Understanding and Treatment of Acne

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Learning objectives

Upon completion of this course, student will be able to:
- Define acne.
- Repeat current statistics on acne and acne treatments.
- Describe myths associated with acne.
- Recognize the social and emotional impact that acne can have on the sufferer.
- Identify and list triggers associated with the development of acne.
- Identify acne types (descriptions of individual lesions and conditions).
- Recognize skin conditions that can be mistaken for acne.
- Identify and list triggers associated with the development of acne.
- Recognize skin conditions that can be mistaken for acne.
- Explain the factors that contribute to the formation of adult acne.
- Repeat guidelines for skin care treatments, equipment and over-the-counter medications used to treat acne.
- Repeat guidelines for physician referrals, treatment options, and medications.
- Recognize how to treat acne in the skin of people of color.
- Explain benefits and side effects associated with treatments and medications.
- Explain how acne scarring occurs.
- Identify the different types of acne scars.
- Discuss options for addressing acne in children, teens, and adults, including special considerations for adult women and pregnant women.

What is acne?

The term acne comes from a mutation of the Greek words akmē, meaning “a point or edge,” but in the sense of a “skin eruption, or achme meaning ‘chaff.’” Acne refers to the presence of comedones (blackheads and whiteheads), papules, pustules (pimples), and in more severe cases, nodules and cysts.

It usually affects skin with the densest population of sebaceous glands (face, neck, chest, and back), but also often occurs on the shoulders, scalp, upper arms and legs.

The most common form of acne is known as “acne vulgaris,” meaning “common acne.” Use of the term “acne vulgaris” implies the presence of comedones.

Acne usually begins during puberty, when androgens tend to be present in relatively large amounts. The androgenic influence on the sebaceous follicles at this time is the reason that acne is often thought of as a teenage condition. As the body matures and androgen levels stabilize in adulthood, acne clears in the majority of cases.

However, acne is not restricted to any age or ethnicity; it affects all ages, races and ethnicities. Adults in their 20s, 30s, 40s and beyond can develop acne. The number of adults who have acne is growing, especially among women.

Acne statistics

In the U.S., 40 to 50 million people suffer from acne, making it the most common skin disorder in the nation. Globally, acne affects approximately 650 million people, roughly 9.4 percent of the population as of 2010.

According to the American Academy of Dermatology:
- Almost 85 percent of all people have acne at some point in their lives, usually affecting the face, neck and back.
- It affects almost 90 percent of people during their teenage years and sometimes persists into adulthood.
- 40 percent of adolescents have either acne or acne scarring that requires treatment by a dermatologist by their mid-teens.

- 20 percent of all visits to the dermatologist are related to the treatment of acne.
- In 2004, the total direct cost associated with acne treatment exceeded $2.2 billion; this figure includes substantial costs for prescriptions and over-the-counter products.
- Of the more than 85 percent of teenagers and young adults between the ages of 12 and 24 who suffer from acne, 25 percent will have permanent scarring, ranging from severe to light.

The American Dermatological Association finds that:
- 20 percent of all adults have active acne.
- 20 million Americans have acne badly enough to cause scars.
Only 11 percent of acne sufferers seek help. Acne is considered a social taboo. Acne is more severe in Caucasians than people of African descent.

Further findings reveal that while it is treatable, of those who suffer from acne:
- 11 percent will see a physician.
- 20 percent will go to a skin care center.
- 30 percent will use an over-the-counter medication from a drug store or pharmacy.
- More than 40 percent will do nothing.

Acne does not affect people’s overall health or life expectancy, but it can have a significant impact on their self-confidence and social life. The following are common among acne sufferers:
- Social withdrawal.
- Low self-esteem.
- Poor body image.
- Embarrassment.
- Depression.
- Anger.
- Preoccupation with their condition.
- Frustration.
- Higher rate of unemployment.

Having acne as an adolescent can seem overwhelming. Acne just adds to the intense emotions teenagers already feel. Several studies of teens with “problem acne” found that 14 percent reported feeling depressed. More than 23 percent of the kids said they’d thought about committing suicide, and nearly 8 percent had tried to take their own lives.

Acne and its emotional effects don’t magically disappear upon turning 18. For a long time, acne was considered a teen problem, but when you get to be 30 or 40 and you still have acne, it’s no longer the norm, and it becomes an issue socially and psychologically.

That may be why depression is two to three times more common in adults with acne than in the general population. Women are particularly vulnerable to self-consciousness and a loss of self-esteem from acne.

Acne and depression can quickly turn into a vicious spiral. Stress and anxiety fuel acne outbreaks, and depression can magnify skin problems, making acne seem far worse than it actually is. People will blame their skin for everything that’s wrong with their lives. Further complicating the issue is that isotretinoin, the most powerful drug used to treat severe acne, may cause depression. Not every study agrees that isotretinoin increases the risk of depression, but dermatologists still use caution when they prescribe this drug, and they carefully monitor patients for depression symptoms while taking the medication.

Coping with acne

Having acne can seem like a huge burden to carry, but it’s not a lifelong sentence now that so many effective acne treatments are available. Most cases of acne can be controlled, no matter how severe. But there are no quick fixes; treatment can take months or even years.

Acne treatments attack pimples on two fronts. Dermatologists prescribe a number of different acne medications, including retinoids, antibiotics, and benzoyl peroxide, to clear the skin. Meanwhile, psychologists help patients deal with the emotional effects of skin problems. There are many psychological techniques that can be used, including relaxation, imaging, focused psychotherapy, and hypnosis or self-hypnosis.

Following a plan outlined by an esthetician or dermatologist is the key to controlling acne. People cannot expect results if they are not willing to follow the plan outlined by their practitioner. An improvement in the overall condition of the acne can lessen depression caused by the acne.

For some people, living with long-term acne can be just as devastating as having a chronic disease such as diabetes or epilepsy. The shame and embarrassment of regular breakouts can be overwhelming enough to cause depression. Some people with severe acne even try to commit suicide. And the emotional scars can linger long after the pimples have faded.

Acne is particularly troubling because of its visibility and its intimate relationship with our self-esteem. “The skin in general, and particularly the skin of the face, is the way we see ourselves. It’s the way others see us, and most importantly, it’s the way we think others see us,” explains Feldman, who is a professor of dermatology in the Wake Forest University School of Medicine and author of the book “Compartments.”

Severe acne can ignite a number of different emotional reactions; it can make people feel unattractive and unloved enough to get angry with themselves or the whole world. Acne sufferers feel lonely and isolated. People can become withdrawn as they begin to see themselves as afflicted in a way other people couldn’t possible understand.

How acne emotionally affects adolescents

The first onset of acne typically appears in children one to two years before the start of puberty. Interestingly, puberty also happens to coincide with an overall increase in depression in children, especially young girls. Acne is one of the most common medical conditions linked to depression. It can have an obvious impact on a child’s appearance. During childhood, appearances become increasingly important in a child’s mind, and any perceived flaw could have a devastating impact on the child’s self-esteem.
and confidence. Adults, who have more experience reconciling their emotions, may be able to better cope with acne, but even some adults cannot overcome the emotional pain they experience from acne.

The role of stress

Unfortunately, not only can acne often cause a child distress, but that distress can worsen existing acne or lead to new breakouts, reports Dr. M.A. Gupta, in an editorial in Canadian Family Physician in 2002 on the psychological effects of acne. As such, a child’s distress as a result of acne is often a motivating factor to try aggressive prescription acne treatments. Research has found that the severity of acne does not predict a child’s reaction to it. Gupta’s report found that even sufferers of mild acne often exhibit depressive symptoms. Given this information, it is especially important to be sensitive to a child’s feelings about acne.

Do acne treatments cause depression?

As noted above, there have been numerous reports linking use of strong acne medications, such as isotretinoin (Accutane), to depression and suicidal thoughts and behavior. As a result of those reports, the FDA launched an investigation and issued a subsequent warning in 1998. The warning aimed to educate patients on the drug’s side effects and urged prescribers to screen patients for existing psychiatric disease. Dr. Parker Magin, Ph.D., who published a review on isotretinoin, depression and suicide in The British Journal of General Practice in 2005, reports that it is more likely that acne, not a treatment, is responsible for depression. Still, this possibility is something that should be discussed with a doctor. Symptoms of depression in children can include:

- Feelings of excessive guilt.
- Lack of concentration; academic decline.
- Irritability.
- Isolation from family and friends; avoiding school and social activities.
- Hopelessness.
- Appetite changes.
- Sleep problems.
- Excessive crying.
- Thoughts or behaviors of self-harm.
- Vague physical complaints, such as headache, bellyache, fatigue or general pain.

Diagnosing depression in children with acne

If a child has any symptoms of depression, it is important to seek medical advice from a physician, who can determine whether the child is depressed and recommend treatment. The National Institute of Health recommends early identification and treatment for depression, especially for children, given its short- and long-term consequences (such as poor academic performance, substance abuse and suicidal thoughts and behavior).

Acne triggers

We know that acne is caused by excess production of oil in the sebaceous gland, but there are certain triggers associated with it:

- **Heredity** – Acne is a genetic disorder, and those who inherit it have a defect in the structure and function of their skin. A family history of acne is associated with an earlier occurrence as well as an increased number of rotational acne lesions.

- **Stress** triggers the pituitary gland to stimulate the adrenal glands. The adrenal glands produce testosterone in women, which results in an increased production of sebum.

- **Hormones** – Testosterone is secreted by the male sex organs and by the ovaries in women. In both sexes, it is secreted into the body and enters the sebaceous gland. Excessive hormone levels send the sebaceous gland into overdrive, causing the follicular glands to get larger and produce more sebum. This is most noticeable during times of increased hormonal activity. Acne is slightly more common in females than males (9.8 percent versus 9.0 percent). However, young men are more likely than young women to have more severe, longer-lasting forms of acne and are less likely to seek help for their acne.

- **Friction** – Also referred to as “acne mechanica,” is a caused or exacerbated by heat, occlusion, pressure and friction against the skin. Common causes include clothing, helmets, headbands, and straps that retain moisture and sweat.

- **Physical irritation** – Picking and squeezing blemishes along with poor hygiene can worsen acne.

- **Medications** – Acne is a side effect of certain prescription medications used to treat epilepsy and depression. Additionally, drugs containing lithium, barbiturates, amphetamines and androgens may contribute to acne formation.

- **Cosmetics** – Makeup, fragrances and hair care products can contain plastics that lead to the development of acne. Almost all hair conditioners, sprays and gels contain plastics, which can block pores and cause breakouts. Products placed directly on the skin, such as fragrances, can cause contact reactions (contact dermatitis). Chin, jaw line and forehead breakouts are common in people who touch their hair and then touch those areas, or from treated Cosmetology.EliteCME.com
hair laying directly on them and transferring the product. Ingredients to avoid include PVP, CVP or any copolymer. These chemicals are the basis of many hair spray and hair gel formulations. They work as adhesives and wetting agents.

- **Industrial oils and chemicals** – Chloracne occurs when industrial chemicals called halogenated hydrocarbons come in contact with the skin. An individual who is exposed can transfer the chemicals to others by way of their clothing if another person handles it.
- **Environment** – Includes exposure to ultraviolet rays, seasonal changes, climate and pollution. Continuous exposure to a hot, humid atmosphere may be a factor in causing or worsening acne in certain individuals. People who work in kitchens, coin laundries and industrial settings with high heat and humidity can be affected. Acne sufferers may notice a spike in their condition during the summer months. Heat and humidity increase oil production and blood flow; therefore, tanning should never be used to clear acne. Exposure to ultraviolet rays will eventually exacerbate acne and can lead to other problems, such as premature aging and skin cancer.

## Acne myths

Contrary to popular beliefs, acne is not caused by what people eat or how often they wash their face, although these variables can contribute to the general condition. Here we will address some common misconceptions about acne.

**Myth No. 1 – Acne is caused by poor hygiene.**

Those who believe this have a tendency to wash their skin vigorously and frequently. This will only make acne worse. The truth is, acne is not caused by dirt or surface oils, but excess oils, dead cells, and a day’s accumulation of environmental toxins indeed can make the skin look and feel unsightly. Good skin hygiene incorporates gently cleansing twice daily with the appropriate cleanser, followed by products to treat the acne. Acne is associated with genetic makeup and hormonal activity, and while there is no cure, it is treatable.

**Myth No. 2 – Acne is caused by a poor diet.**

Food doesn’t cause acne, right? The link between food and acne is a source of much debate. Early studies found no link between diet and acne. Fast forward to 2006, when a Harvard study found that girls who drank two or more glasses of milk a day had about a 20 percent higher risk of developing acne than those who have less than a glass a week. Additional studies suggest that fat-free milk in particular, which is higher in sugar than whole milk, may be the culprit. Let’s assume we can thank the hormones in our dairy products.

An Australian study in conducted 2007 found that people who followed a low-glycemic index (GI) diet (which is lower in refined carbohydrates like those found in white bread) had a 22 percent decrease in acne lesions, compared with a control group that ate more high-GI foods. Scientists suspect that raised insulin levels from the carbohydrates may trigger the release of hormones that inflame follicles and increase oil production. Research on the relationship between acne and diet is ongoing. When it comes to food and drink, the truth is that we just do not know for sure.

Here’s why we do not know. When researchers conduct studies, they start by testing an idea. For example, when dermatologists wanted to know whether acne patients who followed a certain diet had less acne than patients who eat whatever they want, the dermatologists designed a study to test this idea. In the first study, dermatologists found that the patients who followed the diet had less acne. The dermatologists also found that the patients who followed the diet lost weight and had healthier insulin levels. This means that the diet could have caused the improvement. Weight loss or a healthier insulin level also could have caused less acne. To find out what happened, the study was repeated.

When the study was repeated, the patients given the special diet did not have less acne, meaning we really do not know for sure whether the diet leads to less acne. When it comes to research about diet and acne, there are many examples like this one, and that’s why we do not know for sure.

Researchers continue to study the connection between acne and diet. People who believe certain foods, such as chocolate or fried foods, trigger their acne should probably avoid those foods.

**Myth No. 3 – Acne is just a cosmetic disease.**

Acne does affect the way people look, and although not a serious threat to a people’s physical health, can result in scarring, which can affect how they feel about themselves as well as how they interact with others.

**Myth No. 4 – You just have to let acne run its course.**

Acne can be controlled by one or more of the many treatment options available. Without treatment, dark spots and scars can remain long after the acne clears. Treating acne also has been shown to boost people’s self-esteem.

## What causes acne?

Four major factors contribute to the formation of acne:

- Type of follicle.
- Abnormal keratinization.

- Blockage of the sebaceous follicles.
- Growth of bacteria, called *P. acnes*, within the hair follicles.
It has been found that acne sufferers excrete more sebaceous lipids onto the skin’s surface than people without acne.

To understand how an acne lesion is born, we must understand the pilosebaceous unit. The pilosebaceous unit is made up of three parts:
- The hair follicle is the skin organ that produces hair. There are three types of follicles in the dermis:
  - Vellus follicles, comprised of a tiny hair and much larger sebaceous gland.
  - Sebaceous follicles, comprised of a tiny hair so small that it is rarely seen (even in microscopic sections) and an exceptionally large, multi-lobed sebaceous gland.
  - Terminal hair follicles, which have a long, stiff, thick hair and a proportionately sized sebaceous gland.
- The arrector pili muscles are attached to the hair follicle and cause small contractions, allowing hair to stand on end, commonly referred to as a goose bump.
- The sebaceous gland is connected to the hair follicle and secretes oil (sebum) on the hairs; from there it travels along the hair shaft and is deposited on the skin. Sebum is an oily substance that is composed of:
  - 41 percent triglycerides.
  - 16 percent free fatty acids.
  - 12 percent squalene.
  - 25 percent wax esters.

**Altered keratinization**

The first sign of acne is usually the comedo (blackhead). For some time, researchers believed that a comedo was nothing more than a plug of dried sebaceous oil lodged in the duct of the sebaceous gland. We now know that a comedo is a combination of keratinized lipid material. Initially, it has large amount of lamellar-granular material followed by an increase in keratohyaline granules and dense keratin materials. How and why this change occurs is not known. We do know for sure that the proliferative rates increase in the keratinocytes of the sebaceous follicle.

Lamellar-granular cells are secreted from keratinocytes, resulting in the formation of an impermeable, lipid-containing membrane that serves as a water barrier and is required for correct skin barrier function. These granules release components that are required for skin shedding (desquamation) in the uppermost layer of the epidermis, the stratum corneum.

The keratinocyte is the predominant type of cell in the epidermis, constituting 90 percent of the cells found there. Those keratinocytes found in the basal layer (stratum basale) of the skin are sometimes referred to as “basal cells” or “basal keratinocytes.”

The primary function of keratinocytes is the formation of a barrier against environmental damage, such as pathogens (bacteria, fungi and parasites), heat, ultraviolet radiation and water loss. When pathogens invade the upper layers of the epidermis, the keratinocytes react with the production of pro-inflammatory mediators that attract leukocytes (white blood cells) to the site of the pathogenic invasion.

**Propionibacterium (P. acnes)**

_P. acnes_ are found on most skin. In acne, these bacteria multiply out of control and play a part in the development of inflammatory lesions by digesting the oil trapped within the pore. These bacteria live without oxygen (anaerobically) and feed on the sebum. When the follicle becomes blocked, there is no air and plenty of food. This causes the bacteria to turn triglycerides into glycerol and other fatty acid waste. The bacteria require glycerol to survive. The waste then irritates the pore lining, causing redness and inflammation. The cells are stimulated to produce histamine, leading to inflammation. There is no real correlation between the number of skin bacteria and the severity of acne. Improper extractions can result in leakage of _P. acnes_ into the dermis, resulting in additional lesions.
Acne lesions

The word lesion is derived from the Latin word laedere, meaning, “to hurt.” A lesion is defined by any pathological traumatic discontinuity of tissue or a loss of function. Scars, papules, pustules and cuts are all types of lesions. The common lesions of the skin are grouped into three types, flat, elevated or depressed, based on their relationship to the skin’s surface. Acne includes all three flat (macule), elevated (pustule), and depressed (scars). Additionally lesions associated with acne are classified as either non-inflammatory or inflammatory.

Non-inflammatory acne consists of open and closed comedones (blackheads and whiteheads). This type of acne is not associated with redness or pain. Symptoms of non-inflammatory acne include bumps, uneven texture, and sandpaper-like feel.

An open comedone (blackhead) is a sebaceous follicle plugged with sebum, dead skin, small hairs and bacteria. Comedones are small, usually 1 to 3 mm in diameter. As the blackhead pushes through the surface of the skin, the exposed opening appears black from a buildup of melanin. Blackheads are not filled with dirt; rather, what you are seeing is simply the skin’s dark pigment.

Closed comedones (whiteheads), on the other hand, remain below the surface of the skin, and the plugged sebaceous follicle is very narrow or “closed,” hence the term “closed comedone.” They appear on the surface of the skin as small whitish bumps and may need to have the white center, or milia, lanced. They have a slight papular appearance and can become quite large if they extend into the dermis.

Inflamed acne lesions develop when the follicle wall ruptures, leaking infected material into the dermis, infecting adjoining follicles. These lesions extend into the deeper layers of the skin and are the cause of tissue damage and scarring. Symptoms commonly associated with inflamed lesions include redness, swelling, pain, oozing, crusting and scabbing.

Severe forms of acne

There are three types of severe acne: acne conglobata, acne fulminans and Gram-negative folliculitis.

Acne conglobata is a chronic, severe form of acne characterized by deep abscesses, inflammation, comedones and bacterial infection. It is found primarily on the back, buttocks and chest, but can also be seen on the face, upper arms and thighs. Males between the ages of 18 and 30 are more likely than females to suffer from this condition. The cause of acne conglobata is unknown. It may be preceded by cysts, papules and pustules that do not heal but instead rapidly deteriorate. Occasionally, acne conglobata can flare up after being in remission for years.

Nodules form around multiple blackheads and whiteheads, gradually increasing in size until they break down and discharge pus. Deep ulcers may form under the nodules, resulting in a severe scar called a keloid or atrophic scar. Treatment for this type of acne must be aggressive and includes regular visits to a dermatologist.

Acne fulminans is the sudden onset of acne conglobata normally afflicting young men. It includes nodulocystic acne, fever, inflammation and aching joints, particularly the hips. As with acne conglobata severe scarring and resistance to antibiotic therapy are common. Acne fulminans is a rare disease. Over the past several years, fewer cases of this disease have occurred, possibly because of earlier and better treatment of acne.

Acne fulminans is an uncommon, immunologically induced, systemic disease in which the triggering antigen is believed to be from P. acnes. Some authors note that elevated levels of
testosterone may play an important role in the pathogenesis of acne fulminans. High levels of testosterone and anabolic steroids cause an increase in sebum excretion and in the population density of P. acnes. The increase in the amount of P. acnes or related antigens may trigger the immunologic reaction in some individuals and lead to an occurrence of acne fulminans.

In addition to testosterone, isotretinoin may also precipitate acne fulminans, possibly related to highly increased levels of P. acnes antigens in the patient’s immune system. Acne fulminans has also been observed in patients with measles infection.

Gram-negative folliculitis is a rare bacterial infection than can result from long-term antibiotic use. It is characterized by pustules and cysts that are filled with bacteria and most often resistant to previously prescribed antibiotics. Approximately 4 percent of patients with acne vulgaris who were under treatment with broad-spectrum antibiotics reported this infection. However, the frequency of this infection is probably generally underestimated. Gram-negative folliculitis should be considered in patients with acne who have a flare-up of pustular or cystic lesions and in patients whose acne is resistant to treatment. Gram-negative folliculitis may also occur in the setting of hot-tub immersion and in people infected with HIV.

Usually, Gram-negative bacteria constitute less than 1 percent of the total bacterial flora in the nose. In patients with Gram-negative folliculitis, enterobacteria (a large family of gram-negative bacteria) constitute approximately 4 percent of the total bacterial flora.

Although Gram-negative folliculitis is largely a complication of acne vulgaris and thus is expected to follow the age distribution of that entity, a slightly increased age at onset has been observed. The tendency for Gram-negative folliculitis to begin after the early teenage years is most likely because most patients who develop Gram-negative folliculitis have undergone treatment for acne with a broad-spectrum antibacterial agent for a prolonged period.

A history is helpful in suggesting the diagnosis of Gram-negative folliculitis.

Patients usually have been receiving a course of antibiotics for a prolonged period. Patients with Gram-negative folliculitis may present with one of two histories, as follows:
- A history of apparent acne, usually of the nodulocystic form, may be present. The acne has not been responding to antimicrobial therapy or other therapy.
- A history of acne that has responded well to therapy and suddenly flares may be present. This exacerbation may occur a few days following cessation of an effective antibiotic or a few days following institution of a new antibiotic. The effectiveness of isotretinoin in the treatment of Gram-negative folliculitis has been attributed to its ability to make the skin and the mucous membranes dry as a result of the marked reduction in sebaceous gland secretion.

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**OTHER FORMS OF ACNE**

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### Infantile acne

The development of acne is usually associated with adolescence, but acne lesions can occur in infants.

Baby acne is usually characterized by small red bumps or pustules on a baby’s cheeks, nose and forehead. It often develops within the first two to four weeks after birth. Baby acne may look worse when a baby is fussy or crying.

Many babies also develop tiny white bumps on the nose, chin or cheeks. These are known as milia. This is usually caused by hormonal changes that occurred as the fetus was developing. The best treatment for baby acne is usually none at all. However, a physician may need to be consulted if:

- **The acne persists for more than a few weeks** – An infant or very young child with acne that persists for more than several weeks should be examined by the child’s pediatrician or a dermatologist. If the acne persists or becomes severe, consultation with an endocrinologist and pediatric dermatologist is recommended. Causes that may be investigated include:
  - **Family history** – Do the infant’s parents, brothers or sisters have acne, or did they have it at some time? A close genetic connection is a high risk factor for developing acne.
  - **Early hormone production** – Does the infant have a condition that causes very early production of sex hormones, especially the androgenic hormones associated with acne? The possibility of early sexual development requires medical attention to prevent or moderate disabilities linked with this condition.
  - **Growth and developmental abnormalities** – Are there any indications of problems with mental or physical development? Early acne can also be an indication of a developmental abnormality.
  - **Drug-induced acne** – Has the infant had any contact with a medication that can cause acne, such as corticosteroids or iodine-containing drugs?

- **Acne develops between the ages of 2 and 6** – While acne occurs in infants, it usually subsides by age 2. If acne develops between the ages of 2 and 6, a dermatologist should be consulted because this is a stage in life known as the acne-free zone. During this time, acne vulgaris rarely occurs because of low sebum production, associated with low androgen activity.
**Childhood acne**

Thought once to only be the bane of the average teenager’s existence, acne is now a problem for young children. Pediatricians now say there is enough evidence on effective treatment options to warrant issuing guidelines on how to address acne in children.

According to the May 2012 issue of the American Academy of Pediatrics (AAP) the organization supports guidelines from the American Acne and Rosacea Society that outline how to treat acne in children and teens of all ages.

Acne is becoming increasingly common in pre-teen girls. In one study of girls aged 9 to 10 found that more than three-quarters of them had inflammatory acne (pustules).

These findings are easily attributed to the fact that both boys and girls are starting puberty earlier than previous generations.

According to the AAP, most cases of mild acne can be controlled with OTC medications. Washes, lotions, creams and other products containing benzoyl peroxide are the best-studied, and the best place to start.

Benzoyl peroxide is one of the most common ingredients in most OTC acne treatments. This gives the consumer a wide variety of products to choose from, considering that not all products work the same for every acne sufferer. Salicylic acid is also found in many OTC acne preparations.

If OTCs do not do the job, the next step could be a topical retinoids prescription medication, such as Retin-A.

The main side effects associated with the use of topical treatments are skin irritation and dryness; if the condition is moderate to severe, an oral antibiotic could be added. OTCs should be given time to work. An oral antibiotic can be added, but should be prescribed judiciously because common side effects, such as stomach upset, dizziness, and yeast infections, can occur.

When acne is severe and all else fails, doctors and parents may want to consider isotretinoin therapy. Although highly effective in treating severe cases of acne, isotretinoin has been linked to birth defects in developing fetuses, inflammatory bowel disease, depression and suicidal thoughts in some. On its own, severe acne can cause depression and suicidal thoughts, so the AAP is not convinced that the drug itself is to blame.

When should parents consider taking their child to a doctor for acne treatment? That will depend on the severity of the problem and how bothered the child is by his or her appearance. Some children can deal with skin eruptions, while others may not want to be seen in public.

Parents can help by dispelling some common acne myths. Children need help understanding that the condition is not a direct result of surface dirt or poor hygiene habits. Also, make them aware that scrubbing and picking the acne lesions will only make the situation worse. With a little bit of patience, the condition should improve. Children need to be diligent about using their medications; acne therapy should not be discontinued the moment the condition subsides. Ongoing treatment will be crucial to keep new lesions from forming and to prevent permanent or long-term scarring.

Pre-teens should gently cleanse their face twice daily (morning and night) with a mild, soap-free cleanser, followed by an oil free-moisturizer to help keep water from escaping and to alleviate any feelings of dryness. Facial toners should be used only on occasion because they can further dry the skin and may interfere with other OTC medications.

Children who participate in sports or outdoor activities (especially when it’s warm or humid) may need to cleanse immediately following play to keep bacteria and sweat from entering the follicle.

A discussion of teens and acne would not be complete without another visit to the subject of diet. Because diet and acne are touchy subjects, parents should just encourage the youngsters to eat well-balanced meals that include fruits and vegetables. In addition to clearing their acne, they may develop good dietary habits at an early age that could last a lifetime.

**Acne grading**

Methods of measuring the severity of acne vulgaris include simple grading based on clinical examination and lesion counting, and those that require complicated instruments, such as photography, fluorescent photography, polarized light photography, video microscopy and measurement of sebum production. The two commonly used measures are grading and lesion counting.

Grading is a subjective method that involves determining the severity of acne, based on observing the dominant lesions, evaluating the presence or absence of inflammation, and estimating the extent of involvement.

Lesion counting involves recording the number of each type of acne lesion and determining the overall severity.

Photography has also been used as a method of measuring acne severity. Drawbacks of this approach include:

- It does not allow palpation to ascertain the depth of the lesions.
- Small lesions are often not visualized.
- Maintaining constant lighting, distance between the patient and camera, and developing procedure is difficult to maintain and measure.

Fluorescence and polarized light photography have some advantages over normal color photography in estimating the number of comedones and emphasizing erythema. However, the disadvantages include problems such as excessive time involvement and the need for more complicated equipment.
Acne grading became more mainstream in the 1950s as the available therapies for treatment increased.

The first person of record to use a scoring system for acne vulgaris was Carmen Thomas. She used lesion counting in her office notes, starting in the 1930s. Several systems for grading the severity of acne currently exist; the most popular are the Leeds, Pillsbury and Cook scales.

### A history of acne grading

**1956 – The Pillsbury Scale**
- Grade 1: Comedones and occasional small cysts confined to the face.
- Grade 2: Comedones with occasional pustules and small cysts confined to the face.
- Grade 3: Many comedones and small and large inflammatory papules and pustules, more extensive but confined to the face.
- Grade 4: Many comedones and deep lesions and involving the face and the upper aspects of the trunk.

**1958 – James and Tisserand**
- Grade 1: Simple non-inflammatory acne with comedones and a few papules.
- Grade 2: Comedones, papules and a few pustules.
- Grade 3: Larger inflammatory papules, pustules and a few cysts; a more severe form involving the face, neck and upper portions of the trunk.
- Grade 4: More severe, with cysts becoming confluent (blending or flowing together).

Many felt that the response to acne therapy could never be precisely assessed by grades of 1 to 4, and such classification systems were deemed overly simple.

**1966 – Witkowski and Simons** initiated lesion counts for assessing the severity of acne vulgaris. Lesions were counted on one side of the face as a time-saving measure, after it was established that the number of lesions of the left side was nearly equal to those on the right.

**1977 – Michaelson, Juhlin and Vahlquist** counted the number of lesions on the face, chest and back. They gave a different score to each lesion type. Comedones were valued at 0.5; papules at 1.0; pustules at 2.0; infiltrates at 3.0; and cysts at 4.0. By multiplying the number of each type of lesion by its severity index and adding each product, these authors obtained a total score that represented the severity of the disease for each visit. This grading system has been criticized on the grounds that scores ascribed to lesions are non-parametric, whereas absolute counts are parametric data, and it is probably wrong to mix these two types of data.

**1979 – Cook, Centner and Michaels** evaluated the overall severity of acne on a 0-8 scale anchored to photographic standards that illustrate grades 0, 2, 4, 6 and 8. In addition to the photographic standards, a nine-point scale for comedones, papules and macules over the face was used in conjunction for more sensitivity.

**1984 – Burke, Cunliffe and Gibson** presented the Leeds technique. They described two scoring systems. The first is an overall assessment of acne severity for use in routine clinical evaluations, and the second is a counting system for detailed work in therapeutic trials. A scale of 0 (no acne) to 10 (the most severe) was used for grading. The groups 0 to 2 were divided into subgroups, by 0.25 divisions. Grades 0.25 to 1.5 represented patients with physiological acne or “acne minor,” and those with grades of 1.5 or more with clinical acne, or “acne major.”

**1996 – Lucky** assessed the reliability of acne lesion counting. Acne counts were recorded on a template divided into five facial segments: right and left sides of the forehead, right and left cheeks and chin. The nose and the area around it were excluded. Counts of each lesion type were recorded within each segment of the template. Total lesion count along with total inflammatory lesions and comedonal counts were then calculated. They concluded that reliability of acne lesion counting was excellent when performed by the same trained rater over time.

**1997 – Doshi, Zaheer and Stiller** devised a global acne grading system (GAGS). This system divides the face, chest and back into six areas (forehead, each cheek, nose, chin and chest and back) and assigns a factor to each area on the basis of size.

**2008 – Hayashi** used standard photographs and lesion counting to classify acne into four groups. They classified acne based on the number of inflammatory eruptions on half of the face as 0-5, mild; 6-20, as moderate; 21-50 as severe; and more than 50 as very severe.

Assessment of the severity of acne vulgaris continues to be a challenge for dermatologists. No grading system has been accepted universally.
Acne grading chart

Here is a chart from “Therapeutic Strategies in Dermatology” by Bruce U. Wintrob, M.D., and Timothy G. Berger, M.D., that is useful for the esthetician.

<table>
<thead>
<tr>
<th>Type</th>
<th>Severity</th>
<th>Location</th>
<th>Scarring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade I: (Comedonal)</td>
<td>Mild with fewer than 10 lesions</td>
<td>Face only</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Grade II: (Papular)</td>
<td>Moderate with 10 to 25 lesions</td>
<td>Face and trunk</td>
<td>Possible</td>
</tr>
<tr>
<td>Grade III: (Pustular)</td>
<td>Severe with more than 25 lesions</td>
<td>Face and trunk</td>
<td>Possible</td>
</tr>
<tr>
<td>Grade IV: Cystic/nodular</td>
<td>Very severe</td>
<td>Face and trunk</td>
<td>Usually</td>
</tr>
</tbody>
</table>

Excoriated acne

Also known as “picker’s acne,” the term excoriated acne describes the condition of a person who spends hours in the mirror squeezing and picking at blemishes. The results are irritation, red marks, and possibly permanent scarring.

Excoriated acne is usually mild, without pustules and papules. But for people with the disorder, it may be intolerable for a variety of reasons. People with picker’s acne often wish that they could stop, but they are driven by an uncontrollable desire to get rid of the acne. The compulsion to pick and squeeze every blemish regardless of its size is a medically recognized condition that should be discussed with a dermatologist. The occasional temptation to squeeze a blemish is not considered excoriated acne.

Is it acne?

The following conditions are sometimes mistaken for acne because they have similar symptoms.

- **Rosacea** is a chronic inflammatory skin disorder that affects people between the ages of 30 and 50, and is often mistaken for adult-onset acne. It is more common in women than men but more severe in males. People with darker pigmented skin are rarely affected. Areas affected by rosacea include the central part of the face (cheeks, nose, chin and forehead). It comes and goes, but eventually stays. Rosacea causes dilation of the blood vessels that give the skin a flushed appearance. Comedones are usually not found, and cysts and scars are rare, which helps distinguish it from acne.

  The cause of rosacea is unknown, but it is thought to be affected by factors such as hot and cold, spicy foods and alcohol. Further research indicates that it may have more than one cause. The demodex (a parasitic tiny mite that lives in or near the hair follicle) is a common organism seen, along with bacteria and fungi.

- **Folliculitis** is caused by irritation and inflammation of the hair follicle. It can appear anywhere on the body where friction occurs. Its symptoms include redness, swelling and pus formation.

- **Pseudofolliculitis barbae (PFB)**, also known as razor bumps, are unsightly pus-filled lesions that occur from shaving too close to the skin. As the hairs begin to grow, they curl and get trapped back into the follicle, causing an inflammatory action. This condition is common among African American men. PFB can be resolved through modification of the shaving regimen, including using a non-irritating, lubricating shaving gel, or prescription shaving foam containing benzoyl peroxide or a topical antibiotic that’s designed for men with acne.

  Men should use a sharp razor to avoid creating tension or pull on the hair or cut skin. They should shave downward in the direction of growth of the hair follicles to prevent irritation. After shaving, men also should forego the splash of cologne or alcohol-based aftershave, which only irritates the skin, especially if open cuts or recently popped pimples exist. Use an oil-free moisturizer or a prescription topical antibiotic lotion or gel instead. Shaving can be both a plus and minus for a man’s skin. The plus is that shaving each day acts as a natural exfoliant, opening pores so the excess oil can drain out. But shaving the wrong way or using the wrong product can exacerbate acne.

  If PHB is more severe and does not respond to a modification in the shaving routine, other viable options include electrolysis, use of chemical depilatories, growing a beard, and in more severe cases, topical steroid antibiotics.

- **Hidradenitis suppurativa (HS)** is a skin disease that most commonly affects areas bearing apocrine sweat glands or sebaceous glands, such as the underarms, under the breasts, inner thighs, groin and buttocks.

  The non-contagious disease develops as clusters of chronic abscesses, epidermal cysts, sebaceous cysts, pilonidal cyst (a cyst or abscess near or on the natal cleft of the buttocks that often contains hair and skin debris) or multiple infections, which can be as large as baseballs or as small as a pea. It can also start as a single abscess, and once it pops, can make tracts of many more abscesses. These cysts can be extremely painful to the touch and may persist for years with occasional to frequent periods of inflammation, culminating in incision and drainage of pus, often leaving open wounds that will not heal. For unknown reasons, people with HS develop plugging or clogging of their apocrine glands. HS causes chronic scarring and pus.
formation of the underarms (axilla) and groin and inner thigh areas.

The simple procedure of incision and drainage provides some relief from severe, often debilitating, pressure and pain. Flare-ups may be triggered by perspiration, hormonal changes (such as monthly cycles in women), humidity, heat, and friction from clothing. HS is painful, and depression can be difficult to manage.

HS often goes undiagnosed for years because patients are too ashamed to speak with anyone. When patients see a physician or medical practitioner, the disease is frequently misdiagnosed. There is currently no known cure or any consistently effective treatment. Several articles and clinics consider this disease as widely misdiagnosed because of misunderstanding of the causes and progression of the disease. HS is often referred to as an orphan illness because little current research is being conducted on it.

In 2005, The Hidradenitis Suppurativa Foundation Inc. (HSF) was founded. HSF is a nonprofit corporation dedicated to improving the quality of life and quality of care for individuals and families affected by hidradenitis suppurativa (HS). The skin disease affects an estimated 1 percent of the population. HSF was founded to support research of scientists and physicians devoted to studying HS and to develop and deliver more effective forms of treatment and preventative measures for those with HS.

- **Keratosis pilaris** is common among children and young adults. It often appears on the upper arms, thighs, buttocks, and in more severe cases, the face. Keratosis pilaris is caused by a buildup of keratin (the main protein found in skin and nails) within the hair follicle. These plugs give the skin a rough bumpy appearance and sandpaper feel. It occurs most commonly in drier climates and can persist for years.

- **Miliaria rubra**, also known as prickly heat or heat rash, is an acute inflammation of the sudoriferous glands. Small red bumps that may itch, sting or burn erupt on the skin’s surface. Miliaria rubra is usually limited to areas that are covered by clothing and is caused by exposure to excessive heat and worsens with sweating.

### Adult acne

Acne can no longer be thought of as a teenage problem. All it takes is excess sebum, dead skin cells and bacteria to create an acne lesion. Studies show that 40 to 55 percent of the adult population in the age range of 20 to 40 has been diagnosed with low-grade, persistent acne and oily skin.

Women are more likely to suffer from adult or late-onset acne than males, due in part to fluctuating hormone levels. According to a 2012 study published in the Journal of Women’s Health, acne affects nearly one-half of all women ages 21 to 40, and 12 percent of women ages 41 to 50. For most women, hormonal surges related to menstruation, pregnancy and menopause are responsible.

Adult acne usually consists of deep-seated, tender, inflamed pimples and nodules. The areas most affected are the chin, jaw line, mouth, chest and back. Symptoms include redness, increased skin sensitivity, slow healing, stress, and changes in pigmentation.

Researchers have found that the following may also contribute to adult acne:

- **Medications** – Some women are prescribed birth control pills (those containing both estrogen and progesterone) that can aid in suppressing mild to moderate cases of acne. Often, if the birth control is discontinued, the acne will flare up. Conversely, some medications, including anticonvulsants, corticosteroids and birth control pills containing only progesterone, can cause acne to worsen.

- **Chronic stress** – This should not be confused with temporary stressors that cause the occasional breakout. Research has found a link between increased stress levels and higher incidences of acne in women, especially those in fast-paced careers. The body responds to stress by producing more androgens, which then stimulate the sebaceous glands and hair follicles, creating the perfect storm for the formation of acne lesions.

- **Underlying conditions** – Acne can be a warning sign of an underlying medical condition, particularly in women. Adult women who experience acne along with excessive facial hair, thinning or balding hair and irregular menstrual cycles may be suffering from a condition referred to as polycystic ovaries (PCOS). This condition causes cysts in the ovaries or adrenal hyperplasia (a disorder of the adrenal glands). It is a common female endocrine disorder affecting between 5 and 10 percent of all women. The acne cannot be cleared until the PCOS is diagnosed and treated.

Excluding any underlying condition, most cases of adult acne can be controlled with acne therapy.

### Treating acne

The history of acne treatments can be traced back to the ancient Egypt, where it was recorded that several pharaohs suffered from acne. In ancient Rome, one of the few acne treatments available was bathing in hot, sulfurous mineral water. One of the earliest writings to mention acne was De Medicina, published in the first century by Aulus Cornelius Celsus.

Throughout the centuries, acne treatments have evolved. Following is a list of early remedies:

- **1800s** – Dermatologists use sulfur to treat acne for its drying properties.

- **1920s** – Benzoyl peroxide is introduced as a medication to treat acne.
such as tetracycline. a topical (antimicrobial or retinoid), along with a systemic drug

of therapy. In most cases, combination therapy (two or more treatments) will be prescribed. The dermatologist may prescribe the best results, the client needs to commit to regular treatments and get the condition under control. As the acne improves, treatments may become bi-weekly and then monthly. The therapist’s expertise will determine the client’s needs. To ensure the best results, the client needs to commit to regular treatments as well as follow a home-care regime.

It may be necessary for a client to start with a home-care regime until the skin has cleared or healed enough to carry out a professional treatment. Clients who are under the care of a dermatologist may need assistance treating side effects of their prescription medications, such as dryness and sensitivity. You also may need to start them on a skin care regime to prep the skin for further treatment. For example, a lightening product used before a professional treatment for hyperpigmentation is designed to boost the results.

Certain products may need to be discontinued before proceeding with certain treatments. A good example is Retin-A. This drug is usually suspended a few days before and after treatments such as chemical peels and microdermabrasion.

Keep in mind that you may need to evaluate makeup choices; check on issues such as phone hygiene; picking and touching the face, fabric, and hair care products; physical activity; stress level; diet and water consumption; work; and the home environment.

### Acne and the esthetician

For treatment to work, it must interfere with what is causing the acne. This is why many treatment protocols often require patients to use more than one medication.

To get results with our acne clients, we need to recommend a professional treatment program along with effective home-care products. The frequency and type of treatment will be determined by the grade of acne and the condition of the skin.

Initially, weekly visits may be necessary to clear the skin and get the condition under control. As the acne improves, treatments may become bi-weekly and then monthly. The therapist’s expertise will determine the client’s needs. To ensure the best results, the client needs to commit to regular treatments as well as follow a home-care regime.

### Addressing mild acne

Cases of mild acne consisting of small lesions that appear at or near the surface of the skin can often be controlled at home by:

- Gently cleansing the affected area twice daily with a mild cleanser and warm water to remove excess oil and dead cells.
- Applying a topical over-the-counter preparation containing benzoyl peroxide, salicylic acid or both.

Instruct clients to never pop, pick or squeeze blemishes because that leads to further inflammation and possible scarring that can be permanent. Furthermore, tissue damaged by picking can become infected with staphylococci, streptococci and other forms of harmful bacteria.

Results can usually be seen in four to eight weeks. Once the condition improves, treatment should be continued to prevent new lesions from forming.

If acne does not respond to at-home treatment, a trip to the dermatologist may be in order. A dermatologist can further assess the situation and determine the most appropriate course of therapy. In most cases, combination therapy (two or more treatments) will be prescribed. The dermatologist may prescribe a topical (antimicrobial or retinoid), along with a systemic drug such as tetracycline.

The following tips may be useful in treating mild cases of acne:

- Use products exactly as prescribed – Acne can only be controlled when treatment targets everything that is causing the condition. Because most medications only target one or two causes, it may be necessary to use multiple products.
- Discontinue the use of acne treatments not prescribed by a practitioner – Using acne products that are not part of the plan can irritate the skin and lead to more breakouts. More is not always better. Individuals with acne often will apply too many products in an effort to clear the condition quicker.
- Avoid abrasive products – These are potentially irritating and can lead to more breakouts.
- Wait five to 15 minutes before applying topical medications – The skin is most absorbent when wet; application too soon after showering or cleansing can result in irritation and breakouts.
- Use only oil-free skin and hair care products – Makeup, hair gel and other products should not contain oils, which tend to clog pores, the source of the acne lesion. Recommended products should be labeled oil-free, non-acnegenic, or non-comedogenic.
Professional treatments

Estheticians today have a wide variety of treatments and tools to help them treat acne.

Microdermabrasion – This is a cosmetic procedure used in both spas and physicians’ offices that uses crystals, such as aluminum oxide or diamond flakes, to gently remove the outermost layer of dead cells from the epidermis, allowing fresh new cells to reach the surface. Results are temporary, and treatment should be repeated at two- to four-week intervals for continued improvement. Multiple treatments coupled with home care, including sunscreen and sun avoidance, yield the best results. Microdermabrasion can be combined or alternated with other treatments, including chemical peels and facials. It is important to obtain the necessary training for carrying out this procedure as well to follow the manufacturer’s instructions. Skin sensitivity and mild erythema are common side effects, but most people return to daily activity immediately following treatment.

According to the Esthetics Manufacturers and Distributors Alliance, the FDA lists microdermabrasion equipment as Class I devices intended for use by licensed practitioners trained in the appropriate use of such equipment. For purposes of these guidelines, microdermabrasion equipment is considered a cosmetic resurfacing exfoliating substance only if it is used in a manner that is not intended to remove viable (living) skin below the stratum corneum.

Chemical peels – Combinations of AHAs (alpha hydroxy acids) and BHAs (beta hydroxy acid) have been found to provide exfoliation and antibacterial action. The level of exfoliation depends on the type and concentration of the acid, its pH (the degree of acidity or alkalinity) and other ingredients in the product. It is imperative for the esthetician to know the concentration of the acid as well as the pH. The Cosmetic Ingredient Review Panel (CIR) outlines the proper use of cosmetic resurfacing exfoliating procedures as follows:

“Cosmetic use AHAs” means alpha hydroxy acids and exfoliation preparations that do not exceed a 30 percent concentration with a pH value no lower than pH 3.0 as established by and recommended by the Cosmetic Ingredient Review Expert Panel and the formulations administered by a skin care professional have a concentration of no less than 30 percent with a pH of no less than 3.0.

AHAs are complex chemical compounds that are either naturally occurring or synthetic. AHAs are found in products claiming to reduce wrinkles and improve the overall appearance of the skin. The AHAs most commonly used in cosmetics are typically sourced from food products.

An AHAs’ effectiveness in skin care relies on its ability to permeate the top layer of skin. Glycolic acid has the smallest molecular weight and is used in concentrations of 5 to 70 percent. Over-the-counter preparations ranging from 5 to 10 percent help to reduce cell adhesion in the top layer of the skin. Concentrations of 10 to 50 percent have been shown to smooth the skin, and applied by a physician in formulas from 50 to 70 percent can have a significant impact in treating acne.

Salicylic acid is a beta hydroxy acid best known for its ability to open obstructed pores and promote shedding of epithelial skin cells without the irritation associated with the use of some AHAs. A component of aspirin, salicylic acid was once sourced from the bark of willow trees.

Acnes type I and II (pustules and comedones without deep cysts) will respond best to superficial peels. Comedones will be lifted out and pustules will dry up quickly.

Equipment guide

Wood’s light – Developed by physicist Robert Williams, this medically based tool uses filtered black ultraviolet light that illuminates skin disorders, allowing for more thorough skin analysis.

Magnifying lamp – Used to get a bright, enlarged view of the skin, making skin analysis and extractions easier to perform.

Electrical brush – Recommended for oily, comedone-prone skin, but not for sensitive, infected or inflamed acne lesions.

Steam – Used carefully, steam relaxes, warms and softens the skin, making comedone removal easier. Ozone was added to steam for its drying properties on acne. Now considered a respiratory irritant, ozone was achieved by including a UV bulb in the arm of the steamer. As the water vapor passes over the bulb, the UV light reacts with the oxygen naturally present, and converts it to ozone gas.

Ultrasonic blade – Ultrasound uses sound waves at specific frequencies to create a mechanical effect in the tissues, like ripples of water. As the energy within the sound wave is passed to the material, it will cause oscillation of the particles of that material. Ultrasound allows for the release of dead surface skin cells and loosening of comedones, therefore making it a deep cleansing treatment. Modern day therapeutic ultrasound machines may have a blade that can be used to help remove dead skin cells, resulting in a superior deep cleansing action.

Desincrustation – This is a pre-softening treatment performed before extractions. It may consist of a soapless skin softening solution that is applied under steam and left on while extractions are completed or alternatively, used with galvanic current. The solution must be able to conduct the electrical galvanic current and be water-soluble. Galvanic current is used on the negative pole for desincrustation. The negative pole releases hydrogen on the surface of the skin, which converts naturally occurring salts (sodium chloride) in the skin to sodium hydroxide (caustic soda). This mixes with the oily comedone plugs and softens them, making extractions easier.
Iontophoresis – Also known as ionization, this is a process where galvanic current is used on the positive pole or negative pole to pass active substances through intact skin, where once penetrated, they perform a specific function.

Vacuum suction – The vacuum massage is a mechanical method to stimulate lymph circulation. The treatment may be applied after manual cleansing or steam to increase removal of comedones, sebaceous matter and reinforce the initial cleansing. Vacuum suction is not recommended for skin that is broken, inflamed or irritated.

High frequency – Use of the Tesla current (an alternating radio wave) uses gas-filled electrodes on the skin’s surface. The gas, either neon or argon, is ignited within the electrode by electrical current. The gas glows, giving off ultraviolet light, which when exposed to the oxygen in the air, converts to ozone gas. The release of the ozone gas is drying and germicidal to the skin. The ozone quickly breaks down into active oxygen, which is healing and antibacterial. The skin must be completely dry before use, and the high frequency should be used over dry gauze on the skin to avoid a large gap between the electrode and the skin that can result in burns.

Dr. Lucas pulverizer – Useful in acne treatments for several reasons, including:
- Aids in the removal of cleansing products, clay masks and exfoliant residue from the skin without sponges or clothes.
- Re-hydrates and soothes the skin with a fine mist of pulverized herbal extracts during or at the conclusion of the treatment.

Ingredients for fighting acne

These products are used to treat mild, moderate and severe acne. An over-the-counter (OTC) product’s effectiveness depends on the active ingredients; not all actives work the same way. For example, the active ingredient benzoyl peroxide reduces *P. acnes*, whereas salicylic acid helps correct abnormal skin shedding. For acne to clear, the ingredients must address the factor that is the cause of the condition. Following are some common actives used in acne preparations. They are listed based on their benefit in treating acne.

Excess sebum
- Microsponges – Microscopic spheres capable of absorbing and holding skin secretions (up to four times their weight), therefore reducing oiliness and shine from the skin.
  - Kaolin.
  - Bentonite.

Bacteria (*P. acnes)*
- Benzoyl peroxide (BPO).
- Sulfur.
- Rosemary.
- Balm mint.
- Zinc gluconate.
- Tea tree.
- Cinnamomum bark.
- Spiraea ulmaria.

Inflammation
- Oat extract.
- Licorice.
- Zinc sulfate.
- Green tea.
- Panthenol.
- Bisabolol.
- Menthol.
- Spiraea.
- Aloe vera.

Cell proliferation and impacted follicles
- Salicylic acid.
- Lactic acid.
- Sulfur.
- Papain.

Sebum production
- Niacinamide.
- Yeast extract.
- Horse chestnut.
- Zinc gluconate.
- Caffeine.
- Sarcosine.
- Biotin.
- Enantia bark.

More about benzoyl peroxide (BPO)

One of the most popular OTC acne treatments, BPO works to clear up acne by reducing *P. acnes* and removing dead skin cells from the surface to prevent plugged follicles. It was one of the first ingredients found to be effective in treating mild acne and has been used for decades.

Side effects include excessive dryness of the skin, so it is important to not use more than the prescribed amount. BPO also has been known to bleach hair, sheets, towels and clothing. For this reason, care should be taken when applying this product to acne on the back, chest or shoulders.

BPO is available in a wide range of strengths and can be found in many forms, including cleansers, gels, creams and lotions. Higher strengths are only available by prescription and often combined with other preparations because BPO has been shown to increase the effectiveness of other medications, such as erythromycin and clindamycin. BPO also reduces the likelihood of a patient developing antibiotic resistance, and should be taken once acne lesions clear to prevent new ones from forming.
The truth about natural acne treatments

Most people have tried a natural acne treatment at least once or have been tempted to try an all-natural supplement or diet that certainly may seem like a safe option. But all-natural supplements may not be as safe as you think. And, despite the claims, studies have not proven that any acne diet works. (Consider this: poison ivy, poison oak, poison sumac, even cyanide are all “natural” substances.) All-natural supplements can have serious side effects.

Perhaps you would expect supplements sold in health food stores and online to be safe. But some evidence exists that these products can create problems with skin, hair, and nails, including a rash, scaly skin, breakouts on the scalp, lots of hair loss, and discolored nails. Women have reported dizziness and fatigue.

For two women with such problems who had used a supplement, testing revealed that the supplement contained more than 200 times the amount of selenium stated on the label. Our bodies need selenium for healthy skin, but too much can be toxic and cause selenium poisoning.

If you are looking for a home remedy for acne, you may see selenium for sale. Taking too much selenium can cause serious health problems, similar to the ones experienced by those women. Hundreds of people reported health problems after taking the supplement that contained too much selenium. Eventually, stores stopped selling this supplement.

So how did this dangerous supplement end up in the hands of these people?

In the United States, supplements do not need to be tested and found safe before they are placed on store shelves or sold online. Companies that make supplements do not need to prove that a supplement works. The government does not require safety testing of the ingredients that go into supplements. Even when the ingredients come from another country, safety testing is not required.

As a result of this lack of regulation, potentially harmful supplements do make their way onto store shelves from time to time. It can be very difficult for the U.S. government to order retailers to stop selling a supplement. Instead, it issues warnings. This means you need to listen to the news or browse the Internet for information, including recalls.

The government also may ask a company to recall products considered unsafe. Recalls are voluntary, but companies usually comply. However, recalls only happen after problems occur. This makes it very difficult to know which supplements are safe. Diets should be safe, so why can’t studies prove which foods affect acne? It certainly seems possible that what people eat and drink can affect their acne. Research also shows that taking the medication lithium can make a person’s acne worse.

What have studies shown can treat acne? This is what the research shows:

- Skin care makes a difference and can be just as important as treatments to clear acne. Proper skin care can reduce possible side effects from prescription medications. It can make a product that can be purchased without a prescription more effective, and help to prevent new breakouts.

- Healthy foods deliver more nutrition than supplements. Fresh fruits and vegetables, whole grains, and other foods found in a healthy diet contain many beneficial nutrients. For example, plants contain phytochemicals, which interact with the body in many different ways to keep people healthy. It would be impossible to get all the nutrients a body needs from a pill or powder formulation.

- Supplements can interact with prescription medicines and cause unexpected problems. The dermatologist should be made aware of clients’ consumption of vitamins, minerals, herbs, and other supplements. This measure is for the patients’ protection.

- Medicine prescribed by a dermatologist has been tested and found to work on acne. Before a medicine can be used in the United States, it must be tested in clinical trials and found to be safe and effective.

Ayurveda and acne

The ancient art of Ayurveda has been practiced in India for many centuries and is presently gaining popularity in the West. Ayurvedic medicine states that all diseases stem from improper organ imbalances and poor diet.

The first principle of Ayurveda focuses on the role of energy in determining the health of a person. Energy is the core of all human activity, and when there is an imbalance of energy, the tissues and organ systems begin to fail.

Does Ayurveda work on acne?

Like most traditional medicines, balance is of utmost importance to Ayurveda. When you aggravate the three centers of energy, you become ill. Your dosha (A dosha or dosa is one of three bodily humors that make up one’s constitution,
according to Ayurveda) is the own body’s balance. We start off with having perfect doshic constitutions. However, because of modern living, our doshic constitution often becomes unstable.

Imbalances are often caused by dietary habits and lifestyle. Bad dietary habits include too many products made with white flour, sugar, greasy, fried and spicy foods. And if you combine bad dietary habits with the following bad lifestyle habits, you can become ill:
- Stress.
- Tension.
- Polluted environments.
- Excessive use of synthetic chemicals.

According to Ayurveda, when the pitta dosha becomes aggravated too much, you will get acne.

### Ayurveda side effects on acne

It appears that some of the traditional remedies in Ayurvedic medicine make use of heavy metals. Heavy metals in large amounts are never safe for the human body. Certain elements that are normally toxic are actually beneficial for certain organisms or under certain conditions. Examples include vanadium, tungsten, and even cadmium. Living organisms require varying amounts of heavy metals; humans require iron, cobalt, copper, manganese, molybdenum, and zinc. But excessive levels can be damaging to the organism.

Heavy metal toxicity can result in damaged or reduced mental and central nervous function, lower energy levels, and damage to blood composition, lungs, kidneys, liver, and other vital organs. Long-term exposure may result in slowly progressing physical, muscular, and neurological degenerative processes that mimic Alzheimer’s disease, Parkinson’s disease, muscular dystrophy, and multiple sclerosis. Allergies are not uncommon, and repeated long-term contact with some metals (or their compounds) may be carcinogenic (cancer causing).

So far, no scientific tests to prove the effectiveness of this approach to treating acne can be found. Individuals willing to try this approach should first consult with a physician to avoid causing any undue injury to their health.

### Chinese medicine and acne

Traditional Chinese medicine has been the mainstay of alternative medicine in many regions around the world. Trained Chinese traditional doctors practice in the United States, the United Kingdom and other regions of the Western world.

How old is traditional Chinese medicine? It’s very old, roughly 4,000 years old. It’s still growing and it’s still being developed. One of the basic principles of traditional Chinese medicine is that there must be balance between the opposing forces of life itself, better known as the Yin and the Yang.

Yin is male: light, goodness, health, and other positive things. The Yang is female, darkness, cold, and so on. It is the balance of these two poles that result in health. Traditional Chinese medicine states that any discord that exists between the two poles will result in dysentery, disease and death.

Homeostasis, the process of returning the body to its original state of balance, is the aim of traditional Chinese medicine.

#### Chinese herbs used to treat acne

The following Chinese herbs are used in treating acne:
- Flowers of the honeysuckle plant.
- Dandelion.

The following are guidelines used in the treatment of acne at home, according to Ayurvedic principles:
- Drinking fresh aloe vera juice at least twice a day.
- Applying nutmeg paste to the afflicted areas of the face.
- Nutmeg should be mixed with water to produce a paste that can be applied like a cream or ointment.
- Creating face packs from orange peels. Pounded orange peels are added to water to form a paste that should then be applied generously to the affected regions of the face, neck, back or chest, or wherever the acne has manifested itself.

The sunder vati herbal drink is also recommended. The sunder vati drink is composed of ginger, holarrhena antidysenterica, embella ribes and kampo.

The following are guidelines used in the treatment of acne at home, according to Ayurvedic principles:
Understanding Chinese herbal preparations

Remember, not everyone is capable of understanding just what goes into traditional Chinese herbal preparations. What a user ingests could be a strong concoction that could improve acne – or perhaps not.

Herbal preparations are NOT weak. Many herbal preparations can be as strong and potent as the drugs dispensed in modern drug stores. These preparations may have been mixed in much more primitive conditions, but that doesn’t mean that they can’t affect the body.

There have been reports of individuals reacting violently to herbal preparations. Ma huang, once a popular diet pill ingredient, is now banned in the U.S. because it causes severe reactions in users. Anyone choosing to try Chinese herbal preparations for the treatment of their acne should contact an authentic Chinese herbalist to produce the herbal mixtures into a capsule form.

Effectiveness of Chinese herbs in acne treatment

Traditional herbal preparations cannot produce the effects of tetracycline or minocycline. It’s also not as effective as topical remedies, such as benzoyl peroxide. So why do people still try traditional Chinese medicine?

Commitment is often the reason for sticking with herbal remedies. People who don’t like synthetic chemicals and expensive drugs often make use of cheaper herbs that are easier on the pocket. However, it will take a very long time before severe instances of acne will clear up. If a normal Accutane treatment takes from six months to more than a year, the herbal treatment of acne may take even longer.

Homeopathy is an ancient proto-medical approach to the treatment of disease. The base principle of homeopathy is this: If a substance can cause adverse illness in a robust person, the same substance is capable of treating an ill person if administered properly.

For example, if substance A can produce chicken pox-like symptoms in a healthy person, then it would stand to reason that it can be used to treat a person with real chicken pox.

The method for treating diseases was developed 300 years ago by Samuel Hahnemann, in Germany. In essence, the small doses administered act as vaccines that help the body repair itself.

Homeopathic acne treatments

Various homeopathic remedies that have been marketed as acne treatments:
- **Antimonium tartaricum** is primarily prescribed by homeopaths for individuals with large pustules that are very tender and very painful (inflammatory acne).
- **Calcarea carbonica**, on the other hand, can be taken by people who suffer from frequent breakouts of acne and other painful skin conditions. This mixture was supposedly designed to increase the resistance of the skin to disease.
- **Hepar sulphuris calcareum** is recommended when boils are present. It also is useful in treating skin that heals poorly or slowly and can be applied to lesions that are beginning to form into pustules.
- **Pulsatilla** is effective for acne sufferers who developed the disorder because of poor dietary choices. An over-dependence on fatty foods (animal fat, red meat, and so on) can trigger acne. Pulsatilla is recommended for acne sufferers who are just entering puberty. It’s also recommended for women who have breakouts during menstruation.
- **Silicea** is another acne remedy that is recommended for individuals who have been suffering from acne for years. The longer you’ve had acne, the deeper the problem becomes in the skin.
- **Sulfur** is indicated for individuals who are having trouble with itchy skin, which often results in reddish hues and abnormal-looking patches.

Where can people find these exotic-sounding homeopathic remedies? Visit your local health store, where they may be found in the form of a tablet, powder, granule or liquid.

The key is to match the remedy with a specific symptom. Some physicians don’t mind homeopathic remedies because they produce little or no direct effects in the body. However, if suffering from something very severe, it’s best to consult with a physician for a prescription.

Does homeopathy work for acne?

While it is important to be open to holistic and home remedies and to someday get to the root of acne, there simply are no other chemicals or compounds today that can penetrate the skin and deliver the oxygen needed to wipe out acne-causing bacteria. Without the ability to penetrate the skin, most homeopathic treatments are limited.
The table below lists ingredients that score a 3 or above on the scale of comedogenicity ingredients; the scale is measured with 0 being the least likely to clog pores and 5 being highly likely to clog pores. If the highest-scored are among the first seven ingredients listed on a product, you may want to reconsider. If, however, any of these ingredients are far down on the list, it usually means the manufacturer may have included it in a very small amount, and therefore, the product may still be safe to use. This type can be used as an illustration for clients when choosing products that will not aggravate their condition.

The question many estheticians hear time and time again is, “What do you recommend that I can purchase from the drugstore?” The answer should be, “Nothing.” There is value in spending money on good products for their skin, especially if they are prone to acne. This is not to say that all drugstore products are bad; there are more choices now than ever before. It’s just that acne, as noted above, usually responds best to combination therapy because more than one issue may need to be addressed.

The esthetician is charged with educating the client on the best course of treatment. A good example would be to analyze cost. Products that cost more are usually going to have a higher percentage of active ingredients and may not contain parabens, preservatives or other ingredients that may have been deemed potentially harmful.

For example, parabens are a group of preservatives that have been used in cosmetics for decades. Recent attention has been drawn to them because parabens have been found in breast tissue taken from cancer patients. Research on the subject is inconclusive and ongoing at this time. However, many cosmetic companies and skin care manufacturers have chosen to voluntarily remove these preservatives in their products to appease today’s much more savvy or “green” consumer.

The following is listed from the highest level of comedogenicity to the lowest:

5 – Isopropyl isostearate.
5 – Isopropyl myristate.
5 – Myristyl myristate.
5 – Laureth-4.
5 – Oleth-3.
4 – Coconut butter.
4 – Acetylated lanolin.
4 – Acetylated lanolin alcohol.
4 – Lauric acid.
4 – Isopropyl palmitate.
4 – Isostearyl isostearate.
4 – Myristyl lactate.
4 – Stearyl heptanoate.
4 – Cetearyl alcohol + ceteareth 20.
4 – Cocoa butter.
3 – Mink oil.
3 – Soybean oil.
3 – Shark liver oil.
3 – D&C red No. 30.
3 – Stearic acid: TEA.
3 – Myristic acid.
3 – Buytl stearate.
3 – Decyl oleate.
3 – Isostearyl neopentanoate.
3 – Glyceryl stearate SE.
3 – Wheat germ glyceride.
3 – Laureth-23.

Acne and cosmetics

A lot of time, effort, and money go into looking your best. Americans shell out nearly $9 billion annually for creams, scrubs, concealers, and a vanity full of other cosmetics that claim to keep our skin looking clean, clear, and more youthful. Ironically, the very same products relied upon to keep skin looking its best could be doing a great disservice to the pores. Using the wrong makeup or cream could actually accentuate the pimples that acne sufferers try so hard to conceal.

Moisturizers and acne

Somehow the idea that moisturizers are a bad for acne-prone skin began circulating a few years back. Consequently, a lot of people with acne avoid them in fear of more breakouts. Nothing could be further from the truth; in fact, moisturizers are an essential part of the acne skin care routine. Most acne treatments prescribed or recommended by professionals tend to contain potentially drying ingredients, such as benzoyl peroxide, which can suck the moisture out of your skin and leave it looking and feeling red, dry and irritated. A good moisturizer will keep the water in your skin and help avoid unsightly drying and peeling.

Moisturizers for acneic skin should be lightweight and oil-free and labeled “non-comedogenic.” Ingredients like glycerin and hyaluronic acid will help bind moisture to the skin. Products that should be avoided include heavy, greasy formulations with ingredients such as cocoa butter, mineral oil, or cold creams.

Scrubs and acne masks

The experts have weighed in on the benefits of scrubs and mask for treating acne, and studies show that masks and scrubs do little, if anything to improve acne. It’s better to choose a non-abrasive cleanser specifically formulated for dry, oily or combination skin...
Makeup and acne

People have been covering up their blemishes for centuries. In the 1600s, women wore star-and-moon-shaped silk patches to hide their smallpox scars. Today, we use makeup to camouflage our pimples, but applying layer after layer of cover-up when you have acne isn’t necessarily the best approach.

Makeup can be very good at hiding pimples, but it can also accentuate them if you use the wrong kind of concealer or slather it on too thickly. The redness and peeling that many acne treatments leave behind can look even worse when smeared with thick makeup.

All makeup (foundation or powder, blush, and eye shadow) should be non-greasy, non-comedogenic (or non-acnegenic), hypoallergenic, non-irritating, and oil-free. Makeup free of possible acne-causing ingredients should contain water as its first ingredient.

Acne and sunscreens

Sunscreen doesn’t cause acne. And while red, sunburned skin might be a temporary fix to hide acne, getting too much sun can also leave behind premature lines and wrinkles, and increase the risk of skin cancer. Skin needs to be protected from the sun’s harmful rays.

Professionals should recommend a broad-spectrum sunscreen with an SPF of at least 30 that protects against both UVA and UVB light. A water-based or light liquid-based gel or spray-on sunscreen is best for people who tend to get breakouts, as well as light lotions and powders. Most makeup today has SPF protection included in the formulations. “Non-comedogenic” or “non-acnegenic” should be printed on the label.

Chemicals such as PABA and benzophenone can irritate sensitive skin, and physical sunscreens should contain zinc oxide or titanium dioxide. Sunscreens with higher SPFs, such as 60 higher, can also irritate the skin if used on daily basis for sun protection. Higher formulations tend to contain more chemicals that can aggravate acne.

Dermatological treatments

This section will address methods used by dermatologists to treat moderate to severe cases of acne. There will be some crossover, because estheticians and physicians both perform microdermabrasion and chemical peels. Obviously, when a physician provides these services, the treatment can be and usually is more aggressive.

Grades III and IV should always be referred to a physician because they involve cysts and nodules, and any attempt by an esthetician or patient to treat these types of acne will only result in spreading the infection and possible scarring.

Treatments to address these cases may include:
- Physical methods, such as comedone extraction, chemical peels and light therapy.
- Prescription medications and topicals such as antimicrobials, retinoids, oral antibiotics and oral contraceptives (females only).

Physical methods for treating acne include:
- Drainage and surgical excision – Some large cysts do not respond to medication and may require drainage and extraction. Acne surgery, as it is referred to, should only be performed by a qualified dermatologist under sterile conditions. Patients who attempt to drain and extract lesions on their own may incur infection, spread the disorder and cause scarring.
- Interlesional corticosteroid injections – When an acne cyst becomes severely inflamed, there is a chance that it will rupture and result in scarring. To treat these cysts and minimize the chances of scarring, a dermatologist may inject the cyst with a diluted corticosteroid. This lessens the inflammation and promotes healing. The injection works by literally melting the cyst over a period of days, typically three to five.
- Chemical peels can be administered up to strengths of 70 percent by doctors, or up to 30 percent by estheticians in spas and salons. Chemical peels are acids that are applied to the skin about once every two to four weeks, depending on the severity of the condition and age of the client. Skin turnover can take anywhere from 21 to 45 days, depending on the condition of the skin and age of the client. These acids chemically exfoliate the top layers of skin. This exfoliation signals the cells inside the skin to produce more rapidly, which can help hasten skin turnover and prevent pores from becoming clogged. Chemical peels are also sometimes used to help lessen the appearance of acne scars. Studies show about a 45-50 percent reduction in acne lesions after a series of four to six peels. Most study
participants report a fair to good result. Results tend to last for one to two months, with acne beginning to reoccur at this time.

Types of peels used in salons and physicians’ offices include:
- Glycolic acid.
- Salicylic acid.
- Lactic acid.
- Polyhydroxy acid.
- Amino fruit acid.
- Pyruvic acid.
- Trichloroacetic acid (TCA).
- Jessner’s peel.

More on polyhydroxy acid
Alpha hydroxy acids (AHAs) may be irritating to the skin of many sensitive skin patients. Gluconolactone and lactobionic acids are types of polyhydroxy acid (PHA) that are as effective as AHAs but less irritating. Polyhydroxy acids are often combined with vitamin A, and vitamin E and vitamin B, resulting in rich emollient products that help hydrate the skin, reduce fine lines and wrinkles with gentle exfoliation and improve uneven pigmentation and sun damage. Polyhydroxy acids are produced synthetically, but can also be produced by plants.

Special considerations for trichloroacetic acid (TCA) and Jessner’s peel
Trichloroacetic acid has the ability to penetrate deep into the papillary dermis, so it must be used with caution. An esthetician should never attempt to perform TCA peels; they must be performed under medical supervision by a physician. Proper wound care must be addressed immediately following application of a deep TCA peel. TCA peels are recommended for Fitzpatrick skin types I, II, and III.

The Jessner’s peel is a combination of 14g of salicylic acid, 14g of resorcinol and 14g of lactic acid in an ethanol solution. It is indicated for the treatment of acne vulgaris, hyperpigmentation and as a pre-treatment before a TCA peel for Fitzpatrick skin types I, II, and III.

A modified Jessner contains equal amounts with fewer grams of each active substance, and are considered to be superficial and controllable. Unlike an AHA, Jessner’s solutions tend to penetrate more uniformly and create a significant amount of exfoliation. Always purchase the solution from a reputable manufacturer and apply according to its instructions. A patch test is highly recommended before carrying out this type of peel.

Side effects
Most people experience a sunburnt look with obvious peeling of the skin in the days after their first peel. This redness and peeling tends to be less pronounced with each consecutive peel. Temporary darkening of the skin has been reported, and some people with darker skin have experienced skin lightening, which can be permanent. It is vital that people with darker skin and people who are prone to keloid scarring consult an experienced dermatologist before embarking on chemical peels. Because the process actually does peel away the protective layers of the skin, the skin will be much more sensitive to sunlight and ultraviolet rays. It is extremely important to keep the skin protected by staying out of the sun and using an adequate SPF.

- **Comedone extraction**
  Removing comedones can sometimes prove beneficial. Dermatologists use a sterile, pen-sized device to remove comedones.

- **Phototherapy**
  Laser and light treatments usually target only one cause of acne, specifically *P. acnes*. The advantages of phototherapy include not having to remember any medication and the ability to treat hard to reach areas such as the back. Light therapy or phototherapy (classically referred to as heliotherapy) consists of exposure to daylight or to specific wavelengths of light using light lasers, light-emitting diodes, fluorescent lamps, dichroic lamps or very bright, full-spectrum light, usually controlled with various devices. The light is administered for a prescribed amount of time. With targeted phototherapy administered only to the affected area of skin, more intense dosages of light can be administered, allowing skin conditions to be repaired in less time.
  - Photodynamic therapy (PDT) – A form of phototherapy that uses nontoxic light-sensitive compounds that are exposed selectively to light, whereupon they become toxic to targeted malignant and other diseased cells. PDT has proven ability to kill microbial cells, including bacteria, fungi and viruses. To understand the mechanism of PDT, it is important to distinguish it from other light-based and laser therapies, such as laser wound healing and rejuvenation, or intense pulsed light hair removal, which do not require a photosensitizer.
    - Most modern PDT applications involve three key components: a photosensitizer, a light source and tissue oxygen. The combination of these three components leads to the chemical destruction of any tissues that have either selectively taken up the photosensitizer or have been locally exposed to light.

    Evidence for light therapy and lasers in acne vulgaris as of 2012 is not sufficient to recommend them. While light therapy appears to provide short-term benefit, there is a lack of long-term outcome data or data in those with severe acne. Treatments can be costly, and for many patients, lasers are not a comprehensive course for resolving their acne.

Data from clinical trials is limited. The Food and Drug Administration classifies laser and light therapies as procedure-oriented; therefore the stringent, long-term studies necessary for approval of drugs is not required. Clinical trials conducted to test a new drug are usually required to have hundreds, sometimes thousands of participants before the findings can be submitted to the FDA for consideration. With such small numbers, statistically valid conclusions cannot be drawn. More comparative
studies are needed to determine long-term effects and to perfect these technologies.

Medications for treating acne

Many different treatments exist for acne, including benzoyl peroxide, antibiotics, retinoids, anti-seborrheic medications, anti-androgen medications, hormonal treatments, salicylic acid, alpha hydroxy acid, azelaic acid, nicotinamide, and keratolytic soaps. They are believed to work in at least four different ways, including, normalizing skin shedding and sebum production in the pore to prevent blockage, killing \emph{P. acnes}, anti-inflammatory effects, and hormonal manipulation.

A variety of prescription medications are used today to clear acne. Topical (applied directly to the skin) medications may be prescribed for mild to severe acne. Systemic therapies (taken by mouth) work internally to treat moderately severe to severe acne. These medications play a crucial part in acne treatment by attacking the different factors that lead to acne. To achieve long-term results, dermatologists often combine therapies. Following are descriptions of medications used in the United States to treat acne.

Oral antibiotics

Oral antibiotics are prescribed for patients with moderate to severe acne, and have been a mainstay in acne therapy for years. Like topical antimicrobials, antibiotics work by reducing the \emph{P. acnes} population, which in turn decreases inflammation. Treatment usually begins with a higher dose, which is reduced as the acne resolves. Oral antibiotics are generally prescribed for six months or less.

There is a chance that \emph{P. acnes} can become resistant to the antibiotics used to treat them, and antibiotics are becoming less effective with an increase in \emph{P. acnes} resistance. When this occurs, acne can no longer be controlled, and it is not uncommon for an alternate medication or treatment to be prescribed.

A number of studies support the effectiveness of the following oral broad-spectrum antibiotics for the treatment of acne:

- **Erythromycin** is effective against a wide range of bacteria, including \emph{P. acnes}; it works by reducing the changes the bacteria cause to stop the acne. Individuals taking erythromycin should avoid sun and tanning beds. The most common side effects are gastrointestinal distress and yellowing of teeth in young children.

- **Clindamycin** is used to treat infections with anaerobic bacteria. The most severe and common side effect is gastrointestinal distress. Clindamycin is marketed under various trade names, including Dalacin and Daclain. Combination products include Duacl, BenzaClin, Clindoxyl and Acanya (includes benzoyl peroxide), and Ziana (includes tretinoin).

- **Tetracyclines** are a group of broad-spectrum antibiotics that work by reducing the papules and pustules associated with acne. Long-term low doses may be continued for many months to suppress the condition. Doxycycline has proven especially effective in treating inflammation; its most serious side effect is ultraviolet sensitivity. Minocycline is an effective treatment for those who have not responded to other oral antibiotics, and seems to produce fewer incidents of antibiotic resistance. In North America and Europe, a significant number of acne patients no longer respond well to treatment from this family of antibiotics because their acne symptoms are caused by bacteria, primarily the \emph{P. acnes} that are resistant to these antibiotics.

- **Oral contraceptives** have proven effective in clearing acne in women by suppressing the overactive sebaceous glands, and can be used long-term. Oral contraceptives are not recommended for women who smoke, are prone to blood clots, suffer from high blood pressure, are over the age of 35, and have a history of migraines.

- **Hormone replacement therapy** is usually reserved for female patients who develop acne around or after menopause. This is more likely to be prescribed when the acne is accompanied by mood swings, anxiety, insomnia, hair loss and decreased verbal skills.

- **Isotretinoin (Accutane)** – Isotretinoin is marketed under many brand names by different manufacturers including Amnesteem, Claravis, and Sotret. Accutane is a powerful systemic drug reserved for treating severe cystic acne and acne that has proven itself resistant to other therapies. Isotretinoin is a synthetic retinoid (form of vitamin A) that comes in the form of a pill; it is usually taken once or twice a day for 16 to 20 weeks.

It works by halting oil production and decreasing inflammation, and has the potential to suppress acne long-term. While considered to be the most effective treatment available, not everyone with severe acne is a candidate because of a number of potential side effects, including the potential to cause birth defects in a developing fetus. For this reason, the FDA requires that women not be (or become) pregnant while taking the drug. Furthermore, women of childbearing age are required to take pregnancy tests before beginning any course of therapy and use two forms of birth control one month before taking the drug, while taking the medication, and for one full month following therapy. It is also emphasized that women not nurse during this time. Women who wish to become pregnant after finishing isotretinoin should consult with their dermatologist and gynecologist about when it would be safe to conceive.

Other possible side effects that may occur include:

- Severe chest and abdominal pain.
- Trouble swallowing or painful swallowing.
- Severe headaches.
- Blurred vision or dizziness.
- Bone and joint pain.
- Nausea and vomiting.
● Irritable bowel syndrome (IBS).
● Ulcerative colitis.
● Liver damage.
● Diarrhea and rectal bleeding.
● Depression, psychosis, suicidal thoughts and attempts.
● Dryness of the skin, eyes and nose.
● Thinning hair.

Patients are monitored through regular follow-up visits. Any serious side effects should be reported to the practitioner immediately. To prevent relapse, it is important to take isotretinoin as prescribed, even if the acne clears before all the pills have been taken. Accutane works in 80 out of 100 people with severe acne, while one-third relapse after successful treatment within the first year. The FDA now has a registry in place for all individuals prescribing, dispensing, or taking Accutane. While taking Accutane, patients are considered at high risk for abnormal healing and the development of excessive granulation tissue. Patients are advised against procedures such as dermabrasion and laser treatments for up to one year following treatment. Other procedures to be avoided during therapy include tattoos, piercings, waxing, and any other form of epilation.

**Topical antimicrobials**

These products are used to treat patients with mild to moderately severe inflammatory acne by inhibiting the population of *P. acnes*. They can be used alone or combined with other products to treat other factors that contribute to acne besides *P. acnes*.

Prescription topical antimicrobials used to treat acne in the United States Include:

- **Azelaic acid** is an organic compound, found in wheat, rye, and barley. It is a component of a number of hair and skin conditioners. Azelaic acid is used to treat mild to moderate acne, both comedonal acne and inflammatory acne. It works by killing acne bacteria that infect skin pores. It also decreases the production of keratin, which is a natural substance that promotes the growth of acne bacteria. Azelaic acid is also used as a topical gel treatment for rosacea, because of its ability to reduce inflammation. It clears the bumps and swelling caused by rosacea. Azelaic acid has been used for treatment of skin pigmentation, including melasma and post inflammatory hyperpigmentation, particularly in those with darker skin types. It has been recommended as an alternative to hydroquinone. As a tyrosinase inhibitor, azelaic acid reduces synthesis of melanin.

- **Benzoyl peroxide** and **clindamycin** are combined in a gel sold under the trade name Duac or BenzaClin. Both contain 1 percent clindamycin phosphate and 5 percent benzoyl peroxide and are available by prescription. Its activity is derived from the combined antibacterial action of clindamycin and from the comedolytic and antibacterial actions of benzoyl peroxide. Both ingredients have been shown to significantly reduce the number of acne lesions. Clindamycin prevents the *P. acnes* from replicating by preventing it from making vital proteins. Benzoyl peroxide also kills *P. acnes*, but since it is an oxidizer, not an antibiotic, it is not subject to *P. acnes* resistance like clindamycin is. Benzoyl peroxide also dries out the area, preventing clogged pores, and is a keratolytic agent.

- **Erythromycin/tretinoin** (trade name Isotrexin) is a gel with active ingredients erythromycin 2 percent and tretinoin 0.05 percent. Tretinoin reduces the production of sebum. The active ingredients reduce the changes the bacteria causes to try to stop the acne.

- **Sulfacetamide 10 percent topical lotion**, sold under the brand names Klaron and Ovace, is approved for the treatment of acne and seborrheic dermatitis. It is believed to work by limiting the presence of folic acid that bacteria need to survive. There are several prescription topical products containing sulfacetamide, such as foams, shampoos, cream and washes.

**Topical retinoids**

Retinoids are medications derived from vitamin A. Retinoids work by normalizing the follicle cell life cycle in patients suffering from mild to moderately severe acne. Research shows that retinoids can reduce comedones and inflamed acne lesions. Early treatment can also reduce scarring and may help diminish signs of aging, including fine lines and wrinkles. In studies, patients who were treated with a topical retinoid combined with a topical antimicrobial or an oral antibiotic saw clearer skin faster, and it stayed clear longer. Side effects include skin irritation, increased ultraviolet sensitivity and possible birth defects.

Retinoids currently prescribed for acne in the United States include:

- **Tretinoin (Retin-A)** was the first retinoid developed for the treatment of acne and this type of topical use. Tretinoin is the best-studied retinoid for the treatment of photo-aging, is used as a hair loss treatment, and is a component of many products that are advertised as being able to slow the aging process and remove wrinkles. It is also used to treat and reduce the appearance of stretch marks by increasing collagen production in the dermis.

It was co-developed by Dr. James Fulton and Dr. Albert Klingman in 1969. At the time, Dr. Fulton was researcher at the University of Pennsylvania, which once held the patent for Retin-A, which was then licensed to pharmaceutical companies. It works by gradually unclogging pores and keeps them unplugged. Side effects include redness, scaling, dryness, itching and burning. Many patients find tretinoin to be too harsh for their skin, but newer forms have proved to be less irritating. This class also includes adapalene,
and tazarotene, which are generally have much milder side effects.

Because usage of tretinoin may cause thinning of the skin, it is strongly recommended that patients who are using the drug abstain from hair removal waxing. The wax will, when removed, pull off the top level of epithelium (skin) with it, leaving a red, inflamed, sore and mark for several days. Tweezing or threading may be viable options for hair removal. The recommended time frame to wait for a waxing treatment after using tretinoin varies from source to source. Patients should consult with their esthetician and dermatologist to discuss the best hair removal options during or after tretinoin therapy.

- **Adapalene** – This product was approved in 1996 by the FDA for use in the treatment of acne. Available in gel or cream, it works by unclogging pores and decreasing inflammation. Adapalene is a third-generation topical retinoid that is also used to treat keratosis pilaris as well as other skin conditions. In an in-vivo study, adapalene’s ability to reduce comedone formation was demonstrated by a 50-60 percent reduction in comedone counts. In the United States, adapalene is available under the brand Oxy. The drug abstain from hair removal waxing. The wax will, when removed, pull off the top level of epithelium (skin) with it, leaving a red, inflamed, sore and mark for several days. Tweezing or threading may be viable options for hair removal. The recommended time frame to wait for a waxing treatment after using tretinoin varies from source to source. Patients should consult with their esthetician and dermatologist to discuss the best hair removal options during or after tretinoin therapy.

### Acne scarring

Early treatment is recommended for moderate to moderately severe acne because of the risk of scarring. Acne scars come in two forms, as raised, thickened tissue or as a depression, such as pits or pockmarks. Anyone with a known tendency to scar should be under the care of a physician.

Before beginning a comprehensive study of acne scars, we need to look at the presence of macules and hyperpigmentation and how they relate to acne scarring. Macules and hyperpigmentation are not considered true scars in the sense that they create a permanent change in the skin, but they can and often do contribute to the overall appearance of acne.

Macules, or “pseudo scars,” are flat or red or reddish spots left behind by a healed acne lesion. These spots can remain for up to six months. Unlike a scar, when a macule disappears, no trace of it will remain on the surface of the skin.

Hyperpigmentation is discoloration of the skin at the site of a healed or healing inflamed acne lesion. It is most common in people of color, but can occur in individuals with light skin. The key to controlling hyperpigmentation is early treatment and limited ultraviolet exposure. Hyperpigmentation can persist for months and even years if left untreated. Treatments that have proven to be effective against hyperpigmentation include chemical peels, microdermabrasion, and the application of lightening or bleaching creams. Products used to lighten dark spots act as tyrosinase inhibitors. Tyrosinase is an oxidase, which is the rate-limiting enzyme for controlling the production of melanin.

Tyrosinase is a copper-containing enzyme present in plant and animal tissues that catalyzes the production of melanin and other pigments from tyrosine by oxidation, as in the blackening of a peeled or sliced potato exposed to air. It is found inside the melanosomes.

No study on skin lightening is complete without a look at one product that has caused quite a controversy in recent years: hydroquinone. Used as a topical skin-lightening agent, its use has been banned in some countries because of health concerns.

In 2006, the Food and Drug Administration revoked its previous approval of hydroquinone and proposed a ban on all over-the-counter preparations. According to the FDA, hydroquinone cannot be ruled out as a potential carcinogen. This conclusion was reached based on the extent of absorption in humans and the incidence of neoplasms in lab test subjects. However, to date, while hydroquinone has been banned in many countries, it is still available in the U.S.

While using hydroquinone as lightening agent can be effective with proper use, it can also cause skin sensitivity. Using a daily sunscreen with a high SPF rating reduces the risk of further damage. Hydroquinone is sometimes combined with AHAs that exfoliate the skin to quicken the lightening process. In the United States, topical treatments usually contain up to 2 percent hydroquinone. Otherwise, higher concentrations (up to 4 percent) should be prescribed by a physician and used with caution.

Treatment for PIH can take months or even years and should not be discontinued once the condition has cleared because changes in hormones and sun exposure can cause it to re-appear.

Scars form at the site of tissue injury, visible reminders of injury and tissue repair. In the case of acne, they are caused
by the body’s inflammatory response to sebum, bacteria and
death cells that plug the sebaceous follicle. When the body
suffers an injury, its first response is to send out the elements
needed to repair, among them white blood cells and an army
of inflammatory molecules. Their job is to facilitate repair and
fight infection, and they remain at the site of the injury for days
or even weeks. When their job is done, they may leave behind
a somewhat messy repair site in the form of fibrous scar tissue or
eroded tissue.

It’s difficult to assess who will scar and how extensively, or
for that matter the depth of the scars or how long they will

**Depressed acne scars**

After acne clears, most people are left with soft, saucer-like
depressions or pits. Sometimes the skin loses its underlying
support (collagen) and develops a wavy texture. The aging
process can make these scars even more noticeable. There are
three types of depressed acne scars: rolling, boxcar, and icepick.

- **Rolling scars** cause a wavy texture to the skin.
- **Boxcar scars** resemble large pores; these scars cause
  “boxlike” walls to form on the skin.
- **Ice pick scars** look like a small ice pick has punctured the
  skin. These scars leave deep pits with narrow openings.

**Treating depressed acne scars**

- A treatment plan administered by a dermatologist may
  include one or more of the following:
  - **Acne scar surgery**
    With today’s technology, dermatologists are able to
    remove, raise, fill, and even separate scar tissue from the
    underlying skin. The purpose of all acne scar surgery is
    to replace a large, deep scar with a smaller, flatter
    scar that will be less noticeable and more likely to fade.
    Following the initial acne surgery, the physician may
    treat the newly revised scar with laser resurfacing, which
    tends to make the scar even less noticeable.

    Surgery is usually performed in a dermatologist’s office.
    Before the surgery, the physician will administer a local
    anesthesia (numbs only the area to be treated) or light
    sedation.

    The more common acne scar surgeries that
dermatologists perform are:
    - **Punch excision** – A surgical instrument that looks
      like a round cookie cutter is used to remove the
      entire scar.
    - **Punch elevation** – After removing the scar, the
dermatologist carefully raises the remaining tissue
      so that when it heals, it will be level with the rest of
      the skin.
    - **Punch graft** – After removing the scar, the patient’s
      own skin is used to fill the opening.
    - **Subcutaneous incision** – A surgical probe is used
      to separate the scar tissue from the skin, which will
      raise the skin and flatten the scarred surface.

There is usually some down time associated with these
procedures, which may include care of the skin with
soaks, antibiotic ointments and dressings.

- **Laser skin resurfacing**
  Studies show that laser skin resurfacing can effectively
treat depressed acne scars. In one such study, 158
patients aged 18 to 46 years old were treated with an
ablative laser (creates a visible wound). In patients with
ice pick scars or shallow boxcar scars, the results were
good to excellent. Some patients with rolling scars had
good results when dermatologists used a type of laser
called the dual-mode laser. Deep boxcar scars showed
the least improvement, but a few patients with them also
had good results.

Ablative lasers cause visible wounds, so the patient will
have downtime, including care of the skin. Most people
return to normal activities in about two weeks, which is
when most patients begin to see improvement. Most will
continue to see improvement for up to 18 months.

Non-ablative lasers do not cause visible wounds, so they
do not carry the downtime associated with ablative laser
treatments. Most patients will return to their normal
activity immediately after the treatment.

- **Fillers**
  With improved, longer-lasting fillers, this treatment
option has become very popular. People like that fillers
can quickly diminish the appearance of acne scars.
They also like that most fillers allow them to return to
everyday activities immediately. The only drawback is
that most are temporary and may need to be repeated in
three to six months.

Individuals with autoimmune disorders are
contraindicated for collagen sourced from non-human
sources. Human collagen or fascia is helpful for those
allergic to bovine derivatives. Some of the more popular
fillers include those containing hyaluronic acid, such as
Juvéderm and Restylne. Hyaluronic acid stretches
cells in skin known as fibroblasts in a way that causes
the skin to create new collagen, and may help to stop
the breakdown of existing collagen. The new collagen
helps decrease the appearance of facial creases, wrinkles
and scars. Most temporary fillers last about three to six months.

PMMA (polymethylmethacrylate), also known as acrylic glass, is the only permanent filler. Tiny PMMA microspheres suspended in some form of biological fluid are injected under the skin to reduce wrinkles or scars.

When scars are filled with the patient’s own fat, the results can last one to three years, but there is downtime with this filler. To get the fat, the dermatologist will perform liposuction, a surgical procedure.

While most will return to everyday activities immediately, redness and swelling are normal. Some minor bruising also may be visible. To alleviate these, the dermatologist may recommend icing the area for 15 to 20 minutes following the injection. Makeup can usually be applied to cover redness and bruises.

- **Chemical peels**
  
  For some people with acne scars, a chemical peel may be part of the treatment plan. A high-potency (50 to 70 percent) acid will be applied to the skin to remove the top layer of skin. Very strong peels can reach even deeper into the dermis, creating severe necrosis that causes new skin to be formed.

  Redness should be expected following the treatment. The amount will depend on the type of peel used. Over the next one to 14 days, new skin will appear. Moderate or deep peels may require some downtime.

  All peels require some follow-up care. Sun protection after a chemical peel is necessary to help prevent unwanted side effects, such as infection and scarring.

- **Microdermabrasion**
  
  While not a leading treatment for acne scars, microdermabrasion can be effective for very mild acne scarring. During this procedure, a machine removes the outermost layers of the stratum corneum. With a series of microdermabrasion sessions, the skin can repair itself and shallow scars tend to become less noticeable.

  Patients like the fact that microdermabrasion does not require downtime and is considered painless. After a microdermabrasion procedure, the treated skin may be pink or slightly red and swollen. If the skin is red and swollen, this should disappear within a day. Sun protection helps ensure the best possible results and reduces the risk of side effects.

- **Dermabrasion**
  
  Laser skin resurfacing has largely replaced dermabrasion, but dermabrasion remains an effective treatment option for some acne scars.

  Dermabrasion is usually performed in a surgical center. Before the procedure, the skin is cleansed and anesthetized (numbed). Usually, a topical spray is used to anesthetize the area and a sedative is given. Sometimes a general anesthesia (which puts the person to sleep) is used instead. The dermatologist will move a handheld device back and forth or in a circular motion over the skin. An extremely sharp rotating blade will gradually remove the skin, which can remove the acne scars.

  Dermabrasion must be performed carefully, one section at a time. If the entire face is being treated, the procedure lasts about two hours. To treat a smaller area, such as the upper lip, takes about 30 minutes. After the skin has been treated, particles from the device are rinsed away. Next, compresses are applied to control the bleeding, and the wound is dressed.

  With dermabrasion, the treated skin will feel raw and sore, and patients may experience side effects from the anesthesia, such as grogginess. It takes roughly five to seven days to recover at home. Instructions for at-home care will include how to change the dressings and care for the skin. Following at-home care instructions is essential to prevent side effects and obtain the best possible results. New skin will appear within 10 days, and it is normal for the skin to continue improving for several months. As the skin continues to improve, redness and swelling may still be present.

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**Raised acne scars**

When acne clears, some people see raised scars on their skin. With time, these scars may become larger and more noticeable. Some raised scars itch and can even be painful or tender. To ease discomfort and diminish the appearance of these scars, dermatologists have a number of treatment options available.

There are two types of raised scars that can form after acne clears:

- **Keloid** – A keloid is a type of scar that is a result of an overgrowth of granulation tissue that has formed at the site of a healed skin injury. Keloids are firm, rubbery lesions or shiny, fibrous nodules, and can vary in color, from pink to flesh-colored or red to dark brown. A keloid scar is benign and not contagious, but sometimes accompanied by severe itchiness, pain, and changes in texture. In severe cases, it can affect movement of skin. Keloids can develop in any place where an abrasion has occurred. They can be the result of pimples, insect bites, scratching, burns, or other skin trauma. Keloid scars can develop after surgery. They are more common in the central chest, the back and shoulders and the ear lobes. They can also occur on body piercings. The most common spots are earlobes, arms, and over the collar bone. They are more common in people of African or Latino descent.

- **Hypertrophic** – A hypertrophic scar is a condition characterized by deposits of excessive amounts of collagen that gives rise to a raised scar, but not to the degree
observed with keloids. Like keloids, they form most often at the sites of pimples, body piercings, cuts and burns. They often contain nerves and blood vessels. They generally develop after thermal or traumatic injury that involves the deep layers of the dermis.

When a normal wound heals, the body produces new collagen fibers at a rate that balances the breakdown of old collagen. Hypertrophic scars are red and thick and may be itchy or painful. They do not extend beyond the boundary of the original wound, but may continue to thicken for up to six months. They usually improve over one or two years, but may cause distress because of their appearance or the intensity of the itching.

Some people have an inherited tendency to this type of scarring. It is not possible to completely prevent hypertrophic scars, so those who have suffered from them should inform their doctor or surgeon if they need to have surgery. Scar therapies are available that may speed up the process of change from a hypertrophic scar to a flatter, paler one.

When choosing a treatment, the dermatologist will factor in where the scar appears, the size of the scar and how long the scar has been there. A treatment plan often will include more than one treatment option. Raised scars, especially keloids, often respond better when treated this way. Treatments that dermatologists use to treat raised scars include:

- **Injections**
  These injections, which your dermatologist may call “intraleisional injections,” help shrink raised scars. Injections of corticosteroids can soften and flatten thick, raised scars. Interferon can help soften a keloid and make it feel smoother. A series of injections is usually given every few weeks; the frequency will depend on the type of scar and other considerations. Some patients receive an injection every two or three weeks. Others get an injection once every three to six weeks. If a scar does not respond (or stops responding) by the fourth injection, scar surgery may be recommended.

- **Acne scar surgery**
  When raised scars do not respond to injections, acne surgery may be recommended to remove the scar.

When treating keloids, dermatologists do not recommend surgery alone. Most keloids have a high risk (between 45 and 100 percent) of returning when surgery is the only treatment. To prevent a keloid from returning, dermatologists use other treatments before and after surgery. Many people receive injections of corticosteroids before surgery.

The following often are used after surgery:

- **Surgery, followed by pressure** – Applying pressure by wearing a pressure garment or pressure device can help prevent a keloid from returning.

- **Surgery, followed by injections** – After surgery, dermatologists often treat raised scars with injections of corticosteroids or interferon. Combining surgery with these shots remains one of the most effective treatments for raised scars, especially keloids. Most patients receive corticosteroid injections once a month for a few months.

- **Surgery, followed by radiation** – Studies show that radiation can prevent raised scars from returning after acne surgery.

- **Lasers and other light therapies** – More dermatologists are using lasers to treat raised scars. The pulsed dye laser (PDL) can be effective for treating some keloids and hypertrophic scars. Treatment with a PDL can help reduce the itching, pain, diminish the color, and flatten a raised scar. For people with lighter skin, intense pulsed light (IPL) also may be a treatment option.

- **Cryotherapy** – This treatment freezes the scar tissue. Freezing the tissue causes it to die and gradually fall off. To improve the results, dermatologists may schedule a series of cryotherapy sessions and corticosteroid injections. This combination often produces the best results. It can effectively diminish hypertrophic scars and flatten some keloids. However, cryotherapy can leave the skin looking lighter than the surrounding skin. This limits its use in people with skin of color.

- **Topical treatments (gels, creams, and tapes)** – Many of these are available without a prescription and can be used at home to treat raised scars. Products containing silicone may help reduce the itch and discomfort of both hypertrophic scars and keloids. One study found that some keloids (34 percent) actually flattened a bit when patients applied a silicone gel continuously for six months.

Applying tretinoin twice a day to keloids may help stop the itch and pain. This medication also may help reduce the size of the keloid. Sometimes a dermatologist will prescribe a strong corticosteroid that can be applied to the scar. Applying both tretinoin and a strong corticosteroid to a keloid seems to improve the results.

To be effective, gels, creams, and tapes must be used continuously. This can be difficult, especially for scars on the face. Many people are willing to do this because these treatments have little risk of side effects. Even so, with continuous use, some people develop itchy, irritated skin.

None of these gels, creams, or tapes is likely to eliminate a raised scar, but these can help reduce the discomfort and the size.

Raised scars can be especially difficult to treat, so researchers continue to look for better treatments. Some treatments that have recently been studied for treating raised scars are:

- **5-Fluorouracil (5-FU)** – Injections of this medication have been effective for treating hypertrophic scars and sometimes keloids. Combining 5-FU with injections of corticosteroids may be more effective than either 5-FU or corticosteroids alone.

- **Imiquimod** – One study found that fewer keloids returned when patients applied imiquimod 5 percent (a cream approved to treat genital warts and some skin cancers) after the keloid was removed with surgery. Additional studies did not support the initial finding.
• **Radiation therapy** – Dermatologists are finding that radiation therapy alone can effectively treat some keloids. It seems most effective for keloids that have been on the skin fewer than five months.

**Treating acne in skin of color**

The U.S. Census Bureau estimates that people with skin of color will comprise approximately half of the U.S. population by 2050. This group, which includes African-Americans, Asians, Latinos and other ethnicities, are more prone to certain dermatologic problems than those with lighter skin tones because of their genetic makeup and in some cases, cultural practices. For that reason, estheticians and dermatologists need to understand the distinctions in different skin tones. This knowledge will help in the diagnoses and treatment of acne and other disorders in patients of color.

Although people of color have more natural protection from ultraviolet radiation because of the increased amount of melanin in their skin, these cells tend to be more reactive to inflammation and injury; therefore pigmentation problems are more common in skin of color. These genetic factors along with cultural differences in their skin and hair care practices can result in differences in the appearance of common dermatologic conditions, such as acne and the frequency in which it can occur.

The first goal of any acne treatment is to control the acne with topical and systemic medications, depending on the severity of the acne. Addressing the client’s initial concern and any pigmentation problems that may result as the result of the treatment are important.

There are many factors that must be considered when treating acne in skin of color. One of the first misconceptions when dealing with darker pigmented skin is that it is tough and thick. On the contrary, olive and black or brown skins are very sensitive. Irritation is less visible on darker skins compared with lighter complexions. When treating skin of color, two things to consider are the increased risk of post-inflammatory hyperpigmentation (PIH), and irritation.

**Preventing PIH**

Picking at acne lesions is perhaps public enemy No. 1 when it comes to PIH. Also, while it may seem intuitive to scrub the darkened areas, harsh scrubbing will only prolong their duration of PIH and should be avoided. But the best way to prevent PIH is to treat the acne itself, thus preventing future acne lesions and any hyperpigmentation they might leave behind.

Hyperpigmentation is the term used to describe the dark spots associated with healed acne lesions. This darkening of the skin is a normal reaction when dark skin becomes inflamed as the result of a rash, scratch or pustule. For this reason dermatologists coined the phrase “post-inflammatory hyperpigmentation.” While these spots tend to gradually fade over time, they are the No. 1 complaint of dark-skinned patients who suffer from acne.

Hyperpigmentation can occur anytime the skin incurs inflammation. The inflammation stimulates the enzyme tyrosinase to act on the amino acid tyrosinase to produce melanin. The melanin is then deposited at the sight of the inflammation, causing this disorder. Controlling the tyrosinase action can block melanin granules from depositing in the epidermis. Turning off this response encourages the new cells at the basal layer to emerge with the right amount of pigment.

Hyperpigmentation can be treated with topical skin lightening products or bleaching agents. In reality, most of these products are tyrosinase inhibitors. Some skin-lightening agents are available over-the-counter, while stronger forms can be obtained from an esthetician or dermatologist. The application of cosmetic makeup can make the spots appear less apparent.

Although there are no clinical studies to support it, some dermatologists believe that repeated ultraviolet exposure can lead to longer treatment, and that the use of sunscreen on a daily basis may help resolve the condition more quickly. Only sunscreens labeled noncomedogenic should be used because they will not clog pores.

Acne medications that have a drying effect on the skin, such as benzoyl peroxide, should only be used under the direct supervision of a dermatologist or esthetician, because long-term use may irritate the skin and prolong post-inflammatory hyperpigmentation. Also, common prescription drugs can markedly increase the natural photosensitivity of darker skin tones.

Topical acne medications such as retinoids have been shown in studies to be safe and effective in treating acne in skin of color without excessive dryness when used as directed.

Revealing studies of acne in skin of color found that almost half (46.2 percent) use pomade (oil or ointment for hair) to style or improve manageability. Additionally, more than 70 percent of patients using pomade developed acne on the forehead or along the jaw line. This type of acne, which can be directly linked to the use of pomade, is referred to as “acne cosmética” or simply “pomade acne.” It occurs when the product blocks pores, and acne then develops on the scalp, forehead, temples, jaw line and neck – essentially, places where the pomade come in contact with the skin.

Pomade acne usually consists of open and closed comedones with some papules and pustules. Use of pomades can also be attributed to a bacterial infection called folliculitis. Pus-filled inflamed bumps develop around hair, resulting in hair loss and infection. If this condition is suspected, pomade use should be discontinued and the client should be referred to a dermatologist for treatment.
Treating pomade acne may include discontinuing use of the product until the condition clears as well as keeping hair that has been treated off the face.

When scarring occurs in a person of color, there is a greater tendency for keloid formation. A keloid is a large, raised scar that spreads beyond the borders of the original. Keloids have been seen on the chest, back and jaw line. Early and aggressive treatment is needed to prevent scarring because keloids have a tendency to return even with treatment. Keloid formation in African-Americans is reported to be five to 15 times more likely than in Caucasians. Treatment for acne scars may include pressure, silicone gels, surgery, laser treatments or radiation therapy.

### Treating adult acne

Because women are many times more like to suffer from adult acne, the following information is provided with them in mind.

**Oral contraceptives**

- Oral contraceptives can help normalize hormonal surges and regulate monthly cycles so that oil glands don’t go into overdrive. More specifically, they reduce androgens (male sex hormones), which are partly responsible for acne formation. Women with acne tend to have higher levels of androgens. More specifically, oral contraceptives reduce the level of free testosterone in a woman’s body by coaxing the ovaries and adrenal gland to produce less. Additionally, they increase the level of SHBG (sex hormone-binding globulins), which inhibit the conversion of free testosterone into dihydrotestosterone (DHT). In short, there is less DHT in the body.

  The progestin component of oral contraceptives lowers androgen levels. The FDA has approved only a select handful of birth control pills for patients with acne who also desire contraception. They include Ortho Tri-Cyclen, Estrostep, and Yaz. However, all birth control pills tend to produce 30-60 percent reduction in acne lesions, and research remains inconclusive on which works best. As always, patients taking oral contraceptives should be aware of the potential risks.

**Aldactone (spironolactone)**

- Long used as a treatment for high blood pressure, it is often prescribed to treat hormonal acne. The drug administered orally blocks receptors of the hormone estrogen, helping to limit the testosterone surges that can prompt acne.

  Most acne products that you can find in stores contain ingredients like alcohol, benzoyl peroxide, and sulfur. These are powerful chemicals that can certainly help dissolve a pimple on your face.

### What’s the best way to treat pregnancy acne?

*From Lawrence E. Gibson, M.D. (Mayo Clinic)*

You have many options for treating acne during pregnancy, including self-care and medication. Pregnancy acne isn’t a special form of acne. Many women simply seem to have trouble with acne during pregnancy. Although it isn’t always clear what causes acne to get worse during pregnancy, the likely culprit for most women is an overproduction of sebum, which happens when certain hormones go into overdrive.

- Medical experts suggest treating pregnancy associated acne with gentle home care:
  - Wash twice a day, gently with a mild cleanser and lukewarm water.
  - Shampoo daily if the hair tends to be oily, and try to keep hair off your face.
  - Avoid picking, scratching, popping or squeezing acne sores, which can spread infection and potentially cause scarring.
  - Use oil-free cosmetics. Look for descriptions such as water-based, noncomedogenic or non-acnegenic.
  - Touching the face or testing products in the hands can trap skin oils and sweat, which can irritate acne.

Medication is a second line of treatment for pregnancy acne. Any medication that’s applied to the skin or swallowed can enter the bloodstream, so it’s important to exercise caution during pregnancy even with OTCs. Erythromycin (Erygel) is often the drug of choice for pregnancy acne. Azelaic acid (Azelex, Finacea) may be another option. Both medications are typically applied to the skin as a lotion or gel and are available by prescription.

Opinions about using benzoyl peroxide to treat pregnancy acne are mixed. There’s little research on the safety of OTC or prescription-strength benzoyl peroxide during pregnancy, although problems haven’t been reported.

Concerns about pregnancy acne should be referred to a dermatologist or primary care physician. When in doubt about a product or treatment for a pregnant client, always err on the side of caution. Before doing anything, get a second opinion, ask the client to provide documentation from her physician, or have her sign a special release that states that her pregnancy is not considered high risk.

(Note: Many beauty professionals believe it is proper to always be extremely cautious with pregnant clients, particularly with chemical peels and microdermabrasion, which this author declines to do for pregnant women.)

Some potent acne medications must not be used by women who are pregnant or who may become pregnant because of the potential harm to a fetus. These medications include:

- **Hormone therapy** – The “female” hormone, estrogen, and the anti-androgens, flutamide and spironolactone, are sometimes used to treat acne in women. None should be taken while a woman is pregnant. Flutamide and spironolactone can cause birth defects. It is not known
whether these medications can be passed along when a woman is breast-feeding, so they also should not be used if a woman chooses to breast-feed.

- **Isotretinoin** – This potent acne medication has revolutionized acne therapy because of its effectiveness in treating severe and therapy-resistant acne. However, it also has the potential to cause some serious side effects. The most serious is the potential to cause severe birth defects in a developing fetus. For this reason, it is imperative that women taking isotretinoin follow a pregnancy-prevention program. This requires using two forms of birth control continuously beginning one month before therapy starts and not ending until one month after isotretinoin therapy is complete. Her dermatologist will closely monitor a woman taking this drug during therapy. If pregnancy occurs, isotretinoin must be stopped immediately. Women planning a pregnancy should discontinue taking isotretinoin and maintain birth control methods for at least one month before trying to become pregnant.

- **Oral tetracyclines** – Tetracycline as well as doxycycline and minocycline (synthetically derived from tetracycline), must not be used by women who are pregnant or breast-feeding because of potential side effects. These broad-spectrum oral antibiotics can inhibit bone growth and discolor permanent teeth in both a fetus and a child being breast-fed.

- **Topical retinoids** – The topical retinoids adapalene, tazarotene and tretinoin carry warnings stating that it is not known whether these medications can adversely affect a developing fetus or child that is being breast fed.

### New developments in acne treatment

Science marches on in the form of new prescription drugs and clinical studies. One such study was conducted by UCLA with researchers at Washington University in St. Louis and the Los Angeles Biomedical Research institute who discovered that acne bacteria contain “bad strains” associated with pustules and “good strains” that may protect the skin.

They began with the theory that the bacteria that cause acne live on everyone’s skin, yet one in five people is lucky enough to develop only an the occasional pustule over a lifetime. So how is this possible?

Their findings, published in the Feb. 28, 2013, edition of the Journal of Investigative Dermatology, could lead to a host of new therapies to prevent and treat acne.

The study revealed that not all acne bacteria trigger pustules; one strain may actually help keep skin healthy. These findings could potentially be applied to developing strategies that could stop a blemish before it starts, enabling dermatologists to customize treatments to each patient’s unique blend of skin bacteria.

The research centered on the study of *P. acnes*. OTC pore cleansing strips were used to lift *P. acnes* from the noses of 49 acne sufferers and 52 clear-skinned subjects. Once the microbial DNA was lifted, the laboratory tracked a genetic marker to allow it to identify the bacterial strains in each of the test subjects’ pores and where able, to record whether the person suffered from acne. From there, further observation enabled scientists to isolate genes unique to each strain of *P. acnes* discovered. Overall, two unique strains of *P. acnes* appeared in one out of five test subjects with acne, but rarely occurred in the clear-skinned group. However, they did discover a third strain of *P. acnes* that is common in healthy skin yet rarely found in acneic skin.

What this means is that acne sufferers may be able to increase their body’s friendly strain of *P. acnes*, through the use of a topical cream or lotion. This new strain would offer protection to the skin acting in a similarly to the live cultures in yogurt that protect the digestive system from harmful forms of bacteria.

Additional studies will focus on testing drugs that kill bad strains of *P. acnes* while keeping the good bacteria intact, the use of viruses to kill acne-causing bacteria, and the development of a skin test that will be able to predict whether a person will develop an aggressive form of acne in the future.

It’s been decades since any significant progress has been made in developing new strategies for treating acne. Researchers believe that his particular study holds a lot of promise for the future of acne treatments.

There are literally millions of products that claim to target acne; these days, skin care is a booming, billion-dollar industry. No longer is the esthetician just competing with drugstores or department stores; hundreds of companies are doing business online.

You must use your expertise in the area of not just acne, but skin care as a whole. Keep in mind, if you are not talking to your clients about their blackheads, whiteheads, and pustules, they will be talking, tweeting, emailing, blogging, Facebooking, instagramming and searching about it — and purchasing from someone else.

Acne is definitely not treated the same way it was 25 years ago, or even 10 years ago. Scientific research has greatly increased our knowledge of how acne develops, leading to many new acne therapies and changes in existing treatment options.

Newer products include acne treatments made for different skin types and less-irritating topicals. Newer topical retinoids have dramatically changed the way acne is treated. Twenty-five years ago, use of topical retinoids was commonly accompanied by side effects, such as redness, stinging, and peeling. Many patients were so frustrated they gave up before the medication could get started. There was a time when we had to advise clients that retinoids come with a certain amount of irritation, and that’s how we knew it was working.

With the advent of newer topical retinoids and patient-tailored dosing regimens, topical retinoids are now the first-line treatment for most patients with mild to moderately severe acne. Research shows that topical retinoids can effectively
reduce blackheads, whiteheads, and the inflamed or red acne lesions. Early treatment with retinoids also can reduce scarring.

When a topical retinoid is prescribed along with a topical antimicrobial, such as benzoyl peroxide, or an oral antibiotic, such as doxycycline, most patients’ skin clears faster and the results last longer. This combination also allows patients to stop taking oral antibiotics sooner and eliminates the need for long-term use of oral antibiotics, which was common 25 years ago.

In recent years, combination treatments have become common. Most acne treatments work on only one cause of acne. Combining two or more medications allows the different factors causing the acne to be attacked simultaneously. Today, dermatologists often combine medications to give patients faster clearing and better resolution.

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UNDERSTANDING AND TREATMENT OF ACNE

Final Examination Questions
Choose the best answer for questions 1 through 20 and mark your answers on the Final Examination Sheet found on Page 33 or complete your test online at Cosmetology.EliteCME.com.

1. A Harvard study found that girls who drink two or more glasses of milk a day have about a 20 percent lower risk of developing acne than those who drink less than a glass a week.
   ○ True ○ False

2. Several systems for grading the severity of acne currently exist; the most popular are the Leeds, Pillsbury, and Cook scales.
   ○ True ○ False

3. With rosacea, demodex (a parasitic tiny mite that lives in or near the hair follicle) is a common organism seen along with bacteria and fungi in Rosacea.
   ○ True ○ False

4. BPO (benzoyl peroxide) increases the likelihood of a patient developing antibiotic resistance and should be discontinued once acne lesions clear in order to prevent new ones from forming.
   ○ True ○ False

5. Tetracyclines are a group of broad-spectrum antibiotics that work by reducing the papules and pustules associated with acne.
   ○ True ○ False

6. Punch elevation is a surgical procedure in which an instrument resembling a round cookie cutter is used to remove an entire scar.
   ○ True ○ False

7. Hyaluronic acid stretches cells in skin known as fibroblasts in a way that causes the skin to create new collagen, and may help to stop the breakdown of existing collagen.
   ○ True ○ False

8. With dermabrasion, the treated skin does not get raw and is rarely sore; patients will recover at home overnight.
   ○ True ○ False

9. A hypertrophic scar is a result of an overgrowth of granulation tissue that has formed at the site of a healed skin injury. A keloid scar is a condition characterized by deposits of excessive amounts of collagen that gives rise to a raised scar, but not to the degree observed with hypertrophic scars.
   ○ True ○ False

10. More than 70 percent of people who use pomades develop acne along the forehead and jawline.
   ○ True ○ False