025). Furthermore, according to the authors, with increasing resistance to antibiotics, the identification of alternative antimicrobial agents is becoming increasingly important in the development of alternative treatments.

For mild to moderate acne, it is recommended to first try gentler methods and only then resort to medication (Ghazanfar et al., 2025). Various skin care products are available over the counter in beauty stores, pharmacies and online shops, but many of them are ineffective, and consumers generally lack knowledge about which ingredients are effective and beneficial for their skin condition (Ghazanfar et al., 2025). A 2020 study found that 39.3% of people obtain information from the internet or social media, which leads to myths and misconceptions about acne and its treatment (De Cruz et al., 2025). A study by Ghazanfar et al. (2025) found that in the group where participants used self-selected products, minor adverse reactions were reported, including redness, stinging, and itching, however, in the group that received individualised treatment, no minor or severe adverse reactions were reported.

Epidermal barrier dysfunction is a common feature of acne (Secchi et al., 2025). Studies show that acne is accompanied by altered barrier function and microbiome dysbiosis (Thiboutot et al., 2025). Increased TEWL contributes to increased sensitivity, inflammation, and progression of acne symptoms (Liu et al., 2025). This dysfunction may be caused by aggressive acne treatment (Secchi et al., 2025). Excessive face washing can also disrupt the epidermal barrier, so cleansing should be performed twice daily to reduce erythema, papules, and general inflammatory lesions (De Cruz et al., 2025). The use of moisturisers to restore the damaged protective barrier of the epidermis plays a very important role in the treatment of acne. Prebiotics, probiotics or other microbial components help restore healthy microbiota, thereby strengthening the skin barrier, especially in skin diseases such as acne (Rajoo et al., 2024). Plant extracts have various beneficial properties, including sebum-regulating, anti-inflammatory, antimicrobial, keratolytic and antioxidant effects (Leti et al., 2025).

*More information about active ingredients suitable for oily, acne-prone skin is provided in section 3.2.*

Physical treatments for acne include procedures such as chemical peels (salicylic acid, mandelic acid, Jessner's peel), LED therapy (blue, red or combined blue and red light) (Maden, 2024). It is important to avoid exposure to sunlight without broad-spectrum (SPF 30+) UVB and high UVA sun protection (De Cruz et al., 2025). Preference should be given to water-based, non-greasy and light-textured formulations suitable for oily skin (Piquero-Casals et al., 2023). Recent clinical studies show that the impact and management of skin diseases vary among patients, therefore, increasing attention is being paid to the development of individualised treatment methods to optimise treatment response, reduce adverse reactions and improve the overall quality of life of patients (Ghazanfar et al., 2025). Various authors recommend a holistic approach, combining standard treatment with the use of cosmetics and additional therapy, as well as considering the individual characteristics of each patient (Branisteanu et al., 2022).

Acne is a common chronic inflammatory skin disease characterized by lesions of varying severity, including comedones, papules, pustules, and in severe cases, nodules and cysts. The primary causes of acne include increased sebum production and its composition, follicular hyperkeratinization, dysbiosis of the skin microbiota, and increased colonization by *Propionibacterium acnes* bacteria, which triggers inflammation. Hormonal changes, especially during adolescence, activate sebaceous gland activity, while stress, dietary habits, and other factors can exacerbate the condition. Acne often causes not only physical discomfort, but also psychological stress, therefore, complex treatment is important, including proper skin care, medical intervention, and additional holistic therapy.

### ***3.3.2. Seborrheic Dermatitis***

Seborrheic dermatitis is a chronic, recurrent inflammatory skin disease that most commonly affects areas rich in sebaceous glands, such as the scalp, face (nose and lip folds, ears and eyebrows), chest and back (Maldaa, 2025; Xu et al., 2025). It often resembles other dermatoses, such as rosacea or psoriasis, so it is necessary to differentiate it accurately (Tao, Wang, 2023; Tucker, Masood, 2024). Seborrheic dermatitis can occur in people of all ages, but its prevalence is increasing worldwide due to the increasing amount of fat and sugar in the diet, sleep disorders and negative psychological factors (Xu et al., 2025). It often causes persistent itching of the scalp, visually noticeable symptoms in the facial area, long courses of treatment and frequent relapses, all of which cause significant psychological stress for patients, which in turn can exacerbate the progression of the disease and create a vicious circle that complicates treatment (Xu et al., 2025).

**CLINICAL FEATURES.** Seborrheic dermatitis affects the scalp, face and skin folds – areas of the body rich in sebaceous glands – and clinically manifests as itching, salmon-coloured papules and plaques, and greasy scales (Nguyen et al., 2024). It is characterised by symmetry, affecting the central third of the face – the nasolabial folds, cheeks, centre of the forehead, eyebrows (especially the inner part), temples and behind the ears (Xu et al., 2025). Several examples of seborrheic dermatitis are shown in Figure 14:



**Figure 14. Clinical signs of seborrheic dermatitis**

Source: Tucker et al., 2024

Thus, the main clinical manifestations are bright erythema covered with greasy yellowish scales or crusts, often accompanied by varying degrees of itching (Xu et al., 2025). However, seborrheic dermatitis often resembles other dermatoses morphologically, such as psoriasis, especially when only the scalp is affected (Tucker et al., 2024). Psoriasis is characterised by hardened red papules and plaques with clearly defined edges and loose, silvery plaque-like scales (Tucker et al., 2024). According to the authors, psoriasis does not usually cause itching and tends to affect the occipital and frontal areas, while seborrhoeic dermatitis tends to affect the parietal and temporal areas of the scalp. In some cases, it can be difficult to distinguish between seborrheic dermatitis and rosacea, the latter being characterised by persistent facial erythema, telangiectasia, and papules and pustules (Tao et al., 2023). According to the authors, seborrheic dermatitis is associated with an imbalance of fungi and bacteria, while rosacea is more commonly associated with bacterial dysbiosis alone.

**EPIDEMIOLOGY.** The global prevalence is 4.38% (Xu et al., 2025). It is more common in men and is more prevalent at certain stages of life: in infancy during the first three months of life, in adolescence and after the age of 50 (Piacentini et al., 2025).

**CAUSES AND RISK FACTORS.** The pathogenesis of seborrheic dermatitis is multifactorial, involving genetic predisposition, impaired lipid metabolism, and colonization by *Malassezia* fungi

(Xu et al., 2025). One of the main factors is stress, which can alter sebaceous gland activity and immune response, worsening clinical symptoms (Taş Aygar et al., 2025). The results of the authors' study emphasise the importance of including systematic psychosocial assessment in the management of seborrheic dermatitis. Impaired skin barrier function, immune system disorders, hormonal influences and environmental factors such as stress, cold climate and dietary habits influence the development and severity of seborrheic dermatitis (Xu et al., 2025). Although previous studies suggest that *Malassezia* plays a major role in seborrheic dermatitis, emerging evidence suggests that immune dysregulation and skin barrier dysfunction are the main factors in the pathogenesis of the disease, with *Malassezia* playing a secondary role (Piacentini et al., 2025). *Malassezia* is a natural part of the skin microbiome, but in seborrheic dermatitis, there is an excessive or altered immune response to these fungal species (Piacentini et al., 2025). Changes in the organisation of the lipid matrix (mainly composed of cholesterol, fatty acids and ceramides) directly affect skin permeability, and when the barrier function is impaired, *Malassezia* and its metabolites can penetrate the skin (Rousel et al., 2024).

#### CARE AND PREVENTION:

The goal of seborrheic dermatitis treatment is to control symptoms and reduce flare-ups using methods tailored to the severity and location of the lesions, as well as factors specific to the patient, such as age and comorbidities (Vidal, Menta, Green, 2025). Patients with seborrheic dermatitis develop dandruff due to keratinocyte hyperproliferation, and the *Malassezia* fungus strongly promotes this process, therefore, treatments for dandruff and seborrheic dermatitis in general are usually divided into antifungal agents, keratolytics, and anti-inflammatory agents (Xu et al., 2025).

By reducing *Malassezia* proliferation and the associated lipase activity, which releases inflammatory free fatty acids, antifungal drugs reduce inflammation, scaling and erythema (Xu et al., 2025). For example, ketoconazole is an antifungal drug that inhibits the biosynthesis of fungal phospholipids and triglycerides and alters sebum production, reducing fungal growth and subsequent inflammation (Tynes et al., 2024). Clinical data show that antifungal drugs significantly reduce scalp symptoms in patients with seborrheic dermatitis (Xu et al., 2025). Ketoconazole shampoo has been shown to be safe and effective in treating and preventing the symptoms of seborrheic dermatitis (Tynes et al., 2024).

Keratolytic agents, including salicylic acid, sulphur, urea and zinc pyrithione, primarily work by promoting the exfoliation of the hyperkeratotic skin layer, reducing the accumulation of debris and modulating sebum secretion (Xu et al., 2025). Antifungal shampoos containing selenium disulphide (1-2.5%) and zinc pyrithione (1%) are effective in treating the symptoms of scalp and other skin diseases (Vidal et al., 2025). They can improve the penetration of additional treatments by removing dandruff and sebum, thereby enhancing the overall therapeutic effect (Xu et al., 2025).

Corticosteroids are often used to reduce inflammation, but such treatment often poses challenges due to drug resistance, and long-term use can lead to complications such as skin thinning, perioral dermatitis or telangiectasia (Maldaa, 2025). The authors' study of exosome-based therapy has attracted considerable attention due to its ability to modulate the immune response and effectively regulate inflammatory processes in seborrheic dermatitis. In cases of immune system dysregulation and impaired skin barrier function, exosomes can deliver anti-inflammatory molecules directly to damaged skin cells, helping to reduce inflammation and restore the skin's natural protection (Maldaa, 2025). Phototherapy, including ultraviolet B (UVB) rays, intense pulsed light (IPL), light-emitting diode (LED) therapy, and photodynamic therapy (PDT), can be effective in treating seborrheic dermatitis by targeting inflammation, *Malassezia* growth, and sebaceous gland activity (Vidal et al., 2025). The results of a study by Rousel et al. (2024) show a correlation between the skin's protective barrier and inflammation, therefore it is recommended to include emollients, moisturisers or other barrier-restoring agents in the treatment of seborrheic dermatitis.

Seborrheic dermatitis is a chronic inflammatory skin disorder that affects areas rich in sebaceous glands such as the scalp, face (including the folds around the nose and lips, ears, and eyebrows), chest, and back. It is characterized by symmetrical lesions, including redness, scaling, plaques, as well as itching. The causes include genetic factors, increased sebum production, inflammatory response, and yeast infection caused by the *Malassezia* species. Although the condition is often chronic, appropriate therapy allows for symptom reduction and improvement in skin condition.

## SCIENTIFIC DISCUSSION

In the practice of a cosmetologist, it is particularly important to correctly determine the skin type, possible complications, their causes, and the appropriate individual care for each skin type (Brzozowska, 2025; Kim et al., 2022). Accurate skin type determination is particularly important for selecting appropriate products and procedures, developing individual methods and protocols to maintain healthy skin. Incorrect skin analysis, assessment and individually inappropriate skin care can lead to various skin disorders (Bhanot et al., 2024).

Dry skin lacks moisture and lipids, which can increase inflammation and reduce resistance to skin problems such as atopic, contact or perioral dermatitis, and psoriasis (Augustin et al., 2024; Fujita et al., 2025; Saiwaeo et al., 2023). It is particularly important for dry skin to restore and maintain its protective barrier using appropriate active ingredients (Kang et al., 2022). Due to impaired skin barrier function, dry skin is more likely to react to exogenous and endogenous factors and may be prone to wrinkles more quickly. Oily skin, on the other hand, secretes too much sebum, but often, like dry skin, it can be accompanied by a compromised skin barrier, often due to improper care (Kakuda et al., 2022). It is very important for oily skin to individualise care, regulate the activity of the sebaceous glands, control the balance of the microbiome (normalize increased colonization of *Propionibacterium acnes* bacteria, restore the balance between *Staphylococcus epidermidis*, *Corynebacterium*, *Micrococcus*, *Malassezia*, etc.) and additionally moisturise with active ingredients suitable for oily skin (De Cruz et al., 2025; Secchi et al., 2025).

Targeted skin care improves appearance and boosts self-confidence (Saiwaeo et al., 2023). To achieve the best results, a holistic approach is needed, paying attention to risk factors (Teyateeti et al., 2025; Radu et al., 2025). It is important to consider not only cosmetic facial care – environmental factors, lifestyle (professional activity, hobbies, nutrition, etc.), chronic stress, and other diseases affect skin physiology and pathological processes (Augustin et al., 2024; Brami-Cherrier et al., 2022).

### Contribution to cosmetology theory and practice

This systematic analysis of scientific literature contributes to the deepening of knowledge in the field of cosmetology about dry and oily skin types, their physiology and differences that determine different skin conditions and the necessary care strategy. A concentrated, systematic theoretical synthesis of the active ingredients used in the care of dry and oily skin is presented, along with their effects and detailed explanations of how they work. This is confirmed in studies by De Cruz et al. (2025), Draelos et al. (2020), Madnani et al. (2024), Secchi et al. (2025), and many other authors. When the skin lacks various substances and products are used that are not suitable for the skin type and condition, the risk of complications increases. Certain conditions that can be diagnosed by dermatologists as skin diseases still pose a challenge for cosmetologists to identify and recommend

appropriate care (Tao et al., 2023; Tucker et al., 2024 and more). This analysis provides a detailed overview of the physiology, clinical signs, epidemiology, causes and risk factors of the main problems associated with dry and oily skin types, as well as recommended care and prevention measures.

The limitations of the study include:

1. *sample limitations* – using the PRISMA method, only freely accessible publications that met other predefined filters were analysed (n=135);
2. *keyword combination limitations* – the literature search was performed only according to predefined combinations (Skin type classification, Dry skin type, Dry skin ingredients, Dry skin dermatitis, Dry skin psoriasis, Oily skin type, Oily skin ingredients, Acne, Seborrheic dermatitis);
3. *database restrictions* – the study only covered databases such as PubMed and EBSCOhost;
4. *methodological limitations* – the scientific literature review method used does not allow for a direct assessment of clinical effects, as it is based solely on the content of publications.

Future research directions

Further research could focus on deepening the topic by including more literature sources and supplementing the systematic literature analysis with more keywords or combinations of keywords, e.g. skin physiology, skin conditions, skin care, epidermal barrier, personalised skin care, active ingredients for skin, skin health, holistic facial care, etc. It could also include more scientific databases, such as Scopus Elsevier, Web of Science, etc. More data and a broader application of keywords could improve the quality of the systematic review, providing a stronger scientific basis for conclusions and recommendations.

It would be useful to conduct empirical research to confirm the results obtained during the systematic analysis and to determine the practical effectiveness of different care methods for dry and oily skin types in different conditions. Such studies would allow for the assessment of not only theoretical but also real skin changes and reactions to selected cosmetic products and procedures. It would be appropriate to include case studies and an analysis of the experiences of cosmetologists as experts. This would allow the data from the systematic analysis to be supplemented with specific clinical cases that may not be sufficiently analysed in scientific sources. Expert opinions can reveal real challenges or problems that have not yet been widely researched in the literature, thus directing further research into areas that are relevant to practice.

It is also recommended to deepen research on the importance of innovative active ingredients and their interactions to improve the condition of dry and oily skin types, considering their physiology. In further research, it is recommended to define and analyse more skin problems that are not necessarily dependent on a specific skin type, such as skin dehydration, sensitivity, ageing, rosacea, etc., and to present appropriate care and the importance of active ingredients to ensure skin

health and good appearance. By including more skin problems in the studies, it would be possible to examine in depth how different skin conditions can interact with skin type or with each other, which would allow for the development of more complex diagnostic and skin care strategies.

Thus, the results of the study pave the way for further research that could refine and expand current knowledge in this area. Future research should expand the scientific basis for improving health and aesthetics by taking a holistic approach that encompasses not only the physical aspects of the skin, but also emotional, psychological and social well-being, with the aim of comprehensive skin care and health maintenance.

## CONCLUSIONS

1. The classification of facial skin types based on sebum production and the integrity of the skin's protective barrier reveals fundamental difference between dry and oily skin types: dry skin is characterized by barrier dysfunction, increased transepidermal water loss, and disruption of the multilayer lipid membrane structure, while oily skin is characterized by excessive sebum production, microbiome imbalance, and an increased risk of inflammatory processes in the skin. These physiological characteristics not only explain the different etiologies of skin conditions, but also necessitate the development of individualized care strategies.
2. The effects of active ingredients is based on mechanisms confirmed by scientific research – they enhance skin hydration, replenish lipid deficiencies, thereby restoring barrier function. According to the physiology of oily skin, it is particularly important to maintain optimal sebum production, regulate keratinization processes, sustain microbiome balance, and reduce inflammation. The synthesis of the study confirms that the targeted use of active ingredients not only relieves symptoms, but also addresses underlying causes, thereby strengthening long-term skin homeostasis.
3. The clinical manifestations of dry and oily facial skin main conditions encompass distinct phenotypic differences corresponding to specific skin type attributes. A disrupted skin barrier can increase inflammation in the skin and be a critical factor in the pathogenesis of conditions such as psoriasis, atopic, contact or perioral dermatitis. Oily facial skin, characterized by excessive sebum production, is associated with dermatological issues like seborrheic dermatitis or acne. Etiological mechanisms relate to skin barrier dysfunction, skin microbiome dysbiosis, as well as genetic predisposition, immune system disorders, neuroendocrine system changes and various environmental and lifestyle factors. Preventive strategies are based on individualized recommendations, applying a holistic approach tailored to the pathophysiology of the skin type and condition.

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## APPENDIXES

### Appendix 1. Fitzpatrick Skin Type Quiz (Sharma et al., 2025a)

#### 1. Genetic Disposition

Score	0	1	2	3	4
What color are your eyes?	Light blue, gray, green	Blue, gray or green	Blue	Dark brown	Brownish black
What is your natural hair color?	Sandy, red	Blonde	Chestnut/dark blonde	Dark brown	Black
What is the color of your untanned skin?	Reddish	Very pale	Pale with a beige tint	Light brown	Dark brown
Do you have freckles on untanned areas?	Many	Several	Few	Incidental	None

Total score for genetic disposition: \_\_\_\_\_

#### 2. Reaction to Sun Exposure

Score	0	1	2	3	4
What happens if you stay in the sun for too long?	Painful redness, blistering, peeling	Blistering, followed by peeling	Burns sometimes, followed by peeling	Rarely burns	Never burns
How fast does skin brown?	Hardly or not at all	Light color tan	Reasonable tan	Tans easily	Turns dark brown quickly
Do you tan within a few hours of sun exposure?	Never	Seldom	Sometimes	Often	Always
How does your face react to the sun?	Very sensitive	Sensitive	Normal	Very resistant	Never had a problem

Total score for reaction to sun exposure: \_\_\_\_\_

#### 3. Tanning Habits

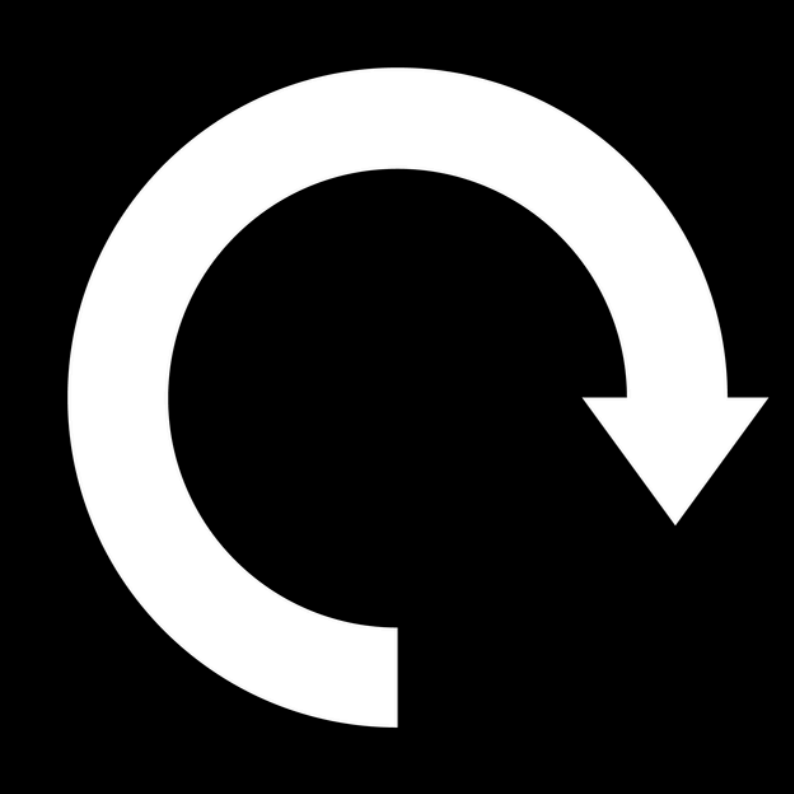
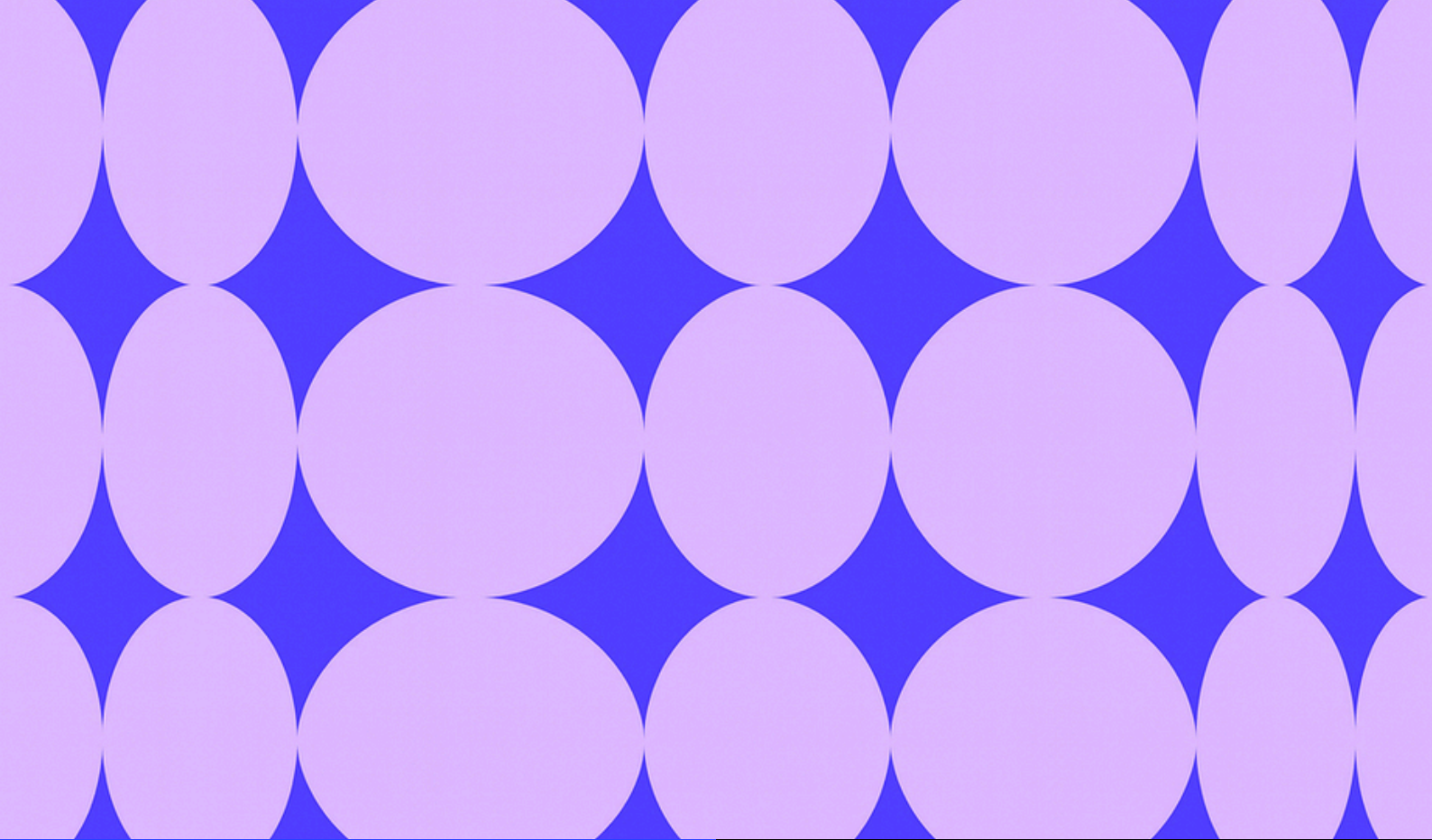
Score	0	1	2	3	4
When was the last time you tanned?	More than 3 months ago	2-3 months ago	1-2 months ago	Less than one month ago	Less than 2 weeks ago
Do you get sunburned?	Never	Hardly ever	Sometimes	Often	Always

Total score for tanning habits: \_\_\_\_\_

**Appendix 2.** Fitzpatrick skin type test results (Sharma et al., 2025a)

Add up the total scores for each section. Your Fitzpatrick skin type:

<b>Skin Type Score</b>	<b>Fitzpatrick Skin Type</b>
0-7	I
8-16	II
17-25	III
25-30	IV
Over 30	V-VI



**SMK**