



# SKIN SCIENCE

All M·A·C Artists must understand skin structures, functions and characteristics. If M·A·C Artists recommend the appropriate skin care regimen and fully explain its benefits and uses, the Customer will be confident and loyal.

## Skin Structure

The skin is the largest organ of the body. It makes up approximately 5% of the body's weight. It is more than a wrapping. It is a living organ with vital functions that interact with other internal organs. Skin protects the body from harmful elements in the environment such as UV radiation, foreign substances, bacteria and harmful chemicals. Skin shows how healthy the body is. It continually eliminates wastes, secretes protective lubricants, grows hair and nails and is instrumental in producing and shedding skin cells.

The skin's harmonious balance with the environment allows it to react to many internal and external stimuli. Any subtle changes in either of these factors will be reflected through the skin. Blushing when embarrassed, retaining heat when cold, perspiring when hot or eating spicy food, and turning red when sunburned are all examples of the skin's reactions to stimuli.

## The Parts Of The Skin

Skin is made up of three main parts: the **epidermis**, the **dermis** and the **hypodermis**.

The **epidermis** is the outermost protective part of the skin. It resists cuts, scrapes and the entry of certain chemical substances.

The **epidermis** is divided into five layers. It consists of various cell structures with various functions. The **keratin layer** is the outermost barrier layer of the skin. It is composed of protein, water and lipids and consists of ten to twenty layers of flattened cells. Keratin comes in two forms, hard and soft. Hair and nails are made of hard keratin and skin is made of soft. The Keratin surface of the epidermis is coated with an oily substance called sebum which helps the skin retain moisture to keep it soft and smooth. Sebum also protects and waterproofs the skin and stops the growth of certain bacteria and fungi.

The **clear layer** is found beneath the keratin layer. Under the clear layer is the **granular layer** and next is the **prickle layer**. Finally, at the bottom of the epidermis is the **basal layer** which makes new cells. As the new cells travel upward through each layer, they gradually lose their ability to absorb and respire. They become flat and die to produce the Keratin layer and slowly fall off the surface. This whole cycle is called keratinization and it normally takes about 24 to 30 days depending on a person's age.

Melanin cells are also present in the basal layer and they produce a brown/black pigment which gives skin its colour. Melanin provides protection against UV radiation. Everyone has a similar number of melanin cells, but the amount of pigment varies from person to person.

The **dermis** is the middle part of the skin. It is made of connective tissue, blood vessels, sweat glands, nerve endings and hair follicles. The connective tissue is made of collagen and elastin proteins. It gives the skin its strength and firmness and makes the skin elastic.

The blood vessels in the dermis provide oxygen to the cells. The cells then release carbon dioxide and this is called **respiration**.

Another function of the skin is **absorption** (the ability of the skin to absorb some substances). For example water on the skin can be absorbed into the epidermis to soften and plump the skin. Other substances on the skin can get into the skin through the hair follicles and sweat glands.

Sensory nerve endings in the dermis let us feel pain, heat, cold and pressure. Some parts of the skin have more nerve endings, like the finger tips, and some parts have less, like the lower back.

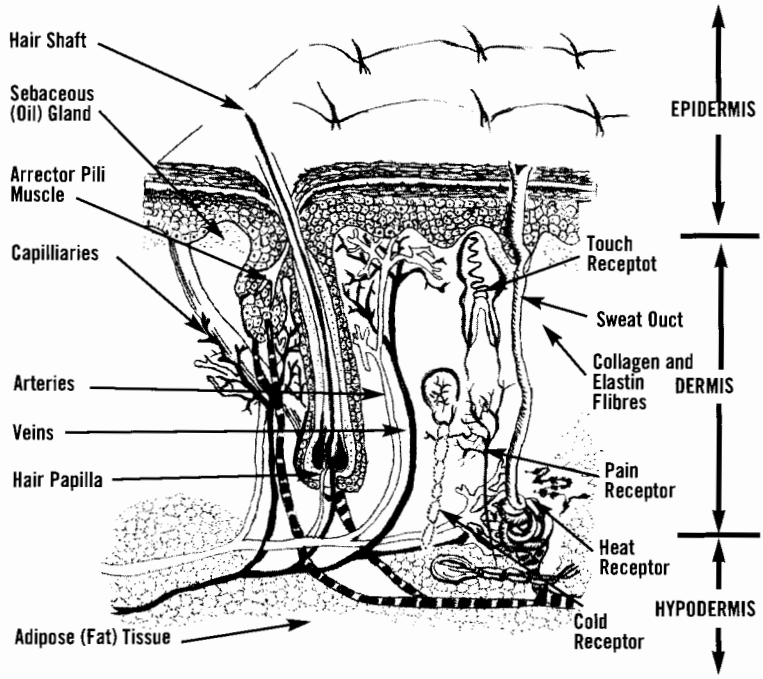
**Elimination** is necessary for cells in the dermis. Wastes are transported away from the skin by capillaries and blood vessels.

The skin secretes oil (sebum) and sweat through the oil glands (sebaceous glands) and the sweat glands (apocrine and eccrine glands). The amount of oil produced determines the type of skin a person has; normal, oily or dry. **Eccrine** glands release sweat through openings on the skin surface. Sweat is a mixture of excess water, salts, sugars, proteins and vitamins or natural moisturizing factors. These eccrine glands are everywhere on the body except the lips and mucous membranes. **Apocrine** glands release sweat and scent through hair follicles.

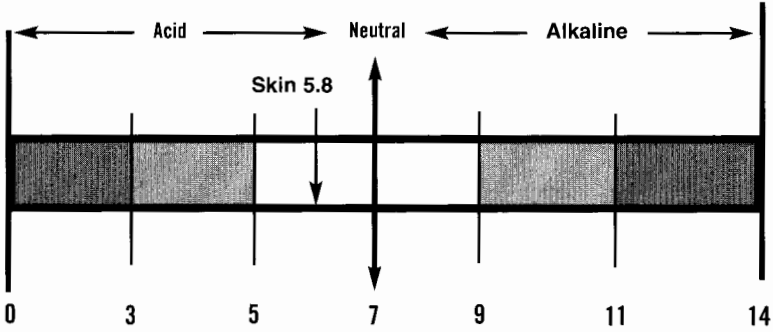
### The Hypodermis

The inner most layer of the skin is the **hypodermis** and consists primarily of “fatty” tissue. It provides protection and padding for the body. This part of the skin helps the body maintain a temperature of 98.6°F or 37.0°C. It can use blood vessels to warm or sweat glands to cool, or it can make the tiny hairs stand up making “goose bumps” to help retain body heat.

# Skin Structure (Cross Section)



# pH Of The Skin



## **pH**

pH is a measure of the acidity and alkalinity of a solution. It measures the hydrogen ion concentration in water (H<sub>2</sub>O). The pH scale ranges from 0 to 14. Seven is the neutral point. Anything higher than 7 is alkaline and anything lower than 7 is acid. The lower the pH, the greater the acidity, the higher the pH, the greater the alkalinity.

Human skin is slightly acidic, usually measuring between 4.5 and 6 on the pH scale. Skin thrives best in an environment that is pH 5.8. The acid mantle of the skin is made up of the oil and sweat the skin produces. The acid mantle protects against bacteria and micro-organisms in the environment.

Products with a pH lower than 3 or greater than 8 may be highly corrosive for the skin.

For example, many commercial soap bars are made with harsh detergents which are alkaline.

They remove the protective acid mantle from the skin making it dry and sensitive. Using a product with the same pH as the skin will help keep the skin healthy.

## **Skin And The Sun**

Over millions of years our bodies have adapted to the environment.

Exposure to the sun can cause damage to skin, both internally and externally. When the skin is exposed to sun, melanin is created and gives colour to the skin to help protect itself.

People living in climates with extreme UV exposure may have darker, more pigmented skin.

The skin may be oilier and thicker. Those living in climates with less UV exposure may have skin that is fairer, less oily and thinner. This skin type is the most sensitive to the damaging effects of the sun. Skaters, skiers and people who enjoy the outdoors, should protect their skin by using products with sunscreen.

## **Effects of Prolonged Sun Exposure**

Minimal exposure to the sun provides a few advantages for the body. It causes production of Vitamin D, metabolism of calcium and the sterilization of the skin (an aid to some skin problems). However, the disadvantages of sun exposure outweigh the advantages. Much of the damage can be seen in the skin's outer appearance. Hyperpigmentation (or pigment discoloration) may occur from too much melanin production—causing freckles and blotches. Sunburn can inflame the skin and cause skin sensitivity. The sun can also dehydrate the skin, leaving it prone to bacterial invasion. Too much sun will break down and destroy the connective tissue (collagen and elastin proteins) and cause premature aging. Skin cancer (melanoma, carcinoma, etc.) may also result from overexposure to the sun.

## How UV Rays Affect The Skin

Total exposure to skin radiation is determined by several factors:

**Ozone** – More UV radiation reaches the earth's surface now because the ozone layer is thinner in certain global locations.

**Time** – The sun's rays are strongest at midday, between 10 a.m. – 2 p.m.

**Season** – UV radiation can be stronger in summer than in winter.

**Latitude** – Sun's rays are more direct or concentrated closer to the equator.

**Altitude** – In higher altitudes the thinner atmosphere gives less protection from ultraviolet rays.

**Clouds** – Cloudy days give little protection. Up to 60% of the sun's radiation can still reach the skin.

## UV (ultraviolet) Rays are divided into three categories:

1. **UVA** rays are the weakest of the rays, but they can go through glass and water.

They will cause a tan, but not a severe burn. Minimal exposure to UVA rays will not cause extreme damage to the skin, but prolonged exposure may make some people photo-sensitive and can cause cell mutations and certain skin cancers.

2. **UVB** rays are medium strength rays. They will cause sunburn, suntan, inflammation and aging.

Screening UVB rays is essential because they are more damaging than UVA rays.

3. **UVC** rays are the most powerful rays. These rays are almost entirely screened out by the earth's ozone layer.

## Sun Protection Factor (SPF) Testing

At M-A-C we use an in vitro method to measure the UVA and UVB protection our products provide.

The product to be tested is applied to an adhesive tape called Transpore. UVA and UVB light is

transmitted through the coated Transpore sample and the amount of radiation that penetrates is measured. The amount of UV radiation can give an indication of the sunscreen's effectiveness.

The more UV radiation that passes through, the lower the SPF of the product. The in vitro method is used as a preliminary assessment. Regulatory guidelines require human clinical testing in order to accurately establish the labelled SPF value of a product.

## Free Radicals

A free radical is an atom or a group of atoms with one or more unpaired electrons. Oxygen is a type of atom which can become a free radical. When skin is constantly exposed to UV rays, pollution or toxic waste, it can generate oxygen free radicals (oxidizing compounds). These free radicals may cause skin to age faster because cells oxidize. Substances called antioxidants can be used in cosmetics to combat the free radicals.

Antioxidant ingredients such as Vitamin E and derivatives of Vitamin A and C used on top of the skin can act as scavengers to stop free radicals from causing damage to the skin.

## **IRRITATIONS AND ALLERGIES**

**Contact Dermatitis** is a local inflammation of the skin. It is caused by substances that come into direct contact with the skin. The inflammation may be an effect of irritation or allergy.

### **Irritation**

Irritation, which is caused by a substance, can develop after small or heavy exposure to the substance. The appearance of a skin irritation can vary, depending on the conditions of exposure, from a redness to blisters. The irritating substance penetrates the skin's outer barrier and causes a reaction in the lower layers. The skin reacts by signaling discomfort and/or redness. Usually an irritation reaction develops within a few hours of exposure to the substance and has a short duration.

### **Treatment (for irritation)**

The best treatment is to stop using the irritating substance. The skin can be treated with compresses, mild creams, and ointments. The skin should be protected from rubbing and scratching. Also avoid light and temperature changes if the skin is still irritated.

### **Allergy**

Allergies differ from irritations in the way they cause reactions in the skin and body.

With allergies, the substance penetrates through the outer layers of the skin and triggers the body's defense system. The priming of the defense or immune system can take from several days to several weeks. During this time there is usually no sign of skin damage or discomfort. When a sensitized person is re-exposed to the allergy causing substance, the primed cells initiate a cascade reaction which create several symptoms including redness, pain, itching, swelling and blisters on the skin. The reaction begins slowly over 24 hours but can last several days.

Most people remain allergic to a substance all of their lives. Some gradually grow less sensitive over time. People who have an allergic reaction to a cosmetic are usually sensitive to an ingredient in the product.

The most common causes of allergies are:

Food (dairy products)

Pollen (grass, ragweed, etc.)

Some plants (poison ivy)

Drugs

Dust

Insect bites

### **Treatment (for allergies)**

Avoid the substance and seek medical attention. The physician will likely prescribe anti-inflammatory drugs, ointments or skin cleansers. Protect the area from rubbing and scratching, or sunlight, wind and temperature changes.

## **Skin Disorders**

A Customer with a skin condition that you do not recognize to be a simple disorder should be referred to a physician. If the skin is weeping, oozing, bleeding, blistered or inflamed, **do not touch it.**

Camouflage is not appropriate when the skin is broken as it is in the process of healing. Share this information with the Customer. Often, the Customer may not be aware of a condition until it is brought to his/her attention. Use discretion, diplomacy and tact.

Your personality is defined as the outward expression of your inner feelings, habits, attitudes and values. The true professional is sincere and has integrity. These are qualities that demonstrate our ongoing excellence in Customer Service. You should safeguard your health as well as the health of the public.

Most skin problems are minor, but some, such as eczema, psoriasis, seborrhea, vitiligo and cystic acne may require medical attention. It is important to correctly identify the specific problem so a proper treatment can be used.

Acne is one of the most common skin disorders. It can be a blackhead or a pimple, but could be as bad as deep cystic acne which may cause scars. Acne can be caused or aggravated by stress, metabolic disturbances, hormonal imbalances, poor digestion, drugs, genetics or poor health.

## **Treatment (for skin blemishes)**

If blemishes are caused by neglecting skin care or poor hygiene, try to keep the skin's surface clean by using a pH balanced product. We recommend non-alkaline skin care products for this purpose. Use cleansers and moisturizers that are compatible with oily or acneic skin. These products contain ingredients that will not clog pores.

## **Skin Analysis**

To determine the Customer's skin type, first look at the Customer's skin. Then ask the Customer questions concerning his/her skin. Most Customers have one of the skin types listed below. Some, however, may have a combination of several.

## **Characterization of Skin Types and Conditions**

**Normal** - There is a balance of oil and moisture. It has medium thickness and healthy colouring.

**Oily** - There is a shiny, oily surface. It could have large pores or blackheads. It is caused by genetics, diet and environment.

**Dry** - There is a matte surface. The skin usually has small pores and is thin. There can be broken capillaries, wrinkles and flakiness. It is caused by genetics, age, diet, drugs, harsh cleansing products and environment.

**Dehydrated** - There is a lack of moisture on the surface with flakiness and wrinkles. The skin may feel tight, thin and itchy. It is caused by diet, age, illness, drugs, improper cleansing, indoor heating and air-conditioning and environment.

**Acneic** - There are blackheads and/or whiteheads, pimples, inflammation, cystic acne, open pores, shiny surface, scars and sensitivity. It is caused by genetics, stress, diet, drugs, poor digestion or improper cleansing.

**Combination** - There are oily areas, dry areas, dehydrated areas and acneic areas. It is caused by the same factors as listed above.

**Sensitive** - The skin is thin with redness or inflammation. It can be caused by allergies, nervousness or an imbalance in the amount of oil the skin produces.

### **Skin Analysis Questions**

These are the questions you could ask the Customer so that you can determine his/her skin type:

1. "How does your skin feel?" (for example, dry, dehydrated, oily, combination, etc.) If the Customer doesn't object, ask if you can touch his/her skin. Make sure your hands are sanitized before you touch and be sure to touch gently. Look at the skin carefully. Ask the Customer if it feels different at various times of the day. For example, oily during the day and dry at night.
2. "Do you have any allergies or are you sensitive to certain substances?" (Look to see if the skin is red, or if it looks thin or irritated.)
3. "What is your regular skin care regimen?" Ask what products he/she normally uses.

### **Optional Questions**

If you need more information, politely ask the Customer any of the following possible questions:

1. "How would you describe your skin? Is your skin flaky? Is it drier in the winter or the summer? Do you drink plenty of fluids?"
2. "What skin problems do you have, such as clogged pores or blemishes? What parts of your face are affected?"
3. "How is your diet? Do you drink plenty of fluids?"
4. "Do you spend much time in the sun?"
5. "Has your skin type changed over time?"
6. "Have you noticed any changes in your skin?"

### **Product Selection and Skin Type**

It is very important to determine the Customer's skin type and then recommend the correct product. If the Customer has combination skin, find the one that stands out and use it to determine the correct product. Don't recommend too many products all at once. Sometimes the skin can react to the new mixture of products. Try three items to begin. Then you can slowly add others if you think it will help.