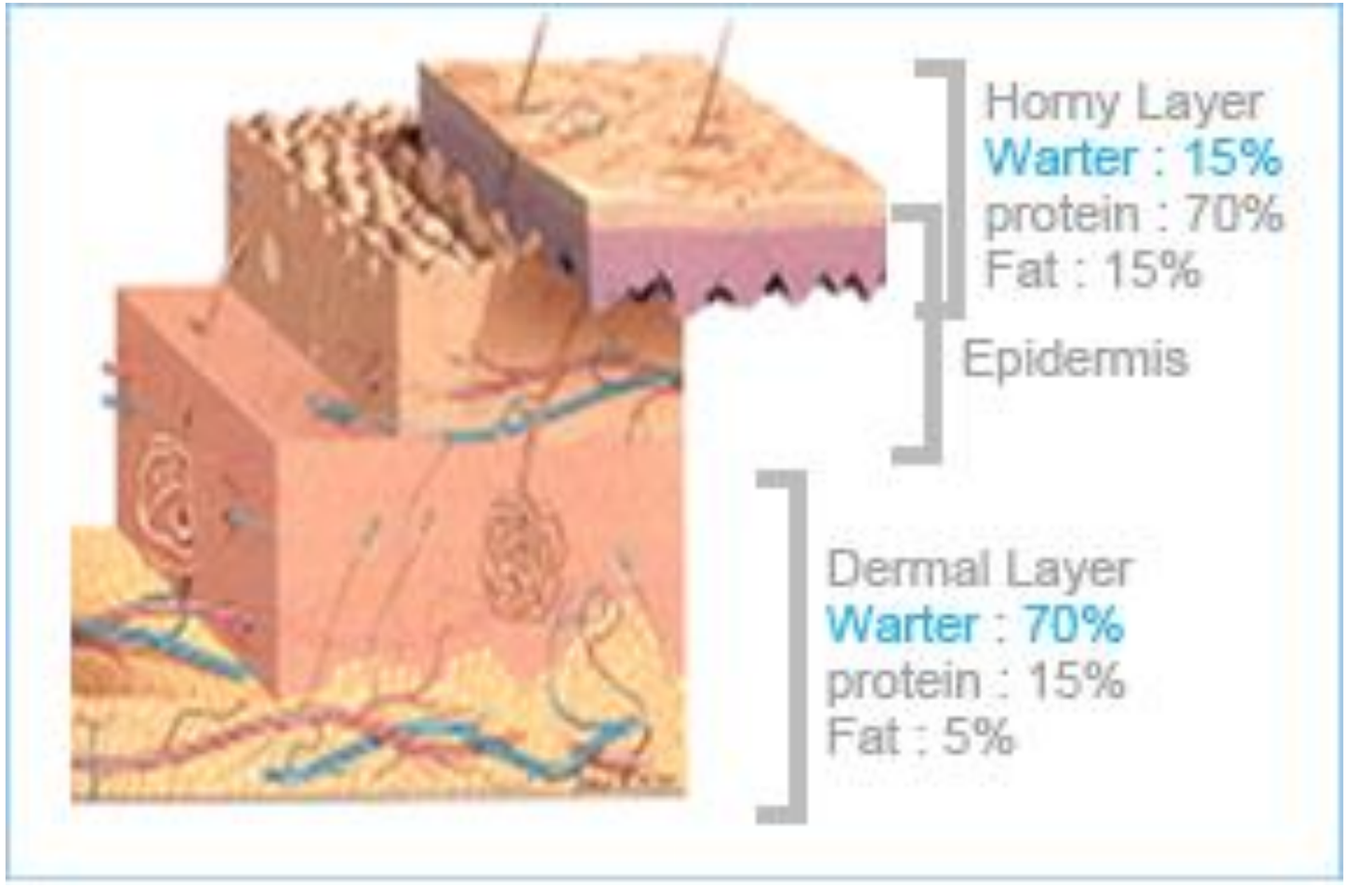
SKIN MOISTURIZING PRODUCTS

- It is known that the elasticity of SC is dependent on a proper balance of lipids, Normal Moisturizing factors (NMF), and water, in conjunction with its keratin proteins.
- Water is a plasticizer for keratin, allowing the SC to bend and stretch, avoiding cracking and fissuring.
- Water increases the activity of enzymes involved in the desquamation process.
- The capacity of the SC to hold onto water is greatly influenced by the NMF in the corneocytes as well as the SC's lipids.


Horny Layer
Warter : 15%
protein : 70%
Fat : 15%
Epidermis
Dermal Layer
Warter : 70%
protein : 15%
Fat : 5%

Skin Types Based on Hydration State and Lipid Content

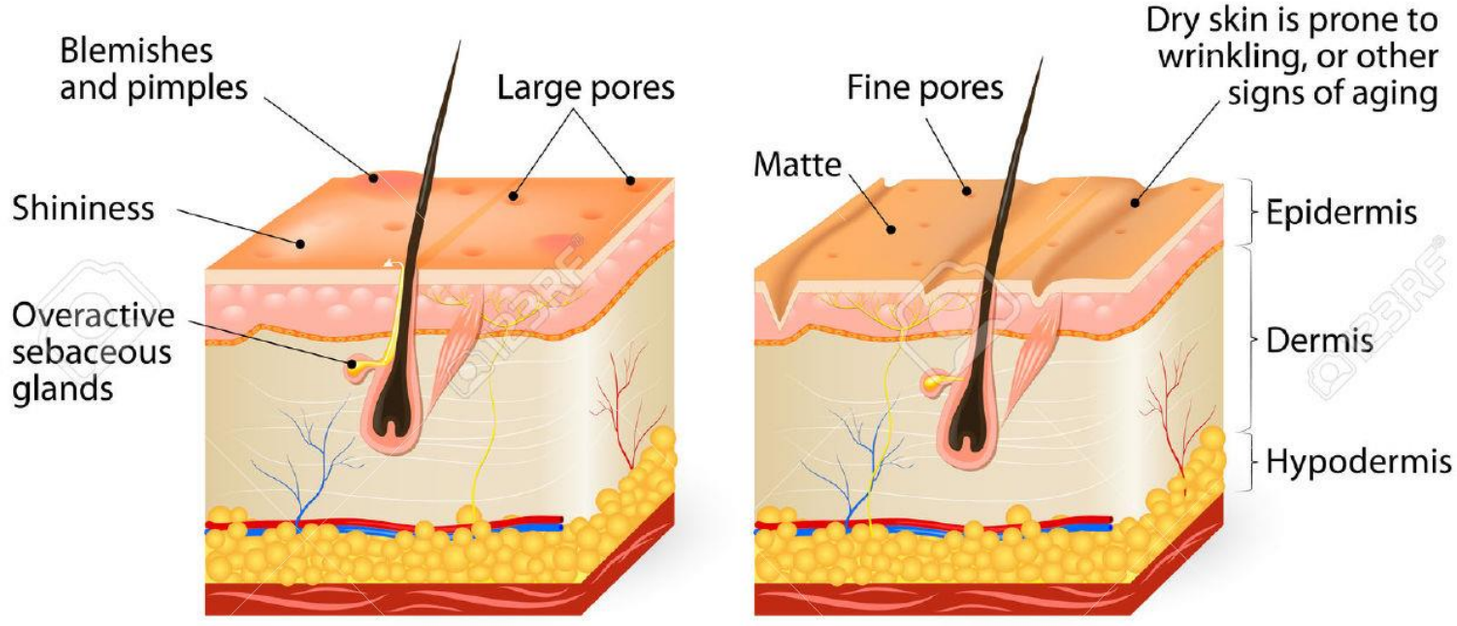
- It is essential to keep the skin hydrated in order to maintain the integrity of the skin barrier and prevent loss of water as well as penetration of physical and chemical substances.
- Scientists differentiate among oily, dry, combination, and normal skin. These types have different characteristic features.
- It should be emphasized that the skin type of an individual is not constant; it may change over time depending on several internal factors, such as hydration state, lipid content, pH, moisture binding capacity, as well as some external factors, such as UV light, wind, temperature, and humidity content.

- **Normal skin** has no exact definition; it is usually compared to other skin types as a reference. It is generally described as not too oily and not too dry.
- normal skin is structurally and functionally balanced, and it has fine pores; it is smooth and well supplied with blood. In addition, it has no or only a few imperfections, no severe sensitivity, and a radiant complexion.

- **Dry skin** is relatively common; most people experience it from time to time due to various factors. It can be characterized as scaly, rough, and dull, which can lead to tautness and itchiness
- In addition, it generally has red patches and can be characterized with less elasticity and a rough complexion. Dry skin tends more toward premature aging and is likely to have more wrinkles.
- Environmental factors, such as low relative humidity, cold weather, and sunlight, in addition to repeated contact with water, surfactants, and solvents, plus numerous skin diseases and dietary deficiencies, can produce dry skin.

- **Oily skin** has enlarged pores; therefore, it is very shiny as a result of overactivity of the sebaceous glands.
- Oiliness is most visible on the forehead, nose, and chin, and these parts are oily to the touch.
- There are several factors that can cause and/or contribute to oily or greasy skin, including genetic inheritance, hormonal changes, diet, stress, and external agents (such as cosmetics, chemicals, UV light).
- Individuals with this skin type often tend to suffer from acne and dandruff as adolescents.

OILY & DRY SKIN



- **Sensitive skin** is a complex dermatological condition, defined by abnormal sensory symptoms, for example, tingling, chafing, burning, or prickling, and possibly pain or pruritus by various chemicals (e.g., cosmetics, soaps, water, pollution), physical factors (e.g., UV light, heat, cold and wind), microorganisms, psychological factors (e.g., stress), and hormones. It is often thought to be a specific skin type, similar to oily or dry skin.

- **Combination skin**, as its name implies, is the combination of normal and oily skin, or of oily and dry skin. This type of skin has a tendency to be greasy in the central T-zone of the forehead, nose, and chin. The skin on the other areas (cheeks and hairline) is normal or dry.

- Skin types should be determined when the face is clean, i.e., without any moisturizers and makeup products. Since facial cleansers may have a drying effect, its type cannot be properly determined right after washing the face.


Normal Skin
Feels neither tight or oily
Dry Skin
Feels Tight
Oily Skin
Feels oily all over
Combination Skin
Oily t-zone normal/dry cheeks
Sensitive Skin
Red, irritated tight, patchy

SKIN TYPE

NORMAL

OILY

DRY

COMBINATION

SENSITIVE

- **Skin Hydration based on gender**
- The basic structure, function, and biochemical processes of male and female skin are similar; however, distinct differences exist. There are obvious differences driven by **hormonal** differences between the sexes.
- It is well known that testosterone plays a key role in facial and body hair growth, sebum production, and overall masculine features. Androgen stimulation causes an increase in the thickness of the skin; male skin is reported to be approximately 25% thicker than that of women.
- Estrogen, however, negatively regulates body hair growth, affects body fat distribution, and positively impacts wound repair rates.

- It has been shown that the **sebum content** is higher in men than in women at all body locations and in all age groups. The sebaceous gland activity remains stable in men with aging, whereas it decreases over lifetime in women, especially from the age of 50-60. The reduction in sebum is also accompanied by a reduction in the SC lipids in women, which may be attributed to a reduction in estrogen with advancing age.

- Most recent studies have shown that young men show higher SC **hydration** in comparison with women. **SC hydration** is stable or even increases in women over lifetime, whereas the skin hydration in men progressively decreases, beginning at the age of 40

- **SKIN MOISTURIZING PRODUCTS**
- Moisturizers for the face, body, and hands do not differ significantly in their ingredients. However, many products on the market are specifically recommended for certain body parts.

- The main reason for that is that the hydration state of the skin may vary among different body areas. For example, the hands of a person working in a hospital may be extremely dry due to regular hand washing and the continuous use of hand sanitizers, whereas the hydration state of his/her other body parts may be normal.

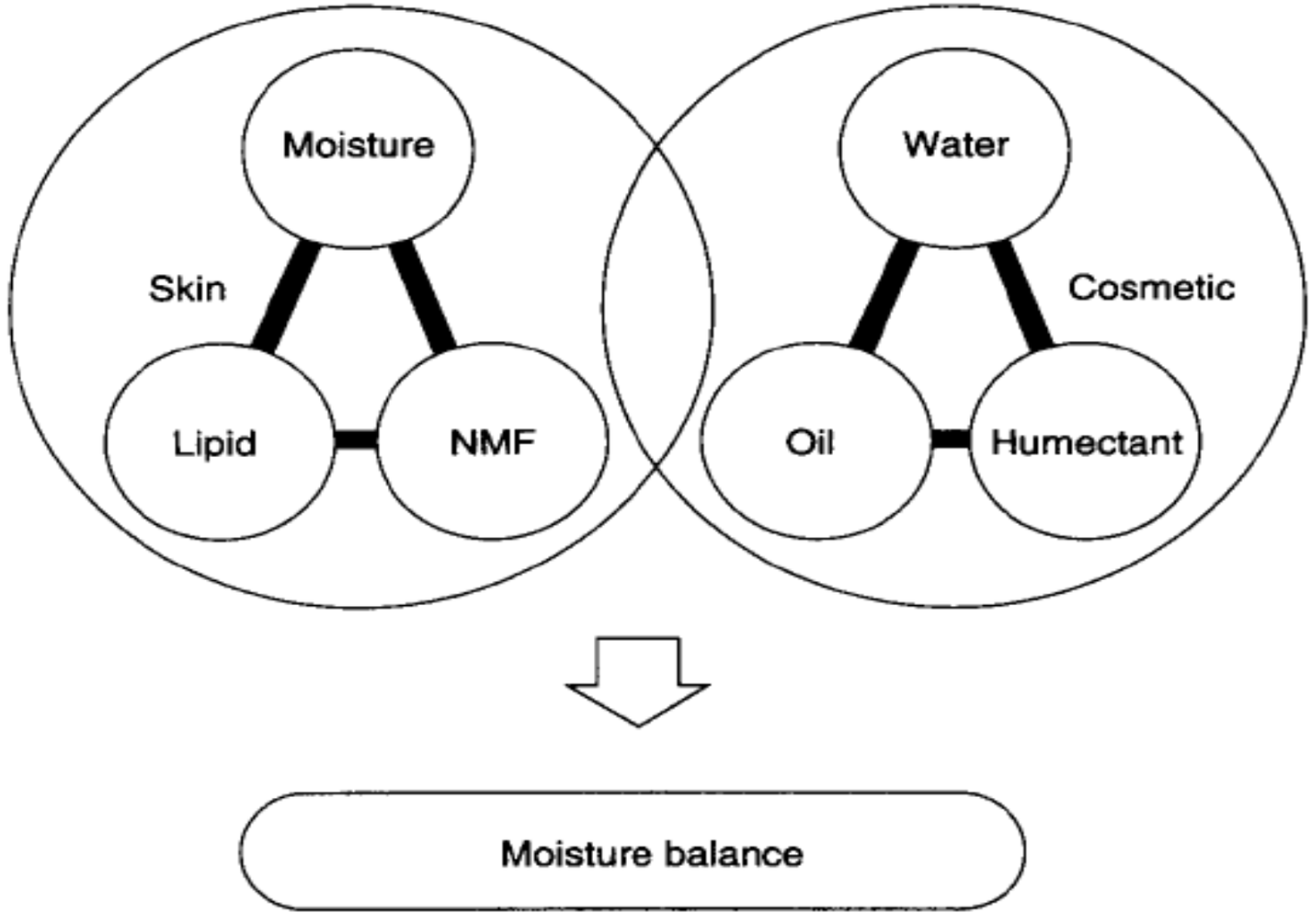
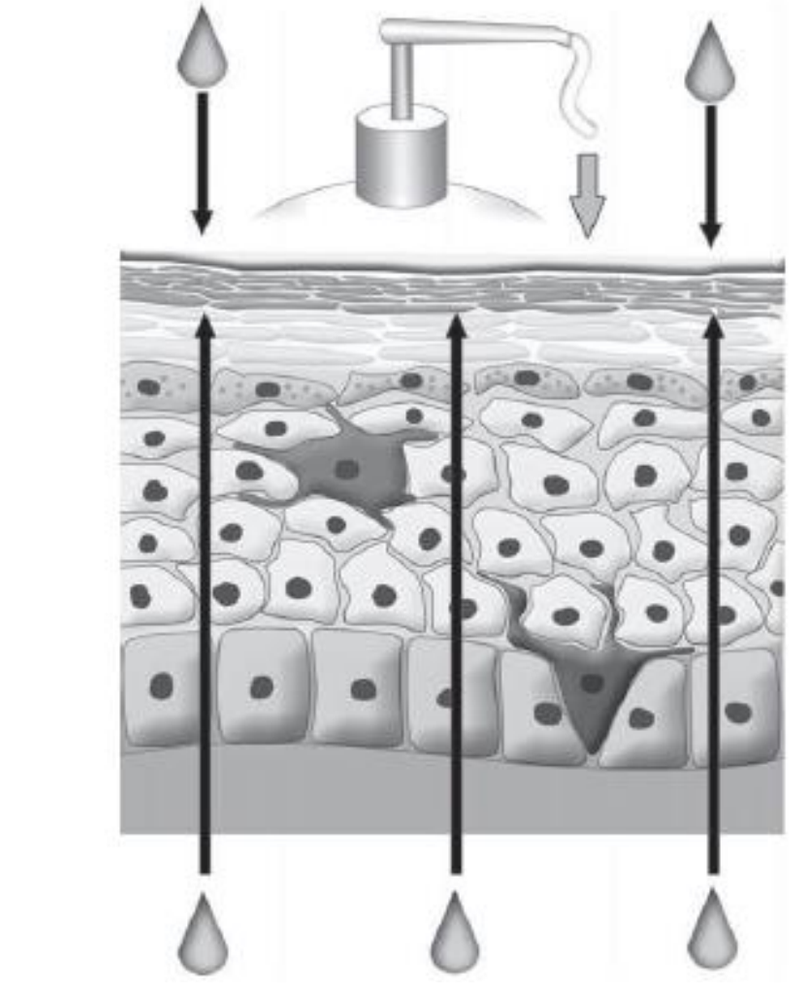
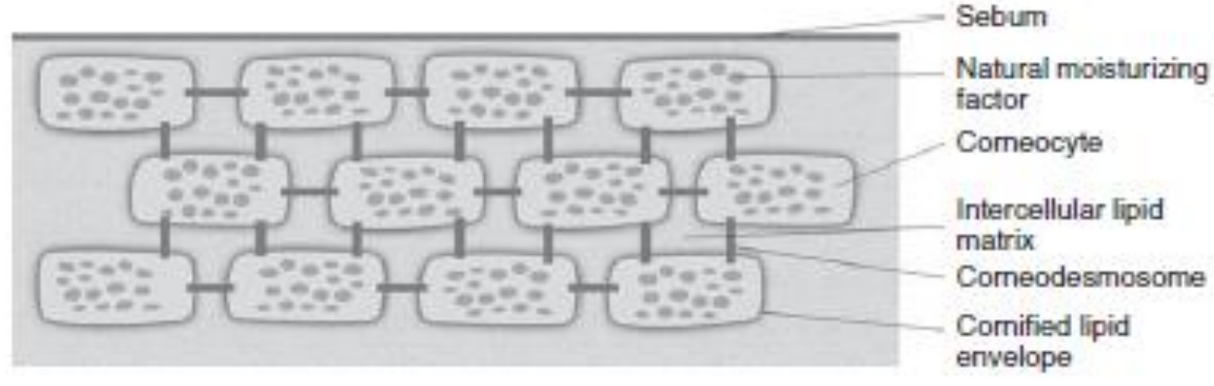


Figure 18.4. Theory of Moisture Balance: Constituents of skin care products are chosen to match components in normal skin [25]. (Reproduced by permission of Elsevier Science B.V.)

- **Typical Ingredients and Formulation of Skin Moisturizers**

- **Humectants**
- Humectants are hygroscopic ingredients that can increase the water content of the top layer of the skin by enhancing water absorption from the dermis into the epidermis
- Some also think that humectants can hydrate the SC by absorbing water from the external environment.
- Humectants also allow the skin to feel smoother by filling the holes in the SC through swelling.
- These ingredients serve to replace the skin NMF that has been washed away or otherwise depleted.




Sebum
Natural moisturizing factor
Corneocyte
Intercellular lipid matrix
Corneodesmosome
Cornified lipid envelope

- **Typical Ingredients and Formulation of Skin Moisturizers**

- **Humectants**
- Humectants act in the same way as NMF, and indeed, some of the humectants commonly used in moisturizers are components of the skin NMF, e.g., lactic acid and urea.
- The key functionality of a humectant is to form hydrogen bonds with molecules of water.
- Examples for humectants include glycerin, AHAs (e.g., lactic acid, glycolic acid), propylene glycol, urea, hyaluronic acid, and sorbitol.

- **Humectants**
- The most common humectant used in moisturizers is glycerin. It acts on several different parameters, which makes it the gold standard.
- It is an effective moisturizer, accelerates the maturation of corneocytes, reduces dryness, and enhances the cohesiveness of intercellular lipids.
- Overall, when combined with occlusive agents, glycerin has the ability to produce significant moisturizing effects in the skin

- **Emollients:**

- Emollients are designed to plasticize, soften and smooth the skin, usually by filling in the void spaces between the corneocytes and replacing the lost lipids in the SC.

- Emollients can also provide protection and lubrication on the skin surface to minimize chafing and enhance the skin’s aesthetic smoothness and softness.

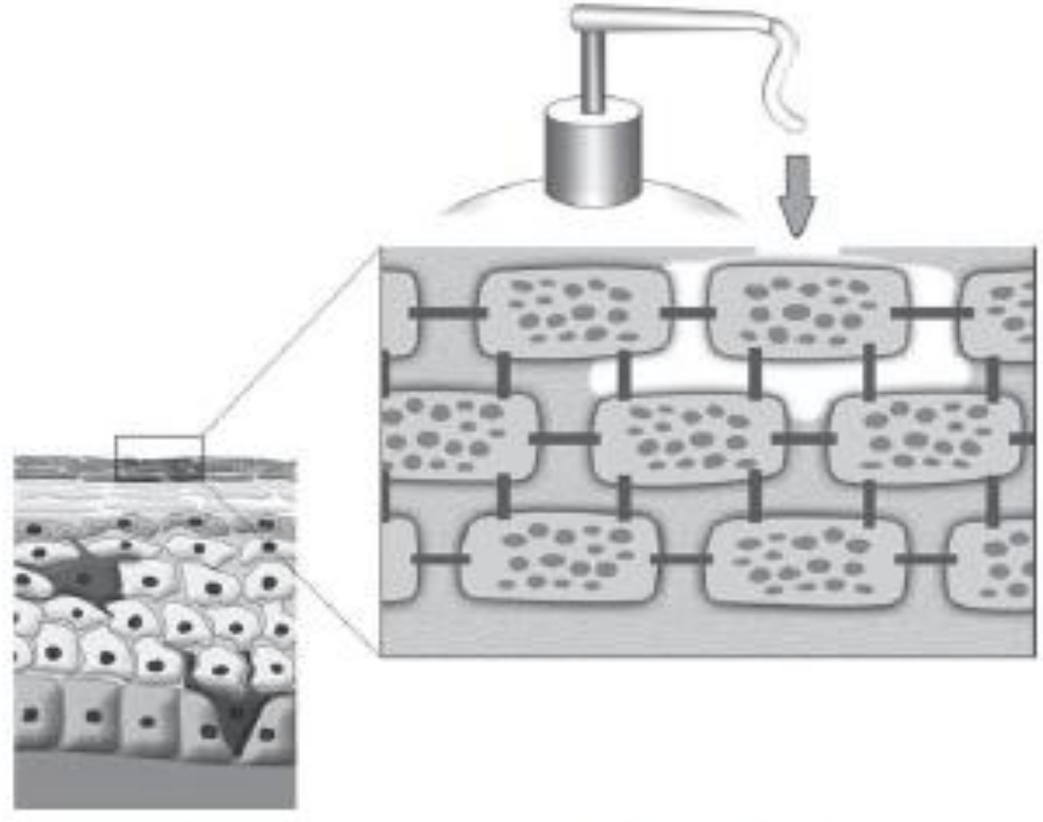


Figure 3.17 Working principle of emollients.

- **Emollients:**
- The most popular emollients :

1. Hydrocarbons, such as mineral oil and petrolatum and their derivatives
2. Fatty acids, such as stearic acid, linoleic acid, and lauric acid
3. Vegetable oils, such as almond oil
4. Synthetic triglycerides
5. Silicones
6. Waxes, such as beeswax, carnauba wax, and cetyl alcohol
7. Lanolin derivatives
8. Polymers.

- ***Occlusives***
- Occlusive agents create a hydrophobic barrier to physically block Trasepidermal water loss (TEWL) from the SC.
- In moisturizer formulations, occlusives complement the water-attracting nature of humectants.
- As they prevent water evaporation from the skin, they can be particularly effective in the treatment of dry skin, which is already damaged. They may have additional emollient effects.
- Although occlusives are not the most appealing ingredients to most consumers since they are sticky, not easy to remove, and may leave the skin with a greasy feeling, they are very effective in reducing TEWL.

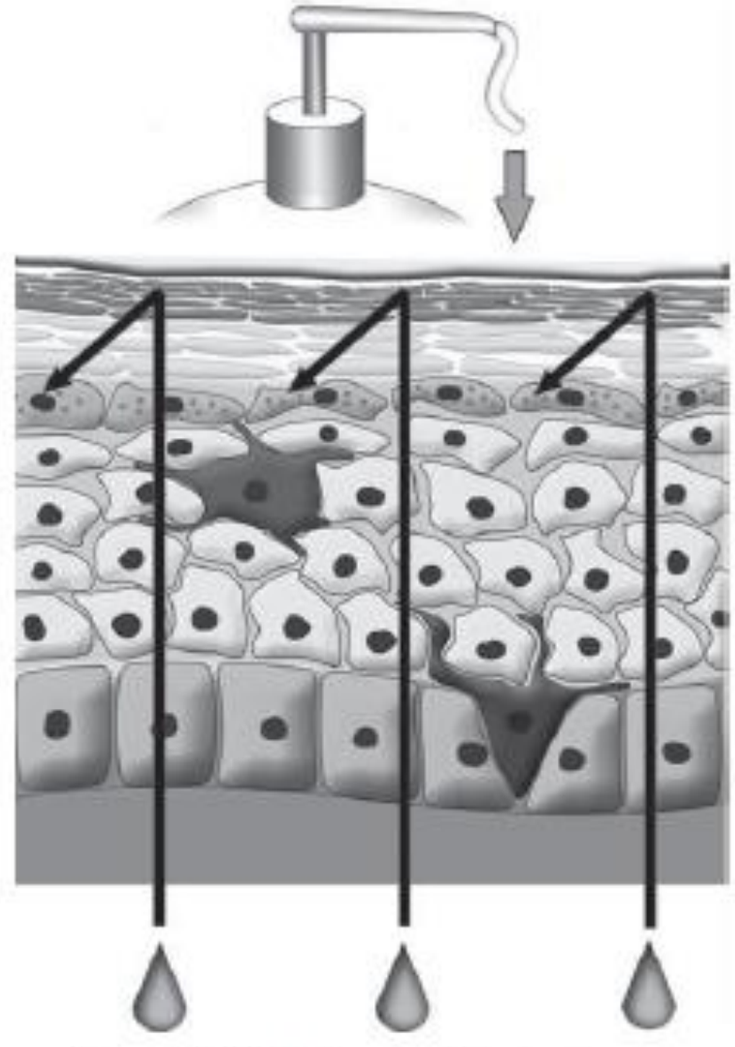


Figure 3.18 Working principle of occlusives.

- ***Occlusives***
- The most commonly used ingredient is petrolatum. In addition to forming an impermeable layer on the skin, it can penetrate into the skin’s upper layers and initiate the production of intercellular lipids.

- Lanolin was also very popular in the past; however, its use diminished as it is a known irritant ingredient and has an unpleasant odor.

- ***Occlusives***
- Today, there are newer occlusives. These include silicone derivatives, such as dimethicone
- They further enhance the aesthetic quality of the formulation by imparting a “dry touch.” They dry very quickly, are easy to apply and remove, do not block the pores on the skin (non-comedogenic), and are able to provide nice and shiny products.
- Additional examples for occlusive include veget able oils, fatty acids, fatty alcohols, waxes, and cholesterol.

- ***Skin Rejuvenators***
- Skin rejuvenators, otherwise known as enhancers of the skin barrier, are claimed to restore, protect, and enhance the skin's barrier function, thereby reinforcing skin hydration. This is the newest class among moisturizer ingredients.

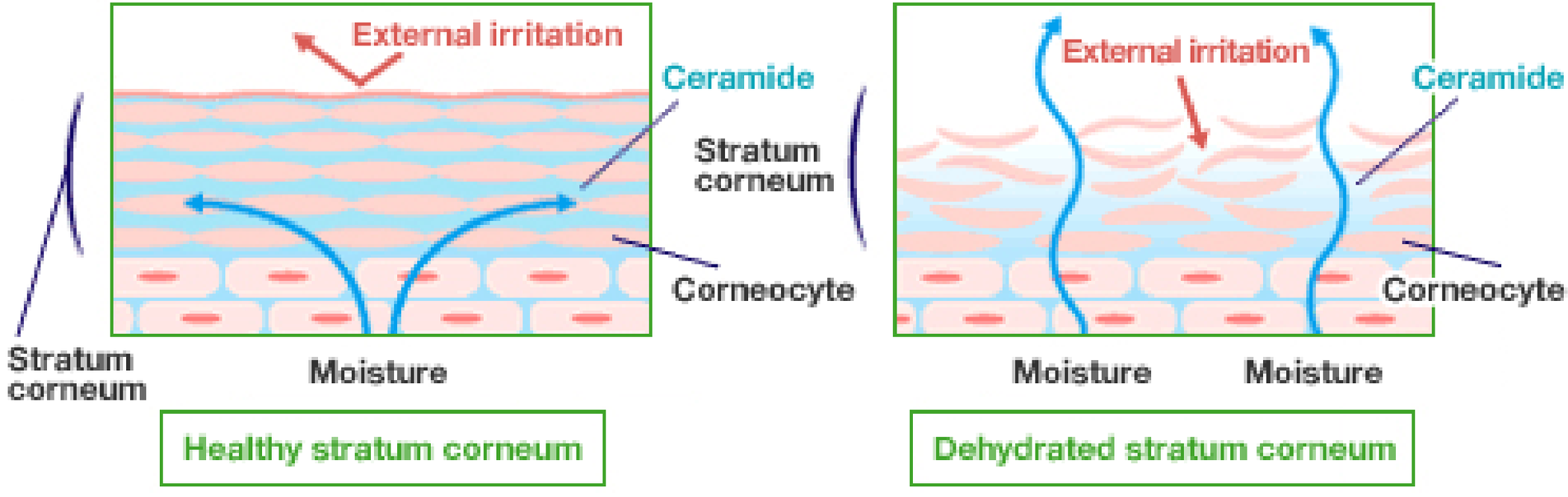
- This category includes proteins, primarily skin proteins, such as keratin, elastin, and collagen.

- Proteins may provide temporary relief from dry skin by filling in the irregularities in the SC. When they dry on the skin, they slightly shrink, leaving a protein film that appears to smooth the skin and stretch out some of the fine wrinkles.

- ***Ceramides***
- Ceramides can be naturally found in the SC. They are the most important structural elements of the intercellular lipids, which are necessary to link the protein-rich corneocytes into a waterproof barrier that is capable of protecting the underlying skin tissues and regulating body homeostasis.

- Ceramides are orderly arranged in lamellar form to act as a membrane and fill the intercellular space in the SC. They function to help maintain the integrity of the skin barrier.

- It has been shown that ceramides applied externally, in the form of moisturizers, can effectively reduce dry skin symptoms. These lipid molecules have been used increasingly in recent years in the treatment of dry skin and in cosmeceuticals.


External irritation
Ceramide
Stratum corneum
Corneocyte
Stratum corneum
Moisture
Healthy stratum corneum
External irritation
Ceramide
Corneocyte
Moisture
Moisture
Dehydrated stratum corneum

Additional Ingredients in Skin Moisturizers

The actual composition always depends on various factors, including:

- the application time of the products (day vs night),
- target age group
- target skin type
- product type
- compatibility issues
- aesthetic needs
- formulation cost constraints
- packaging needs
- product claims
- Safety
- whether makeup will be applied over the product
- and others.

- **Emulsifiers** are an essential part of the formulations since the majority of moisturizing formulations are emulsions.
- Emulsifier selection is not only crucial for the stability of an emulsion but also has also a large impact on consistency and viscosity, skin feel, color, odor, and care properties of the final formulation.
- The most commonly used types include nonionic and polymeric surfactants.
- Cationic emulsifiers can also be used; they have additional conditioning properties.

- **Antioxidants**: Fats, oils, and butters are sensitive to oxidative processes, which may trigger deterioration of these components, leading to color change, odor formation, and stability problems. Antioxidants prevent the oxidization of sensitive components and thus rancidity.
- **Sunscreens**: Some facial formulations have additional benefits over moisturization, including sun protection.

- **Coloring Agents**: Most formulations do not contain coloring agents, but if they do, they contain soft colors. The reason for this is that, on the one hand, if the formulations contained vivid and strong colors, they could **leave a visible color** on the skin, which is obviously undesired. On the other hand, **no one would be familiar** with applying strong colors (such as orange or sea blue) with the aim of moisturizing and nourishing the facial skin.

- **Aesthetic Agents**: Pearlescent pigments, soft-feeling agents, may also be added to the products to make them unique and enhance their appearance.
- Formulations can also contain opacifying agents, which help cover up the formulations color and provide a uniform appearance. The most frequently used opacifiers are titanium dioxide and glycol stearate.

- **Functional Ingredients**: Many other ingredients may be incorporated into moisturizer products, which can have endless functions, including moisturizing, nourishing, protecting, improving the skin’s structure, softening, vitalizing, anti-inflammatory, and others.

- **Product Types**

- Skin moisturizers are typically used after proper skin cleansing.
- Most of these formulations are emulsions, including both low-viscosity lotions and higher viscosity creams.
- Droplet size is usually, but not necessarily, large enough to interfere with the path of light, and thus, emulsions are usually white (these are referred to as **macroemulsions**).
- Special cases exist where the particle size is so small that the liquid is clear. These are special types of emulsion, known as microemulsions and/or **nanoemulsions**.

- Most commonly, **facial moisturizers** are O/W and water-in-silicone (W/Si) emulsions.

- **W/Si emulsions** are desired for customers with oily and sensitive skin. Silicone is known to be noncomedogenic, nonacnegenic, and hypoallergenic. These formulations go on smoothly, dry fast, and they leave the skin with a smooth feeling.

- In **O/W emulsions**, water in the external phase of the emulsion helps hydrate the SC of the skin. This is desirable when one desires to incorporate water-soluble active ingredients in the vehicle.

- These emulsions are easy to apply and absorb quickly due to the quick evaporation of the external water phase. In addition, due to their relatively high water content, the O/W emollients exert a cooling effect as water evaporates following topical application.

- ***Product Types***

❑Products for **the hand and body** are more frequently water-in-oil (W/O) emulsions. In these emulsions, the oil phase forms the external phase, which is deposited on the skin surface after the water evaporates. They are very beneficial for consumers with dry skin; however, they may feel slightly greasy.

- Silicones may also be incorporated into the oil phase to improve its aesthetic properties.

- ***Product Types***

❑ Recently, there has been a growing interest in alternative emulsions, including **water-in-oil-in-water (W/O/W) emulsions**, also referred to as multiple emulsions.

- Their benefit is the claimed sustained release of entrapped materials in the internal phase and the potential for using incompatible ingredients in the same formulation.

❑ Additional product types include **ointments, oils, and gels**. Gels provide a rapid, cooling watery feel to the skin and are commonly used in body massage products and cellulite products.

- **Considerations When Selecting Skin Moisturizers**
- To choose the most appropriate moisturizer, consumers should consider their skin type on the particular body part, such as dry, oily, or normal; then the skin problems and any skin allergies should also be taken into account.

❑To maintain the moisture content of **normal skin**, formulations with humectants and emollients work very well. They provide a light, non-greasy feel.

- **Considerations When Selecting Skin Moisturizers**

❑**Oily skin** is often prone to breakouts and acne. Although it is oily, it still needs moisturizers, especially after using skin care products that remove oils and dry out the skin. Primarily, water-based formulations, such as lotions and gels, work the best, and they do not contain and deposit too much oil on the skin.

- In addition, oily skin consumers should look for non-comedogenic formulations, which are proven not to clog the pores.

- **Considerations When Selecting Skin Moisturizers**

❑ For **dry skin**, products with humectants only will not be enough. Dry skin users are recommended to use products that contain both humectants and occlusives, which can also be combined with emollients.

❑ Fragrances may irritate and sensitize the skin; therefore, consumers with **sensitive skin** should avoid using products with fragrances.

- Although parabens may be irritating to the skin, formulations without preservatives are more dangerous to the users. If no preservatives are present, microorganisms may start growing in formulations within weeks or even days.