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## WELCOME



As a skin physiologist and biomedical consultant to the cosmetic and pharmaceutical industries, I have spent many years in extensive cell studies examining the alterations that occur in aging skin. The challenge has been to solve the mysteries within the complexities of an evolving, aging skin cell enabling study of the more profound effects of this transforming process. Modern-day chemistry, biological actives, and precision laboratory instrumentation have offered me the opportunity to develop effective skin care products.

The efficacy and results of ***Circadia by Dr. Pugliese*** skin care system are a culmination of more than 40 years of research and documented studies. ***Circadia*** is based on sound biomedical research, cosmetic chemistry and demands of an aging population. This foundation arms you with the necessary information and tools to offer your patients and clients a truly remarkable collection of products that contribute to skin repair and younger looking skin.

It is my greatest desire to place at your fingertips an incredible product line backed by scientific research, education, and technical support. I will continue to develop new product concepts with innovative formulations so that you are able to perform effect treatments on the skin.

An important goal for ***Circadia*** is to elevate the educational standards for skin care professionals through intensive training in skin physiology, biology, chemistry and product knowledge. This commitment is part of my unrelenting belief that longevity is a harmony between internal and external factors – the physiological, biological, emotional, and the spiritual. A well-informed skin specialist will be able to grow his or her business backed by a company who believes in the potential and future of the professional skin care specialist.

Peter T. Pugliese, M.D.

March 2003



## Meet leading biophysicist, Peter T. Pugliese, M.D.

Dr. Pugliese is a biomedical consultant to the cosmetics and pharmaceutical industries. His major research interest is normal skin physiology and mechanisms of skin aging. He brings more than fifty years of knowledge and experience and has gained an international reputation as a respected authority in the research areas of aging skin and longevity.

Dr. Pugliese earned a Bachelor of Science degree from Franklin and Marshall College in Lancaster, Pennsylvania, and in 1957, a Doctor of Medicine from the School of Medicine at the University of Pennsylvania in Philadelphia. He studied nuclear physics in 1955 at the Oak Ridge Institute of Nuclear Studies in Oak Ridge, Tennessee, and from 1964-1967 did post-graduate research at the Johnson Foundation of Biophysics of the University of Pennsylvania. He has held academic positions at the University of Pennsylvania and Hershey Medical School. For six years he conducted cancer research under a grant from the Cancer Institute of the National Institutes of Health on the bioenergetics of cell division.

Dr. Pugliese conducted a private rural practice in 1958-1978. Since 1972, he has been engaged in the study of skin physiology. From 1970-1978, he conducted a methadone treatment clinic for heroin addicts and during the same period he was consultant physician to the Berks County Prison. For his work with drug addiction, he was awarded the B'nai Brith Americanism Award and the Italian Citizenship Award. A member of the Society of Cosmetic Chemists since 1972, Dr. Pugliese was awarded the Maison De Navarre Gold Medal for outstanding contribution to the field of cosmetic chemistry.

He is a member of the American Academy of Dermatology, the Society of Investigative Dermatology, the Society of Bioengineers of the Skin, the American Chemical Society and the Society of Cosmetic Chemists. He has written more than 60 scientific papers, given more than 100 world-wide presentations at scientific meetings, has contributed more than ten chapters to scientific texts, and has published four books including *Advanced Professional Skin Care* and *Physiology of the Skin I and II*. He is on the board of the American Aestheticians Education Association as director of medical esthetics.

Dr. Pugliese's laboratories in Reading, Pennsylvania, have investigated the mechanism of aging skin, and evaluated the biological efficacy of skin treatment products. As a product development consultant his discoveries and patents have influenced the direction of the cosmetic industry.



## Chapter I Circadian Rhythms

*Circa=about; dies = a day*

Most organisms co-ordinate their biological and physical activities within the earth's 24-hour cycle. Referred to as *circadian rhythms*, these cycles (movements) are caused by the earth's rotation around the sun. In plants, the circadian clock controls leaf and petal movements, the opening and closing of stomatal pores, the discharge of floral fragrances and many metabolic activities, especially photosynthesis. Photosynthesis is responsible for creating energy for plant growth and the chlorophyll responsible for green leaves. The correct balance of light and darkness influences the built-in biological clock innate to all living creatures.

a human body. This growth is influenced by the built-in biological clock innate to all living creatures.

### □ Skin Color

Genetic skin traits provide special ability for humans to adapt in a healthy manner to their native environment. Much of this is based upon the amount of light radiating onto the skin. In geographical locations closer to the equator, the skin appears darker, thicker and normally contains more sebum (oil) and hair. There is an abundance of pigment to help protect the skin from stronger sunrays.

In northern climates, the skin is lighter simply because it still requires a regulated amount of light necessary for biological activities. Lighter skin absorbs more UV. Abnormal light deprivation leads to malfunction of body mechanisms and may lead to depression and low energy. Too much radiated sun light may cause abnormalities resulting in degradation of tissue.

### □ LIGHT AND HEALTH

Humans exist in a high-tech world. Sometimes we forget how much light, darkness, our natural surroundings and the normal aging process affect our innate biological

clocks. One may observe that energy levels seem higher during the warmer, longer days of spring and summer. During winter months, we would rather slow down, sleep, or have an urge to visit a region where there is more light and warmth, i.e., a visit to the Caribbean in January. Light, our surroundings, food, sound, and the air we breathe all influence our well-being. The entire body, including the skin, subtly responds to these innate forces.

During times of imbalance, we instinctively attempt to move to an environment that surrounds us with balancing energy. A walk in nature or a wonderful spa experience may very well contribute to our internal and external renewal. If we ignore these signs, our body is engulfed by a state of *dis-ease* that may cause unnecessary stress or even premature death.

### □ The skin and its care

Our internal biological clock is responsible for all cellular activities that are responsible for building tissue, breaking down old cellular/tissue components, and eliminating waste. When formulating products, it only makes sense to take advantage of these body rhythms and biological processes by delivering active ingredients during the times when the skin is most receptive.

The skin is at maximum moisture levels at noon with the greatest water loss between 10:00PM and midnight. During the day, the skin constantly adjusts to activities and environmental conditions. It may also be exposed to more ultra violet conditions. Day care products should provide extra moisture and UV protection. They may contain antioxidants, moisture-binding proteins and anti-inflammatory agents to help destroy free radicals, restore hydration, and calm UV-exposed or damaged skin. ***Circadia*** uses an exclusive patented linoleic ester



call *Amino Lipid Complex* as part of its revolutionary formula.

At night, formulations should take advantage of the body's nocturnal repair mechanisms to help reverse or slow down the signs of aging. Skin repair may be inhibited by the presence of excessive enzymes that destroy supportive tissue, as evidenced with collagenase and elastase. ***Circadia by Dr. Pugliese*** has created a patented nighttime repair formula that has been found to inhibit these damaging enzymes, resulting in repair and reversal of existing damage. Clinical studies using ultra sound have proven that the skin is more protected with the signs of aging visibly diminished.

***Circadia by Dr. Pugliese*** offers a complete care program for all skin types and conditions. As a scientifically proven line of products we recommend that it be used in a *system* in order to produce maximum results. Each product builds upon the other. Active ingredients are directed to assist with skin repair and renewal, especially after peels and post surgical care. We offer retail products to work in tandem with your in-clinic treatments. Successful results on the skin require working with a combination of in-clinic treatments with a regimen of home care.

Its clinically proven formulas provide wound-healing capabilities during post peel and surgical procedures. They are highly beneficial for routine maintenance and prevention.

There are correctors such as ***Emergency Eye Lift, White Veil for pigmentation*** and a ***Vitamin C*** reversal system using a highly stabilized form of vitamin C.

Not forgotten are remedies for the acne and problematic skin. Through a unique system of salicylic acid, benzyl peroxide and soothing botanicals, breakout is controlled with antimicrobial properties.

Our dynamic in-clinic professional treatment, **SWiCH™** is a 21<sup>st</sup> century dermal rejuvenation skin miracle that has been proven to "turn on" the cell's own energy mechanisms to help reverse or slow down cell damage.

As skin care professionals, we demand the ultimate in research and product development. ***Circadia by Dr. Pugliese*** is a company who meets that mark and will continue to research, support, educate and work with leading technologies utilizing the highest of standards in delivering efficacious treatments and products.



## Chapter 2 Manufacturing, Terms & Conditions

(Insert photo of manufacturer-filling filling room)

There are many reasons for choosing *Circadia*.

- On-site research and development laboratory directed by a medical doctor
- On-site clinical studies
- On-site chemists
- On-site estheticians
- On-site manufacturing
- On-site education, technical support, sales and marketing

Our formulas are developed from complex biomedical data and intricate cosmetic chemistry. We are dedicated to the highest standards of research and manufacturing. Guidelines for manufacturing of the FDA OTC (over-the-counter) for manufacturing. All raw materials are tested for efficacy and purity. Formulations are carefully documented each step of the way to assure the highest quality and control. Environmental conditions within the plant include air purifiers and specialized air systems; state-of-the-art water purification system, and filling facility following strict sanitization guidelines.

Formulations are made from pharmaceutical-grade raw materials including herbal extracts, marine extracts, biological extracts, and other numerous components approved for cosmetic formulation.

When developing skin care formulas, we avoid

Carcinogenic ingredients  
Known comedogenic materials  
Formaldehyde  
Mineral oil and petrolatum  
Known sensitizing agents  
Isopropyl Myristate  
Isopropyl Palmitate  
Synthetic colorants  
Irritating preservative systems  
Unstable delivery systems  
Unstable ingredients

### Ordering & Shipping

#### *Before selecting your products*

Your account executive will support you in choosing your product collection. Our skin care line is scientifically based and can add milestones to your ability to service your patients and clients effectively. If you are opening your business for the first time, be sure to work from a business plan that has clearly defined your goals and market. Whether you are an esthetics office, medical office, or day spa, your focus should be concerned with what products and treatments will best serve the needs of your patients or clients.

We have also provided further documents and a list of books and articles to support the success of your practice. In addition to this technical document we have created two additional levels of notebooks.

In **Book Two**, *The Treatment Manual*, you will find a collection of in-clinic treatments to give you step-by-step sessions to assist in your facial and body treatments. Also included are



samples of health intake forms, treatment records, informed releases and others that assist you in correct record keeping.

**Education.** Throughout the year we offer classes at our Reading campus as well as at trade shows and other conferences. Classes include chemistry, product knowledge and hands-on performance of treatments.

## Terms & Conditions

Once you've established your order you may e-mail, fax or call it into our office.

### Office Hours

Monday – Friday 8:30AM – 5:00PM (Eastern time)

Phone: 1-888-921-5944

FAX: (610) 921-8227

E-mail: \_\_\_\_\_

**Minimums** Circadia's minimum order is \$100, with an order of 3 units per product, per size for retail, one unit minimum for professional sizes. Single retail units may be ordered with your \$100 minimum if you have not previously ordered the product.

**Method of Payment** Payment is due during time of ordering. We accept Visa, Master Card, American Express or Discover, check or money order. First time orders must be on a charge card or paid for with a money order. COD is available for an additional charge.

**Shipping** Orders received by 10:00AM Eastern Time will be shipped within 24 hours. An order invoice will include your products shipped including any shipping and handling charges. Orders are shipped UPS ground, F.O.B. Reading, Pennsylvania unless otherwise specified. Any other method of shipping such as overnight or 2, 3<sup>rd</sup> day air should be indicated at the time of ordering. Shipping is charged accordingly

**Order Changes** Orders are processed within hours of receipt so we usually cannot make changes or additions. Your customer service representative will repeat your order for your approval at the time it is placed. Please be sure it is correct to avoid later inconvenience.

**Cancellations** Once your order is placed, cancellation requires employee time to process the cancellation. Therefore, we regretfully must apply a 15% service charge to cover our expenses.

**Damaged Products** If products are damaged in shipment please keep the shipping carton and notify your customer service representative and the carrier immediately. The carrier will require a damage inspection and claim for reimbursement.

**Refusal of Shipment** If an order is refused for any reason, shipping fees and a 25% restocking fee will be applied to your account. If you request the shipment to be sent again, an additional shipping fee will be charged. Further shipments will be held until your account balance is paid. If three shipments are refused within a three-month period, your account will be closed. Please arrange for receipt of all shipments.

**Back Orders** When a product is unavailable due to a back-order status, it must be re-ordered. This will be noted on your invoice or indicated to you at the time of your order. We do not automatically ship out "backorders."

**Product Returns** All returns must be made within 30 days from receipt of shipment and receive an authorization number. Returned product must be unused and in saleable condition. You are given credit only on any returned items. Returns due to customer error will receive a 25% restocking fee at the time of return.



**Professional Status** We sell only to licensed skin care professionals. To qualify as an account, we require proof of professional status. A copy of your state license or business license is usually sufficient.

**Returned Checks** There is a \$25 return check fee. If there are more than three checks returned within a twelve month period, future orders must be shipped COD, or paid for with a cashiers check or charge card



## Chapter 3 Reflecting on the Body's Largest Organ

The human skin, with all of its beauty and complexity, has evolved over millions of years. Its ability to adapt and change is one of its wonders. The outer world in which it exists influences its inner world. As in all endless universal structures, it is part of a whole. It cannot exist on its own. It is a cosmos within a greater cosmos that works and adapts in harmony and response to the forces and influences surrounding it. As a skin specialist, this is an important concept to impress deeply in your mind when choosing facial treatments and home care.

### Impression

(Figure 3.1 Insert clip photo of mother and child wrap around text)

The skin acts as a reflector of current events and is considered the window between our inner and outer world. Sight, hearing and smell all contribute to this ability. As our largest sensory organ, nerves stem from the spinal nerve branches and are distributed throughout the body and the skin. They serve as messengers back to the brain regarding heat, cold, pressure, pain, and other sensations. One's capabilities to feel and touch are highly important, since any disruption in this process may interfere with perception, which ultimately influences one's health and well-being.

The ability to sense and touch is essential to human growth and development. During fetal stages, the touching and movement of embryonic fluid presses upon the unborn child. Each new cell *presses* and *grasps* upon the other causing the occurrence of biological reactions. This fosters new cell and eventual tissue and body

The skin is a dynamic organ that is in constant renewal and readjustment. Considered to be *mosaic*, the skin is in a constant state of motion meaning that the cells don't always grow at the same rate. Cell growth and function is managed by internal biological timetables (circadian rhythms) that regulate the occurrence of cell division, the building of new structures, and the break down and discharge of waster materials. Movement of new cells to the surface takes place from several days, as in the case of a newborn, to a period of 30 days or more as one ages.

growth. All of this movement is critical to human development.<sup>1</sup>

A newborn child explores through grasping and touching of the skin of its new mother. Deprivation of human touch may result in underdevelopment and even death. As a young child grows, it becomes more acute in interpreting the messages obtained through this large sensory organ. Early neurological development is dependent upon touch, grasping and brain interpretation received via the senses.

### Adaptability

An incredible attribute is the skin's ability to adapt to its surroundings and environmental changes. The skin responds and tries to adapt as people move from their natural cultural environments into other parts of the world, i.e., northern Europeans moving to southern regions. Unfortunately, lighter skin living in regions closer to the equator tends to be overridden by stronger UV influences. The immune response within the skin is triggered causing other conditions that are foreign to normal skin.

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<sup>1</sup> Dietrich Gumbel, PhD, *Principles of Holistic Skin*

*Therapy With Herbal Essences* (Heidelberg: Haug, 1993).



It may over react by causing hyperpigmentation. Damage may occur in the dermal structures causing the skin to appear thicker, wrinkled, dry and appearing older than its chronological age.

(Figure 3.2 Insert clip photo of black or Hispanic skin – wrap around text)

Individuals living in the far northern regions of the planet may be of lighter complexion and hair. Fair skins tend to absorb more light (UV) so that the normal biological bodily processes can occur in a healthy manner.

### Effects of stress

The skin is subject to both external and internal insults every second of every day, both physical and chemical. Psychological insults such as anger, hatred and fear com-

### The skin's ecosystem

Compare the ecosystem of the skin with that of the earth. Life on earth would cease to exist were it not for the protective effects of atmospheric ozone. This layer of ozone, which is concentrated in the stratosphere, is approximately 15 miles above the earth, shields our planet from much of the life threatening effects of ultraviolet radiation (UV rays). This production of molecules in the upper atmosphere is self-regenerating, formed continuously for the breakdown of oxygen - O<sub>2</sub> – molecules in the upper atmosphere to form ozone molecules – O<sub>3</sub>. When the ozone absorbs harmful UV rays, the ozone itself then reverts to oxygen, which is an essential life giving part of the air that we breathe. Thus, this relatively tiny amount of atmospheric ozone is responsible for life itself on the face of the earth. Interference with this delicate balance can ultimately be catastrophic.

(Fig 3.4 Illustration of ozone pattern and earth)

Similarly, the epidermis, our outermost protective covering, is responsible for protecting the entire body from external factors. This ultra-thin uppermost layer acts as a buffer between our viable body tissues and the outside environment. Like the eco-

bine both physical and chemical stress. We can define stress as any force that when applied to a materials changes its physical characteristics. Stress in medical terms means the sum total of all biological phenomenon resulting from any adverse external influence including damage and defense.

So stress is a biologically negative force. This is a key concept because it is at the heart of any skin care program. We need to protect our skin from stress and repair the damage caused from it. All skin care products, excluding make up items, must relate in some manner to this concept, or they have no function.

system of the atmosphere and the earth, our skin cells continuously regenerate, without which life itself would not be possible. Changes in our diet, health, and inadequate skin care, and environmental factors can compromise this very critical aspect of our body's ecosystem, which can be catastrophic.<sup>2</sup>

### Balance and harmony

The human body's ability to function is dependent upon the delicate balance of all of its innate systems working harmoniously. Like the tides of the ocean, these internal rhythms ebb, flow, and require a congruent ecosystem. *Health* represents a state of being for man's living in harmony with nature. *Illness* becomes a disharmony. *Healing* is the attempt to re-establish a lost harmony.

The skin plays a vital role in maintaining this equanimity. In our modern day world, the skin is often forgotten or neglected causing it to age before its time. Amazingly, it continues to be our silent, unconditional friend always accommodating and protecting us so that we can carry on our life's work.

<sup>2</sup> Adapted from a paper from formulating chemist, John Garruto, Free Radical Technology, Oceanside, CA.



## Chapter 4 Anatomy and Physiology of the Skin

### The structure and function of the skin

Our mission at *Circadia* by Dr. Pugliese is to provide education to our professional skin care specialists. Choosing the correct course of products and treatments requires an understanding of the dynamics of how the skin works.

Anatomy is concerned with the structure of the skin, while physiology deals with how the skin works. We will begin by examining the function of the skin followed by description of each layer. It is highly recommended that you purchase *Physiology of the Skin II* by Dr. Pugliese that is available through Allured Publishing (Skin Inc.) for an in-depth study of the skin. There is also a *Further Reading* section in Appendix A that provides a library of information.

Viewed as a layered structure, the skin acts as an interface for the body and the environment. It is a barrier for minimizing transport of harmful materials. It metabolizes, synthesizes, regulates heat, senses and provides support for the inner organs. The skin loses its elasticity, vitality, smoothness, firmness and suppleness with aging. This process may be accelerated with the onset of sun and environmental damage. The skin protects against mechanical obstacles, i.e., cutting, pricking.

A primary function of the skin is the normal production of a dead horny layer of keratin, which protects the body from the external environment. This permeability barrier is called the *stratum corneum*.

***First, the skin offers protection from the outside, and keeps the inside of us intact.***

The hard surface cells of the skin – the horny layer – must be flexible to allow bending around surfaces and to be able to absorb pressure and stretching. The water loss from the skin called *insensible water loss*, or transepidermal water loss, provides the essential water to keep the skin soft. A critical fact is that only water can soften

protein on the skin. Moisturization, therefore, can occur only from within the skin. When the skin is too dry it will crack and allow microorganisms to enter. By adding lipid materials to our formulas we can control the rate of water loss to the surface of the skin. The skin's water loss is about 0.50 mg./mc<sup>2</sup> each day with average conditions. On a hot, dry day you may lose three times that amount. The relative humidity determines how much water you lose, along with your core body temperature. This assumes that your skin is normal and not irritated or broken.

***Second, the skin regulates our body heat.***

It is a great radiator of heat, and can produce heat if necessary by shivering. Our core temperature must remain around 37.6° C (98.6°F). Sweating reduces our body temperature by pulling heat from the skin to evaporate the sweat. Anything that would interfere with this setting mechanism is not good. Waxy, heavy creams can do this. One additional fact to remember – the skin contains many blood vessels for heat dissipation, many more than it needs for nutrition. Only when the individual reaches age fifty or more does the skin begin to show signs of needing more circulation. Certain diseases, however, may affect this requirement at an early age, even in the teens, i.e., Raynauds' disease is one example.

***Third, the skin is the largest sexual organ, having many functions beside attraction.***

Beautiful skin means attractive skin, free of disease, soft, radiant and pleasant to smell. Skin is an indicator of health, a sign of vigor, an indicator of our emotion state, as well as many more functions yet to be determined. Radiant skin means a high level of reflectivity from the surface of the skin. Dry skin, flaky skin, discolored skin and wrinkled skin will all reduce the amount of reflectivity. Clear skin, that is free of blemishes and well hydrated, provides the maximum reflectivity. Over-



hydration or excess surface oil will produce a shiny skin, which is excessive reflection, indicating a disorder. The need for humans to feel skin requires a soft and blemish free surface. Tactile sensation after applying a skin care product is important to product acceptance. Notice that the first thing your client does after applying a cream is to touch the skin's surface and respond according to how it *feels*.

***Fourth, the skin is a detoxifier and a metabolically active and intricate part of the body.***

Most toxins in the skin are rapidly metabolized to nontoxic materials then returned to the blood stream to be excreted. Antibiotics, as another example, may be pushed into the skin and remain for some time. Tetracycline's are notorious for this. A fair number of people will actually become

## The Epidermis

The epidermis is the outmost part of the skin and is approximately 0.2 – 0.4 mm or 1/1000 of an inch thick. The first line of defense against environmental and bacterial influences, the top of the epidermis contains a thin film of emulsified materials spread evenly over its entire surface. Referred to as the *acid mantle*, components of this mantle originate in the sebaceous glands, sweat glands, and cornification process. This pliable film contributes to numerous functions, among which are antiseptics, with interference for the absorption of toxic agents, buffering of acids and alkalis and lubrication and hydration control of the stratum corneum. It forms a strong barrier to maintain the internal integrity of the skin. The outer layer is constantly being renewed by other cells at the bottom of the epidermis, which prepare and push the hard protective cells to the top. This hard layer gives the skin its texture and feels. The epidermis is nourished through a process called *diffusion*, which is fluid coming from the blood vessels. There are no blood vessels in the epidermis. The color of the skin is made up of reflected light patterns and colors. New skin cells surface within approximately 21

Toxins are essentially poisons. The body needs to excrete or modify toxic materials in such a way that they are no longer damaging to the body. The skin is a great waste disposal organ. Mercury poisoning, for example, is characterized by metallic skin, since the body pushes the mercury into the dermis where it is bound to protein components. Depending on the way the sun strikes the skin, it may look black, or silvery.

photosensitized to these agents when exposed to the sun. It is essential therefore that none of our ingredients interfere with the normal function of the skin in this respect. This is an extremely complex topic and it is mentioned here only so that you will be aware of it.

days. This shedding process or *desquamation* slows down after age 30.

(Fig 4.2 Illustration: the epidermis)

## Dermal-epidermal junction

The epidermis is separated from the dermis by a junction called a *basement membrane* that contains fibers that connect the epidermis to the dermis. Extending from the papillary layer of the dermis, small blood vessels nourish the basal cell layers, which are located in the lower part of the epidermis. The basement membrane is made up of strong connective ridges (rete pegs) that tend to flatten with age. Excessive UVA damage tends to increase this loosening affect.

Epidermal cells or *keratinocytes* begin to differentiate or change structure and function as they migrate from the basal level up to the stratum corneum. A critical step, this process makes up the "hardened" skin barrier in the stratum corneum that helps to prevent moisture loss and invasion of foreign materials (bacteria, pollutants, etc).



## **Skin cells and macromolecules**

The types of cells found in the epidermis include basal cells, keratinocytes, melanocytes, and Langerhans cells.

**Basal cells** make up the lower part of the epidermis and receive their nutrients from blood vessels protruding from the basement membrane at the dermal-epidermal junction. They are considered a *cuboidal* cell and contain a nucleus.

**Keratinocytes** are what is transformed from the basal layer as the cells migrate to the top. The nucleic material begins to break up and the cell flattens. A keratinocyte transforms its cytoplasmic substance

into more hardened protein and develops lamellae which secrete lipids between the cells forming an impermeable barrier.

**Melanocytes** are dendritic cells meaning that they possess a branching “foot” that extends in and around the cells in the epidermis. They may look something like an octopus. Melanocytes contain pigment called melanin. Sunlight, injuries to the skin, and hormones all stimulate melanin production.

**Langerhans cells** are immune cells that travel in and out of the spiny portion of the skin layers and are activated upon invasion of a foreign substance.



### Major Macromolecules of living organisms<sup>3</sup>

Macromolecule	Building Block	Major Functions	Examples
Carbohydrate	Monosaccharides	Energy storage; physical structure	Starch, glycogen, cellulose
LIPID: Fats	Fatty acids and glycerol	Energy storage; thermal insulation; shock absorption	Fat; oil
Phospholipids	Fatty acids, glycerol, phosphate	Foundation for membranes	Plasma membranes (cell)
Waxes	Fatty acids and long-chain alcohols	Waterproofing; protection against elements	Cutin; suberin; ear wax; beeswax
Steroids	4-ringed structure	Membrane stability; hormones	Cholesterol; testosterone; estrogen

### Layers of the Epidermis

Stratum (Layer)	Characteristics
Basal Layer (Stratum basale)	Deepest layer; single layer of cuboidal or columnar cells; site of continuous cellular reproduction; contains the only cells of the epidermis that receive nutrition; cells are constantly undergoing division and being pushed up to the body surface.
Spiny Layer (Stratum spinosum)	Consists of many keratinocytes with spiny appearance; some keratin.
Granular Layer (Stratum granulosum)	Three to five rows of flat cells; site of keratohyalin and keratin formation.
Clear Layer (Stratum lucidum)	Only found in the thick skin of the palms and soles; consists of clear, flat, dead cells; cells contain a protein called eleidin.
Horny Layer (Stratum corneum)	Outermost layer of epidermis; 25 – 30 rows of flat, dead cells filled with keratin; continuously shed and replaced.

<sup>3</sup> Adapted from Anatomy and Physiology, The Easy Way, I. Edward Alcamo, Ph.D.



## The Dermis

Under the epidermis is the dermis; the epidermis rests on the dermis, which carries the blood vessels that nourish it. A support structure of the skin, this multi-layered network is approximately 2mm thick and is highly resistant. The dermis consists of a connective membrane made up of cells reinforced by a network of elastic fibers. The dermis is thickest on the back and thinnest in the eye area. Skin of the scalp, forehead, wrist and palm are all less than two millimeters thick. The abdomen and thigh are between two and three millimeters. Located in the dermis are blood and lymphatic vessels, nerves, and sensory nerve endings, hair follicles, sebaceous glands, and ducts of sweat glands. The dermis contains basic substances that provide nutrition for the epidermis. It contains approximately 60% of the water circulating in the skin tissue and gives the skin its strength.

Two groups of are found in the connective tissue: extrinsic and intrinsic cells.

**Extrinsic cells** Extrinsic cells are the white blood cells (macrophages, lymphocytes, and mast cells) responsible for immune response during times of inflammation or to transport waste byproducts.

**Intrinsic cells** Intrinsic cells are mainly fibroblasts whose function is to produce collagen, elastin, glycosaminoglycans and proteoglycans.

### Layers and cells of the dermis

Papillary dermis (Upper layer)	Contains fine nerves and very tiny capillaries along with elastic fibers
Reticular dermis (Lower layer)	Contains collagen, glycosaminoglycans (GAG's), larger nerves and blood vessels. Major support structure providing strength and resistance to tearing. Contains sweat glands, hair follicles and sebaceous glands.
Fibroblasts	Major cells in the dermis that makes collagen, elastin and GAG's.
Lymphocyte	An immune cell.
Mast cell	An inflammatory cell.

(Fig 4.4 Illustration – the dermis)

## Structures and cells in the dermis

The **papillary layer** is the basis of the most important metabolic activities taking place within the skin tissue. Blood and lymph vessels are found in this layer. Arterial and venous vessels provide oxygen and other essential nutrients and carry away metabolic wastes. Lymphatic vessels regulate tissue pressure and clear away effete cells, proteins, fluids, and degraded materials.

**Fibroblast cells** make up collagen, elastin, reticulin, glycosaminoglycans and proteoglycans.

**Collagen** makes up 70% of the dermis and allows for stretching and contraction of the skin and aids in wound healing.

**Elastin** occupies the space between collagen fibers. It provides elasticity and resiliency to the skin. Elastin undergoes slow but constant degradation and is replaced by new elastin.

**Glycosaminoglycans** and **proteoglycans** are macromolecules with hydrophilic (affinity for water) properties. They have the capacity to bind and release water, and are responsible for the turgor (plumping) of the skin.

The **reticular dermis** is the deeper layer of the skin making up the bulk of the dermis. It is comprised of dense collagen and coarse elastic fibrous tissue. The reticular dermis contains sebaceous glands, fat cells, sweat glands, and large blood vessels.



## Subcutis or hypodermis

This layer consists of irregularly arranged connective tissue with an abundance of fat cells. Its primary function provides a source of energy, thermoregulation, cushioning against mechanical trauma, contouring the body, and filling space. The hypodermis varies in thickness with race, gender and individual nutritional and hormonal status. It separates the skin layer from underlying muscles. Considered as a prolongation of the dermis, it contains extensions of the elastic fibers, hair follicles, and sweat glands.

Numerous fat cells in this layer are organized in chambers (fat lobes) by the sur-

rounding connective tissue. The connective tissue bordering these chambers is called *septa*. Fat lobes and septa in women run radically. In men, the fat lobes and the septa are more angled. As a result, men have smaller, polygonal fat lobes. Women have a layer called “deep reserve fat” that is encapsulated by the *fascia superficialis* above the muscles. It occurs in specific areas of the body: hips, lower abdominal region, inner knees and triceps brachial area. It is necessary for childbirth.

(Fig 4.5 Illustration of the Subcutis)



## Chapter 5 The Cell

All life begins with a single cell where internal nutrients are utilized to build strong, healthy tissue and body systems. A single cell's magnificent and powerful world is reflected ultimately by producing healthy organs, body structures and radiant skin.

Cells are powerhouses of activity whose primary purpose is to produce protein. They are comprised of a gel-like substance called *cytoplasm* that serves as the foundation of the cell. The cytoplasm contains numerous microscopic bodies called *organelles*. Many cellular functions occur within the organelles ("little organs"). The outermost membrane separating the cell from the external environment is called the *plasma membrane*.

A very important part of the cell is its nucleus, which is composed of protein called *histone* and *deoxyribonucleic acid* (DNA). The DNA contains linear units

called *chromosomes* that contain genetic material responsible for programming and directing all workings of the cell.

Cells can be diversified taking on certain tasks depending upon where they are located. For example, a primary purpose of a basal skin cell is to build a strong, impermeable stratum corneum. Understanding the role of a single cell fosters understanding of the harmonious interaction of the communications between other cells, which make up tissues and organs. Cells communicate "chemically" to organelles within its body as well as to other cells. In the skin, there are several different types of cells responsible for specific functions that were previously discussed.

(Insert Fig. 5.1 illustration of cell and its parts)



## Structure and Function of Major Cellular Organelles (summary)

**Organelles** – parts or structures within the cell each having a specific function

<b>Organelle</b>	<b>Structure</b>	<b>Function</b>
Endoplasmic reticulum	Network of interconnected membranes consisting of sacs and canals	Transports materials within the cell; provides attachment for ribosomes
Ribosomes	Particles composed of protein and RNA	Bodies where proteins are synthesized
Golgi complex	Group of flattened, membranous sacs	Packages protein molecules for secretion; origin of lysosomes
Mitochondria	Membranous sacs with inner partitions	Site where energy is released from food molecules and transformed into usable form. Site for respiration and the breakdown of fats and sugars in order to produce energy. (ATP)
Lysosomes	Membranous sacs	Contain enzymes for intracellular digestion
Centrosome	Non-membranous structure composed of two rod-like centrioles	Helps distribute chromosomes to daughter cells during cell reproduction and initiates formation of cilia
Cilia and flagella	Hair-like projections attached to basal bodies beneath cell membrane	Propel fluids over cellular surface and enable certain cells to move
Vesicles	Membranous sacs	Contain various substances after entry to the cell
Microfilaments and microtubules	Thin rods and tubules	Provide support to cytoplasm and help move objects within the cytoplasm; make up cytoskeleton
Nuclear envelope	Porous double membrane that separates nuclear contents from cytoplasm	Maintains wholeness of the nucleus and controls passage of materials between nucleus and cytoplasm
Nucleolus	Dense, Non-membranous body composed of protein and RNA	Contains materials to form ribosomes
Chromatin	Fibers composed of protein and DNA molecules	Contains genetic information for protein synthesis
Cell membrane	Membrane composed mainly of protein and lipid molecules	Maintains wholeness of cell and controls passage of materials into and out of cell



## Mitosis

The lowest layer of the epidermis is the basal layer, which contains immortal cells that divide to supply the new cells that make up the stratum corneum. This process, called *cell differentiation* is ultimately associated with aging. The mother cell remains immortal, that is, able to divide again and again to produce daughter cells. The daughter cells are programmed to differentiate into cells that make up the stratum corneum.”<sup>4</sup>

Cells increase in numbers by duplicating themselves through a process called *mitosis*. They are programmed to perform specific tasks.

Mitosis (Latin – “mito” = threads) is the period of the cell’s cycle during which the nucleus of the cell replicates and separates into two daughter cells.

- A. Nuclear material becomes visible as 92 chromosomes
- B. Chromosomes organize in the center of the cell
- C. Chromosomes separate, and 46 chromosomes move to each new cell that is forming

**Prophase** duplicated chromosomes coil, nucleus and nucleolus disappear; spindle apparatus is completed, chromosomes move to center of cell.

**Metaphase** centromeres line up on metaphase plate.

**Anaphase** centromeres split, chromosomes move to opposite spindle poles.

**Telephase** chromosomes uncoil, nucleus and nucleoli form, spindle apparatus is dismantled, and cytokinesis is completed.

(Fig 5.2 Illustration cell mitosis)

Figure 5.2 Four phases of human cell mitosis. Chromatids appear in prophase and then line up in the cell center at metaphase. One set of 46 chromosomes move to each daughter cell in anaphase and the splitting of the cell in telophase completes the process.

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<sup>4</sup> Peter T. Pugliese, *Skin, Sex, and Longevity*. 1998 Bernville, PA.



## Journey to the top – the four stages of cell migration

This journey signifies the very purpose of the epidermal skin cells—the building of an impermeable skin barrier. The sole purpose of each new basal cell is to undergo chemical changes to become a keratinocyte that eventually forms a strong outer barrier in the stratum corneum. Each new layer indicates a new alteration in the shape and makeup of the keratinocytes. The plump basal cell contains a full nucleus and has the ability to divide. Transformation from the basal into a keratinocyte means that its nucleic material breaks up and the cytoplasm undergoes changes, creating new substances in the cell that causes the cell to become protein- and lipid-enriched. It no longer can divide and its end point is the stratum corneum.

(Fig 5.3 Illustration: four stages of cell migration)

### Stage Four – Generating of lipid-enriched materials

Lipids continue to secrete between the cells to continue strengthening the intercellular matrix. New corneocytes continue to move into the stratum corneum at its base and eventually shed. Stratum corneum lipids are ceramides and free fatty acids. The cells in the stratum corneum appear very flat and contain no nucleus. Corneocytes are protein and lipid-enriched. The *desmosomes* that held cells together on the way up from the basal layer are degraded by enzymes, which allow the cells to shed off the stratum corneum.

### Stage Three – Formation of strong cross-linked cornified envelope

At this stage, a dense band of strong proteins provides a rigid barrier to external assault such as organic solvents, acid and alkaline solutions, and proteolytic enzymes.

### Stage Two – Keratohyalin deposition

**Granular Layer (*Stratum granulosum*)** – Made up of three to five rows, cells begin to flatten and contain granules containing a substance called *keratohyalin*. This substance manufactures a rich protein called *filaggrin*, which is the protein that makes up the stratum corneum. This protein has an affinity for water molecules. As cells die, they are replaced with more keratohyalin and keratin. Lamellar bodies continue to secrete their substances between the cells. *Langerhans cells* (immune cells) are also found in the granular layer.

### Stage One – Keratinization

**Spiny layer (*Stratum spinosum*)** – Differentiation begins to take place with cell division being less than what it was in the basal layer. As keratinocytes migrate to the surface, synthesis of cell proteins (keratin) begins to change the cell's characteristics. Keratin protein is used to make enzymes and structural materials to aid in building strong cell barriers. The keratinocytes show spiny points that adhere to other cells creating intercellular



junctions called *desmosomes*. During cell migration, these links begin to form bundles of fibrous material. Present in this layer are *Lamellar bodies* which contain lipid substances that secrete into the spaces between the cells. Lipids help form a semi-permeable barrier between the cell layers.

Understanding this process is one of the most important subjects when understanding your job as a skin care specialist. It is the lipids that secrete into the intercellular matrix that help make up a strong barrier for the skin. If at any point this process doesn't occur normally, the skin may not be able to function as intended. In aging, this process slows and the lipid secretions between the skin cells mitigate leading to an increase in se the correct treatment and home care regimen to help correct and rejuvenate this type of skin.

## Bricks and mortar

In addition to the surface film, the chief barrier function takes place between the intercellular spaces appearing as *bricks* and *mortar*. This brick (cell) and mortar (lipids) configuration provides a very dense structure and highly impermeable matrix of cells. Between the cells (intercellular matrixes) specific lipids make up a water-resistant barrier. Lipids combine with proteins to form *proteolipids*, which are major constituents of the intercellular "cement." It helps to protect from moisture loss and keeps the skin lubricated and plump. Lipid composition in this barrier consists of approximately

- Ceramides (59%)
- Free fatty acids (20%)
- Cholesterol (25%)
- Cholesteryl sulphate (5%)

Lipid structures change as the keratinocytes move upward to the surface. The cells in the basal layer contain a complex lipid composition, with phospholipids as the major constituent.

In the granular layer, the phospholipids content diminishes while the amount of cerebrosides (glycosylceramides), ceramides, cholesterol and cholesterol sulfate increase.

In the horny layer (*stratum corneum*), the phospholipids have vanished completely.

(Fig 4.3 Illustration: bricks and mortar)



## Chapter 6

## The Immune Response

A vital function for skin protection is the *immune* response that is responsible for human survival. Initial immune response triggers our system's defense mechanisms that protect us from agents or pathogens that could lead to severe response, disease and even death. Immune cells such as Langerhans, Macrophages, and Mast help to neutralize, modify and excrete any bacteria or toxin from the body so that it is not harmed.

The lymphatic system is a large system that helps protect us. This topic is very complex and lengthy, and can be studied from numerous texts, some of which are listed in our Further Reading section.

There are many factors that lead to the skin's immune response. Whenever you perform a treatment that causes irritation, i.e., a peel, an enzyme, microdermabrasion, etc., you are triggering the skin's immune response. This is an important statement because your *choice* of treatment can cause a skin reaction. The degree of that reaction is dependent upon the extent of the activity of the product that may cause a *controlled damage* effect. Controlled damage is caused from peels, microdermabrasion, and any other chemical agent or mechanical device that disturbs the skin's mantle. *Controlled damage* may ultimately produce positive results by stimulating fibroblast cells responsible for collagen and elastin formation. During this process however, we also must be very aware of the tolerance levels of our clients. Not only can we cause too much response, we can also trigger free-radical activity, which ends up damaging vs. repairing. There is a delicate balance that must be adhered to at all times. Treatments should be performed according to the Fitzpatrick scale and health history of our patients/clients. An understanding of wound healing is also recommended.

Invasion of foreign substances such as bacteria, an irritant, or a strong dose of ultra violet rays can cause an immune re-

sponse. The stratum corneum is the first line of defense against external aggression. The acidic pH on the surface prevents the proliferation of numerous pathogens. Whenever the skin is wounded, i.e., a cut, heat, a burn, an irritant such as poison ivy, or a bacteria or even a bug bite, may cause a response. A response may look like red swelling and inflammation, oozing, fluid buildup, itching, and peeling. Anything that causes potential harm to the body places the immune system on high alert and causes it to react.

### Immune cells

*Langerhans* are star-shaped cells that are manufactured in the bone marrow and found in the lymph nodes and epidermis. Foreign agents known as *antigens* are met head on by these sentinel cells. A piece of the foreign substance is delivered to a large multifunctional immune cell called a *macrophage* (meaning big eater).

Macrophages are found in the dermis and the lymph nodes. They are programmed to identify what is part of the body and what is foreign. They emit signals that summon another type of white blood cell called T-helper cells. T-helper cells signal the immune system within the blood stream to react to the invasion of the foreign substance or invading organisms. T-Killer cells found in the lymph nodes are brought into the site of invasion and kill invading organisms. When completed, a third type of T-cell signals that the job is finished.

A result of an immune response is to build antibodies. Antibodies help kill substances if they re-enter the body. For example, antibodies are built when we have certain illnesses such as measles. Once the antibodies are formed they can kill any re-invasion of this foreign antigen.

(Fig 6.1 Illustration of the immune response)



## Chapter 7

## The Fitzpatrick Classification

When most estheticians discuss skin typing, they think of oily, dry, or combination skin. When dermatologists discuss skin types, they are referring to a *degree* of hereditary skin coloration (pigment). The Fitzpatrick Skin Classification's ranking of coloration is also representative of a natural tolerance, or lack of tolerance, to the sun and its ultraviolet rays. Dr. Thomas Fitzpatrick, a renowned Harvard Medical School dermatologist was the developer of this scale, who classified skin into five types.

Both dermatologists and plastic surgeons refer to this scale prior to performing any aggressive peels or light therapies, i.e., the FotoFacial™, laser resurfacing, plastic and corrective surgery, laser hair removal, and varicose vein injections. This information serves as an indicator for determining the treatment selection, tolerance level, healing time, and end results.

An esthetician will find this a valuable gauge when determining potential reaction and/or tolerance level associated with facial treatments, especially microdermabrasion, and any other exfoliating

agents. Knowing this information also helps in product selection for home care since it serves as an indicator for what the skin needs for correction and maintenance.

The more natural pigment in the skin, the greater its resistance to sunburn and environmental skin damage. While black skin can suffer from both sunburn and sun damage, it has greater resistance to potential damage due to its pigment. The melanin in the skin provides a natural hereditary form of sunscreen. Darker skin types are much less likely to develop sun damage, sun-induced skin cancer, wrinkles, and solar elastosis.

The Fitzpatrick Scale types skin from the lightest, most susceptible to sunburn and sun damage, to the darkest skin coloring, the most resistant to sunburn, and cumulative sun damage. When you analyze skin, you should also note the client's Fitzpatrick skin type. Fitzpatrick skin types are referred to with Roman numerals.

The Fitzpatrick Scale

Skin Type	Color	Reaction to First Summer Exposure
Type I – White (Cream)	Celtic or Irish extraction; often with blue eyes, red hair and freckles. Very fair.	Always burns easily, never tans
Type II – White (light)	Fair skinned, blue, green, or hazel eyes, blond hair	Burns easily, tans slightly
Type III – White (Light/matte)	Very common skin type; fair with any eye or hair color	Sometimes burns, then tans gradually and moderately
Type IV – Moderate Brown (Matte)	Typical Mediterranean Caucasian skin; Latinos and Asians	Burns minimally, always tans well
Type V – Dark Brown	Middle-eastern skin types, rarely sun sensitive; Indian, Light African descent	Burns rarely, tans deeply
Type VI – Black	Black skin:	Almost never burns, deeply pigmented



Daily sunscreen protection should be worn regardless of coloring. This scale not only indicates sun damage susceptibility, but also serves as a scale of *intrinsic* sensitivity. While black skin types can still be sensitive, thinner, type I and II skin types tend to be more reactive to external and topical substances, including exposures to the environment, including sun, heat, cold, and wind.

These skin types may also be affected differently by pigmentation disorders.

Hyperpigmentation is more likely to affect types IV-VI, than the lighter skin types. Certain advanced skin treatments including *Jessner's exfoliation* (peels), more

than 5% *benzoyl peroxide*, and *resorcinol* may irritate types IV-VI and cause or worsen pigmentation. Medically, laser and deep chemical peels are generally reserved for types I-III skin coloration's.

Asian and Hispanic skin types are very susceptible to hyperpigmentation problems. Any injury to the skin can result in hyperpigmentation. Darker skin types produce more melanin than Caucasian skin, and are more reactive to stimulation and injuries, including chemical insults from skin care products that are too strong for their skin. Pigmentation resulting from irritation or injury is called *post-inflammatory hyperpigmentation (PIH)*.



## Chapter 8 Skin Types and Conditions

One of the most challenging tasks when working with the skin is to determine its type and then accurately identify conditions that may be present. A thorough skin analysis during the first session helps provide information for building a customized skin care program for your client. The flexibility of the **Circadia by Dr. Pugliese** skin care system aids in maintaining and correcting the numerous skin types and conditions.

### Skin typing – Estrogen X-Y Theory

During the embryonic stages of fetal development, the formation of the skin and all of its characteristics are predetermined. Our parents passed on programmed data for the formation of our body's organs including the skin. Follicle size, skin thickness, glandular secretions, intracellular lipid secretions, the circulatory system, and nerve endings are all based on these innate traits. Onset of puberty causes character traits that affect our future adult body function and shape.

There are two hormones -- estrogen and testosterone, which may be combined to produce four basic skin types depending on the dominant hormone. These types should be related to the current dry, oily, and normal classifications so that estheticians can get oriented to the new types. Types may change with age, health, or medications. Keep in mind that many individuals will share aspects of more than one type, as Types may be shades of gray, rather than black and white. Ages at which types occur are not fixed; any type may occur at any age. All ethnic groups follow this classification, but it tends to be blunted in Blacks and Japanese Asians.

Skin color plays a major role in skin types yet can be dominated by the effect of the sex hormones. Sex hormones are universal, powerful promoters of cell growth and differentiation. They are the major biochemicals that control whether we shall be male or female and how we shall play out that role. Given all the other genetic influ-

ences on our lives and assuming we are metabolically and anatomically normal otherwise, the sex hormones take control. Here are four types.

Past, traditional skin types have been based on classifications such as

- Normal
- Combination
- Dry/dehydrated Skin
- Oily/Problem Skin
- Sensitive Skin

While there is validity to this theory, Dr. Pugliese has determined that "skin types" can be more accurately classified based on hormone typing rather than sebaceous glands (secretions) alone. During any phase of one's type, skin conditions such as dehydration, sensitivity, pigmentation, temporary oiliness, and dryness (oil dry) can be present. Since hormones typically affect the skin, it is easier to adapt our care programs to these four types based on the dominant hormone level - estrogen or androgen.

The four types are Type I Estrogen X, Type II Estrogen Y, Type III Androgen X, and Type IV Androgen Y. Each type has its own characteristics and each may have skin conditions during various stage of one's life.

#### Type I Estrogen X (Estrogen predominates)

This type of skin is decidedly female. Skin is soft, smooth, and wrinkle free with no intermediate or terminal hairs and no blemishes. Type I is found in the age group from puberty to about 35 to 40. Typically seen in Anglo-Saxons and Scandinavians, but is found in all races and cultures in early years. Features are delicate and eyebrows may be thin and light colored except in darker ethnic groups. Characteristics include small facial pores, estrogen glow and feminine curves due to estrogen fat deposition. Breasts are moderate to large. Estrogen X individuals tend to be prime candidates for cellulite.

Example: Early Marilyn Monroe



### **Type II Estrogen Y (Estrogen dominant but androgenic influence)**

This type of skin has oily areas, a few blemishes of the acneic type, some intermediate facial hair and larger pores than Type I. The skin is not as smooth as Type 1. It feels thicker and is less resilient. Type II can occur at any age but is most common after 35. Seen in young Latinos and Europeans of Latin origin, and some Asians. Features are fine, but not as delicate as in Type 1. Eyebrows are slightly darker and longer. Estrogenic fat deposition is present but to a lesser extent. The breast size ranges from medium to large.

Example: Joan Crawford

Example: Margeaux Hemmingway

### **Type IV Androgen Y (Androgen predominate with estrogen influence moderate)**

This skin type can occur at any age, but is most common during and after late menopause. Acne and seborrheic dermatitis are common, along with coarse facial hair and strong features. Large pores and terminal hairs are seen on the chin, upper lip and lower cheeks. Most facial features are less refined and the eyebrows are heavy, wide and dark.. There is a heavier bone structure with a tendency for the hands and feet to be bigger. The breasts tend to be smaller.

Example: Brook Shields

## **Role of Estrogen, Progesterone and Testosterone**

Estrogen is produced in the ovaries and in the adrenal cortex. During pregnancy the placenta produces estrogen and progesterone. At puberty estrogens play a significant role in the maturation of female reproductive organs including the uterus, vagina, fallopian tubes and ovaries. Secondary sexual characteristics are estrogen driven such as breast development, increased bone formation, subcutaneous fat deposition in the breast, buttocks and thighs. Estrogens also influence development of vascular function and soft textured skin and have a minor effect on pubic and underarm hair growth.



### **Type III Androgen X (Androgen dominant with estrogen influence strong)**

This type of skin is acne prone and has moderately large pores, more surface oil and scattered but pronounced terminal hairs, frequently on the upper lip and chin. The eyebrows are heavier and tend to be thicker. The skin is usually firmer and less resilient. The classical sign of a Type III is scant, but visible mustache at almost any age. This Type is more common in early menopause. The breasts are small to moderate with bone structure heavier and the features are less refined. The body is more angular with less curves and the skin color often darker.

Estrogens are known to cause a slight retention of sodium and water by the kidneys and more pronounced retention during pregnancy.

#### ***Effects of progesterone on female physiology***

Progesterone plays a role in increasing the size of the breasts by stimulating the development of lobules and alveoli. During the menstrual cycle, progesterone promotes secretory changes in the endometrium preparatory to the implantation of a fertilized ovum. Progesterone also has a minor effect on the retention of sodium, chloride, and water by the kidneys.

#### ***Effects of testosterone on female physiology***

In the adult female, testosterone plays an important role in maintaining lean body mass, bone density, skin elasticity, and libido. In addition, testosterone is involved in blood cell production. Low testosterone levels have been linked to increased risk for osteoporosis, decreased lean body mass, and decreased libido, and may suggest ovarian "insufficiency and/or adrenal insufficiency."

Elevated testosterone levels have been linked to masculinization, hirsutism, and increased risk of insulin resistance. Elevated testosterone levels have been noted in polycystic ovary disease and adrenal hyperplasia and suggest the presence of ovarian dysfunction or adrenal dysfunction.

These observations are but a few of the many physiological aspects of female hormones.

To review lipid or secretion function, it is important to make the distinction between lipids in the follicle and those found in the intercellular spaces.

Specific types of lipids are found in the area between the skin cells (intercellular) and help build the skin's impermeable barrier. Types of intercellular lipids include ceramides, cholesterol, sphingolipids, and phospholipids. The quality and activity level of these lipids determine how well the skin can retain moisture. In aging, this barrier decreases.

Lipid (sebum) in the follicle is secreted by the sebaceous gland duct and travels up the hair shaft onto the skin's surface. They are not the same lipids as found in the intercellular spaces. Sebum secretions from the sebaceous apparatus move up the follicle onto the skin's surface. The activity of this gland, which is affected by the hormone estrogen and progesterone, determines how much sebum is secreted into the follicle. Increased

Secretions may produce an oily condition on the skin's surface. The activity of this gland is normally genetically predetermined. Hormones, disease, medication and sun exposure may influence it.

## TREATMENT

### Normal Skin

The skin appears to be perfect to the naked eye and quick touch. Small children often appear to have perfect skin. Their skin actually would remain this way if not exposed to the elements and the onset of puberty with many hormone fluctuations. Normal skin is plump, soft, smooth textured with even pores, even color tones, and comfortable to the touch. It functions well with no excess of oiliness or dryness. The pores are fine to medium, the blood circulation is good and the skin looks and feels firm, smooth, and toned. "Normal" skin is rare and the

term *normal* is a phrase that can vary depending upon age

### ***How to treat***

While normal skin doesn't need any specific correction, treatments should be applied to help keep the skin in its good condition. A daily regimen of cleansing and stimulation and exfoliation of dead cells are important. The skin should be protected from environmental and treatment damage. The esthetician's goal is to maintain, prevent, and postpone the signs of aging.

### **Combination Skin**

Combination skin is partially oily and partially dry/dehydrated. The forehead and central part of the face is known as the "T-Zone." This area generally shows the oiliness with more enlarged pores. Due to the increased number of sebaceous glands concentrated in this area, it tends to be oilier. Contrasted to normal skin, the skin appears shinier with an enlarged pore texture throughout the T-zone area. The cheeks and outer areas of the face appear more dry, perhaps even a little flaky or scaly. When this area becomes extremely dry or dehydrated, then your choice of treatment should be directed to performing a facial for dry skin. While the treatment is directed towards correcting the dry areas, part of it can address the oilier T-zone areas. A special mask may be applied just in those areas. Home care regimen can also address this.

### ***How to treat***

Combination skin types are sometimes challenging. A resolution is to assess the severity of the oilier T-Zone area. It may require applying an oily skin mask twice weekly to keep it under control. There are also products that are designed just for application in the oilier areas. After cleansing and toning, apply this specialized product in the T-zone area followed by the moisturizer for combination skin. Most product lines address the combination skin type. Normally the creams in the combination skin system are higher in water content which adds needed moisture. Since there is less oil in the product, it also serves the T-



zone area well without adding additional oil. Combination skin care product systems are top sellers in most salons simply because they address the needs of many people.

## Dehydrated/Lipid-Dry

There are several considerations to assess when determining dry versus dehydrated skin types. 90% of what we see is actually dehydrated, not dry skin. It is essential to understand the difference between what causes the skin to be dry in the first place. Is it a temporary situation? For example, an environmental condition such as winter heat, or dry, hot outside air can easily cause more transepidermal water loss. Other circumstances such as lack of water, strenuous exercise, allergies, medications, and other factors may all lead to dehydrated skin. Dehydrated skin may be a temporary condition that is easily corrected when the environmental factor is no longer a problem. Young skin or old may encounter being dehydrated. Oily and sensitive skins are all subject to dehydration.

### *Dehydrated Skin*

Dehydration means the skin lacks water. It could be a result of extrinsic damage (sun) or intrinsic (aging) issues. Dehydrated skin is frequently delicate, thin, flaky or scaly, feels tight, dry, and uncomfortable to the touch or when facial expressions are made. Sometimes dehydrated skin looks very fine but still has flaky roughness to it. The skin seems to have very fine pores and is very prone to fine lines and sun damage.

Dehydrated skin is inclined to showing early signs of aging. It is the most difficult to correct. There are also other factors that play into dry skin. Have you ever had a client who drank eight glasses of water a day and still showed a dry condition on the skin? While drinking water is certainly very beneficial, it isn't always the answer to why the skin is dehydrated. In cases such as this, the dehydration may be a result of the skin experiencing too quickly of a trans epidermal water loss. Something is interfering with the skin's ability to hold moisture.



Water/moisture is regulated by the internal workings of the skin. Humans are 70% water, thus, we need to replenish it from the inside. Our skin needs a little water to soften the protein that helps forms the skin barrier. This special water is provided through a slow, insensible transfer of water from the moist lower layers up to the top outer skin layers where it binds to tough protein to make it soft.

Dehydrated skin is more common than a skin that lacks lipids. In many cases, it's difficult to discern the difference between skin that truly lacks lipids and dehydrated skin. Skin dryness and dehydration may occur as conditions that exist from time to time

### *Oily Skin and Dehydration*

Oily skin may experience intense lipid secretions yet be dehydrated. A good example is to watch a team of teens play a sport. They are sweating and losing a great deal of moisture. A closer look after the game shows that their T-zone areas are slick with clogged, oily skin. One might conclude that they have plenty of moisture due the oiliness. Quite to the contrary, they are most likely dehydrated.

Skin from other areas of the world may naturally have an oily skin type. The skin may be thicker and have enlarged pores.

- An oily skin can have areas of dehydration or water loss but still have enough oil. This would fit into the categories of Combination skin.
- A dry skin lacking lipids is also dehydrated. When there is lack of oil, water evaporates rapidly.
- A primary goal for treating dry/dehydrated skins is to reinforce the moisture and oil balance of the skin, soften the texture, hydrate and moisturize. This skin type needs much moisture in

the maintenance program along with sun protection.

### ***Dry Skin (lipid-dry)***

As the skin ages and is ravaged by environmental issues. Loss of moisture leads to further conditions within the skin. It causes a deterioration of the collagen and elastin fibrils. This results in aging, sagging, wrinkles and folds in the skin. It's critical to be conscious of treating dry/dehydrated skin with the utmost care because of its high disposition to aging. While not always visible initially, there is damage occurring to the underlying skin structures. The surface may appear smooth, however, the transition continues.

Dry skin may be classified as oil-dry. Dry skin lacks oil. Not only is the skin surface dry, but also it lacks sufficient lipids within the intercellular matrix. Remember that the lipid barrier helps hold moisture inside the skin. As one ages, experiences sun or environmental damage, the barrier diminishes considerably. Individuals who had normal to combination skin in the earlier part of their life may have graduated to dry skin. In normal aging, mitigation (diminishing) of lipids between the skin cells causes the skin to become consistently dry and dehydrated. The skin requires both water and oil to help replenish the moisture barrier.

### ***How to treat***

Dehydrated skin requires an assessment of why an individual is dry in the first place. To hydrate means to use products that contain ingredients to hold moisture. The goal in treating dehydrated skin is to increase the moisture or water hydration level in the skin. This may be accomplished with special serums, highly water based treatment creams, protection from water evaporation, sun protection, and exfoliation.

Care for dry/alipidic skin requires treatments that address both the dehydration issue and lack of barrier lipids. Facials for anti-aging combined with well-designed

home care products containing both lipids and oil may make a dramatic improvement.

### **Oily Skin**

Oily skin means oil. It exhibits an excess of sebum or oil production. The follicle size appears enlarged. The skin appears sallow, shiny, and thicker.

Predisposition of the sebum sticking to the dead corneocyte material that normally sloughs off the stratum corneum becomes a problem. Clumping of dead cells and sebum may cause clogging of the follicles. It increases the surface thickness of the skin. This causes the sallow appearance common to oily skins. Additionally, oily skin is more at risk for breakout.

When analyzing, consider the overall skin circumstances to determine whether or not it should be classified as an oily skin type. The number and condition of the lesions on the skin changes the designation from oily/ problematic to acne. Acne is a conditional disorder and not a skin type.

Most people classified as an oily skin type will always have oily skin. When the nose is congested with blackheads or open comedones, they are the characteristics that exist with an oily skin type. The difference between an oily skin and one that is acneic is the amount of conditional lesions and comedones appearing on the face.

The good news for oily skin types is that they are less inclined to form fine lines and wrinkles. The excess oil provides a better moisture barrier preventing water loss.

Oily skins are typically emotionally more problematic. They are easily triggered by intrinsic aging factors such as puberty and hormonal explosions. While one may not age from the standpoint of developing deep lines and wrinkles, younger individuals and those with hormonal fluctuations are challenged with problematic conditions associated with comedones and pustules. It takes hard work to get this skin type in better condition. Balancing the excess oil se-



cretions is a daily challenge. The skin requires frequent cleaning.

The tendency is to over treat individuals challenged with removing surface oil. Excessive treatment may end up producing a worse problem. The body's natural system will try to compensate for the excess oil loss. Eagerness to remove and degrease the oil actually causes more secretions and not less. The problem is perpetuated.

### ***How to treat***

Treatment of oily skin is to balance it and get secretions under control. Exfoliate the buildup of keratinized cells. Moisturize the surface with a hydrating product for oily skin. Eventually the skin creates a balance whereby the oil secretions are more in control. Treatment of an oily skin type is a constant juggling act of cleansing without overdoing. Providing adequate moisture allows the skin to be protected without an excess greasy feeling.

If an oily skin has breakout a key is to control bacteria proliferation (growth). It exaggerates the problematic nature of this skin type. The skin should be well exfoliated without overdoing. Gentle exfoliation helps to prevent the occurrence of skin buildup.

Balance between control and over treating the skin is a must. Oily skins do not require excess oil. Clean but do not strip. Exaggerated cleansings contribute to increasing the problem. Gentle exfoliation, good cleansing, and moisturizing helps to balance the secretions. Oily skin types require consistent maintenance to avoid cell buildup. Oily skin will always remain oily.

## **Sensitive Skin**

Sensitive skin may occur in all age groups and skin conditions resulting from heredity, surgery, menopause, disease and environmental factors. Highly reactive skin means that the area becomes temporarily red with touch or application of a skin care product. Treatment for these conditions must be directed according to the reason and degree of sensitivity. Severe cases must be referred to

a physician due to underlying systemic causes. We have included a section on Rosacea skin further on in this text.

More recently, sensitive skin has acquired its own classification. Sensitivity is a condition that may occur on any skin type. There are other circumstances, however, that cultivate a separate classification for a more at-risk sensitive skin.

Generally, beauty characterizes the sensitive skin type. Sometimes classified as "peaches and cream," it is pink to red in color, and clear with a smooth looking appearance. A closer look, however, sometimes indicates that there is a parchment look or feel. Sensitive skin is mostly thin and it easily flushes. It may feel uncomfortable or painful to the touch. Aggravated by topical substances, environmental conditions and topical sensitivity, delicate skin types require utmost care and gentleness.

Do not confuse a sensitive skin with one that is allergic to specific substances. Allergy reactions can occur in all skin types. An allergic reaction is due to a specific cause. A sensitive skin is genetically predisposed or has been sensitized by an aggressive treatment.

During the initial skin analysis, any refined, delicate looking skin with a tendency to redness is safely classified as sensitive. Treat it in your most careful manner both in treatment and selection of home care products.

### ***How to treat***

We have recognized that sensitive skin requires special agents to help reduce sensitivity. Sensitizing ingredients such as perfumes, certain preservatives and too many active ingredients may cause irritation to a sensitive skin.

Treat sensitive skin very gently.

Avoid sun exposure and conditions that may cause irritation.

## **Skin Conditions**

During a facial analysis, it is always easy to pick out the obvious issues on the skin.



Every individual has a skin type classification; however, not everyone has a skin condition. “Condition” means an irregularity or circumstance occurring in/on the skin that is not considered normal. This concept is important since it demonstrates the difference between type and condition.

During a consultation, the skin specialist must consider all information regarding the client. It begins with completing the health evaluation form and continues with a visual analysis. An important point to consider is that *conditions* may occur in all different skin types.

- Closed comedones
- Open Comedones
- Distended or broken capillaries
- Nodules
- Macules
- Papules
- Pustules
- Sebaceous hyperplasia
- Grade I Acne
- Grade II Acne
- Grade III Acne
- Grade IV Acne

### **Dehydration and dryness as a condition**

Chronic dehydration causes the skin to be tight, stretched, and tight. When pressed between the fingers, it shows tight fine lines. The eye area indicates more exaggerated lines. The mouth and neck areas are creased. Dry patches of scaly or flaky skin are noted on the surface.

Lipid dryness is harder to discern. Areas may seem tough, thick and rubbery like old leather. Also, take into consideration the age and sun exposure of the client. Oil/dry skin is evident in very damaged skin. It also is an indicator of aging.

Oily skin may have some flaking and fine line creases. Oily skin, however, normally doesn't experience an exaggerated amount of dryness.

A key indicator for determining dehydration is to notice the small fine lines

and sense of tightness. During consultation, the client may convey that the skin feels very tight and dry. These are all clues as to defining a correct course of treatment. When you can confidently discern the difference between dryness and dehydration, a proper course of treatment can be planned. It may include more lipid-based product and surface lubrication for the dry conditions. More water type moisture and specialty hydration serums and masks are indicated to correct the dehydration.

### **Sun and environmental damage**

Sun and environmental damage appear in many forms. Dehydration may be a result of living and working in a hot or dry cold climate. Wind causes severe dehydration. Lubrication and protection of the skin is a primary goal. Typically, dehydration in this instance is more acute and worse than in normal environments.

#### ***Hyperpigmentation***

This is another condition that may be a result of environmental damage. Hyperpigmentation means an excess of skin pigment. Freckles – lentigenes - are an example of hyperpigmentation. Freckles may also be caused by sun and environmental damage rather than by genetic predispositions.

#### ***Pregnancy mask***

This is a common hormonally determined example of hyperpigmentation that often gets worse under sun exposure. Other hyperpigmentation spots known as *melasma* or *chloasma* may appear on the skin as patches or splotches. The sun is an immediate cause of pigmentation irregularities. Melanin or pigment is a natural protecting mechanism that is triggered from UV exposure. Existing pigmentation becomes worse upon exposure.

Pigmentation actually begins prior to it being visible. Deeper pigmentation can be seen through a Wood's lamp. Pigmentation shows up as brownish dark splotchiness or dark spots. These spots often disappear when the Wood's lamp is turned off. This is a good clue that it is deep in the dermis. Hyperpigmentation seen under the Wood's



lamp is a prime sign of environmental sun damage. It is important that future sun exposure be avoided and that UVA, UVB sunscreens be worn. Skin brighteners also help to prevent further pigmentation. Treating pigmentation is difficult. There are newer treatment modalities using a combination of treatments including Circadia's SWiTCH™ and other brightening agents. A medical device known as the FotoFacial™ IPL will help to breakup deep pigment.

## Rosacea

Rosacea is a skin disorder/condition that is sometimes misunderstood by many skin care specialists. Terms such as “couperose” have been used to describe so many «red» conditions. We are including this topic in our manual because it requires very special care. Rosacea must be treated correctly. **Circadia by Dr. Pugliese skin care system** incorporates specific products for this type of skin.

Rosacea is a chronic inflammatory skin condition that appears in the central cheeks, nose, brow and chin. It appears as a flushing erythema with acne-like eruption that will progress if not treated. This condition is found mostly in individuals between the ages of 40 and 60 who are of Northern European heritage.

There are several theories as to why rosacea occurs, the first being that is caused by Demodex mite. The second is that there appears to be some relationship with ultra violet ray damage. This condition is still under study. Numerous factors play a role in triggering the flushing mechanism. Hot foods and beverages, spicy foods, or alcohol are some of these triggers. Exposure to head and cold, wind and sun may precipitate acute episodes of flushing. Also the use of topical corticosteroid may induce a rosacea-like syndrome.

There are four clinical forms of rosacea:

1. The mildest form is limited to frequent episodes of erythema and edema.
2. Persistent erythema and telangiectases appear with the addition of acne in a

form of papulopustular eruption of the mid-face. The papules are non-tender, non-scarring, and without inclusion of the follicle. Papules and pustules may appear in crops or clusters.

3. Deep-seated slow spreading pustules, furuncles and cystic nodules appear.
4. Hyperplasia of the nasal sebaceous glands and connective tissues result in the development of rhinophyma that is seen mostly in men over 40.

It has been reported that 58% of patients with rosacea experience ocular conditions such as conjunctivitis and a more serious ulceration conditions. In some studies it was found that rosacea patients suffer from fatritis, and abnormal stomach patterns. Migraine headaches have been shown to be 2-3 times more common.

## Telangiectasia

*Telangiectasia* is the abnormal dilation of capillary vessels and arterioles that often form an angioma. Numerous reasons play a role in this condition having to do with genetic traits. It occurs in the autoimmune collagen vascular diseases such as Lupus and in disorders such as rosacea. Photo-damage can easily lead to this condition along with any severe impact on the skin. Normally seen on the face and legs, they appear as small, red enlarged capillaries. When stress is induced on the capillaries, it causes the blood vessel to enlarge or distend. Some vessels may burst. Sun exposure, cigarette smoking, alcohol, and poor health may initiate this response.

Commonly called *couperose*, diffused redness manifests in the cheek, nose, and neck areas. Sometimes this redness is associated with sensitivity. It may or may not be associated with an allergic response. All redness is not a direct result of sensitivity. For example, individuals who work outside, such as a farmer or road worker, have developed very abused, sun-damaged skin. Environmentally exposed skin, especially one that is an oily type, displays diffused redness without having sensitivity. What is observed is sun damage, not sensitivity.



This is where the analysis is so important to do in conjunction with client feedback.

### **Lines and wrinkles**

Dramatic aging occurs in the neck and eye area as a result to sun and environmental exposure. There is an absolute direct correlation between sunbathing and premature aging. One of the first results of a skin analysis will be to advise the client of sun prevention and protection. Sun is a major factor contributing to damaging the collagen and elastin matrix in the skin. The result is the exaggerated lines, deep furrows and wrinkles. Once the underlying skin structures are damaged, the skin loses its firmness and begins to sag.

### **Moles, birthmarks, scars, and warts**

These are skin conditions that have cause beyond our realm of a non-medical doctor. It is, however, very important to note them in a skin analysis. Any unusual mark or growth should referred to a physician

### **Eye area**

The appearance of puffiness, dark circles, and redness many times responds to a lifestyle change. Eye products and treatment help to reduce the appearance of fine lines and dark circles. Fatigue is a factor that causes dark circles around the eye. Some cultures have a natural darkness to the eyes. This is more of a result of skin pigment. Esthetic improvements can be received through lymphatic drainage, application of eye products, and sleep.



## Chapter 9

The hottest topic today is aging. It is something that presents itself hundreds of times a day on television, in books, articles, and in general conversation. Billions of dollars are spent annually on face and body care products. Our role as a skin care specialist becomes more and more challenging as we sift through the thousands of products we see in the trade magazines and shows. While sorting through this hodgepodge of products we must always keep in mind our focus and goal for our business and the majority of clients that we serve. What are the mainstream conditions that prevail in our practices that require specialized treatment and active components (ingredients) to achieve results most effectively?

### **Perception of beauty, progression of time, and effects of exposure**

The appearance of the skin contributes to the psychological needs of an individual. In many cultures, a young skin contributes to beauty and social acceptance. Aged skin is an alternating factor that often minimizes an individual's self-esteem. During this century, approximately 20% or more of the population of developed nations will be 65 years or older. Consequently, there are greater demands for comprehensive studies of age related biological changes. Aging baby boomers are challenging researchers, the medical community, nutrition and cosmetic scientists to search for new innovative ingredients and formulations to turn back the hands of time. Additionally, it is predicted that 40 million women will enter menopause during the next twenty years. Demands for internal and anti-aging nutrients, natural substances that assist in regulation of internal systems when hormone levels decrease, and age-defying skin care preparation bring to the forefront new intense research.

## Aging

One of the most exciting aspects is that the technologies within our industry have made such great advances. We are offered effective delivery systems and ingredients that contribute to skin correction. We have at our fingertips very advanced scientific research and skin care systems. *Circadia by Dr. Pugliese* is based on scientific breakthroughs in formulation and delivery. It was made to correct as well as prevent.

### **Intrinsic & Extrinsic Aging**

When it comes to the health and rate of aging, we used to think that our choices were limited. The aging process would definitely mirror that of our parents and grand parents. We now have knowledge and scientific progress available at our fingertips. We can alter our belief systems with the wisdom that each of us possess the ability to influence our health and the way we will look at 50, 60 and beyond. Knowledge is power.

#### *Intrinsic (chronological)*

Refers to the way we would normally age during each segment of our life's journey. The body and skin show little changes in our twenties. It is relatively healthy and vibrant. Around thirty-five, there is more evidence of internal changes as fine lines and wrinkles appear around the area of the mouth and eyes. There may be slight sagging around the neck area, and the skin may experience some loss of elasticity. After 40, noticeable differences occur as the body experiences internal changes with skin cells taking longer to migrate to the surface. Cell buildup may increase, resulting in less vibrant skin.

(Photo – chronological aging –wrap around text)

During chronological aging, skin becomes thinner. A decrease in biological function declines. Degeneration in the vas-



cular system occurs whereby the capillary network becomes more visible. Blood vessels of the dermal papilla are also reduced to approximately 40% of its original capacity. There is a reduction in the skin's ability to hold water, which leads to fine lines and wrinkles. The ability to heal decreases with age.

### ***Extrinsic***

Superimposing environmental aggression and excessive sun damage onto chronological aging is a very daunting process. A 40 year old can easily look 55! We have just influenced the rate by which we age by overstimulating the skin's defense mechanisms that produced cell damage and tissue degeneration. Reproduction of healthy cells is altered, resulting in irreparable damage to cell membranes, nucleic material and the rate at which cells divide. Coarsening, deep

wrinkling and furrowing, hyperpigmentation, actinic keratosis (skin growths) are the ultimate results of this process.

(Photo: aged, sun damaged skin – wrap around text)

Solar energy reaching the earth consists of UVC, UVA and UVB rays. Most of the UVC rays are blocked by the earth's ozone layer. However, UVA and UVB still reach the earth. They are strongest between the hours of 10:00AM and 2:00PM, and may be longer depending upon geographical location. While the B rays consist of a shorter wavelength, they still are responsible for the skin's initial response, which can be sunburn and basal cell cancer. Initial penetration is within the epidermis with gradual penetration into the deeper skin layers.

- While clouds filter some of the UVR, it is still possible to get burned.
- 90% of what we associate with “aging” is a result of overexposure to sun.
- The vast majority of UVA passes through clouds and window glass. Significant skin damage is the result.
- Ground surfaces such as sand and snow reflect most of the UVR. Snow can reflect as much as 80% of the incident UVR.
- Water reflects little UVR since it actually absorbs it.
- For every 1000 feet increase in altitude the UVR increases by 4%
- The ozone layer filters out much of the UVB but has little effect on UVA. Any changes in the ozone layer will affect this.
- There is no such thing as a “safe” tan. Even when a person tans, the melanin creates approximately a protection of 4 SPF. That is far too little protection for skin that is constantly bombarded with dangerous radiation.

Langerhans cells reside in the epidermis and are there to help protect from invaders such as bacteria. They also are involved in recognizing and eliminating early skin cancers. Even a few minutes of unprotected exposure will damage the Langerhans cells in ways that can last for weeks.<sup>5</sup> The sun delivers a double hit (1) causes damage that can lead to skin cancer and (2) impairs one our body's normal cancer defenses. When there is an inflammatory response as in sunburn, there are many chemical changes within the skin. Sunburn continues to develop for 12-24 hours after exposure. Whether one burns or not, overexposure can still develop the delayed problems such as skin cancer, wrinkled and sagging skin, and hyperpigmentation.

<sup>5</sup> Sun Protection Explained. [www.nprhealthcare.com](http://www.nprhealthcare.com)  
Golga Classification for Photoaging<sup>6</sup>



UVA rays are longer in wavelength and initially penetrate deep into the dermis, giving rise to irreparable destruction to DNA within the cells. Consequently, the collagen strands become disorganized, frayed and tangled. UVA causes the wrinkling.

Type I – “No wrinkles” Early photoaging	Mild pigmentary changes, no keratosis, minimal wrinkles, younger patient age: 20s or 30s; minimal or no makeup
Type II – Wrinkles in motion” Early to moderate photoaging	Early senile lentigenes visible; keratosis palpable but not visible; parallel smile lines beginning to appear; patient age: late 30s or 40s; usually wears some makeup foundation
Type II – “Wrinkles at rest” Advanced photoaging	Obvious dyschromia, telangiectasia; visible keratosis; wrinkles even when no moving; patient age: 50s or older; always wears heavy makeup foundation
Type IV – “Only wrinkles” Severe photoaging	Yellow-gray color of skin; prior skin malignancies; wrinkled throughout, no normal skin; patient age: 60s-70’s; cannot wear makeup due to caking and cracking



## Human rust – free radicals

*“While scientists have viewed aging as a natural process there are some who see aging as a manifestation of environmental stress, a disease related to oxygen stress. Considering that we have to suffer many trillions of oxidative hits on our cells every day, it is no wonder that we slowly burn out under this load.”* Peter T. Pugliese, M.D.

Free radicals naturally interact with oxygen to form ozone in the upper atmosphere of the earth protecting us from UV radiation. They are also naturally present in small amounts in the body. Daily, we are bombarded by destructive free radicals from air pollution, cigarette smoke, rancid fats, and the byproducts of normal metabolism. Under normal circumstances, the body keeps them in check. Exposing the body, however, to ionizing radiation activates the formation of these free radicals – a large number of which stimulates the formation of more free radicals, leading to greater instability. These oxidative hits all contribute to aging, cardiovascular disease, cancer and other degenerative conditions.

Observe an old piece of iron or wood. You will note a process called oxidation, the union of oxygen with matter. Anything that oxygen can attack, it will destroy. Oxygen is absolutely necessary for life. At the same time, however, reactions of oxygen cause a slow deterioration of our body’s cells. We need oxygen to neutralize electrons that are produced in the process of creating energy from our food intake. Just as we burn coal or oil to heat our homes, we burn food to heat our bodies and to supply us with energy. Burning any carbohydrates such as coal, or oil produces caustic byproducts, which must be eliminated. We burn carbohydrates such as sugars, which form carbon dioxide, water and energy. During this process, free radicals are formed and react with our cells. They either damage or destroy them. By the very act of living, we are actually slowly destroying ourselves. This is known as *aging*.

(Illustration of a molecular structure – wrap around text)



Chemically, oxidation occurs when a molecule loses an electron. An electron is a negatively charged particle that orbits an atom. Stable oxygen contains two orbiting electrons. When oxygen loses an electron, it becomes a free radical. Free radicals are formed in the normal course of our biochemistry and metabolism. When this process runs out of control, damage to our cells, disease and premature aging occurs.

Most cells are internally programmed to divide, but usually receive a signal from the outside to initiate cell division. This is a highly controlled process. Nerve cells and muscle cells do not divide. As they continue to grow, they accumulate oxidative damage over time. Other cells that are programmed to divide may become so damaged that they are no longer able to do this. Usually the body destroys these cells in a process called *apoptosis*. Some, however, are not destroyed and continue to exist. The arrested cells are called *senescent cells*. They do not function normally and often send false or harmful signals to the normal cells. They play an important, yet not clearly or completely defined role in the aging process.

The major oxidants or *reactive oxygen species*, or ROS are

- Superoxide ion
- Hydrogen peroxide
- Singlet oxygen
- Hydroxyl radical

The loss of viable cells literally ages all of us... one cell at a time. These damaged cells do not have the ability to repair themselves. Free radical damage is summarized.

**Lipid Peroxidation** Free radicals damage fatty compounds within the blood creating even more free radicals in a chain reaction.

**Membrane damage** Free radicals destroy the integrity of cell membranes, interfer-

ing with the ability of a cell to absorb nutrients, which then kills the cell.

### **Cross-linking**

Free radicals damage cells. This action causes other cells to split off to repair the injury. When these cells “rejoin,” a process called cross-linking occurs. DNA damage, destruction of intact collagen and other structural proteins, cause accelerated aging. Deep wrinkling is a sad consequence.

### **Lysosomal damage**

Lysosomes are membranous sacs within the cell. They contain enzymes that must be kept intact. If the surrounding membrane around these sacs is damaged, their contents seep into the cell’s cytoplasm destroying the entire cell.

Cells have highly evolved defense systems that limit and repair chemical damage that reactive oxygen can cause. In aging and solar damaged skin, these free radical scavenging systems undergo a natural decline that leads to irreparable tissue damage. This builds a solid case for internal and external use of vital nutrients that help combat this process.

### **Role of antioxidants**

Known as reducing agents, antioxidants are compounds that readily donate an electron to molecules in need such as free radicals. In doing so, these free radicals are converted back into a stable state, thus disrupting their damaging behavior. Antioxi-

dant compounds, which possess these properties, exhibit beneficial results when taken internally and applied externally with an inward-outward strategy.

Major antioxidants for defense include

- ◆ Vitamin E, C
- ◆ Ubiquinone
- ◆ Catalase
- ◆ Superoxide dismutase
- ◆ Glutathione peroxidase
- ◆ Lipoic acid

Positive actions that slow down aging include skin protection and modification in lifestyle. It is easier to prevent than to repair. The tiniest scar in the skin will stay forever as a fibrotic muddle. The same holds true for sun damage and smoking damage. It remains perpetually in the dermis and the epidermis. Most of the diseases in mankind are self-induced, probably 60-70 percent.

### **Menopause**

Menopause is derived from the Greek word men (mēno), month and pauein, to stop. It means to stop from monthly menstrual cycle.

Menopause is a profound passage in a woman’s life that results in emotional, physiological, and biological changes, the degree of which varies in each woman. It is a topic that has not always been well understood until the end of the 20<sup>th</sup> Century. Attitudes and belief systems place numerous theories and negativities around this phase in a woman’s life. This varies from culture to culture.

At the turn of the 20<sup>th</sup> century, the average female life span was around 48. Prior to that it was even less since woman often died in childbirth or from other causes. They never lived beyond childbearing years. Present life expectancy is now 84 years.

The word hormone – Greek hormon – means to urge or excite. Hormones are produced by



the endocrine glands and transported by the blood and serve to regulate metabolism, growth and reproduction. Referred to as cell messengers, they are responsible for regulation of cell physiology. They interact with each other in the coordination of cell and organ function. Regulated by the hypothalamus and pituitary glands, hormones are released to target cells containing hormone receptors. The receptors recognize their presence and convey a message to the nucleus inside the cell causing a response. This could be a trigger for building of new cells, secretion of a substance, or restraint of some activity.

Some hormones act on cell membrane surfaces while others, such as sex hormones, pass through the membrane and act within the cell. This is the case with the hormones involved in reproduction. Hormones such as estrogen and progesterone affect the physiology of the skin.

### **Estrogen's effect in the skin**

Estrogen has positive affects on the skin

- Reduces the size and activity of the sebaceous glands in the follicle.
- Is responsible for fibroblast activity.
- Increases the production of hyaluronic acid
- Slows hair growth rate
- Increases mitosis in the epidermis

Mitigation of estrogen causes physiological changes and alterations in the skin cells, including metabolism of the bone cells. Calcium uptake from the blood into the bone decreases. Bone mass loss is a major consideration in the prevention of osteoporosis.

The dermis suffers a decreased in thickness and suppleness. Transepidermal water loss is increased. There is a decrease in enzyme activity, which affects the collagen.

Melanin production decreases causing increased susceptibility to sun damage and pigmentation. Furthermore, the skin becomes warmer, the nervous system more sensitive, giving rise to the need of lifestyle changes that involve reducing stress and other influences that may trigger psychological and physiological duress.

Sebaceous secretions in the follicle are affected by progesterone. Hence, it is not uncommon to have breakout just before a period. Progesterone is also responsible for helping to build the endometrium in the uterus in preparation for a fertilized egg cell. When ovulation ceases, progesterone becomes unopposed. It may over-stimulate secretions in the sebaceous gland causing an increase in lipids within the follicle. This action causes proliferation of the natural bacteria found deep in the follicle. Irritation and congestion within the sebaceous apparatus may very well promote a mid-life breakout. Needless to say, it is a very difficult condition to treat since the tendency is to dry out the lesions. Given that the lipid barrier decreases with age, lipids in products are the very substances that are required to help protect from excessive moisture loss. A delicate balance is required from any skin care regimen.

Skin care specialists are challenged with skin conditions during menopause. It takes a greater understanding of your client as well as a close study of the best course of treatment in order to satisfy and balance your mid-life client/patient.

"In our ageist culture, many women, instead of believing in their capacity to remain strong, attractive, and vital throughout their lives, instead come to expect their bodies and minds to deteriorate with age. Thus we as a society collectively create a pattern of thoughts, behaviors, and fears that makes it that much easier to manifest the worst physical reality. We cannot reverse our collective cultural negativity about menopause... What we can do is consider ourselves pioneers on a new frontier... I encourage a woman to think of it as a process during which she'll be creating the healthy body she needs to last her until the end of life."

Christiane Northrup, M.D.

*From her book Women's Bodies, Women's Wisdom*



## Chapter 10 Formulas of Circadia by Dr. Pugliese

In Chapter 6 we discussed the anatomy and physiology of the skin. In order to appreciate the use of skin care products, it is essential to know *how* the skin works. Understanding the physiology provides a foundation from which to build so that we gain insights as to why we use formulate the way we do and why we use certain products.

### pH of the skin

The pH scale is from 0 to 14 with a midpoint of 7, which is considered neutral. The left side from neutral point – below pH value 7 – is considered to be acidic (acid). The right side of the neutral point 7 is considered to be alkaline (base). In solution, the rate of hydrogen ions determines the pH. The higher the concentration of hydrogen, the more acidic it is. The pH value is considered lower or more acid. In contrast, the fewer hydrogen ions, the more alkaline. The pH value is higher or alkaline. Why is this important to understand in skin care?

The pH value of the skin ranges from 5.3-6.1, therefore the skin's mantle is slightly acid. The benefits of this environment are to ward off bacteria and other pathogens. Acid and alkaline pH values can be good and bad. When we refer to “wounding” or “irritating” the skin for example, when applying peels or acids, anything that goes below the skin's normal pH will irritate it. In contrast, higher pH swells the skin making it more permeable.<sup>6</sup> When formulating products such as a cleanser, sometimes the pH is raised to cause a “surfactant” effect on the skin, i.e., emulsifying dirt and lipid buildup. A skin cream, on the other hand, may be at pH 6-7 or neutral. Depending upon the targeted outcome, a product is formulated so that it is compatible with the chemistry of the skin.

### Anti-aging skin care products

While each *Circadia* product has a specific utility and its own unique properties, there is a philosophy and sensibility that led to the development of the entire line. They are differentiated from current products found most often in the marketplace. Dr. Pugliese's many years of research into a diversity of aging mechanisms impacted the selection of ingredients and delivery systems.

Material	pH	Material	pH
Gastric juice	1.4	Tears	7.2
Urine	6.0	Blood	7.4
Saliva	6.8	Intestinal juice	7.8
Milk	7.1	Pancreatic juice	8.0

*Circadia by Dr. Pugliese Anti-Aging Skin Care* program is a scientifically designed treatment and prevention regimen consisting of externally applied products that, with a commitment from the user, will result in beautiful, healthy and radiant skin. Circadia's **SWiCH™** is a topical treatment that provides the most advanced and comprehensive age-reversal system.

<sup>6</sup> Mark Lees, PhD. *Skin Care, Beyond the Basics*. 2001, Albany, NY: Milady, pp 101-102.



## Route of absorption

Skin care formulations act as vehicles to deliver active ingredients, which select the transepidermal passage that is compatible to its specific properties. Since the skin is a barrier, penetration must pass through multiple lipid layers between the cells. Formulations that are both water and lipid soluble permeate best.

The first route of penetration is through the large surface of epidermal cells in the stratum corneum. The next route is between the intercellular spaces and the third is the pilosebaceous apparatus (the follicle). This transfollicular absorption permits substances to reach the duct of the sebaceous gland and from there, the gland cells. Penetration is considerably higher through this passage than by means of the transitional epidermal cells.

When products are applied to the skin, penetration is influenced by several factors<sup>7</sup> chemical structure, molecular size and product compatibility

- pH of the skin
- The rate by which the product can be absorbed
- Releasing of the available actives
- Application of harsh surfactants can extract 10-20% of lipidic material in the epidermis transforming the outer skin surface into a porous non-selective membrane.
- Alterations in the structure of the stratum corneum, such as keratinization disorders, affect permeability. For example, in psoriasis and eczema, permeation is greatly increased. In hyperkeratinized skin resulting from sun damage or other factors, permeation is diminished.
- The stratum corneum thickens with age thus making permeability more difficult.

Circadia by Dr. Pugliese formulates their products to work with the circadian rhythms and scientifically sound compatibility with the skin to achieve maximum effectiveness and results.

## Formulation function

It is easier to understand the composition and functions of a cosmetic formulation if it is separated into components by function. There are three major groups of ingredients: The base, the actives, and preservative/fragrance. These groups will be further broken down into functional components. In some cases the ingredients may have more than one function, and most active ingredients are going to be either protectants or reparatives.

**Protectants** Include lipoic acid, oat protein, OPC, vitamin E, vitamin C, saccharide isomerate, linoleic esters, and the other moisturizers. These substances protect against free radical damage, protease degeneration, and other oxidative metabolic damage.

**Reparatives** Include vitamin C, to rebuild collagen, OPC to strengthen the capillaries, vitamin A to restore the epidermis and dermis, beta glucan to aid the immune system, phospholipids and sphingolipids to restore the skin barrier.

<sup>7</sup> Cinthia Audet, B.S., The laws of absorption (2000, Sin inc, 12:3) pp 76-82.



To illustrate this in a meaningful way, let's discuss how the ingredients for night cream, *Circadia Evening Cell Renewal Complex* fits into this concept.

### Base Group Emulsifiers and Stabilizers

Glycerol Monostearate, Peg-100 Stearate	A primary emulsifier. Emulsifiers combine the lipids with the water to make a smooth emulsion
Glycerin	A humectant, it is used in our formula at a low level to help stabilize.
Carbomer and TEA	Auxiliary emulsifiers, they help stabilize the product without making it feel heavy.
Titanium dioxide	A whitening agent, it is used to reduce the brown color imparted by the natural ingredients. It also functions in some products as a sunscreen.

### Base Group Moisturizers and Emollients

C12-C15 Alkyl Benzoate	Medium chain length fats that act as moisturizers and emollients. Emollients soften the skin by combining with the skin's water and protein.
Joboba oil	A liquid wax that contains long chain fatty material that is unsaturated. Jojoba oil is an excellent moisturizer and emollient and a natural lipid.
Dimethicone	A silicone material that is a moisturizer and spreading agent.
Cetyl Alcohol	Provides "body" to the product, i.e., helps to increase the viscosity or thickness.
Saccharide Isomerate	A special climate-control moisturizer that controls moisture levels in the skin as the climate varies from hot to cold, or dry to wet.

### The First Actives Group: Vitamins

Vitamin A – Retinyl Acetate	A form of vitamin A that is four times more active than Retinyl Palmitate on a weight basis, since there are more carbon atoms in palmitic acid than in acetic acid. Vitamin A is essential for keratin growth and maintenance. It is also necessary for good dermal structure. Too much vitamin A can be an irritant.
Vitamin E Acetate	A chemical name for vitamin E acetate is tocopheryl acetate. The "ryl" suffix indicates an ester. Vitamin E is added as an antioxidant to counteract peroxidation compounds.
Vitamin E USP	Added as the Tocopherol to provide natural antioxidant activity to the skin and to help preserve the vitamin A in the product.
Vitamin C	As ascorbyl palmitate, it is often used to stabilize vitamin E products. It also functions as an essential component of collagen synthesis.

### The Next Actives Group: Anti-oxidants

Lipoic Acid	Essential for metabolic processes. While it is not a vitamin, it is an important component of glucose metabolism as well as fat metabolism. It helps to regenerate reduced ascorbic acid. A very new ingredient in skin care. In the past it was considered unstable, however, new technology has removed this factor.
Oat Protein Powder	A powerful antioxidant, as well as a special ingredient that is both an anti-irritant and a time releasing agent. It combines with certain ingredients to control their release into the skin. The mechanism is proprietary.
Vitamins E & C	As above listed and are powerful antioxidants.
OPC	Abbreviated for oligomeric proanthocyanidins. They are powerful natural antioxidants as well as protease inhibitors.

### Special Ingredients

OPC's	They are more than antioxidants. Complex organic compounds, OPC's are derived from vegetable sources that exhibit remarkable qualities. While they are powerful free radical neutralizers, they also serve as inhibitors of certain enzymes, particularly collagenase and elastase, which break down collagen and elastin, causing sagging skin as we age. It is possible to counteract this process if enough OPC is used. It
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	takes at least 1% to block 60% of the collagenase activity. About 90% of elastase can be blocked at this level.
Beta Glucan	A complex polysaccharide, it is derived from seeds or yeast. It is found in barley, oats and wheat, but can e also made by genetic engineering. It is an immune stimulator that has a direct effect on the immune system to help build collagen and elastin. While not new, it is expensive and not found in most products.
Hepes Linoleate	A new compound, it was developed by The Pugliese Group as an anti-inflammatory agent. It contains HEPES, a buffering agent and linoleic acid, an essential fatty acid. This new ingredient helps to control inflammation of many kinds that occur even as a result of natural metabolic functions. It prevents many of the end product reactions that occur with free radicals.
Phospholipids/Sphingolipids	They are essential for the skin barrier. Sphingolipids do not contain phosphate but serve as a critical part of the barrier function.

### Preservatives and Fragrance Group

Fragrance	Plays an important role in cosmetic formulae. While there is some negative press concerning fragrances, very few products actually are fragrance free, regardless of the label. Use of natural fragrances is limited by their function in nature, which is to attract or repel insects or predators. Preservatives are needed to keep the product free of bacteria. Only refrigeration can keep most products germ free without a preservative, and then only for a limited time.
Diazolidinyl Urea with Parabens	A safe and effective preservative widely used in the industry.
EDTA or Ethylenediamine Tetrasodium Acetate	A chelating agent.
BHT (Butylated hydroxy toluene)	An antioxidant to prevent breakdown of the product.



## Percentages

In the marketplace, percentages are often an area of concern. For example, what is the percentage of vitamin C or glycolic acid? It is common for salesperson in a field as competitive as skin care to get into contest about “star” ingredients and “highest” percentages of actives. At ***Circadia by Dr. Pugliese***, we do not engage in this type of banter, and we encourage our estheticians and representatives to be *educators* rather than contestants when the subject arises. Unless someone is a formulating chemist, much of what is on the label may be foreign to a reader.

When formulating a product, there is a great deal of research and experience to achieve a correct balance of ingredients. We must adhere to strict standards in order to produce an attractive, effective product. We apply the amounts that are scientifically sound for delivering the most efficacious results. We clinically study them using very scientific instrumentation so that we can back up our claims. There are certain protocols established by the scientific community that are employed when formulating and performing scientific studies. As skin care specialists and representatives, we must be able to arm ourselves with correct knowledge so that we can effectively deliver sound products and results to our clients and patients.



# Chapter 11 Sunscreens and SPF

The sun is necessary for all forms of life; even our daily biological rhythms are based on the sun's light. The sun's infrared rays keep us warm and the visible rays give us light to see by. Ultraviolet radiation (UVR) is the cause of most skin cancers, many cataracts and 90% of visible aging.<sup>8</sup> Over exposure has two serious side effects, acute effects such as sunburn and phototoxicity and chronic, or repeat exposure effects such as wrinkling, premature aging, keratosis, hyper- and hypopigmentation, and skin cancers. While the skin has developed some protective mechanisms, the fair skinned individual is not well protected against the damaging rays of the sun. Here are a few basic facts on the sun's radiation (electromagnetic energy) that will help you to appreciate the need for sunscreens.

## The electromagnetic spectrum

The sun's radiation or solar radiation can be divided into three energy levels based on the wavelength of radiation. These are ultraviolet radiation (UVA, UVB, UVC), visible light and infrared radiation. Our atmosphere filters out UVC so that none reaches the earth's surface. In contrast, UVA and UVB reach the earth in significant amounts.

(Illustration of solar spectrum - earth)

Depending upon the time of year, UVR can have a shorter path in summer and a longer one in winter. This means that summer rays are more directly overhead, stronger and more intense. In winter, they are more angled giving more opportunity to reduce some of the energy. Seasonal fluctuations in the ozone layer also affect UVR intensity. Midday UV radiation that reaches the ground is about 10% UVB and 90% UVA. UVB intensity declines from the

noontime apex, but UVA remains relatively constant throughout the day.<sup>9</sup>

A *wavelength* is the unit used by physicists to characterize one aspect of electromagnetic radiation. Light travels in waves at a set speed. You can visualize the concept of a light wave if you tie a length of rope to a pole and rapidly move the rope up and down. This action will generate a wave in the rope. The more rapidly it is moved, the smaller the wave. *However, you are exerting more energy into the rope, the smaller you make the waves. Why?*

The *speed of light* is equal to the wavelength times the frequency of light. The shorter the wavelength, the faster is the frequency. While this all sounds complex, recall that you had to pump the rope up and down very fast to get a small wave. This principle is the basis for understanding ultraviolet radiation.

There are three levels of energy in the ultraviolet rays. The shorter the wavelength of ultraviolet light the higher is the energy level. We use three ranges to describe these levels. The letters "nm" stands for nanometer, which is the unit of wavelength used by biologists.

UVA ranges from 320 nm to 400 nm,

UVB ranges from 290 to 320 nm

UVC ranges from 200 nm to 290 nm

(Illustration of the light spectrum graph)

Electromagnetic radiation is measured in energy units called Joules (pronounced "jewels"), represented with a capital J. Now, a J is a watt of energy spread over a square centimeter (cm<sup>2</sup>) of area. To get sunburn with UVA, you need between 20 and 100 mJ/cm<sup>2</sup>, and a lot of time is required. For UVB, however, only 20-50 mJ/cm<sup>2</sup> are needed to produce a redness of

<sup>8</sup> Applied Therapeutics – Sun Protection Explained, www.nprhealthcare.com



<sup>9</sup> Friedlander, Josiah, et al. Sunscreens. Cutaneous Medicine and Surgery, Vol 1: pp751-757, 1996.

the skin, which is much faster. The point at which the skin turns red from sun exposure is called the MED, or minimal erythematous dose.

The amount of UVA reaching the earth is 5.0-6.0 mJ/cm<sup>2</sup>, and the energy of UVB reaching the earth is 0.3 to 0.5 mJ/cm<sup>2</sup>. It is about 20 times as much UVA as UVB.

To get a sunburn with UVB would take  $50 \text{ mJ/cm}^2 / 0.4 \text{ mJ/cm}^2 = 125/60 \text{ sec}$

### The true meaning of SPF

In order to understand sunscreens, it is necessary to understand the meaning of SPF. Using the MED factor (solar radiation required to produce first sign of skin redness), SPF is defined as follows:

$$\text{SPF} = \frac{\text{MED of sunscreen protected skin}}{\text{MED of the non-protected skin}}$$

We radiate a fair skinned male with UVB and it takes 30 mJ/cm<sup>2</sup> to produce a red spot (MED) without protection. Then, we apply sunscreen and radiate him again at various lengths of time to get different dosages until we get a new MED. With the sunscreen, it may take 300 mJ/cm<sup>2</sup> to get an MED. We divide  $300 \text{ mJ/cm}^2 / 30 \text{ mJ/cm}^2 = 10 \text{ SPF}$ . That means he can stay in the sun 10 times longer with this sunscreen than he could without the sunscreen. So the higher the SPF the greater protection one receives. To simplify this a bit more, if an individual without sun protection takes 10 minutes to burn in the sun, applying a SPF 15 means that that individual will be protected up to 150 minutes.

10 minutes to burn x 15spf = 150 minutes of protection

Another factor to consider is the type of sunscreen ingredients are in a formula. What is the total "spectrum" or nanometers will that sun component will cover? See chart below for guidelines.

onds, or 2 minutes. For UVA, it would take  $60 \text{ mJ/cm}^2 / 6 \text{ mJ/cm}^2 = 60/0.006 = 10,000/60 = 166.6 \text{ minutes}$  or 2.77 hours. (Note that a capital J is 1000x more than a little j, which is a millijoule). While you must be protected from both UVA and UVB, the protection from UVB must be given major consideration, though the two types are additive. Most drugs interacting with solar radiation are interacting with the UVA and visible light.

(Insert graph of nms' and screen components)

Keep in mind that many formulas combine different sun protection components that are then tested in the final formula in order to produce a SPF rating. Products must by law undergo SPF testing before they can assign any SPF number rating.

### Organic vs. inorganic

Sunscreens are ingredients that keep UVR from reaching the skin. They work by either absorbing the UVR or by reflecting. *Organic* sunscreen was the foundation of commercially available products for years. Referred to as *soluble* or *chemical*, organic sunscreens are composed of carbon and hydrogen. It doesn't mean that they are *naturally* occurring. They are not. Organic sunscreens are relatively complex molecules that are to some degree absorbed into the skin. They have been found to be efficient UVB absorbers. An example of an organic sunscreen was PABA that was very popular for years until many individuals ended up being allergic to it. Today, there are less irritating choices.

### A guideline for SPF

The sun's highest energy reaches the earth between 10 AM and 2 PM, however, depending upon geographical location, intensity can still remain up until 3:30-4:00PM. In the



average person, staying in the sun without sunscreen protection for 15 minutes or more will produce a burn. It is recommended that when there is constant exposure such as when doing outdoor activities, sun protection be applied every 90 minutes.

- Individuals with fair skin, blue eyes and blond hair should use a product with an SPF 15 – 30
- Red hair and hazel eyes with fair skin, or freckled skin should use an SPF 15 – 30. A history of frequent burning in the sun would warrant an SPF of 30.

- Dark skinned and brown eyed individuals should use an SPF 8 or higher.

***Inorganic*** sunscreens are actually microscopic solid pieces of sunscreen. They tend to reflect UVR and are considered physical blockers. A good example is zinc oxide and titanium dioxide that are commonly used. They tend to have good absorption for both UVA and UVB. Combining sunscreen components (organic and inorganic) with antioxidants produces more effective sun protection.



## Chapter 12 Peeling and Enzyme Agents

Chemical peeling involves the use of destructive chemical agents that wound the skin. The key here is *wound*. The healing of a wound is a complex process. In that process new tissues are constructed, and damaged tissues replaced. The skin looks better and actually feels better than before the wound. This is the basis for chemical peeling: *wound the skin and allow it to generate new skin in the healing process*. This sentence takes all the magic and mystery out of chemical peeling, but it lays the scientific foundation for the use of peeling as a restructuring, or rejuvenating technique.

### Wound healing

Depending upon the degree of the wound – from a small cut, to a chemical or mechanical peel or even surgery – the healing process and timing varies. The rate at which a person heals is dependent several factors from genetic traits to state of health. Prior to performing any peel or deep exfoliation, a thorough analysis of your patient is necessary. Knowing the Fitzpatrick type and condition of the skin is also very important. Many chemical peeling agents require a patch test prior to performing a full treatment. Adhere to these guidelines and you will avoid any surprises or mistakes.

### Five stages of wound healing takes place in the skin.<sup>10</sup>

**Stage One: Inflammation (Vascular state):** Biochemical changes occur to begin the wound repair process. Coagulation occurs in the injured vessels. Enhanced dilation of blood vessels brings cells to the wounded area. Special chemicals called *growth factors* are secreted by the platelets. There is swelling caused from the histamine secreted from mast cells. Edema and redness is present. This is all beneficial to

wound healing. White blood cells arrive to combat infection and macrophages also appear to remove debris.

**Stage Two: Re-epithelization Phase:** Structural repair begins as new blood vessels and wound edge cells move in hours after the wound occurs. A cell proliferation phase begins with a rapid increase in cell rate. These cells consist of glycoprotein, fibronectin and collagen. Water is vital so the migration of cells will follow a moist route. Simultaneously, there is a formation of granulation tissue.

**Stage Three: Granulation Tissue Formation Myofibroblast:** In this stage, the fibroblast cells begin to produce collagen Type III and then Collagen Type 1, fibronectin, elastin and the ground substance. Cell differentiation begins. This stage may take place from 5 to 15 days after the wound occurs dependent upon size and condition of the wound.

**Stage Four: Wound Contraction:** The filaments in the myofibroblast contract and pull the surrounding matrix together and force the wound to contract, completely healed.

**State Five: Wound Remodeling:** This process may take many months or years. The collagen matrix is constantly being reformed. In the event of laser resurfacing, this stage could take up to a year.

The rate at which a wound is healed is greatly influenced by the type of procedure performed, nutritional factors, the age of the skin and medications. During laser resurfacing, the most dangerous condition after the procedure is the possibility of infection during the skin's re-epithelization process. This is a complication that can be avoided with proper post-care. The patient must follow the doctor's instructions.

<sup>10</sup> Peter Pugliese, MD, *Advanced Professional Skin Care* (Bernville, NY: APSC Publishing, 1991).



In the event of microdermabrasion, you have removed the upper surface of the epidermis. Combine this with an enzyme peel and you've just gone a bit deeper. While you are still in the epidermis, you have removed most of it and it needs to re-epithelize. The patient must follow their homecare regimen and wear sunblock.

When performing a chemical peel, such as salicylic acid, modified Jessner's or alpha hydroxy acid, you have disturbed the

## Selecting the right candidate

There are numerous individuals who will tolerate a peel just fine and there are others who may be more at risk. There are some standards for both physicians and estheticians. In his excellent book called *Chemical Peeling*, Dr. Brody indicates 13 considerations to make prior to performing a peeling procedure. They are also very applicable to all of your treatments. All of these considerations can be assessed from the patient's health in-take form and verbal consultation.

1. Fitzpatrick skin type
2. Degree of actinic damage
3. Philosophy of sun exposure
4. Philosophy of cosmetic use
5. Present and past sebaceous gland activity and previous treatment (Accutane®, or Radiation)
6. Prior cosmetic surgery
7. Philosophy of smoking
8. General state of physical and mental health
9. Medications
10. Pregnancy history
11. History of herpes simplex
12. History of hypertrophic scarring
13. Realistic expectations

A clear understanding of the process of wound healing goes a long way to help in understanding the benefits and limitation of chemical peeling. First we shall discuss the principles of wound healing, then the clinical indications for chemical peeling, and end

skin's mantle and it must heal. Depending upon the type of peel, the skin will react according to the skin's condition and the strength of the peel. Anyone performing this procedure should be thoroughly trained in any treatment process of this nature. When directions are followed, there are normally no negative effects. However, as a skin care specialist, you must also know what to do when there is a problem. That is why training and certification is a necessity.

Chemical peels have many benefits.

with a description of professional treatments available to you from Circadia.

### *Sun damaged skin*

Sun damage can cover a wide spectrum of insults to the skin. Both UVA and UV ultra violet rays damage the skin. UVA has less energy but penetrated deeper into the dermis and is the cause of dermal damage. UVB has very high energy and operates mainly on the epidermis producing skin cancers and ugly lesions. Discolorations and keratosis along with deep wrinkles are common findings with these clients. This syndrome is often called "tough Florida skin." Sun damaged skin responds best to mid- to deep peels, through superficial peels can be helpful if they go as deep as the lower layer of the epidermis. To be safe, only treat mild cases. Anyone with deep wrinkles and leather-like skin should be referred to a physician. Unfortunately, repeated superficial peels are not effective in severely sun-damaged skin. Glogau types I and II respond well to superficial peeling.

### *Acne vulgaris*

Acne of the common types Type I and Type II, (pustules and comedones without deep cysts) will respond to superficial peels. Comedones will be lifted out and pustules will dry quickly.

### *Pigmentation abnormalities*



The most common types of pigmentation seen are melasma and post-inflammatory pigmentation. It is necessary to determine the level or extent of pigmentation before deciding to use a superficial peel. The pigmented granules, called melanosomes, will be found in either the epidermis or dermis. In visible light (natural sunlight) the epidermal pigmentation will appear light brown compared to dermal pigmentation, which appears dark brown, or gray. Use a Wood's light to further distinguish these two levels. The Wood's light emits ultraviolet between 320-400nm, that is, in the UVA range. With epidermal pigmentation the color will be enhanced, while in the dermal pigmentation there is no increase in color. In Blacks and Asians, this technique cannot be used because the pigment blocks the fluorescent light.

### ***Aging and resurfacing of the skin***

Many skin care specialists use the superficial peel on a regular basis to provide a smoother, blemish free skin for their patients. It is looked upon as a sound practice as long as it is not overly used. Depending upon the type of peel, some are done once every three months and others more frequently. Follow the guidelines found in the procedure manual. Fine lines and small pigmented lesions will be removed, as well as other things on the skin that are not recognized as pathological, but nevertheless do produce an unattractive appearance.

**Circadia by Dr. Pugliese's** skin care line provides you with very effective in-clinic professional treatments. We shall begin our description of each treatment product. Step-by-step procedures can be found in Book Two, The Treatment Manual.



## Chapter 13 Professional Treatments

This chapter describes the professional treatments that are available through Circadia by Dr. Pugliese. We feel that they are very advanced formulas. A great deal of research has been done to document their efficacy. Book Two – The Treatment Manual provides step-by-step procedures.

### Derma Frost Salicylic Acid Peel

Salicylic acid has been used for more than 100 years to treat dandruff, seborrheic dermatitis, warts, psoriasis and other conditions. It is found in wintergreen and birch bark. Sometimes referred to as a *beta acid*, salicylic acid is different from glycolic acid due to the positioning of the hydroxyl group in its molecular structure. Salicylic acid is lipid-soluble, in contrast to the water-soluble AHA's. This is very important in relation to how it affects the follicular orifice, which is filled with sebum, a lipid. Due to these characteristics, salicylic acid easily penetrates into the lipid plug in a congested follicle. It also helps to kill bacteria. Studies performed by Dr. Albert Kligman report that salicylic is more effective than glycolic resulting in decreased comedones, quicker exfoliation and an accelerated improvement of the skin without excessive irritation. It does not increase transepidermal water loss even though the proliferative effect of the exfoliant is greater. It is less irritating and does not alter skin barrier properties.

Considered a “lunch-time peel”, Derma Frost has two strengths – 12.5% with a pH 2.7 and 25% at a pH of 2.7. A higher strength agent, salicylic has the benefits of alpha-hydroxy acid, but is more effective in the treatment of early to moderate photoaging. The use of salicylic acid is a rapid in-office procedure with high tolerability, safety, and efficiency for the patient.

#### Indications

- ◆ Sun damaged skin (actinic keratosis)
- ◆ Acne vulgaris types I and II
- ◆ Pigmentation abnormalities
- ◆ Aging skin, fine wrinkles
- ◆ Rough, calloused skin

#### Contraindications

- ◆ Aspirin or salicylic sensitivity
- ◆ History of being “highly allergic” to anything
- ◆ Pregnant or nursing baby
- ◆ Accutane® within the last year
- ◆ Antibiotics – topical or systemic
- ◆ Broken skin
- ◆ Laser surgery within the last twelve weeks
- ◆ Using glycolic acid products, Retin-A® or Renova® in the last 4 weeks

During the procedure, a burning and stinging sensation will be experienced with little discomfort, however, following the treatment. Smoothness and tightness is felt on the skin immediately. Use caution with a patient who has labial herpes, seborrhea or atopic dermatitis.

Maximum side effects seen are superficial crusting, edema, and transient hyperpigmentation in areas of inflammatory acne. Peeling usually begins 2 days after the treatment, with most of the peeling occurring in the central part of the face.

Patients should avoid excessive sun exposure, use sunscreen, and apply a daily moisturizer. Most patients can return to work after the peel.

Derma Frost can be performed in a series of three sessions spaced four weeks apart allowing for epidermal regeneration.



## Circadia's Enzymes

Enzymes are a necessity for life and for every cell process in the body. They are considered a catalyst meaning that they cause things – chemical reactions – to happen. For example, when there are waste products from the building of collagen, an enzyme called collagenase is responsible for breaking down these byproducts. Enzymes are considered *proteolytic*. They digest proteins. In a facial treatment, the enzyme powder is mixed with a “wetting” solution into the consistency of a pancake batter, and gently brushed onto the skin. It must remain moist. The action of the enzyme dissolves different forms of cellular debris and buildup leaving the skin soft, clearer and more receptive to any subsequent correction product.

Our enzyme formulations combine bromelain (pineapple), papain (papaya) and trypsin (bovine derivative). Bromelain and papain are cysteine protease and trypsin is

- Use between SWiCH™ treatments.

### Contraindications

- Accutane or other medications causing severe skin sensitivity
- Allergies to pineapple or papaya
- Sunburned skin
- Any condition that may give cause for non-use of this product

Each dry enzyme powder is sold with its own activator. Use one part powder to three parts activator. Stir for two minutes and it will form a pudding-like gel, which can be applied to the client. Leave the product on the skin, which is kept moist, by steam from a distance. It can be left up to 10-15 minutes, however, on a first-time patient, timing should be anywhere from 4- 8 minutes. Always watch for sensitivity. Any unused product may be covered and stored in the refrigerator. Circadia has studied its potency after being mixed and found it to be still active from up to a week.

a serine protease. Bromelain is an effective anti-inflammatory agent; papain works with the sulfhydryl group and is highly effective in removing the keratin. Trypsin attacks proteins that contain amino acids. With these three enzymes working together to attack different parts of the keratin molecule, they produce very effective results.

Chocolate, Raspberry and Orange (Zymase) may be used as a light peel or as a pretreatment before a salicylic acid peel

### Indications

- Remove keratin buildup on skin
- Dry calloused hands or feet, knees or elbows
- Acne skin with pustules and macules
- Back treatment



# SWiCH™ Dermal Rejuvenation System

For over 40 years chemical peeling has been practiced by physicians to rejuvenate or remodel sun-damaged skin. Both intrinsic and extrinsic aging changes have been the object of many types of skin peeling including chemical, mechanical and thermal modalities. The common thread tying these methods together is the *ability of the skin to heal itself when damaged*. All of these methods produce some degree of tissue destruction, which incites the natural repair process within the skin. It is possible to achieve repair of the skin without having to induce tissue damage. Other mechanisms are available to trigger the reparative systems.

## The concepts of SWiCH™

The body's repair systems, including that in the skin, are held in *ready state* at all times; even with aged skin these repair systems are fully operable. Understanding what is needed to trigger the system is the key to the efficacy of the SWiCH System. Any repair system requires a large input of energy. Biologically this is in the form of adenosine triphosphate, or ATP. This energy source is generated by a natural cycle as part of the metabolism of food. For the SWiCH system to be effective the active ingredients must penetrate into the skin. Next, the repair mechanism must be switched on and the energy supplied – just as you flip a light switch to supply electrical energy to a bulb. The three parts of the SWiCH System as (1) effect penetration, (2) generate energy, and (3) turn on the repair system.

## Effective safe penetration of the skin

The outer layer of the skin, the stratum corneum, consists mainly of keratin protein and some lipids. Keratin as a protein will bind water, and the amount of water it binds relates to the stability of the keratin. Hydrolysis, or the addition of water to protein, is an effective way of breaking down the protein's structure. Since proteins are

large molecules they are folded in a manner that relates to their internal structure and their relationship to the external environment. When the environment becomes denaturing either by heat, cold, acid, alkali, or organic denaturants, the balance is disrupted and the protein unfolds. Using urea to denature the protein causes a change in normal water structure. The interaction of urea-with-water is weaker than that between water-and-water. This disrupts the dynamic network of hydrogen bonding that exists in pure water resulting in the water molecules reacting with the hydrogen bonds of the nearby protein. This competition for internal hydrogen bonds in the protein weakens the protein structure and starts the unfolding of the protein.<sup>11</sup> When the keratin begins to unfold or unravel, the integrity of the stratum corneum is broken and the defense line is breached. This action is achieved with mild amounts of urea. Having provided for penetration the next step is to introduce the energy producers.

## The generation of ATP

The key to producing ATP in large amounts is to promote the spinning of the Krebs's Cycle. All organisms require a source of energy to survive and the major source of energy for organisms capable of using oxygen is cellular respiration. Energy derived from organic compounds is released and stored in high-energy bonds of the ATP molecule. This ATP can be used immediately for all its endergonic chemical reactions. Three linked pathways make up the major source of ATP in our bodies. We call these processes collectively cellular respiration. They are *Glycolysis*, *The Krebs's Cycle* or citric acid cycle, and *The Electron Transport System*.

Glycolysis is an anaerobic pathway that produces only two molecules of usable ATP. This system generates lactic and pyruvic acid. Only a small amount of energy is

<sup>11</sup> Shiffer, C.A. and Dotsch, V. The role of protein-solvent interaction in protein unfolding. *Current Opinions in Biotechnology*, 1966 7:428-432.



derived from glycolysis and even from the Krebs's Cycle, and the purpose of these metabolic cycles is to supply the Electron Transport System, which is able to harness far more energy from the glucose molecule than both of these pathways. The immediate role of glycolysis is to produce pyruvate. This process does not require oxygen; the process of oxygen determines the destiny of this pyruvate molecule. This process of glycolysis refers to anaerobic glycolysis, and under anaerobic conditions, will result in the conversion of pyruvate to lactic acid. Pyruvate is further metabolized in the mitochondria.

### The mitochondria

The mitochondria are the major energy producers of the cell. While glycolysis occurs within the cytoplasm all the other processes of energy production take place within the mitochondria, starting with the Krebs's Cycle. The Krebs's Cycle involves the oxidation of pyruvic acid to carbon dioxide. This system starts with the formation of citric acid from oxaloacetic acid by adding an acetyl CoA group. The final pathway, The Electron Transport System, generates ATP in large quantities through a process of oxidative phosphorylation that couples the transfer of electron energy to ATP. This process produces 38 molecules of ATP from energy stored in the electrons of reduced coenzymes. Oxygen is used to accept the final low energy electrons to form water. Mitochondria function is critical for good health and the production of pyruvate is essential to the function of mitochondria.<sup>12</sup>

### Some physiological actions of pyruvate

Additionally, pyruvate has a protective effect against oxidative stress which may lead to apoptosis in severely damaged cells.<sup>13</sup> Pyruvate has also been shown to be effective as a sunscreen, providing significant protection when applied topically.<sup>14</sup> The addition of

pyruvate to topical products for the treatment of wounds has been found to accelerate wound healing. Pyruvate turns the wheels of the Krebs's Cycle faster as it enters the metabolic pathway. It also stimulates the Electron Transport System to generate more ATP which is needed in cell and tissue repair.

### Some physiological actions of citric acid

Citric acid has been known to stimulate new cell formation and the formation of collagen. In sun-damaged skin citric acid is able to increase the viable epidermal thickness and content of glycosaminoglycans.<sup>15</sup> Citric acid also is involved in the regulation of the melanin biosynthetic pathway since it enhances melanogenesis by increasing tyrosine hydroxylase.<sup>16</sup> A very special function of citrate is the protection of neurons under conditions of low tissue oxygen levels, or hypoxia.<sup>17</sup> An important enzyme in the metabolism of pyruvate is pyruvate carboxylase. When this enzyme is low, citrate combined with aspartate can help maintain the Krebs's Cycle.<sup>18</sup>

### Combined actions of pyruvate and citrate

The addition of pyruvate and citric acid to the SWiCH system activates the Krebs's Cycle forming more intermediates to produce more ATP. Pyruvate also increases the energy level in tissues by this system, while citric acid promotes the formation of new collagen and new cells. Both citric acid and pyruvate are active in wound healing and tissue restoration. Aging skin can be described as a chronic inflammatory condition with reduced capacity to heal itself. The addition of pyruvate and citrate not only triggers the repair system into action, but also provides ample energy to restore the tissue to near normal.

(Illustration of the Krebs cycle)

<sup>12</sup> Mallet, R.T., Sun, J. Mitochondria metabolism of pyruvate is required for its enhancement of cardiac function and energetic. *Cardiovasc Res* 1999 32:149-161

<sup>13</sup> Ramakrishnan, N., et al. Pyruvate prevents hydrogen peroxide induced apoptosis. *Free Radic Res* 1998 4: 238-295.

<sup>14</sup> Gupta, S.K., et al. Delayed manifestation of ultraviolet radiation induced erythema in guinea pigs by sodium pyruvate - a free radical scavenger. *Indian J Pharmacol* 1998, 42: 315-318.

<sup>15</sup> Bernstein, E.F., et al. Citric acid increases the viable epidermal thickness and glycosaminoglycans content of sun-damaged skin. *Dermatol Surg* 1977, 23: 689-694.

<sup>16</sup> Bhatnagar, V., et al. In vitro modulation of proliferation and melanization of melanoma cells by citrate. *Mol Cell Biochem* 1998, 187: 57-65

<sup>17</sup> Kellehr, J.A., et al. Protection of astrocytes by fructose 1,6 biphosphate and citrate ameliorates neuronal injury under hypoxic conditions. *Brain Res* 1996 26: 167-173.

<sup>18</sup> Ahmad, A. et al. Treatment of pyruvate deficiency with high doses of citrate and aspartate. *Amer J Med Genet* 1999 87: 331-338.



## The repair system

The basic repair system of the body is tied to the inflammatory response of the immune system. It is well known that initiation of the repair process begins with cell-to-cell signaling, and then immune agents take over. A critical immune stimulating agent is produced in the thymus gland and is known as *Fraction V*, which is markedly decreased in individuals over 30 years of age. In recent years a great deal of research on thymic extracts has shown the remarkable efficacy of this substance in both tissue maintenance and repair.

Studies have shown that there is a family of biologically active peptides with *Fraction V* that act on T cell-subpopulations to maintain normal immunological reactivity. *Fraction V* has been found to contain two peptides – thymosin alpha 1 and thymosin beta 4 which are especially active.<sup>19</sup> A major action of *Fraction V* is to stimulate secretion of hormones from the hypothalamic-pituitary adrenal axis. *Fraction V* has been used extensively in the treatment of immunodeficiency disorders with significant success.<sup>20</sup> The most significant activity of thymosin Fraction V as it relates to *The SWiCH™ System* is the ability of *Fraction V* to promote wound healing and tissue repair.<sup>21</sup> Collagen deposition in wounds and increased rate wound healing was reported to be 2-3 times that of untreated wounds.<sup>22</sup> All of these reports confirm what we have found with the post application of *Fraction V* cream in *The SWiCH™ System*.

<sup>19</sup> Low, T., Toldstein, A. Thymosins: structure, function and therapeutic applications, *Thymus* 1984, 6: 27-42.

<sup>20</sup> Marshall, G.D., Jr., et al. Thymosin: basic properties and clinical applications in the treatment of immunodeficiency diseases and cancer. *Rec Results Cancer Res* 1980, 75: 100-105.

<sup>21</sup> Malinda, J.M., et al. Thymosin Alpha 1 stimulates endothelial cell migration, angiogenesis and wound healing. *J. Immunol* 1998, 160: 1001-1006.

<sup>22</sup> Malinda, J.M., et al. Thymosin beta 4 accelerated wound healing. *J. Invest Derm* 1999, 113: 364-368.



## Summary of The SWiCH™ System

*The SWiCH™ System* is based on a physiological principle of inducing the natural repair system of the skin to become active. Activation of the repair system can then effect a restoration of both sun-damaged skin and intrinsic skin aging changes. The four-step process is as follows:

1. Cleansing the skin with gentle cleanser removed dead cells and excess lipids.
2. Application of urea modified keratin proteins to allow increased penetration of actives. The skin is then cleansed again complete. Removal of the urea is essential before the next step.
3. Application of pyruvate-citric acid complex activates the Krebs's Cycle, increases flow of electrons to the Electron Transport System generating more energy through ATP synthesis. This product is not removed. It remains on the skin and is followed by the Fraction V.
4. Post-treatment with *Fraction V* stimulates the immune system and simultaneously activates multiple processes to accelerate healing.

Unlike most acid-based treatments, *The SWiCH™ System* is a leave-on system. The active ingredient remains to provide continuous treatment for repair and restoration. Since tissue damage is minimal, repeated treatment can be performed at regular intervals without risk of over-treatment.

### **Contraindications**

- ◆ Allergy to aspirin
- ◆ Allergy to citric acid of any kind – oranges, lemons, grapefruit, etc.
- ◆ Anyone who says they are “highly allergic”
- ◆ Pregnant or trying to get pregnant.

- ◆ User of Accutane® less one year ago.
- ◆ Using antibiotics
- ◆ Used glycolic, Retin-A™ or Renova in the last 4 weeks
- ◆ Laser surgery in the last twelve weeks
- ◆ Lupus or any autoimmune disease

## More questions on the SWiCH™ Rejuvenation System

### **May people who suffer from asthma and other respiratory ailments have a SWiCH treatment?**

*There doesn't seem to be any aggravation of respiratory condition with this treatment.*

### **Is SWiCH safe for an epileptic who is on medication?**

*Check with the client's physician, and supply the doctor with the scientific support for SWiCH supplied in your manual. At this time, there is no foreseeable reason why this would be contraindicated, however, it is recommended that you patch test a small, inconspicuous area such as the forehead or the forearm.*

### **Can SWiCH be used on older clients with extensive severe actinic keratosis?**

*We have had some very good results with this. As always, and particularly with the elderly, be sure to do a complete pre-treatment history and be aware of all current medications.*

### **Are there any contra-indications for diabetics?**

*None known. Best to check the client's physician, and supply the SWiCH data.*

### **How long does the SWiCH mechanism continue to work?**

*One application will provide benefit up to one month.*



**Will SWiCH address skin pigmentation?**

**How?**

*Yes, it has been shown to reduce pigmentation in a variety of skin types.*

**Is there scientific data supporting skin changes after using SWiCH?**

*Representative examples of both ultrasound and histological data show an increase in dermal activity immediately following the SWiCH treatment. Currently a long-term study is underway with a large number of subjects who will be studied for the long-term benefit. At the conclusion of this study, Dr. Pugliese will likely publish the results in the esthetic/anti-aging journals.*

**Can people who have Botox® injections have a SWiCH treatment?**

*There is no foreseeable reason at this time why they should not. We encourage you to photocopy the Science of SWiCH™ (Chapter 15) for clients with concerns to take to their surgeon for review before receiving the SWiCH treatment.*

**How long after a facelift or blepharoplasty can people do SWiCH?**

*A minimum of three months.*

