The Skin Care Answer Book
Real-World Answers to 275 Most-Asked Skin Care Questions

Mark Lees, Ph.D.
This book is dedicated to my mother, Dr. Virginia Lees. Thank you for your teaching and communication skills!
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Dr. Mark Lees is one of the country’s most noted skin care specialists, an award-winning speaker and product developer, and has been actively practicing clinical skin care for over 20 years at his multi-award-winning CIDESCO accredited Florida salon, which has won multiple awards for “Best Facial,” “Best Massage,” and “Best Pampering Place” by the readers of the Pensacola News-Journal.

His professional awards are numerous and include American Salon Magazine Esthetician of the Year, the Les Nouvelles Esthetiques Crystal Award, the Dermascope Legends Award, the Rocco Bellino Award for outstanding education from the Chicago Cosmetology Association, and Best Educational Skin Care Classroom from the Long Beach International Beauty Expo. Dr. Lees has also been inducted into the National Cosmetology Association’s Hall of Renown.

Dr. Lees has been interviewed and quoted by NBC News, The Associated Press, the Discovery Channel, Glamour, Self, Teen, Shape Magazine, and many other publications.

Dr. Lees is cofounder of the Institute of Advanced Clinical Esthetics in Seattle, special science-based advanced training programs for clinical estheticians.

Dr. Lees is former chairman of EstheticsAmerica, the esthetics education division of the National Cosmetology Association, and has served as a CIDESCO International Examiner. He has also served on the national Board of Directors of the NCA.
Dr. Lees is former chairman of the board of the Esthetics Manufacturers and Distributors Alliance, is a member of the Society of Cosmetic Chemists, and is author of the popular book **Skin Care: Beyond the Basics**, now in its third edition, and contributing science author of **Milady’ Comprehensive Training for Estheticians**. He holds a Ph.D. in Health Sciences, a Master of Science in Health, and a CIDESCO International Diploma. He is licensed to practice in both Florida and Washington State. His line of products for problem, sensitive, and sun-damaged skin is available at finer salons and clinics throughout the United States.
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Perhaps it is a dermatologist’s bias, but I am often amazed by how little the average person knows about skin. This complex and remarkable fabric is the body’s largest, most visible, and in many ways most vulnerable organ.

In *The Skin Care Answer Book*, Dr. Mark Lees has taken on the enormous challenge of explaining the structure and function of skin, as well as the pathology, symptomatology, and treatment of common skin disorders in terms that both laypeople and skin care professionals can understand. The resulting volume is a clear and concise guide that will make a great contribution to the educational goals of the skin care industry—and will help clear up some culturally ingrained misperceptions about skin and its care.

In my work as a doctor, a professor, and founder of one of America’s leading clinical skin care companies, I have met and collaborated with countless people in the world of skin care, yet few have made the kind of impression on me that Dr. Mark Lees has. There are so many ways in which Dr. Lees has distinguished himself—as a skin care professional, skin care products developer, scholar, educator, author, and industry leader. In each realm, Dr. Lees has focused his intelligence, passion, and creativity to accomplish the extraordinary.

Given Mark’s exceptional background, it is no surprise that *The Skin Care Answer Book* is a thoughtful, well-researched, and comprehensive treatment of issues related to skin and skin
health as well as a user-friendly guide that invites exploration and holds the reader’s attention.

That a guide with the sophistication of *The Skin Care Answer Book* is designed to be used as a reference for esthetics professionals and consumers reminds us of how far the world of esthetics has come and of the many ways that barriers between medical and esthetic care have fallen by the wayside. In many ways, both Dr. Lees and I were pioneering advocates for these changes, and our collaborations over the years are prime examples of what can be accomplished when skin care professionals can acknowledge the unique contributions that different disciplines can make.

I first met Dr. Lees when I was launching Murad Skin care. Even though Dr. Lees had his own line of products, he was willing to hear me out and let me demonstrate the unique benefits of my revolutionary AHA treatments. I could tell we were kindred spirits by his eagerness to start using the products in his spa immediately. Like me, Dr. Lees was excited to discover something new that could help his clients and wasn’t going to let ego or economics get in the way.

What the reader will find embodied in these pages, and in Dr. Lees himself, is a passion for education that is rooted in a broader passion for helping people have the healthy, vibrant skin that they desire and deserve. That passion is the force that animates the day-to-day operation of his flagship spa, his countless appearances on television and in print, his educational efforts, and his own line of skin care products. Since that same passion for skin health has defined my remarkably rewarding journey, perhaps there is something to be said for putting people before profits as a strategy for success in the world of skin care.

I share Dr. Lees’ fundamental belief that our industry will continue to prosper as long as we continue our commitment to taking care of the unique needs of each individual, work hard to advance the level of professionalism, and remember that the
skin is not only the body’s largest organ—it is the body’s most interconnected organ and a therapeutic gateway to a world of wellness.

Regardless of whether one is looking for a primer on skin care or a ready reference for use as questions arise, *The Skin Care Answer Book* is a must-have volume that reflects the innovative thinking of one of America’s most widely regarded authorities on skin and esthetical care.

**Howard Murad, M.D.,** is an associate clinical professor of dermatology at UCLA, founder of Murad Skincare, Inc., the pioneering researcher who unlocked the secrets of *The Science of Cellular Water*, and the author of the Inclusive Health philosophy.
Since the early 1990s, skin care has become a true science, with many effective topical treatments that change the skin’s appearance. Many of these treatments were only dreamed about prior to this era.

In addition, we are living in the information age, where information is as close as any computer. Unfortunately, there is also much misinformation available online. Rumors and erroneous information abound, and there is a real need to sort the facts. In almost three decades of practice as a clinical skin therapist and skin care product developer, I have had thousands of questions posed to me. There are, however, many questions that I answer over and over.

*The Skin Care Answer Book* provides the answers to almost 300 of the most-asked skin care questions, plus advice as to when to seek the help of a medical professional. It is a question-and-answer book written for consumers but also can be used by practicing estheticians, skin therapists, dermatology nurses, and skin care educators for quick reference.

Many clients have more than one problem with their skin. I hope that this book will provide good and easy-to-understand information to help them find an answer for their problems. I also hope that it will help everyone have more beautiful and healthy skin for a lifetime.

**Mark Lees, Ph.D., M.S.**
CIDESCO Diplomate
CHAPTER 1

Understanding the Skin
**Q** Is the outside of the skin really dead?

**A** Technically, yes, at least for most of the outermost layer of the skin. However, this outermost layer of the skin, the epidermis, is the first line of defense against dehydration, bacterial invasion, and irritant penetration. You can think of the epidermis as the outside wall of a fort. It is this layer that we take care of when we practice a skin care program.

The cells in the epidermis go through many biochemical changes, and there are many functions of this layer even though most of it is technically dead.

There are three types of active cells in the epidermis: the **basal cells**, the **melanocytes**, and the **Langerhans cells**.

- The melanocytes are the pigment-producing cells that are found in both the lower epidermis and the dermis. Melanocytes give skin its color and are responsible for tanning.
- The Langerhans cells are immune function cells that “patrol” the epidermis to detect foreign invaders or pathogens.
- The basal cells, described in more detail below, are the cells that make new skin cells in the epidermis.

**Q** How does the skin renew itself?

**A** The cells in the outer layer of the skin, the epidermis, begin as live cells in the lowest layer of the epidermis known as the **basal layer**. The basal layer used to be called the germinal layer or the stratum germinativum.

The basal cells divide in a biological process called **mitotic division**, forming new, identical cells. These fresh cells are pushed upward due to the mitotic division and begin their journey toward the outside surface of the skin. As they approach the surface, these cells are going through a process called **keratinization**.
During this process, the cells fill with a protein called **keratin**. There are two types of keratin. The type in the epidermal skin cells is soft keratin, which is the same type that is in hair. Hard keratin is present in the fingernails and toenails and gives the strength and ridged feel to these structures. Keratin’s main structure in the skin is to make the skin surface more resilient and resistant to water absorption/evaporation; to resist invasion by foreign substances or organisms, such as bacteria; and to help keep the skin from becoming dry and dehydrated.

During the process of the cells moving from the innermost to the outermost layers of the epidermis, these cells change shape several times and go through several named layers within the epidermis. While in each layer, there are more biochemical changes happening to these epidermal cells.

After leaving the basal layer in their journey toward the skin surface, the cells begin to flatten out and form a layer called the **spiny layer** or **stratum spinosum**. From this layer they move farther upward into a layer called the **granular layer** or **stratum granulosum**, where the cells look “grainy” because they are beginning to be filled with keratin. The last and outermost layer in the epidermis is the **stratum corneum**, also called the **horny layer** due to their appearance under a microscope. The cells in the corneum are much flatter and stacked liked shingles on a roof.

All of the cells going through the process of keratinization are referred to often as **keratinocytes**. This is a general term to describe cells in the epidermis, regardless of layer or stage of the process. Keratinocytes that are specifically in the stratum corneum are called **corneocytes**.

A good analogy for the keratinization process is the transformation of a grape into a raisin. Like a grape, the basal cells are fresh, rounded, and plump. As the grape ages and dries, the structure becomes dehydrated, with hardened denser fibers, and is more resilient and harder. The raisin represents the corneocyte, stacked like shingles on
a roof on the surface of the skin, providing the first line of protection for the skin, preventing penetration of possible harmful or inflammatory substances, and preventing water loss that results in dehydration.

**Q** Is any part of the skin alive?

**A** Yes. We have just discussed the epidermis, containing mostly dead or dying cells, but we have also learned how active this layer is biologically.

The skin is actually the largest organ in the human body! The *dermis* of the skin is the layer under the epidermis and is very much alive. The differences between the live layer and dead/dying layers of the skin are as follows:

- The live layer contains blood and blood vessels. The epidermis does not.
- The live layer contains nerve endings that sense heat, cold, pain, pressure, and touch.
- The epidermis sheds and renews itself constantly. The dermis does not shed or have a renewal cycle.

The dermis contains the collagen, elastin, and other support substances that give the skin its structure and form. The dermis also contains blood vessels to nourish the many active and different living cells in this area. These include both arteries and veins. Arteries carry blood to the tissues, and veins return deoxygenated blood to the heart and lungs for reoxygenation.

The dermis is made up of two major layers. The *papillary dermis* is at the top of the dermis and connects the dermis to the epidermis. This attachment point is known as the *epidermal-dermal junction*. The papillary dermis contains many blood capillaries and nerves that are sensitive to the touch. The papillary dermis also contains melanocytes, which are the pigment-producing cells that give skin its color and that are also responsible for tanning.
The reticular dermis is the lower and thicker part of the dermis. The reticular dermis contains collagen that gives firmness to the skin and elastin that gives flexibility and elasticity to the skin. These protein fibers run throughout the reticular dermis.

A filler-like substance called ground substance fills empty spaces in the reticular dermis. This jellylike substance is made of water-binding biochemicals such as glycosaminoglycans, which hold tremendous amounts of water. Hyaluronic acid is an ingredient well known in moisturizers which holds 1,000 times its own weight in water. Hyaluronic acid is a component within the ground substance. Unfortunately, the hyaluronic acid in moisturizers is a large molecule that cannot penetrate the skin or replace dermal ground substance. It can only work on the surface as a water-binder.

Running from the base of the reticular dermis through the papillary layer and the epidermis are the ducts of the sebaceous and sweat glands.

The reticular layer also contains more sensory nerve endings and larger blood vessels that feed the capillaries in the papillary dermis.

The sebaceous glands, the sudoriferous (sweat) glands, and the base of the hair follicle are all in the reticular layer.

Beneath the reticular dermis is another layer called the subcutaneous layer, which contains thicker layers of fat to give the skin protection and to cushion the internal organs. This fat also helps with temperature regulation and insulates the blood vessels and nerve fibers that are also running through this layer.

**Q** So, how many layers are there in the skin?

**A** There are three main layers: the epidermis, the dermis, and the subcutaneous layer.
CHAPTER 1 Understanding the Skin

The epidermis has four or five layers, depending on the area of the body:

- The basal layer, where the cells divide, and also where melanocytes are present
- The spinosum or “prickle” layer, just above the basal layer where the keratinization process is beginning
The granular layer that contains grainy-looking cells containing the **lamellar bodies** that produce lipids for the barrier function, the complex of lipids within the epidermis that helps protect the skin from dehydration and irritant invasion.

- The corneum, the outermost layer of the epidermis—the shingles on the roof.
- The stratum lucidum, an additional layer, also sometimes called the “clear layer,” that is between the granular and corneum layers and is only found in the skin of the soles of the feet and palms of the hands.

The dermis contains two main layers:

- The papillary dermis, which attaches to the epidermis, and is therefore the outermost layer of the dermis.
- The reticular dermis, the lower layer in the dermis, containing blood vessels, nerve endings, collagen, and elastin fibers.

The subcutaneous layer is located under the dermis and is a fatty layer that provides structure and cushion for the skin.

**Q** How thick is the skin?

**A** This depends on the area of the body. Generally the skin is between 1 millimeter and 5 millimeters thick. The soles of the feet have the thickest skin. The eyelid skin is the thinnest.

The epidermis is very thin. If you have ever had a paper cut, you will know how thin the epidermis is. Remember, there is no blood in the epidermis, so when the skin bleeds, the injury has gone through the epidermis and into the dermis.

**Q** Why does skin get dry and chapped?

**A** Exposure to the elements, especially in extreme temperatures, causes water in the skin surface to evaporate, drying
the surface and eventually causing enough damage to pro-
duce chapping. The barrier function of the skin is severely
damaged in chapped skin.

Q What does barrier function mean?

A Barrier function refers to the complex of lipids (fatty
materials such as ceramides, fatty acids, and cholesterol)
that is present between the cells in the corneum. This
lipid barrier guards moisture (transepidermal water loss,
or TEWL) and protects against dehydration, and it also
provides a lipid barrier to prevent irritants from entering
the skin. If you think of the epidermis as a brick wall, the
cells are the bricks and are held together by the mortar
that is the barrier lipid complex, sometimes also referred
to as the intercellular lipid matrix or intercellular
cement. The lipids fill in the gaps between the cells in the
same way mortar fills the spaces between bricks in a wall.

If you have ever accidentally dripped lemon juice on a
chapped place on your hand, you will understand how the
barrier lipid complex (or lack of it, as in chapped skin) pro-
tects the skin. When the skin is chapped, it has lost lipids
in the barrier function, easily allowing the penetration of
irritants such as lemon juice. When the acidic lemon juice hits a nerve ending, it stings and burns.

When the barrier function is fully intact, lemon juice or most irritants cannot easily penetrate the skin surface. Likewise, the skin cannot lose water and become dehydrated when the barrier is intact.

How does the barrier function form?

A The barrier function lipids are formed during the keratinization process. Beginning in the spinosum, structures within the cells that are keratinizing, called lamellar bodies, begin forming. These lamellar bodies eventually produce the lipid complex that over time fills the gaps between the cells in the stratum corneum.

What can damage the barrier function?

A Exposure to elements, especially cold, heat, dry air, and wind, can damage the lipids in the barrier. Sun exposure certainly can also cause an impaired barrier. Skin that is unprotected in the winter will have a strong tendency to become dehydrated due to the destruction of barrier lipids.

Overcleansing or using soaps or cleansers that are too strong for the skin type can damage the barrier. Using or overusing high-foaming detergent cleansers can strip the skin of protective sebum, and it then begins slowly stripping the fats within the barrier function.

Likewise, over-exfoliation can strip too many surface corneum cells and along with these cells, the barrier lipids are also depleted.

Sun and exposure to cold, low humidity, or wind can also severely impair the barrier. Cumulative sun damage can severely affect the cell renewal cycle, which is how the lipids are naturally formed.

When the barrier function is damaged, it is said to be impaired.
What are the symptoms of impaired barrier function?

There are many symptoms of impaired barrier function, and they may vary with the skin type, severity of impairment, and other related skin conditions. For example, people who have rosacea often have skin barrier impairment problems. Impaired barrier function can affect sensitivity, inflammation, skin dryness, hyperpigmentation from inflammation, and aging symptoms.

Some of the common symptoms of an impaired barrier function may be the following:

- Flaking—A typical sign of dehydrated skin.
- Tightness—A sensation that occurs when the barrier has been damaged, such as the feeling of tightness of the body skin that may be experienced after a soapy or hot bath.
- Redness—Inflammation that often occurs because the barrier is unable to protect against irritants penetrating the skin.
- Itchiness—Winter itch is classic barrier function damage. The damaged barrier function affects nerve endings, causing itching. When the dehydrated skin is scratched to relieve the itching, the barrier function may be further injured, and inflammation and redness can result or worsen.
- Stinging—Stinging may result from irritants easily penetrating the skin and inflaming the nerve endings.

Does the barrier function affect the esthetic appearance of the skin?

Yes! If the barrier is fully intact and healthy, the skin will hold moisture well, which makes skin look more supple, firmer, and younger.

Impaired barrier function can make skin look chapped and more wrinkled with many fine lines, and reflect light abnormally. Deep wrinkles and expression lines are
accentuated. Skin with poor barrier function is often said to look somewhat “deflated.”

Impaired barrier function can also lead to redness due to irritant reactions. The redness associated with rosacea and sensitive skin is often related to impaired barrier function.

Q **Can the barrier function be improved?**  
A Yes. Using protective emollient products, such as a good moisturizer with emollient protectants such as silicone or petrolatum, will not only protect the barrier from damage, but it will also allow the skin to repair the damaged barrier lipid layer through the cell renewal process.

Products that contain lipid components can help to supplement the missing lipids in damaged skin. For much more on treating dry skin and barrier damage see Chapter 5.

Q **Why does the skin make oil (sebum)?**  
A Deep in the reticular dermis, near the bottom of the hair follicle, are the sebaceous glands, which secrete (produce) sebum, a complex of oily and waxy components. The sebum exits to the surface of the skin via the follicle canal. The entire structure of the follicle is called the pilosebaceous unit.

The purpose of sebum is controversial. Some scientists think that it is secreted as an additional surface barrier to help prevent dehydration of the skin. Some think it is a leftover from human evolution. Some think that it has no real purpose. What is known is that skin that is alipidic (does not produce much sebum) has a strong tendency to become dehydrated, which supports the first theory.

Q **Why does the skin have pores?**  
A Pores are simply openings or orifices of the sebaceous follicles on the surface of the skin. The pore is not the entire structure, just the opening itself.
Q  Why do some people have bigger pores than others?
A  The size of the pore is determined by the amount of sebum being produced and flowing down the follicular canal. The more sebum produced, the more the follicle and pore stretch to accommodate the quantity of sebum being secreted. Follicles that are clogged with keratinized cells and fatty materials will have larger pores due to the stretching of the follicle walls from the amount of debris in the canal.

Q  Is there a difference between facial and body skin?
A  Yes, there many differences, and there are even differences in the skin in different areas of the body:
  ■ There are more sebaceous glands on the face, but there also lots of sebaceous glands in the skin on the scalp, chest, and back. Anywhere there is hair, there are sebaceous glands.
  ■ The sweat glands are more numerous in the palms of the hands and soles of the feet than anywhere else in the body’s skin.
  ■ The skin on the face tends to be more sensitive and reactive than body skin.
  ■ The muscles under the facial skin are attached to the skin so that facial expressions can be made. You cannot make expressions with your arm!
  ■ Body skin tends to be drier than facial skin. Perhaps this is because there are fewer sebaceous glands on the body, or perhaps it is because people generally take better care of their facial skin than they do their body skin.
  ■ Acne most often occurs on the face but can also affect the chest, scalp, back, and even the legs.

Q  Are there differences between male and female skin?
A  There are many differences between male and female skin, but most are due to hormones, not actual anatomical differences.
It is often hard to look at the face of an infant and know if the child is a boy or a girl. This certainly changes at puberty, and puberty is when the sex hormones begin producing the adult sex characteristics of women and men.

The beard skin of a man, male pattern baldness, active sebaceous glands, and body hair growth and type are a few examples of these hormonal differences. These characteristics are all typical of androgenic (male hormone) activity. The soft skin of a woman, the fact that women have more glycosaminoglycans in their reticular dermis, and more fat in the subcutaneous layer is also hormonally related, specifically to estrogen and female hormones.

There are abnormalities in hormone activity that can cause females to grow facial hair or lose scalp hair in a typical male pattern. In females, chronic chin acne and melasma (pregnancy mask) and other pigmentary problems are examples of hormone abnormalities that may require medical treatment to correct. Men rarely have melasma, and men can lose body hair from hormonal problems.

Esthetically, men’s skin tends to be oilier than women’s and less likely to become dehydrated. Some differences in male and female esthetic skin issues, such as cellulite and lip wrinkling, are related to both hormonal factors and underlying muscle structure differences between the sexes. Women, percentage-wise, have much more body fat than men.

Men generally do not need as much emollient in their treatment as women and also prefer the feel of a lighter-weight product. Women are more likely to have rosacea, but men are more likely to have phymatous rosacea, the type in which the nose becomes bulbous and the cartilage grows. Sensitive skin is more prevalent in females in general, possibly due to some women’s tendency to overtreat the skin, causing barrier function damage.
Q Why does the skin get hot and cold?

A Temperature regulation is one of the amazing major functions of the skin. Sensory nerves in the skin detect outside heat and cold.

Blood vessels can dilate to pump blood to the skin when the body is overheated, so the blood is closer to the outside of the body and can cool. Sweat is produced by the sudoriferous (sweat) glands, and the evaporation of the sweat cools the skin temperature. Coolness of the skin can be caused by exposure to cold external temperatures, but it also can be caused by reduced blood flow to the skin. That someone may look pale when they are ill shows a reduced skin blood flow at that time. The blood flow is reduced when the body is cold to prevent heat from escaping the body.

Q Why does the skin tan?

A Melanocytes are cells that produce the skin pigment melanin, the material that causes a tan. Melanocytes are mainly located in the basal layer of the epidermis, but they are also in the papillary dermis. In the basal cell layer, melanocytes make up approximately 10% of the cells present. In some darker skin colors, the melanocytes may also be present in the reticular (lower layer) dermis.

Melanocytes produce granules of pigment called melanosomes. The melanosomes contain the actual melanin pigment.

Melanocytes are dendritic cells, which means they have tentacle-like branches. These branches or dendrites enable the melanocytes to “inject” keratinocytes with melanosomes, which gives the skin color, as well as cause a tan.

When the skin is exposed to sun, melanocytes produce pigment as a defense mechanism to shield the cells from damaging UV rays. The melanosome granules produced
by the melanocytes after sun exposure are deposited in the skin directly over the nucleus of the cell. So, a tan may look attractive to some people, but it is actually an immune function!

**Q** Why are there so many skin colors?

**A** Skin color is mainly determined by genetic factors we receive from our parents. We inherit the amounts of pigment produced by our individual melanocytes. In skin of color, the melanosomes produced by the melanocytes are much larger. The large melanosomes in black skin are deposited in keratinocytes as large, single melanosomes. In Caucasian skin there are multiple smaller melanosomes in each keratinocyte.

The variety of shades in skin of color has to do with the size of the melanosomes produced by the melanocytes. The color is determined by genetic factors that dictate the mix and amount of melanin produced.

There are two basic types of melanin. **Eumelanin** is a brown-black melanin found in darker skin types and also in black or brown hair. **Pheomelanin** is a red-yellow pigment and is found in red hair. Large melanosomes of eumelanin singly deposited in keratinocytes will absorb a lot of light, making the skin appear darker. Smaller melanosomes absorb less light, allowing skin and hair to reflect more light, and appear lighter in color.

Other factors in the skin that affect skin color are redness due to (arterial) red hemoglobin carrying oxygen in the blood, which may be close to the skin surface in lighter (Fitzpatrick I and II) skin types. The low levels of melanin in these skin types combine with the close blood vessels to produce a redder skin color.

Blue tones in the skin are caused by hemoglobin that is not oxygenated. In other words, this is venous (in the veins) hemoglobin returning to the heart and lungs for more oxygen.
Yellow pigments called carotenoids are from certain foods we eat, such as carrots, that contain this pigment.

The blend of the blue, red, yellow, and the brown coloring from eumelanin mix to an innumerable variety of skin colors and shades.

**Q** What is collagen and where does it come from?

**A** Collagen is a protein that is present in the skin in the form of fibers. It is responsible for skin firmness and youthful-looking skin texture. Skin that has been cumulatively sun-damaged has damaged collagen, which results in the appearance of wrinkles and poor skin texture.

Collagen is found in the lower part of the dermis. There are several types of collagen in the skin. If you removed all the water from the skin, collagen would be 70% of what was left. It is a major component of the skin.

Collagen is produced by specialized cells called fibroblasts. Fibroblasts are present in the reticular dermis and produce collagen in the form of chain molecules that look like spiral strings that form a braid-like structure. Collagen is produced by the fibroblasts as three chains that eventually intertwine in a ropelike braid called a helix.

Creams that contain collagen cannot replace damaged dermal collagen. Collagen present in creams simply helps to bind water to the skin surface. The molecules of collagen are too large to penetrate through the skin. Fibroblasts present in the dermis can be stimulated to produce more collagen by certain ingredients such as tretinoin (Retin-A or Renova), long-term use of alpha hydroxy acids, peptides, or botanical stimulant ingredients such as plant extracts *Centella asiatica* and *Echinacea angustifolia*.

Daily use of broad-spectrum sunscreens is the most effective treatment for maintaining quality collagen, as the fibroblasts are protected by UVA sunscreen components such as avobenzone, emcamsule, titanium dioxide, or zinc oxide that stop the deep dermal penetration of UVA.
What is the difference between elastin and collagen?

Collagen and elastin are both protein-based fiber chains present in the dermis. Esthetically, collagen is responsible for skin firmness and turgor, and elastin is responsible for the ability of the skin to stretch and return to its original form.

Estheticians and dermatologists often gently pinch the skin of a client to observe how quickly the skin returns
to its original contour to test skin elasticity. If the “return to normal” takes more than a split second, the skin has damaged elastin fibrils. Like collagen, elastin is produced by the fibroblast cells, but unlike collagen it is produced as two intertwined molecules.

Collagen protein is abundant in the skin dermis, while elastin only comprises a small portion of the reticular dermis.

Elastin fibers are found in the upper dermis, unlike collagen, which is found in the lower dermis. Both the collagen and elastin fibrils are surrounded by ground substance. The ground substance is a gel-like substance comprised of large sugar-related molecules called glycosaminoglycans. These molecules include hyaluronic acid, an extremely strong water-binding molecule.

There is not much known about elastin, but more research is being conducted. At this point, there is only one type of elastin known. Elastin is so important for skin elasticity and aging-skin treatment.

As discussed previously, collagen is fairly easy to produce and helps repair the skin esthetically. Elastin is much harder to stimulate. Micro-current has been shown to stimulate elastin production, and it is believed that some of the same stimulants used for collagen production may help stimulate elastin.

**Q** How does the skin heal after a cut?

**A** When the skin is injured, a flood of biochemical reactions take place involving the immune system, the blood, and the fibroblasts. The entire biological process of healing is both complicated and amazing. Here we will give a brief overview of how the many systems of the body and different cells types work together to heal a wound.

In a cut, clotting factors in the blood stop the immediate flow of blood from the injury. The immune system is alerted, sending leucocytes (white blood cells) to the area
to help fight off any possible infection. The fibroblasts from surrounding tissues migrate to the area of injury and begin producing large amounts of collagen to help rebuild the tissue in the injured area. A “scaffolding” is established at first. Eventually the collagen fills in the separated area in the cut.

Small blood vessels begin to form from larger vessels to help bring more blood to the healing area. Blood flow to the area is a crucial part of wound healing; without it, the cells are not provided with many factors that help with wound healing, including transport of immune cells to fight and prevent infection.

The epidermis is regenerated in a process called **re-epithelialization**. Cells that line the follicle walls in the lower part of the reticular dermis begin replicating. These new cells migrate to the surface via the follicle and begin the formation of the epidermal layers. This is also how the skin heals after resurfacing laser treatment or a deep surgical chemical peel.

Wounds heal better when they are kept moist; they are also less likely to form scars. They should be cleaned daily with fresh water, and an antibiotic ointment should be used. Use of an emollient such as petrolatum (petroleum jelly) keeps the wound moist for better healing.

**Q** Why does the skin sometimes scar after an injury?

**A** The skin quickly forms fibers to bridge the gap in a cut or injury. These collagen fibers are granular-like to fill in where cells are missing. They are fibers, not cells, and have a different texture than the original tissue.

Over time these collagen fibers will soften and the skin tissue will regain much of its original organization in terms of blood vessels and normal skin function.

It can take up to a year for a scar to soften and become flatter. As the area returns to normal, blood flow is normalized, which makes the scar that is a few months old
look less red. As collagen fibers reorganize in the healed cut, the scar will flatten out.

Raised scars are referred to as **hypertrophic**, and depressed (sunken) scars, which often are called pock-marks, are known as **hypotrophic**.

Hypertrophic scars resolve and become flatter over time as the skin makes an enzyme called **collagenase**, which breaks up excess collagen in the scar, causing a flattening effect. A **keloid** is a hypertrophic scar that does not resolve because the skin hereditarily does not make collagen in a normal way. Keloids require careful and immediate dermatological treatment with steroid injections to help them reduce in size and elevation. Keloid formation is prevalent in skin of color.