

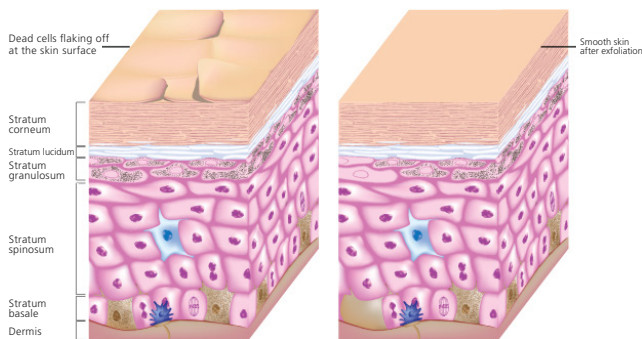


## MECHANISMS OF EXFOLIATION

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### THE NORMAL EXFOLIATION PROCESS

Exfoliation occurs naturally as outworn stratum corneum cells detach and are removed from the skin's surface. Replacement of stratum corneum cells occurs by a self-renewal process as epidermal cells move upward from the basal layer, the stratum basale, and through the subsequent two layers, the stratum spinosum and stratum granulosum, to reach the stratum corneum. This process requires about four weeks, although it can be prolonged in aging and other skin conditions. Normal desquamation occurs invisibly as single corneocytes, or very small aggregates of them, detach from the skin's surface and are shed.



Desmosomes (see figure 2) are structural bridges between corneocytes of the stratum corneum that are dissolved by naturally occurring skin enzymes secreted by skin cells and hair follicles into the spaces between cells (intercellular spaces). Internal clocks within cells gradually weaken the intercellular connections over time until cohesion decreases to a critical level. Normal skin barrier function depends upon maintenance of a healthy stratum corneum, its proper continuous regeneration, and appropriate shedding of devitalized cells.

### Three-dimensional view of desmosome

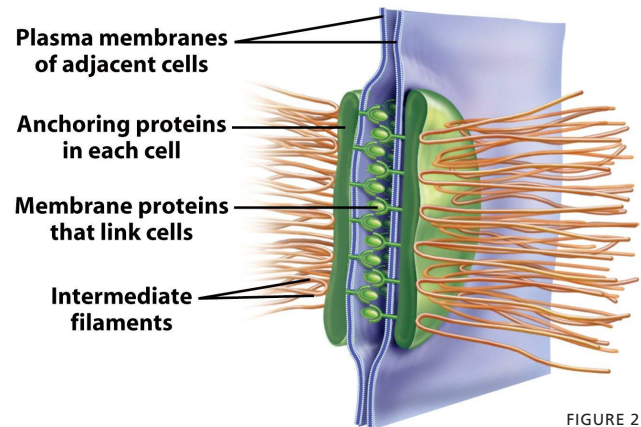


FIGURE 2  
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### ABNORMALITIES OF EXFOLIATION

The most common derangement to the normal process of exfoliation and skin renewal is aging. With aging, metabolism slows and regeneration time of the stratum corneum becomes prolonged. Also with aging, the glue-like desmosome cement between cells becomes denser and cell sloughing is more difficult. These changes can also accompany premature aging, as found with advanced photodamage.

In addition to photoaging, other problems can result in abnormal skin keratinization and epidermal metabolism. These include hormonal influences from androgens or estrogens, exposure to excess epidermal growth factor, and deficiencies of vitamins A or D. Dullness, poor tone, increased or uneven skin thickness, poor texture, roughness, dryness, and loss of youthful appearance occur if the desquamation process is impaired.

### THE COSMETIC EXFOLIATION PROCESS

The impaired exfoliation seen with aging and other conditions may be normalized with the use of appropriate cosmeceutical products and procedures. Cosmetic exfoliation methods can remove dead skin cells, accumulated sebaceous secretions, and dirt while



providing a gentle deep cleansing that returns skin to a more youthful physiology and appearance. This promotes epidermal regeneration while helping skin regain softness, uniform texture, and suppleness.

Cosmetic exfoliation may be accomplished by chemical or mechanical means. Chemical exfoliation methods include acids, non-acid peels, enzymes, or other agents. Mechanical exfoliation may be accomplished using a device or small particles of various types. Both chemical and mechanical exfoliation may be performed as an in-office procedure or at home, depending on the type and strength of treatments desired. The remainder of this discussion will include the gentler, more physiologic types of exfoliation rather than the aggressive peeling procedures performed more commonly in times past. These currently preferred exfoliation methods also work well with a variety of home care products.

#### Hydroxy Acids

Hydroxy acids are of two chemical types, alpha-hydroxy acids and beta-hydroxy acids.

Alpha-hydroxy acids (AHAs) may be obtained from synthetic sources or from natural sources. Natural botanical sources are often preferred by users for tolerability and gentleness. Botanical sources include sugarcane, fruits, and mixed fruit acids.

AHAs are gentle and effective desquamation agents. They act not only on the skin's outer surface but can penetrate to some depth in epidermis to facilitate a somewhat deeper exfoliation. This stimulates skin renewal and shortens epithelial regeneration time, thus more closely approximating a younger physiology. Collagen synthesis can also be stimulated.

Salicylic acid is a beta-hydroxy acid (BHA) which may be derived synthetically or obtained botanically. Furthermore, it is anti-inflammatory and thereby provides other benefits in a variety of skin conditions. Since most skin conditions, including aging, activate inflammatory pathways, salicylic acid has wide applicability.

Beta-hydroxy acids have the unique characteristic of being oil soluble. Alpha-hydroxy acids do not share this quality. Oil/lipid solubility allows penetration of beta-hydroxy acids into sebum and therefore facilitates a deep-cleansing of the pore of the pilosebaceous unit and hair follicle. Since the pilosebaceous unit is the key structure in the development of acne, beta-hydroxy acids are particularly beneficial in this disorder. Cleansing of the pore is also important post-procedure to prevent milia formation, and in shrinking pore size for cosmetic and skin health reasons.

Enlarged pores are the dilated openings of pilosebaceous follicles. These may appear either as conical openings or plugged with debris in comedones. Many factors contribute to enlarged facial pores including ethnic background, environmental factors (season of the year, humidity, temperature), hormonal fluctuations, and aging.

Many women are distressed by large pores. As a 2014 Harris Poll of more than 2000 women revealed, 38% of all women think their pores are too big. This number rises to over 50% in Japanese women between the ages of 20 and 30 and to 48% in Latinas. Thirteen percent of women have avoided taking photos because of perceived large pore size. Twenty-one percent of women say they began noticing their pore size between the ages of 15 and 20. Furthermore, 73% of women say they have not yet found a product effective in shrinking pore size. Cosmeceutical products incorporating salicylic acid effectively would be desirable to this large group of consumers looking for improvements in pore size.

Although previous opinion said otherwise, inflammation and degeneration of skin is not required to produce a controlled exfoliation resulting in epidermal and dermal regeneration. Furthermore, this permits use of these products in ethnic groups subject to hyperpigmentation, including Asians, Latinas, African-Americans, and those of Mediterranean descent.



### Enzymes

Enzymes may be synthetic or from natural sources. They work by dissolving skin cells and facilitating cell renewal, shortening epithelial transit time. Natural sources of botanical enzymes, as in TRI-ACTIVE EXFOLIANT, are papaya and pineapple which are sources of papain and bromelain, respectively. Using plant sources also gives antioxidant and other protective properties to the product.

### Mechanical Exfoliants

Mechanical exfoliation can be achieved with devices, including microdermabrasion, or with small exfoliant particles including ground seed particles, pulverized shells or other vegetal materials. The process of mechanical exfoliation loosens the outer corneocytes of the stratum corneum.

A newer vegetal source of mechanical exfoliants is cellulose. Cellulose is the material composing the cell walls of plants. Small particles of cellulose, if correctly formulated, are uniform in size, have smooth edges, and are non-irritating while still being very effective.

The particular type of cellulose particles used in IS CLINICAL's TRI-ACTIVE EXFOLIANT has been shown to be non-abrasive. Furthermore, in clinical studies of this ingredient, if excessive pressure is applied during application, the cellulose particles begin dissolving - thus avoiding any trauma or irritation to skin. These particles have a very narrow size distribution, ensuring uniform exfoliation. They are friendly not only to skin, but also to the environment, containing none of the plastics that have been banned from cosmetic use due to accumulation in the earth's waterways.

Fragmented seeds, such as apricot pits, have been widely used for mechanical exfoliation but contain rough, irregular edges. These cause micro-scratches on the skin's surface and are irritating, pro-inflammatory, and pre-dispose to complications of infection. They can be particularly dangerous for spreading infectious processes in acne or other inflammatory conditions where potential infection is a concern.

### EXFOLIANT COMBINATIONS

Combining the above groups of exfoliants, each with different mechanisms of action, can provide synergistic effects. TRI-ACTIVE EXFOLIANT by IS CLINICAL contains hydroxyacids, enzymes from papaya and pineapple, as well as uniform, non-traumatizing cellulose particles. TRI-ACTIVE EXFOLIANT stimulates youthful regeneration of epithelium, gently and thoroughly cleans and shrinks pores, and also provides non-irritating mechanical exfoliation. All of these ingredients are friendly to both human skin and the environment.

### OVER-EXFOLIATED SKIN

Mechanical and/or chemical exfoliation assists to skin may be carried too far resulting in excessive stratum corneum thinning, shininess, irritation, redness, sensitivity, and telangiectasias (dilated blood vessels). Products and procedures must be carefully chosen to avoid this "over-processed" look. With repeated over-exfoliation, barrier function is diminished and dehydration occurs in addition to many other potential problems.

Our industry has entered the era in which minimal down-time as well as optimal results are desired. These goals can be achieved with the new formulation technologies, products, and procedures. It is no longer accepted dogma that stronger peels are always better. It is also known that peeling does not have to be clearly visible to be present, since the desquamation and release of corneocytes can occur on a microscopic level. Modern results are also seen much more quickly in a matter of days or even immediately. Clients and patients will no longer tolerate extended periods of discomfort, weeping skin, and peeling sheets of epidermis – and, fortunately, these side effects are no longer required for excellent results and returning skin to a younger epidermal physiology.



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