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1. Understanding Laser

1

Understanding Laser

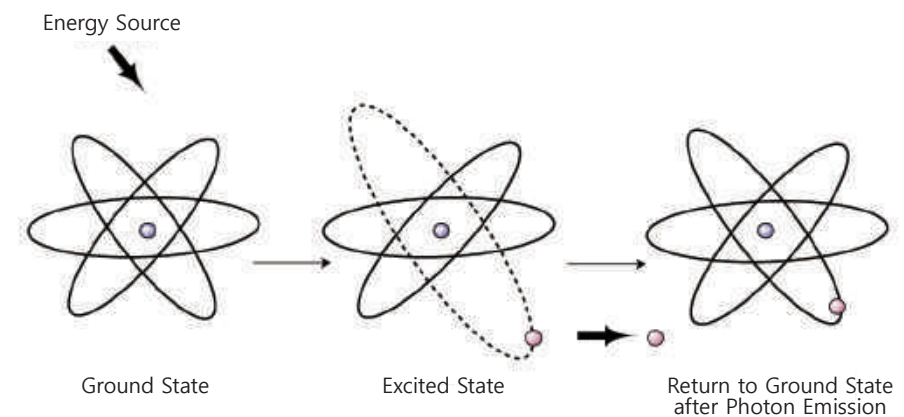
I. Characteristics of Laser

Light Amplification by Stimulated Emission of Radiation

Laser light is a single wavelength and its characteristics include mono-chromaticity, collimation, and coherence. Also, instant brightness of laser allows operator to focus light energy to a particular lesion. Effects of laser are mostly photo-thermal effect and include photomechanical and photochemical effects.

II. Principles of Generating Laser

An element, the minimum unit of all media (solid, liquid, gas), has nucleus atom located in the center with electron orbiting at a constant diameter. Such element maintains an equilibrium between negative and positive extreme and this composition is called 'Ground State'. When external energy is applied onto an element and energy level of the element is increased, an electron is excited and expands its orbit away from the nucleus. The 'excited' electron then emits photon in order to return to the 'ground state' and becomes stable. Photon during this stage is emitted in a form of light energy. This photon then excites a nearby element, causing instant repetition of this process. The chain reaction between the elements causes amplification of light energy and laser is generated.



III. Composition of Laser

Laser is composed of four parts : energy source, medium, optical cavity and laser delivery system.

1. Energy Source

In order to generate laser light, various kinds of external energy sources such as flash lamp, electric current, semiconductor, or other lasers are required. This energy source stimulates elements of medium, solid, liquid, or gas, and creates unstable state within elements, which is necessary for generating laser.

2. Medium

Medium includes solids (Ruby, Alenxandrite, Nd:YAG), liquids (Rhodamine), or gas (Argon, He-Ne, CO₂) and is usually housed in optical cavity, often called laser head or laser tube.

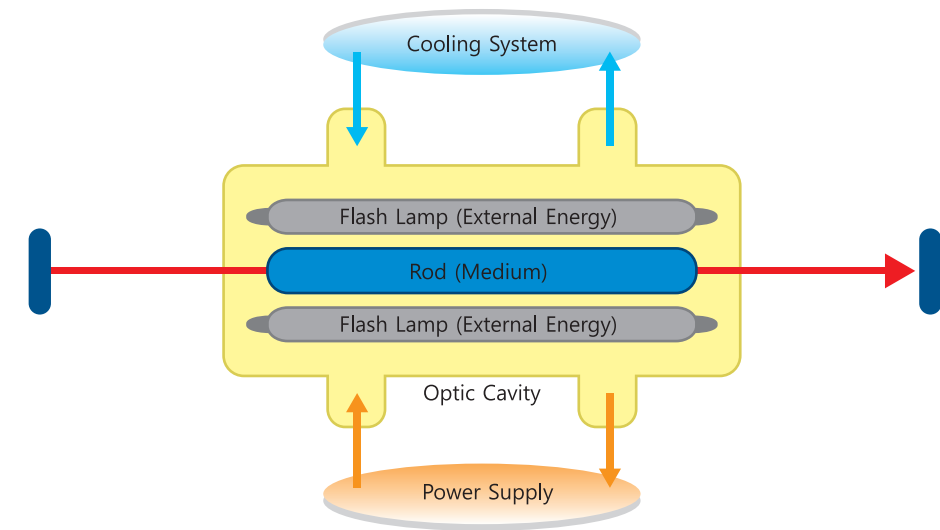
3. Optical Cavity

Optical cavity, containing medium and mirrors attached to each end, works as a reflector of photons that are emitted from electrons. Reflected photons continuously stimulate medium, causing chain reaction that generates laser. While the mirror on one end of optical cavity is completely reflective, the other mirror on the opposite end is semi-translucent, allowing energy light at a particular angle to pass through during the chain reaction.

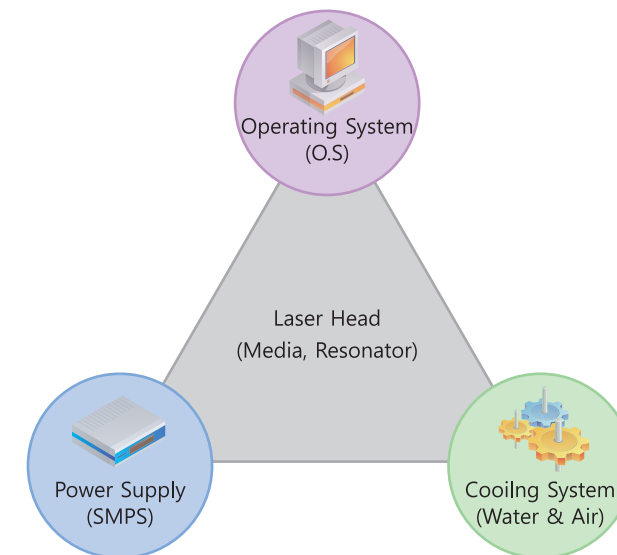
4. Delivery System

Amplified light inside the optical cavity is delivered to its target through a delivery system such as arm or fiber. Cosjet TR has an arm type delivery system and Cosjet SR has a fiber type.

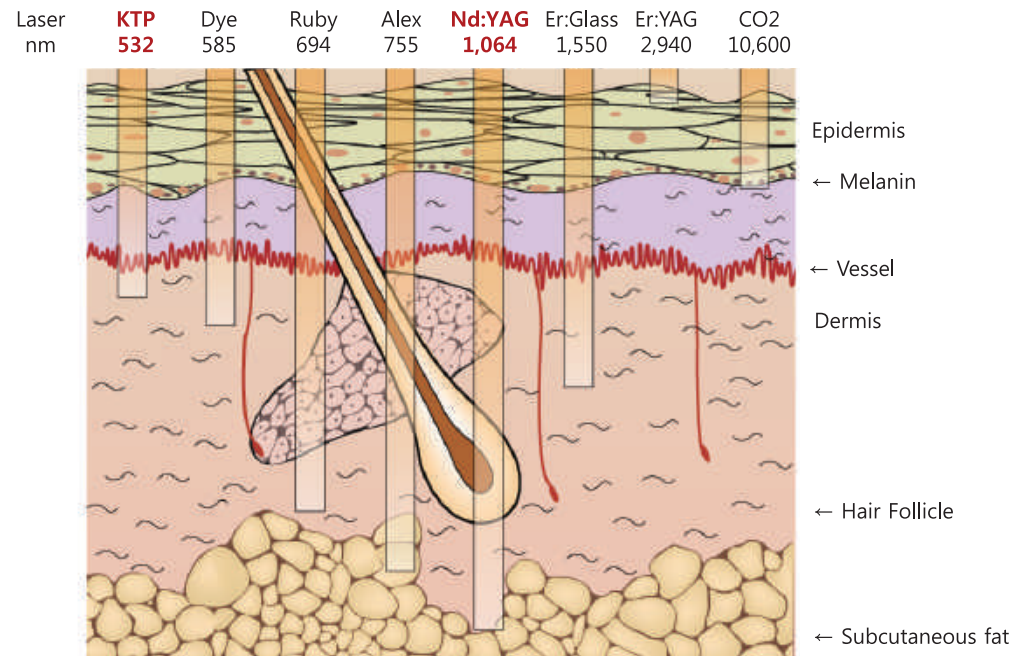
Basic Composition of Laser Head



Basic Composition of Laser System



IV. Other Lasers



Various Types of Wavelength

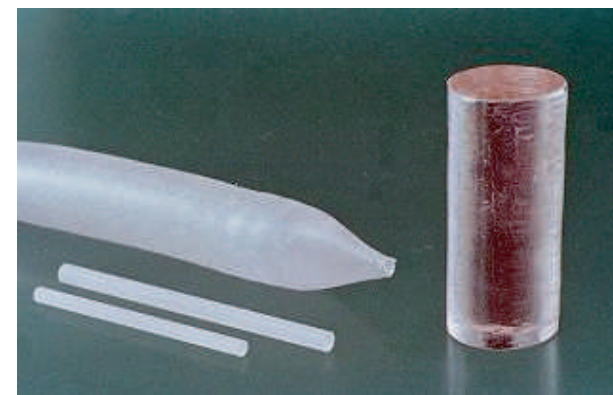
| Laser | Wavelength(nm) | Application Range |
|-----------------|----------------|--------------------------------|
| Argon | 488, 514 | Absorbed in Hemoglobin/Melanin |
| Dye | 585 | Absorbed in Hemoglobin/Melanin |
| KTP | 532 | Absorbed in Hemoglobin/Melanin |
| Nd:YAG | 1,064 | Absorbed in Hemoglobin/Melanin |
| Diode | 810, 980 | Absorbed in Hemoglobin/Melanin |
| CO ₂ | 10,600 | Absorbed in H ₂ O |
| Alexandrite | 755 | Absorbed in Hemoglobin/Melanin |
| XeCl-Excimer | 308 | Absorbed in H ₂ O |
| Er-Glass | 1,540, 1,550 | Absorbed in H ₂ O |
| Ruby | 694 | Absorbed in Hemoglobin/Melanin |

V. Light Spectrum



What is Nd:YAG(Y₃Al₅O₁₂)?

Solid laser medium made of Neodymium doped with Yttrium, Aluminum, and Garnet.



Nd:YAG

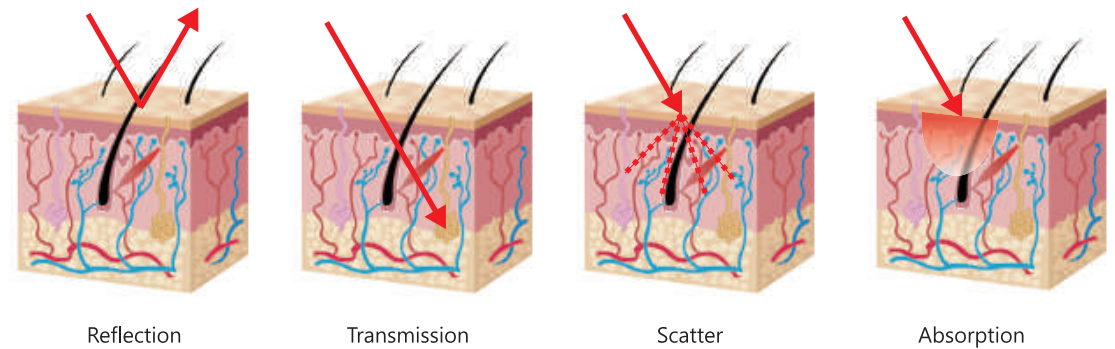
2. Cell Response to Laser

I . Cell Response Type

When laser light is delivered to skin cell, a portion of light energy is reflected, a portion transmits through skin cell, while most energy is either absorbed in the chromophore or scattered to surroundings.

Cell response to laser is determined by the wavelength of the laser and laser affinity and absorbing power of target skin cell. Absorption and scatter of laser light varies to laser wavelength. Usually longer wavelength penetrates deeper. For example, Nd:YAG laser with wavelength of 1,064nm reaches to 3~4mm below skin surface while shorter wavelength of dye laser (510nm~595nm) has lower penetration depth of 0.2mm.

Chromophore is laser-friendly and has tendency to absorb laser light and the most common chromophores found in human skin are melanin, hemoglobin, and water. Lasers like CO₂ (10,600nm) and Er:YAG (2,940nm) have long wavelengths but their high affinity for water absorption prevents the long wavelength to penetrate deep below skin surface.



II. Cell-Temperature Relationship

Laser-absorbed skin will rise in temperature and thermal damage in the skin cell increases in proportion to temperature and exposure duration. Responses in skin cell or skin surface vary depending on temperature.

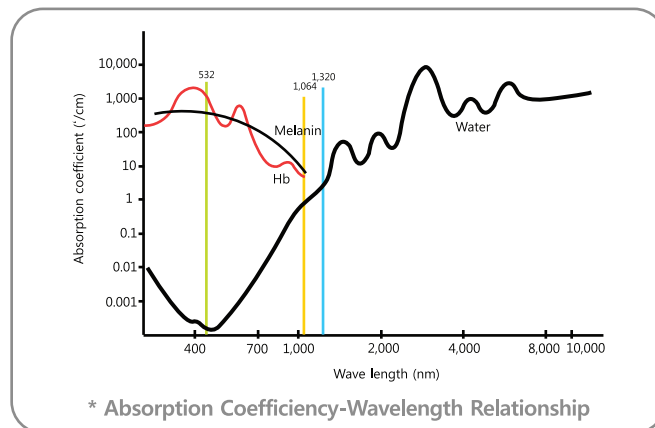
Exposure time is also an important factor since longer exposure to low-temperature thermal damage results in protein regeneration and burn injury.

Connection between Temperature and Thermo-Damage

| Temperature (°C) | Visible Change | Biological Change |
|------------------|----------------|---------------------------------|
| 40~60 | No Change | Warming |
| 60~70 | Bleaching | Coagulation |
| 70~100 | White / Gray | Protein Regeneration / Necrosis |
| 100~200 | Plume | Evaporation (Carbon Generated) |
| 300~1,000 | Ablation | Pure Evaporation (No Carbon) |
| 1,000~ | Carbonization | - |

III. Selective Photothermolysis

It was theorized by Anderson and Parrish in 1983, in case a laser beam is absorbed into the skin tissue or a specific chromophore, it is converted into thermal energy and causes a heat injury in a specific tissue. Thus, it has a curative effect. There is, in addition, another called "selective photothermolysis", which makes the laser irradiation time shorter than thermal relaxation time in order that heat may be minimally transferred to surrounding tissues. In result, it aims at reducing side effects caused by laser therapy.



III. TRT (Thermal Relaxation Time)

There are several important aspects to achieving desired results of laser treatment. One of them is the target of laser light, known as chromophore (blood vessel, melanin, hair follicle, etc.). Each chromophore has specific 'thermal relaxation time' or TRT and manipulating TRT can result in either heating or destruction of skin cell.

Laser exposure time is important because it is directly related to damages in surrounding skin cells. Recently laser treatments have been made able to maximize treatment effects and prevent side effects by effectively manipulating TRT. TRT can be explained as the time needed for the cell to emit the absorbed heat until the amount of heat received is lowered to 50%. Simply put, TRT means time needed for cell to cool off. Q-switched laser is stronger and shorter than the TRT of melanin pigments (0.2μs), allowing laser to selectively destroy melanin and prevent unwanted scattering of laser heat. TRT of a cell is directly proportional to the size of the cell; the larger the cell, the longer the thermal relaxation time.

TRT of Target Cell

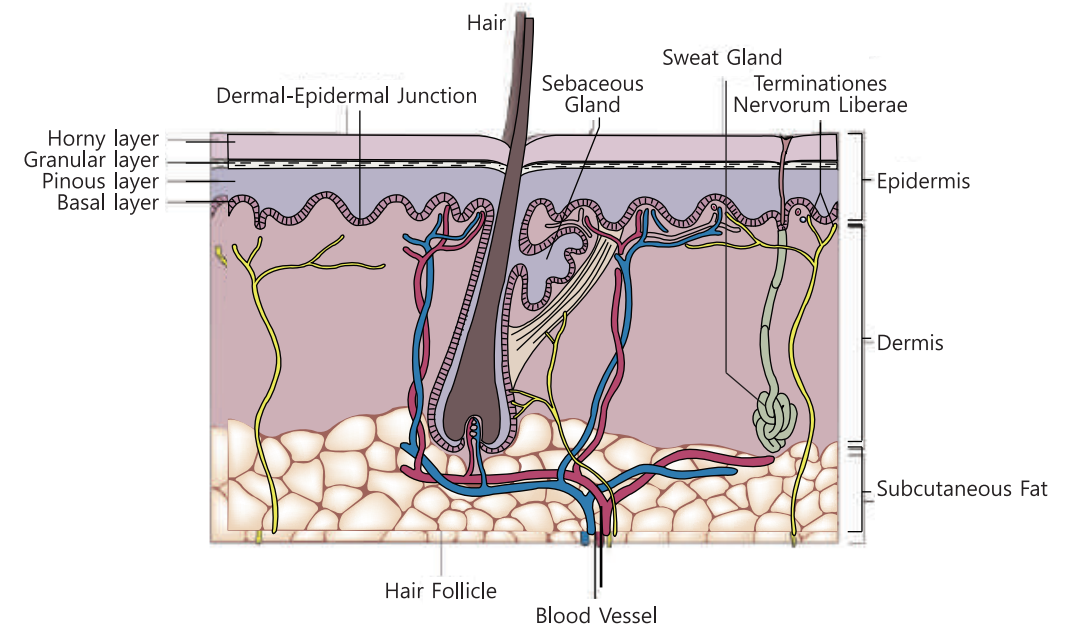
| Target Cell | Cell Size | Thermal Relaxation Time |
|------------------|-----------|-------------------------|
| Melanosome | 1μm | 1μs |
| Red Blood Cell | 5μm | 20μs |
| H ₂ O | - | 300μs |
| Dermis | - | 3~10ms |
| Capillary Vessel | 50μm | 1μs |
| Tattoo | 0.1μm | 10μs |
| Hair Follicle | - | 40~100ms |

Structure of Skin Cell

3. Structure of Skin Cell

Skin, the largest organ in human body, is about 1.8m^2 in area and 2kg in weight. Skin is made of multiple layers including epidermis, dermis, subcutaneous fat, and epidermal appendage.

In addition, skin plays an important role in physiology such as remaining H_2O balance, preventing ultraviolet ray penetration, controlling immunity system, and maintaining body heat.



I . Epidermis

- The most shallow layer of the skin composition (approx. $75\sim 150\mu\text{m}$) is made of layers as following: horny layer, granular layer, pinous layer, and basal layer.
- Epidermis not only protects human body from external environment with its semi-permeable layer but also performs physiological functions.

Epidermal Cells

(1) Keratinocyte

the most important cell in epidermis (90~95% of all epidermal cells) produces Keratin proteins.

- Keratinization process

: Stratified squamous epithelium is maintained by cell division within the basal layer. Differentiating cells slowly displace outwards through the spinous layer to the horny layer, where anucleate corneal cells are continually shed from the surface. In normal skin the rate of production equals the rate of loss, taking about two weeks for a cell to migrate from the basal layer to the top of the granular layer, and an additional two weeks to cross the horny layer.

- Hyperkeratinization

: In normal state, regeneration and separation of epidermal cell occur in equal rate, forming an even horny layer, but decreased keratinization due to aging delays shedding of keratinocytes, resulting in thicker and rougher skin surface and interrupts nutrition absorption through skin surface.

(2) Melanocyte

Found in basal layer (Approx. 5% of epidermal cell)□

(3) Langerhans Cell

Langerhans Cell, which makes up about 2 to 4% of epidermal cell, is a special cell originated from bone marrow, unlike keratinocytes originated from ectoderm and performs as an antigen-presenting cell.

(4) Merkel Cell

Merkel Cell is a minor contact receptor that irregularly exists in the bulge of mucous membrane in the basal layer.

Depth of Epidermis

| | | | |
|------------|---------------|------|------------------|
| Eye lid | 40 μ m | Face | 40~1,000 μ m |
| Palm, Sole | 1,500 μ m | - | - |

II. Dermal-Epidermal Junction

Dermal-Epidermal Junction is connected between dermis and epidermis by various fibers and performs many important functions such as attachment and support of epidermis, permeability control, and wound healing.

III. Dermis

Dermis is a web of collagen and elastic fibers deeply embedded in a stroma that protects nerves, lymphatic vessels, blood vessels, muscle, hair follicles, sebum glands, and sweat glands. Depth of dermis is about 15 to 40 times the depth of epidermis. Right below Dermal-Epidermal Junction is a papillary dermis, a loosely knitted composition of thin fibers. Adventitial dermis is a collection of a papillary dermis and surrounding dermis of nearby nerves and blood vessels. Reticular dermis is an area between papillary dermis and the subcutaneous fat boundary and takes about 75% of dermal layer.

(1) Collagen Fiber

Collagen fiber, a main element in a reticular dermis, runs parallel to skin surface in a form of thick coil of ropes. Collagen fiber takes up 75% of dry weight and 18 to 30% of net volume of dermis and gives tension to skin.

(2) Elastic Fiber

Elastic fiber takes up 3% of dry weight and as its name suggests, 90% of it is composed of elastin. About 10 to 15% of elastic fiber is made of microfibril.

(3) Dermal Matrix

Dermal matrix is an amorphous material that fills the space between dermal cells and fibers. Dermal matrix is made of water, electrolyte, serum protein, and polysaccharide.

(4) Blood Vessel

Blood vessels in dermis are composed of superficial vessel located at the border between papillary dermis and reticular dermis, deep vessel located below reticular dermis, and interstitial vessel that connects the two.

(5) Lymphatic duct

Lymphatic duct is a tube between cells that contains lymph. Lymphatic duct runs parallel to an artery, but is larger in diameter and in quantity.

(6) Nerve

Sensory nerves and autonomic nerves can be found in skin cells. Sensory cell is responsible for sense of pain, temperature, light pressure and vibration while autonomic nerve controls vessel movement, hair movement, and sweat secretion. In facial skin, sensory nerve is responsible for trigeminal nerve and facial nerve for mimische muskeln. Trigeminal nerve can be found in forehead, cheeks and chin.

4. Applications of Cosjet TR

I . Treating Pigment Lesion with Cosjet TR

Definition/Cause of Nevus

Melanin cells create melanin and melanin determines human skin tone. Melanin cells repeat a certain cycle of disruption and growth. If, however, melanin breaks away from the cycle, it proliferates and becomes a tumor. Limited proliferation of melanin results in benign tumor while unrestricted proliferation begets malignant tumor, or skin cancer.

Characteristics and Symptoms

Even though exact reason for its cause is not known, prepotency of autosome, over-exposure to sun during maturity, temporary sun burn, and other syndromes are proven to be related to nevus.

Treating Nevus with Cosjet TR

Ablative laser treatments like conventional CO₂ or Er:YAG lasers caused significant damages to epidermis. However, recent development of Nd:YAG laser has extended laser penetration into both epidermis and dermis without any damage to skin cells. Treatment of nevus differs in methods depending on location of nevus. Generally, epidermal lesions like lentigo, Cafe au lait, freckles and age spots are treated with 532nm wavelength while lesions located deep in dermis such as Nevus of Ota, ABNOM, and melasma are treated with 1,064nm wavelength. Epidermal lesions usually show great results after single session or are treated once every 4 weeks in other cases. In case of dermal lesions, several sessions are required for desired results in interval of 8 to 12 weeks and treatment of dermal pigment lesion is generally carried out in 8 to 12 week intervals.

Epidermal Nevus

- ☞ Lentigo (Simplex, Solar)
- ☞ Age spot
- ☞ S.K (Seborrheic Keratosis)
- ☞ Freckles
- ☞ Cafe au lait
- ☞ Nevus Spilus
- ☞ Becker's Nevus

Dermal Nevus

- ☞ Tattoo Ink
- ☞ Nevus of Ota
- ☞ Nevus of Ito
- ☞ ABNOM

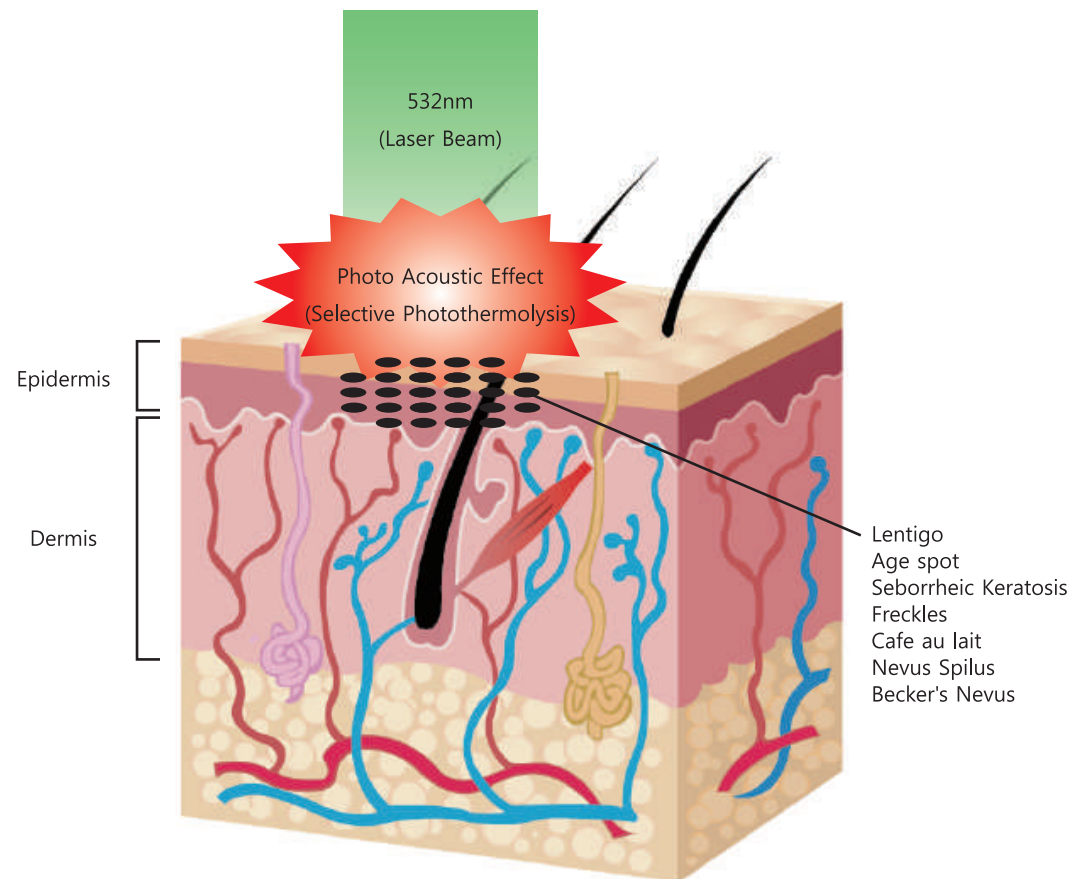
Dermal-Epidermal Mixed Nevus

- ☞ Melasma
- ☞ PIH

II. Epidermal Pigment Lesion

Epidermal Nevus

- ☞ Lentigo (Simplex, Solar)
- ☞ Age spot / S.K (Seborrheic Keratosis)
- ☞ Freckles
- ☞ Cafe au lait
- ☞ Nevus Spilus
- ☞ Becker's Nevus



Lentigo (Simplex, Solar)

What is Lentigo Simplex?

Lentigo Simplex is a nevus with define boundaries of brown or black color and is about 2 to 3mm but no bigger than 5mm in diameter. It is a condition in which epithelium protrusion grows deep into skin layer and quantity of melanin in epidermis is increased. Lentigo Simplex may occur in any parts of body, but is not related to exposure to ultraviolet rays.

What is Solar Lentigo (Age Spot)?

As aging increases ultraviolet exposure, epidermal cell cycle slows and creates irregular Lentigo in face, hands, arms, and legs.

(1) Characteristics and Symptoms

Lentigo is categorized as Lentigo Simplex and Solar Lentigo. While Lentigo Simplex occurs in childhood or twenties and thirties, Solar Lentigo is more common to older people who had been more exposed to UV rays.

Unlike lesions like melasma, proliferation of melanin and melanin cells are observed as well in Lentigo. Lentigo may appear in any parts of human body and rarely disappears naturally, but generally remains on human body as a mold.

(2) Treating with Cosjet TR

Lentigo is an epidermal lesion and requires treatment with 532nm wavelength. Aggressive and non-aggressive treatment methods exist for Lentigo. Aggressive treatment has an advantage of immediate pigment removal but may cause unwanted pigmentation or longer down time. Non-aggressive treatment has significantly lower risk of such side effects, but has the inconvenience of multiple procedures in order to achieve desired results.

(3) Treatment Parameter

- MODE : 532nm
- FLUENCE : Non-aggressive : 0.2~0.5J/cm² / General Treatment : 0.5~J/cm²
- SPOT SIZE : 3~4mm
- INTERVAL : 4 weeks

(4) Treatment Guide

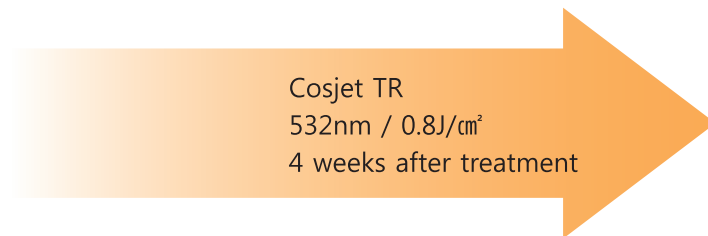
In order to reduce hyper-pigmentation often found in epidermal pigment lesion treatments, use of proper energy level and close attention to post-treatment care are necessary. Proper level of energy can be assumed when whitening that assembles light frosting appears immediately following laser radiation. Sun block and whitening cream must be used on patients after procedure.

(5) Clinical Case of **Solar Lentigo**



Before

After



Seborrheic Keratosis

What is Seborrheic Keratosis?

Seborrheic Keratosis is a wart-like benign tumor in brown or dark brown color. It is a skin lesion often found in face or body after mid-life. Seborrheic Keratosis often causes epidermis to thicken.

(1) Characteristics and Symptoms

Seborrheic Keratosis varies in sizes, usually between that of a rice grain and a peanut. It is a very common skin lesion in a shape of a slightly protruded plate, found in face, abdominal, chest, or neck of a middle-aged person. Seborrheic Keratosis contains fat and increases thickness of epidermis.

(2) Treating with Cosjet TR

If Seborrheic keratosis is not protruded and epidermis shallow, treating with Cosjet TR is possible, but if epidermis is thicker than usual, use of ablative laser like CO₂ or Er:YAG is recommended. Remove epidermis of the target lesion with an ablative laser and use Cosjet TR four weeks later to selectively remove unwanted pigments.

(3) Treatment Parameter

- MODE : 532nm
- FLUENCE : 0.7J/cm²~
- SPOT SIZE : 3~4mm
- INTERVAL : 4 weeks

(4) Treatment Guide

Hyper-pigmentation may appear when performing preemptive treatment with CO₂ or Er:YAG. In this case, Cosjet laser toning and whitening ointment prescription are recommended before proceeding with Cosjet TR procedure.

Freckles

What is Freckle?

Freckle, commonly believed to be prepotency of autosome, is less than 5 to 6mm in diameter and its circular or oval shape has indistinct boundaries.

(1) Characteristics and Symptoms

Freckles, caused by increase in melanin secretion, are brownish colored nevus, often found in Caucasians and lighter skinned Asians. Because they are directly related to UV ray exposure, Freckles turn from dark brown during summer season to light brown in winter. Number of Freckles increases with aging, reaching its peak during puberty. Freckles sometimes decrease in quantity post-puberty.

(2) Treating with TR

Because Freckles mostly exist in the epidermal layer, treating Freckles require 532nm wavelength. Immediate effect is observed in most cases, but post-treatment care is necessary to prevent possibility of recurrence.

(3) Treatment Parameter

- MODE : 532nm
- FLUENCE : 0.5J/cm²~
- SPOT SIZE : 3~4mm
- INTERVAL : 4 weeks

(4) Treatment Guide

Treating Freckles with IPL is partially effective and combination procedure with IPL and Cosjet TR is recommended. Treat with IPL 2 to 3 weeks prior to using Cosjet TR. As Freckles are often found in lighter skin tones, perform test procedure with low energy and a spot size larger than the target lesion. Ideal parameter is found when whitening is observed only in the lesion and the surrounding skin cells are not affected.



Before

After

Cafe au lait

What is Cafe au lait?

Cafe au lait is a phenomenon in which number of melanin pigments is increased without proliferation of melanin cells. While the shape of this particular lesion is often random, appearance of Cafe au lait is observed in two groups : circle or oval with definite boundaries and saw tooth with zigzag-like borders. Color of the lesion is uniform in coffee color, but sometimes is spotted within the boundary of the lesion.

(1) Characteristics and Symptoms

Cafe au lait is mostly found as single lesion without complications, but sometimes can cause complication with neurofibromatosis.

The first type neurofibromatosis can be diagnosed when following symptom is observed : six or more dark brown molds (5mm or larger pre-puberty and 15mm or larger post-puberty) in armpits or inguinal regions.

(2) Treating with Cosjet TR

Because Cafe au lait mostly exists in the epidermal layer, treating Cafe au lait requires 532nm wavelength. A scab is formed 2 to 3 days after procedure and 7 to 10 days after, the scab will naturally fall off. Some redness will be observed one to 2 months after a scab falls off. Repeat treatment if remaining pigment is found on the skin surface.

(3) Treatment Parameter

- MODE : 532nm
- FLUENCE : 0.7J/cm²~
- SPOT SIZE : 3~4mm
- INTERVAL : 8~12 weeks

(4) Treatment Guide

Effectiveness of Cafe au lait treatment varies depending on the type of the target lesion. Normally when boundary is saw-toothed, when size of the lesion is small, when the lesion is a group of small pigment pieces, and when the lesion is visibly darker than skin tone, probability of treatment effectiveness is higher. In other cases, pigment may turn darker after the redness period and therefore, partial test procedure is recommended before committing to a particular treatment parameter.

In case a lesion is too wide, it is advisable to treat it at multiple times, rather than at once, in order to minimize the patient's inconvenience and Down time.

Nevus Spilus / Becker's Nevus

What is Nevus Spilus?

Nevus Spilus is a specific type of Cafe au lait lesion with darker nevus of 1 to 2mm in diameter within the lesion.

(1) Characteristics and Symptoms

Rarely found since birth, Nevus Spilus often appears during infancy or childhood. Appears in torso and limbs.

(2) Treating with TR

Treatment method is the same as Cafe au lait. Darker nevus is easier to treat than lighter lesion.

(3) Treatment Parameter

- MODE : 532nm
- FLUENCE : 0.7J/cm²~
- SPOT SIZE : 3~4mm
- INTERVAL : 8~12 weeks

What is Becker's Nevus?

Becker's Nevus, of light or dark brown, is a shape of regular nevus with thicker nevus inside.

(1) Characteristics and Symptoms

Becker's Nevus can be found at birth or during childhood, but it mostly appears around puberty. At first yellowish brown nevus of irregular shape appears in the upper chest, then grows up to 10 to 20cm or larger in diameter. At this stage, nevus has both light and dark brown spots. Becker's Nevus is often found in male and accompanies hypertrichosis. Because androgen receptor is observed increased in quantity inside the nevus, cause of Becker's Nevus is assumed to be partial androgen hypersensitivity.

(2) Treating with Cosjet TR

Treatment of both pigment and hair removal inside is required. If keratinocytes containing melanin cells and melanin pigments are remaining in the hair follicle, re-pigmentation may occur. Hypertrichosis can be cured completely while removal of pigmentation may not be complete.

(3) Treatment Parameter

- MODE : 532nm
- FLUENCE : 0.7J/cm²~
- SPOT SIZE : 3~4mm
- INTERVAL : 8~12 weeks

III. Understanding Whitening

What is Whitening (Frosting)?

When treating with 532nm, most lesions turn white like frosting. Such phenomenon is called whitening. Whitening occurs because tiny air bubbles are formed in cells and they scatter light sources. Whitening disappears only several minutes following occurrence.

Ideal Whitening Reaction

- Observed faint Whitening after laser radiation as found in photo below.
- Color in pigment area returns to normal after several minutes and erythema /edema should be observed only around lesion area.
- Appropriateness of energy level can be presumed according to Whitening reaction.

Ideal Whitening



Before laser radiation

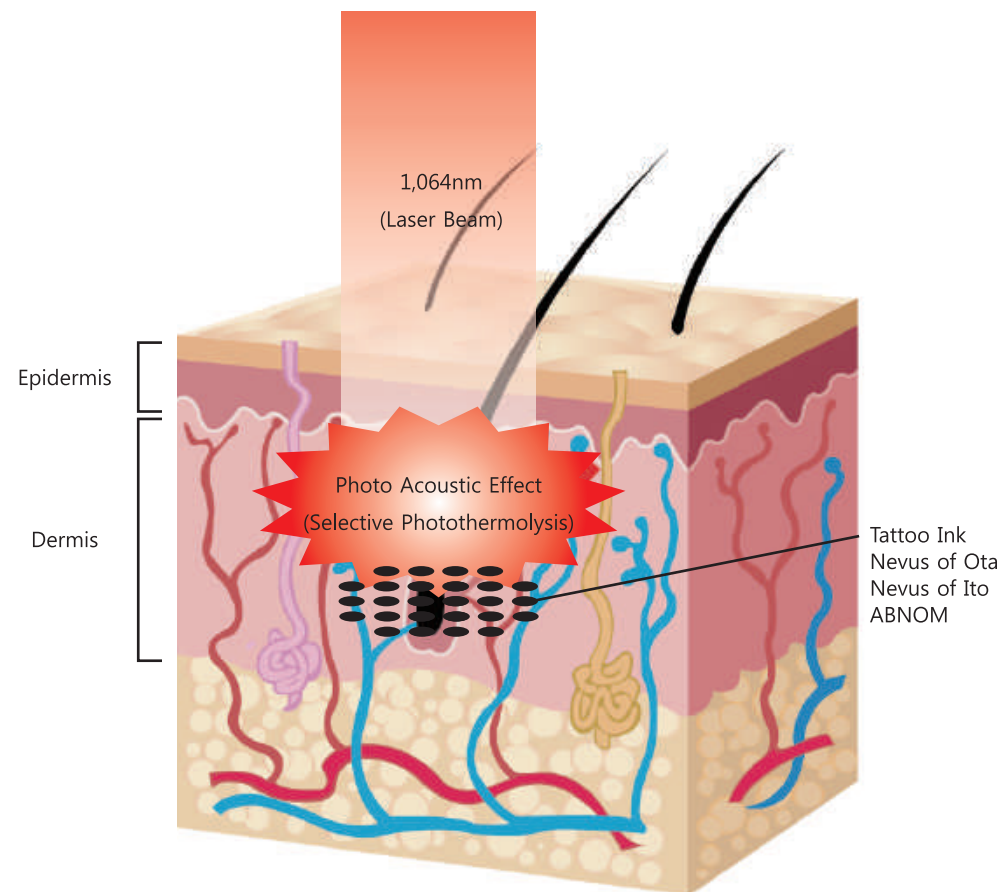
Immediately after laser radiation

5 minutes after laser radiation

IV. Dermal Pigment Lesion

Dermal Nevus

- ☞ Tattoo Ink
- ☞ Nevus of Ota
- ☞ Nevus of Ito
- ☞ ABNOM



Tattoo Ink

What is Tattoo Ink?

Tattoo Ink can be categorized as post-injury, accidental tattoo and artificial tattoo of both professional and amateur job. Tattoo ink pigments exist in cytoplasm such as keratinocyte, fibroblast, macrophage and mast cell.

(1) Characteristics and Symptoms

In early stages of tattoo, pigments spread broadly over keratinocytes to macrophages, but after two to three months, tattoo pigments can only be found in dermal fiber mother cells. Ink carbon particle, while its size ranges from 10 to 100mm as a whole, is a mass of tiny granular shaped particles of 1 to 5 μ m.

(2) Treating with Cosjet TR

Adjust energy level appropriately so whitening is observed after laser treatment but no bleeding or blisters take place. Use large spot sizes to allow laser to penetrate deeper. Usually first pass gives off the best effect and better results are possible if tattoo ink is embedded in multiple layers or has less pigments. Newly done tattoos are easier to remove.

(3) Treatment Parameter

- MODE : 1,064nm
- FLUENCE
 - Eye liner : 3.0 J/cm²~
 - Eye brow : 4.0 J/cm²~
 - Body : 5.5 J/cm²~
- SPOT SIZE : 3~5mm
- INTERVAL : 8~12 weeks

(4) Treatment Guide

Whitening cream and sun block lotion are recommended because some pigmentation and inflammation may occur post treatment.

Sometimes lesions turn reddish black after laser radiation. That is because the particular tattoo ink contains iron oxide. Such case is more difficult to treat and parameter test is highly recommended.

In addition, after first treatment (8~12 weeks), increase the fluence than the conventional treatment in second treatment. It will be more effective to remove remaining tattoo.

(5) Clinical Case of **Tattoo Ink**



Before

After

Cosjet TR
1,064nm / 4.5J/cm²
2 weeks after treatment



Before

After

Cosjet TR
1,064nm / 6.0J/cm²
6 weeks after treatment

(5) Clinical Case of **Tattoo Ink**



Before

Cosjet TR
1,064nm / 6.0J/cm²



Immediately after treatment

After First treatment

Nevus of Ota

What is Nevus of Ota?

Nevus of Ota is a pigmentation that usually appears on one side of face (often around eyes), caused by melanin cell expansion from dermis into epidermis. Nevus of Ota varies in colors from blue to brown depending on depth of pigments in skin layer. It is named Nevus of Ota after its discoverer, Dr. M.T. Ota of Japan.

(1) Characteristics and Symptoms

Pigments of this particular lesion range in various colors such as blue and brown. Deeper nevus appears in blue because red spectrum of the longest wavelength is absorbed into the pigment and becomes invisible while blue spectrum remains in the surface.

- Ito Nevus : similar to Nevus of Ota, Ito Nevus appears in shoulder areas.
- Blue Nevus : blue or bluish grey, Blue Nevus appears in hands or feet in sizes of less than 10mm in diameter. If flat and/or faint, Blue Nevus can be treated with Cosjet TR, but in other cases surgical removal is required.

(2) Treating with Cosjet TR

Treat Nevus of Ota with 1,064nm wavelength because pigments are in the dermal layer. There are three types of lasers commonly used for pigmentation treatment: Ruby, Alexandrite, and Nd:YAG. Longer wavelength has little melanin reaction but has the advantage of deep penetration. Nd:YAG laser can penetrate as deep as 2 to 3mm into skin layer, allowing very effective treatment of dermal pigmentation such as Nevus of Ota. Ruby and Alexandrite, on the other hand, has high melanin absorption and possibility of unwanted bleaching.

(3) Treatment Parameter

- MODE : 1,064nm
- FLUENCE : 6.0J/cm²~
- SPOT SIZE : 3~5mm
- INTERVAL : 8~12 weeks

(4) Treatment Guide

Test with the pre-set parameter and check for changes in lesion. Some whitening may occur in lesions closer to epidermis, but such whitening is hard to observe, so base the parameter on the sound of pigments breaking up. If pin point bleeding is visible after the pigment popping noise, assume proper energy level has been selected for the particular lesion.

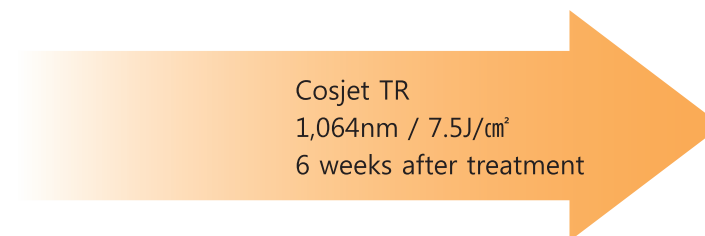
After first treatment(8~12 weeks), if you increase the fluence in second treatment, it will be maximized the treatment effects. When you treat around eyes, it's better to wear Eyeshield for protecting the patient's safety during laser treatment.

(5) Clinical Case of Nevus of Ota



Before

After



ABNOM (Acquired Bilateral Nevus of Ota-like Macule)

What is ABNOM?

ABNOM, Acquired Bilateral Nevus of Ota-like Molecule, is a very common pigment lesion that is often found in women of 30 to 40 years old. ABNOM occurs about 22 times more often than Nevus of Ota.

(1) Characteristics and Symptoms

Unlike Nevus of Ota, ABNOM appears in symmetrical shapes or brown freckles around cheek bones. Because of their similar appearances, it is easy to confuse ABNOM with Freckles. Unlike Freckles, however, ABNOM does not change in color once it appears and similar pigments can be found also on nose and both cheeks. ABNOM is deeply rooted and light in color, making it more difficult to treat than Nevus of Ota.

(2) Treating with Cosjet TR

Pigments of ABNOM are in dermal layer so treat ABNOM with 1,064nm wavelength. About half of ABNOM treatments causes pigmentation so precaution is recommended. To reduce the risk of pigmentation, use whitening cream immediately after procedure or perform second treatment after about two weeks following the first treatment before pigmentation takes place. The latter method may cause hyper-pigmentation and requires special caution.

(3) Treatment Parameter

- MODE : 1,064nm
- FLUENCE : 7.0J/cm²~
- SPOT SIZE : 3~4mm
- INTERVAL : 2 or 12 weeks

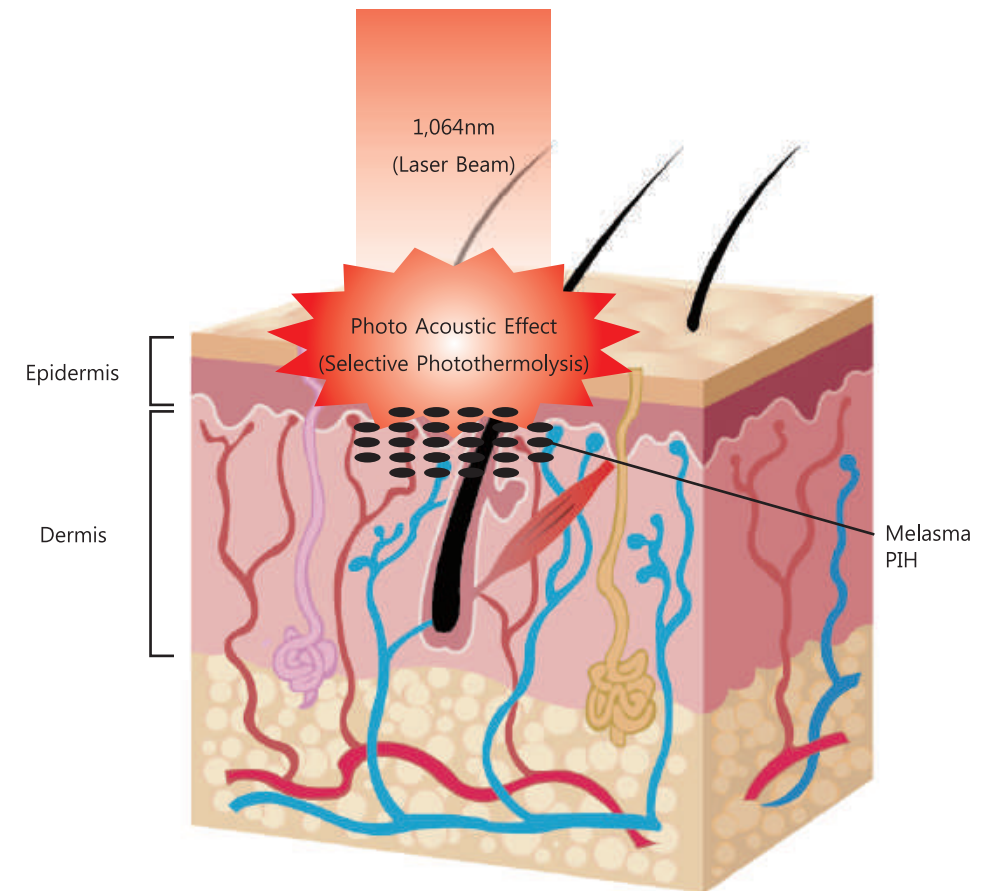
(4) Treatment Guide

Run a test pass with pre-set parameter and check for changes in pigments. Start with large spot size for deeper penetration. Some whitening may occur in lesions closer to epidermis, but such whitening is hard to observe so base the parameter on the sound of pigment explosion. If pin point bleeding is visible after the sound, assume proper energy level has been selected for the particular lesion.

V. Dermal-Epidermal Mixed Lesion

Dermal-Epidermal Mixed Lesion

- ☞ Melasma
- ☞ PIH



Melasma

What is Melasma?

Melasma is a pigmentation in various sizes of brown or dark brown that appears often in light-exposed areas such as face. Melasma is more common in darker skin tones of Asians than in Caucasians and more evident in women because of its relations to estrogens. Melanin cells, over expansion of melanin and dermal macrophage can be found in causes of Melasma. Melasma can be categorized as centrofacial, malar, and mandibular depending on its location.

(1) Characteristics and Symptoms

Melasma can be epidermal, dermal, and mixed. Epidermal Melasma is easier to treat but most Asians have dermal or mixed Melasma.

(2) Treating with Cosjet TR

Melasma can be treated with Cosjet Laser Toning. Long wavelength of 1,064nm is known to influence pigments and blood vessels deep in skin layers and improve Melasma.

(3) Treatment Parameter

- MODE : 1,064nm
- FLUENCE : 1.5~2.5J/cm²
- SPOT SIZE : 6~7mm

(4) Treatment Guide

Melasma is very sensitive to external factors such as ultraviolet rays or laser light and selecting appropriate energy level therefore is very important. Low energy in repetition is more effective than one session with high energy and can prevent side effects. Pay close attention to even distribution of energy to the entire lesion. If certain amount of energy is focused on a particular spot, side effects such as partial bleaching may occur.

- Endpoint : Mild erythema

PIH

What is PIH (Post Inflammatory Hyper-pigmentation)?

Due to external factor (i.e. burn from laser mistreatment), basal layer in the lower part of epidermis is damaged and in order to protect dermis from further damage melanin cell increases in proportion from the original 10% to 50%, causing Hyper-pigmentation. PIH can be categorized as two types: one in which melanin cell activity proliferates into epidermis and the other in which melanin from epidermal damage has been transformed into macrophage in upper dermis.

(1) Characteristics and Symptoms

PIH usually occurs two weeks after mistreatment of laser. One type of PIH, melanin proliferation in epidermis, is brown in color and requires at least four weeks of additional treatment while the other type, pigmentation by macrophage may take several years to cure.

(2) Treating with Cosjet TR

Combination treatment with Cosjet Laser Toning PIH Mode and whitening cream is the most effective way to expedite recovery from PIH.

(3) Treatment Parameter

- MODE : 1,064nm
- FLUENCE : 2.0~3.0J/cm²
- SPOT SIZE : 6~7mm

(4) Treatment Guide

Treatment methods of PIH using Laser Toning have not been completely established but partial destruction of melanin macrophage with 1,064nm wavelength is known to shorten recovery time from hyper-pigmentation.

- Endpoint : Dark erythema

5. Laser Toning with Cosjet TR

I . Laser Toning of Cosjet TR

Basics of Cosjet Laser Toning

Cosjet Laser Toning is a new concept laser treatment for hard-to-cure lesions (i.e. Melasma, PIH, Nevus of Ota) and acne-related lesions with 1,064nm wavelength of Q-Switched Nd:YAG. Compared to more conventional treatment methods, Cosjet Laser Toning delivers higher energy to wider target area in shorter time, allowing it to selectively destroy target pigments and melanin cells located deep in dermis without damaging skin cells and skin surface.

Advantages of Cosjet Laser Toning

1. High-Power Q-Switching Mode

- Most effective for hard to cure and recurring Melasma for Asian skin
- Overall whitening effect for other pigment lesions including Freckles, Age spot, Nevus of Ota, etc.
- Most effective for treating PIH caused by inflammation or mistreatment of laser
- Pore reduction, fine wrinkle improvement and general anti-aging effect due to accelerated collagen generation in dermis
- Acne improvement based on application to sebaceous glands and blood vessels

2. Convenient Procedure with No Down Time

- Great results after 3 to 5 passes
- Short procedure duration (Approx. 5 to 10 min.)
- No anesthesia required
- No bleeding, inflammation, pigmentation or other side effects.
- Shower, make-up, and other daily activities possible immediately after treatment
- Combination treatment with other lasers (IPL, Long pulse Nd:YAG, Whitening Treatment, Soft Peel, Vitaliont, Ionzyme, etc.) available

II. Cosjet Laser Toning Procedure

1. Cleanse face. Shave or anesthetize if necessary.
2. Provide moisture for 5 to 10 minutes.
3. Perform Cosjet Laser Toning (Refer to the following chapters for more info.)
4. Additional treatment if desired (Vitaliont, Ionzyme, Vitamin-C, or TCA Peel)
5. Finish with moisturizer and whitening mask pack.

Cosjet Laser Toning Treatment Chart

| | Fluence | Mode | Spot | Hz |
|---------|--------------------------|---------|-------|-------|
| Melasma | 1.5±0.5J/cm ² | 1,064nm | 6~7mm | 7~8Hz |
| PIH | 2.5±0.5J/cm ² | 1,064nm | 6~7mm | 7~8Hz |
| Ota | 3.0±0.5J/cm ² | 1,064nm | 5~6mm | 7~8Hz |

III. Melasma / PIH / Ota treatment with Cosjet Laser Toning

Step 1 : Energy Level

Increase energy for light skin/lesion and decrease energy for dark skin/lesion.

Step 2 : Treatment Area

Divide and treat three sections as shown in figure 1.

Move in a spiral pattern and overlap as shown in figure 2. Concentrate laser energy on target lesions.

Step 3 : End point (3~5passes)

Check often for changes in skin tone.

- In case of Melasma, Finish procedure when appropriate level of mild erythema is observed.

- In case of PIH and Ota Finish procedure when appropriate level of erythema or petechia is observed.

Excessive overlap, will be cause Hyper pigmentation and Hypo-pigmentation.

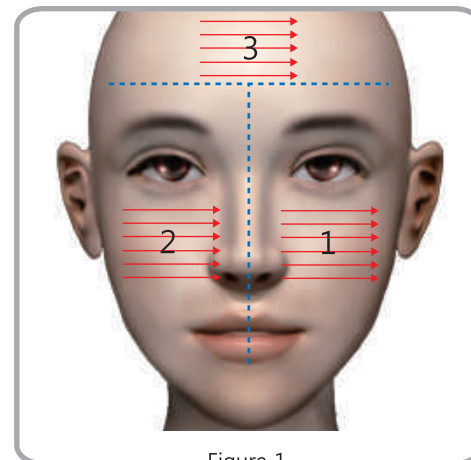


Figure 1.

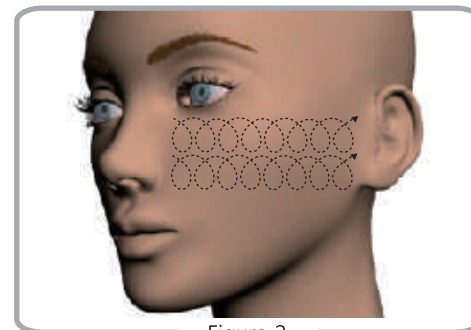


Figure 2.

IV. Cosjet Laser Toning

Laser Requirements for Laser Toning

- Top hat mode
Top hat mode allows even distribution of beam energy.
- Sufficient Energy
Minimum 1,300mJ or higher energy is required.
- Sufficient Spot Size
Larger spot size delivers energy deeper into dermis and covers broader lesion area.
- Sufficient Frequency (= Repetition Rate)
Higher frequency (number of laser shots per second) = Faster treatment.
- Stable Power Supply
Stable power supply is required for even distribution of energy from the beginning to the completion of procedure.

Why Cosjet TR is Most Suitable for Laser Toning

- Suitable beam mode for laser toning
Won Cosjet TR Multi Mode is the state of the art optical instrument, which implements Top Hat Mode that is most adequate for laser toning.

- Sufficient Energy
Maximum energy at 1,064nm is 1,000mJ, allowing increased spot size and reduced procedure duration.

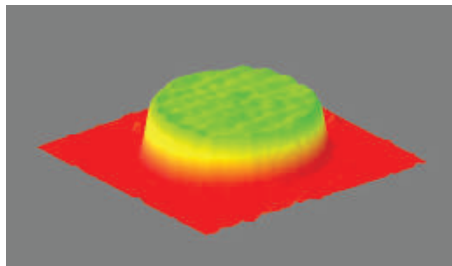
- Sufficient Spot Size
Maximum spot size of Cosjet TR is 10mm.
(Maximum fluence at 10mm spot size : 1.7J/cm²)

- Stable Power Supply
Cosjet TR's SMPS (Switching Mode Power Supply), the power technology for cellular phones, maximizes power efficiency with lower electric current, allowing large quantity of laser shots in pulses as fast as 10Hz.

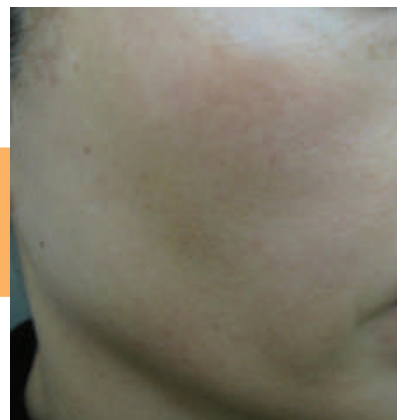
V. Q-Switched Nd:YAG LASER Comparison

| Product | Cosjet TR | Other |
|------------------|---|---|
| Wavelength | 1,064, 532nm, FR | 1,064, 532nm |
| Energy | 1,064nm-1,000mJ/532nm-500mJ | 1,064nm-1,000mJ/532nm-400mJ |
| Fluence(6mm) | 1,064nm-3.5J/cm ² / 532nm-1.8J/cm ² | 1,064nm-3.5J/cm ² / 532nm-1.4J/cm ² |
| Spot Size | 2~10mm | 1064nm-3,4,6,8 / 532nm-2,3,4,6 |
| Frequency | 1~10Hz, Single | 1,2,5,10Hz, Single |
| Pulse Duration | 6ns, 300μs | 5~20ns |
| Dimension | 49X22X75cm | 73X31X113cm |
| Weight | 40Kg | 58Kg |
| Memory Parameter | Max. 300ea | None |

1,064nm 3D Beam Profile of Won-Cosjet TR (Realization of True Top Hat Mode)

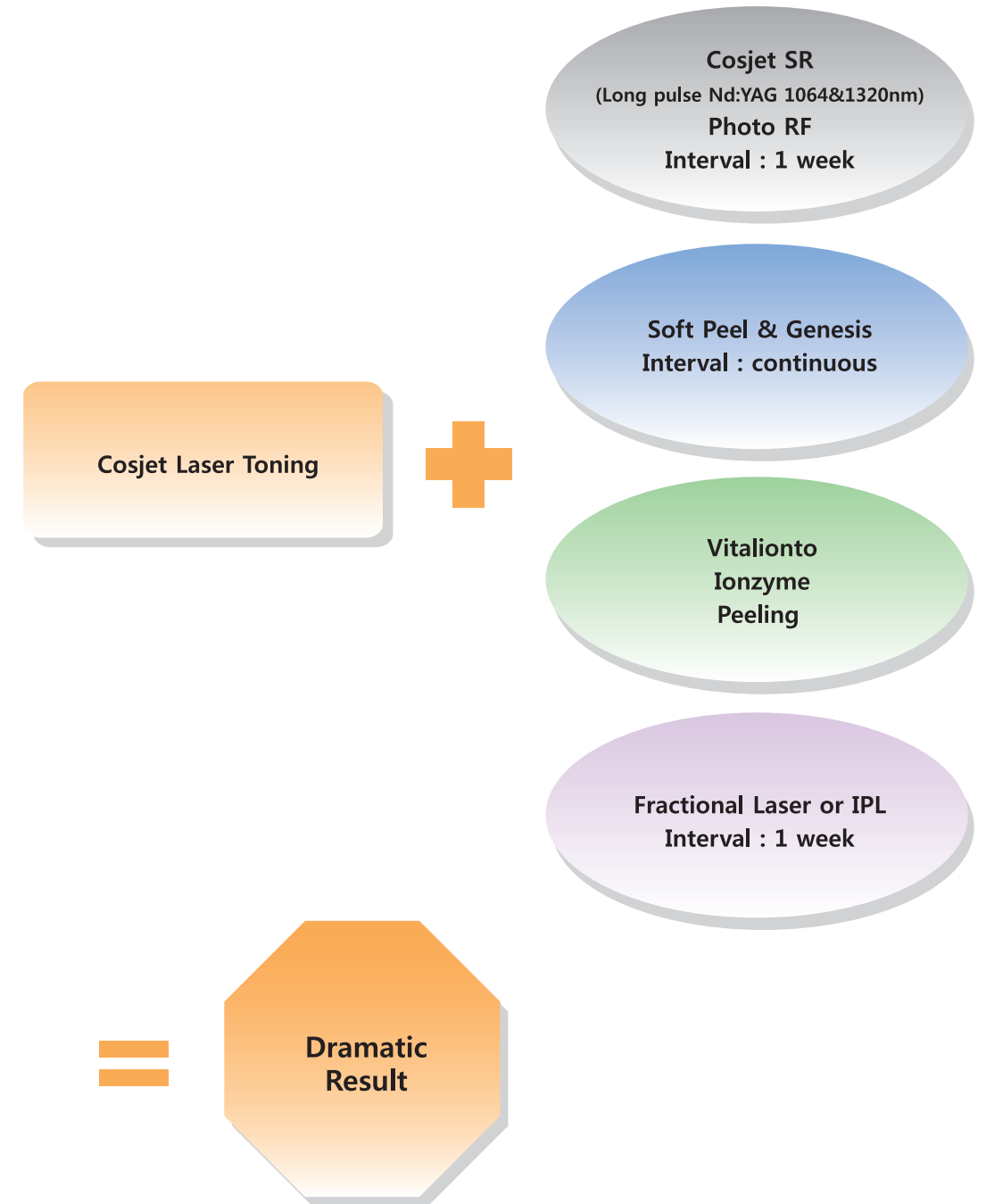


Cosjet Laser Toning
1,064nm / 1.5~2.0J/cm²



Combination Treatment with Cosjet Laser Toning

Cosjet Laser Toning does not inflict as much damage to skin as other laser treatments and allows easy combination procedure with other lasers.



* When change the order, the interval can be converted.

6. Understanding Genesis Mode

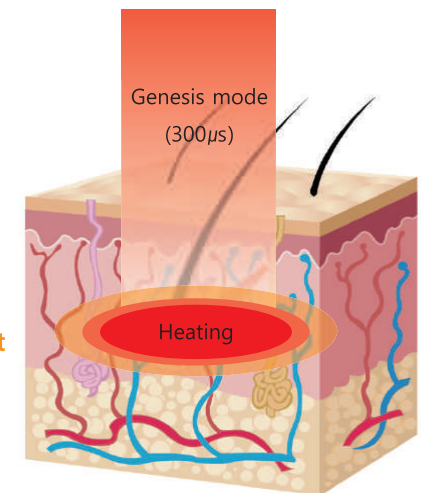
6

Understanding Genesis Mode

I . What is Genesis Mode of Cosjet TR?

Genesis Mode is a new technique in which NAR of Long-pulsed Nd:YAG is integrated into Q-switched Nd:YAG, with longer pulse duration ($300\mu\text{s}$) than Q-switch (6ns), that delivers longer laser radiation than Thermal Relaxation Time of melanin and hemoglobin, resulting in heating of dermis and faster regeneration of collagen.

- Delivers heat energy to dermis
- Collagen remodeling
- Fine wrinkle/pore size/general skin tone improvement / Whitening



Advantages of Genesis Mode

- Can be used with other laser procedures (i.e. Cosjet Laser Toning, Soft Peel, etc.)
- Accelerates generation of collagen in dermis = pore size and fine wrinkle reduction & anti-aging
- No need for pre/post-procedure cares (i.e. anesthesia)
- No side effects (i.e. bleeding, inflammation, crusting, pigmentation)
- No down time (wash and make-up possible immediately following procedure.)

II. Applications of Genesis Mode

Use Genesis Mode after Cosjet Laser Toning or Soft Peel Treatment on delicate parts (nose, cheek bone, wrinkles around eyes/mouth) to heat dermis (60~70°C) for improvement of pore size and fine wrinkles. Check for heating sensation in patients during procedure.

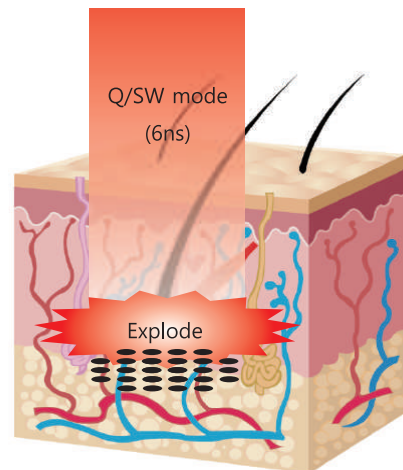
Treatment Parameter

- MODE : FR MODE
- FLUENCE : 10~15J/cm²
- SPOTSIZE : 3~4mm
- FREQUENCY : 8Hz
- INTERVAL : 1~2week

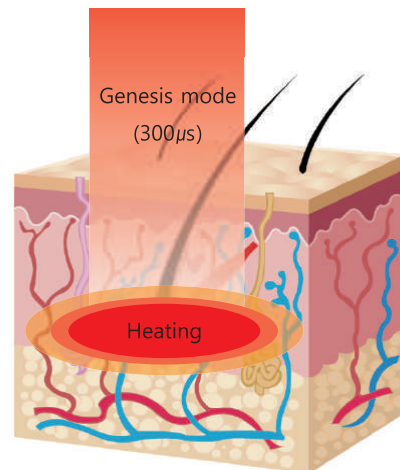
Applications

Enlarged Pores, Fine Wrinkles, Whitening, Skin Tightening

Understanding Q/SW Mode and Genesis Mode



Destruction of Chromophore
Pigment Lesion Treatment



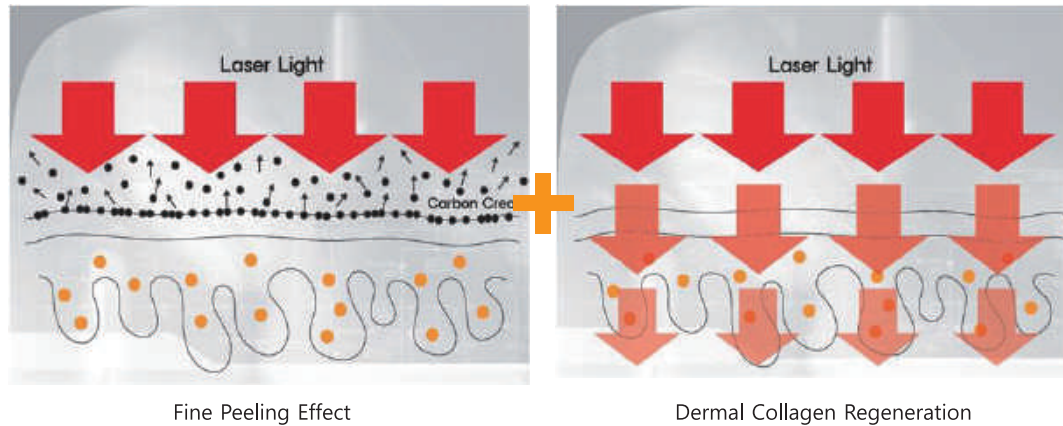
Heating of Chromophore
Skin Rejuvenation

7. Soft Peeling with Cosjet TR

Soft Peeling with Cosjet TR

I . What is Soft Peel?

Soft Peel is technique in which very fine carbon particles are applied onto skin and exploded by laser heat energy, creating peeling effects as well as pore reduction and skin tone improvement by heating of dermis. Soft Peel also delivers skin tightening effect due to laser application to dermal layer.



Advantages of Soft Peel

NO SIDE EFFECT

No burn or skin damage unlike other lasers

NO PAIN

Safe and quick procedure

NO DOWN TIME

Immediate activity available

Soft Peel Parameter

- Spot Size : 6~8mm
Adjust beam size according to size of target lesion.
- Fluence : 1.2~2.5J/cm²
Test with low energy and increase energy according to degree of pain in patient.
- Frequency : 5~10Hz
- Procedure Interval
After 2~4 weeks (3~5 sessions) perform maintenance therapy every 2~3 months
- End Point : Until no carbon cream is left on patient's face.

Combination Treatment

- Soft Peeling + Laser Toning (2~3 pass)
- Soft Peeling + Whitening Treatment (Vitamin C input)
- Soft Peeling + Other Peelings
(Chemical Peeling, Seaweed Peeling, Crystal Peeling / 4 week interval)
- Soft Peeling + IPL (2 week interval)

II. Soft Peel Procedure

Step 1. Cleansing



• Cleanse and eliminate sebum in follicles before the procedure.

👩 Use scrub or mask pack (calming effect, moisture supply) for better results.

Step 2. Apply Carbon Cream



• After evenly applying carbon by use of gauze or the given brush, smooth it with wet sponge or gauze so that its concentration may be properly controlled.

👩 Radiate laser immediately after moderately dry.

👩 Place tapes over eyebrows.



Step 3. Carbon Absorption

👩 The photo in the Step 2, it's exaggerated expressions that just help to explain the procedure. In fact, we recommend you to apply small amount of the carbon.

Step 4. Soft Laser Peeling



- Set the device to Soft Peel mode and shoot laser with 30-50% overlap.
 - MODE : 1,064nm
 - FLUENCE : 1.2~2.5J/cm²
 - FREQUENCY : 8~10Hz
 - SPOT SIZE : 6~8mm
- Carbon explosion from laser radiation generates smoke. Use smoke evacuator.

Notice Always make sure patient wears protection goggles and laser treatment room is equipped with a warning sign in laser treatment room.

Step 5. Genesis Mode

- After carbon has been completely exploded, set the device to FR Mode and focus on delicate areas (nose, cheek bones, mouth, fine wrinkles around eyes).
- End Point : dark erythema is observed and patient feels strong heat.

- MODE : FR MODE (Genesis mode)
- FLUENCE : 10~15J/cm²
- FREQUENCY : 7~10Hz
- SPOT SIZE : 3~4mm

- Use hand piece about 0.5~1cm off skin surface.

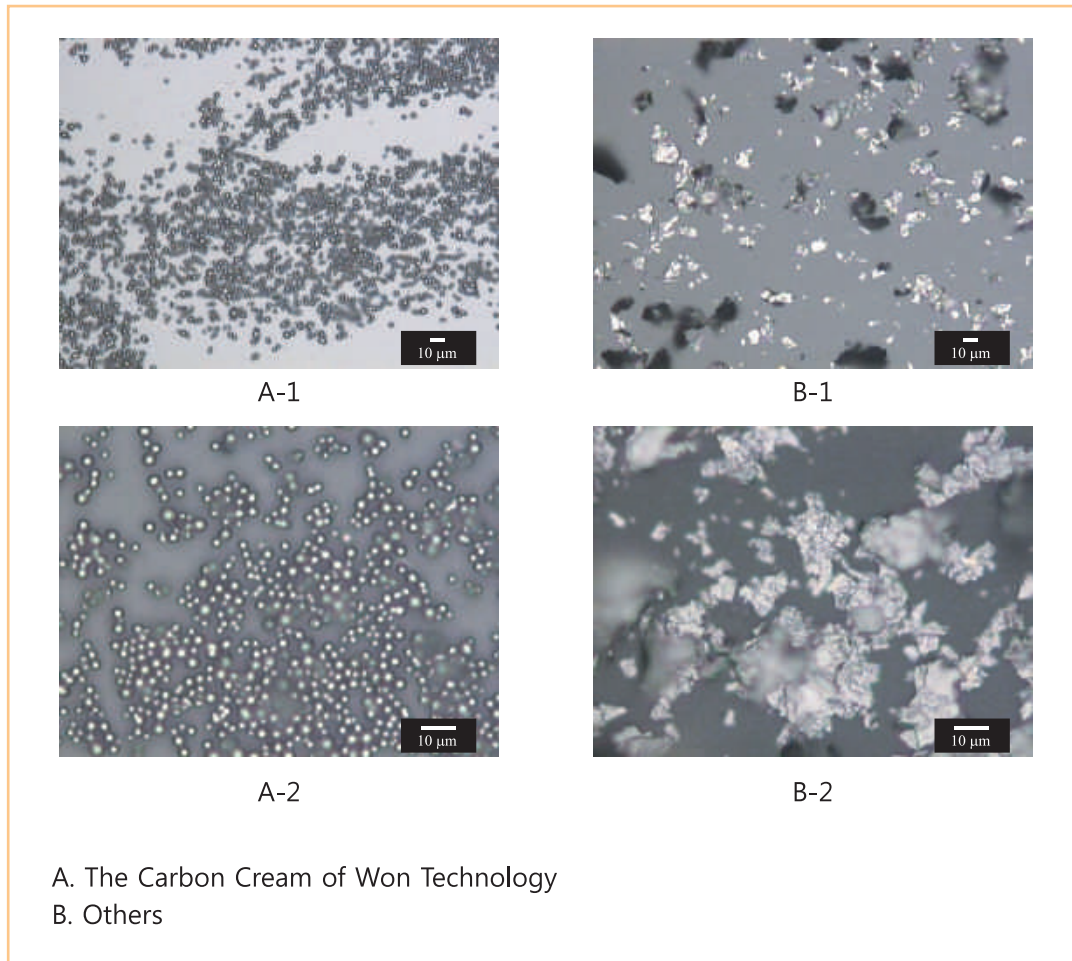
Step 6. Conclusion

- After procedures have been completed, cleanse all remaining oil and carbon in the pores. **Remaining oil and carbon may cause skin trouble.**

Notice When performing FR Mode, do not use cool pack or wash with cold water until dermal temperature returns to normal.



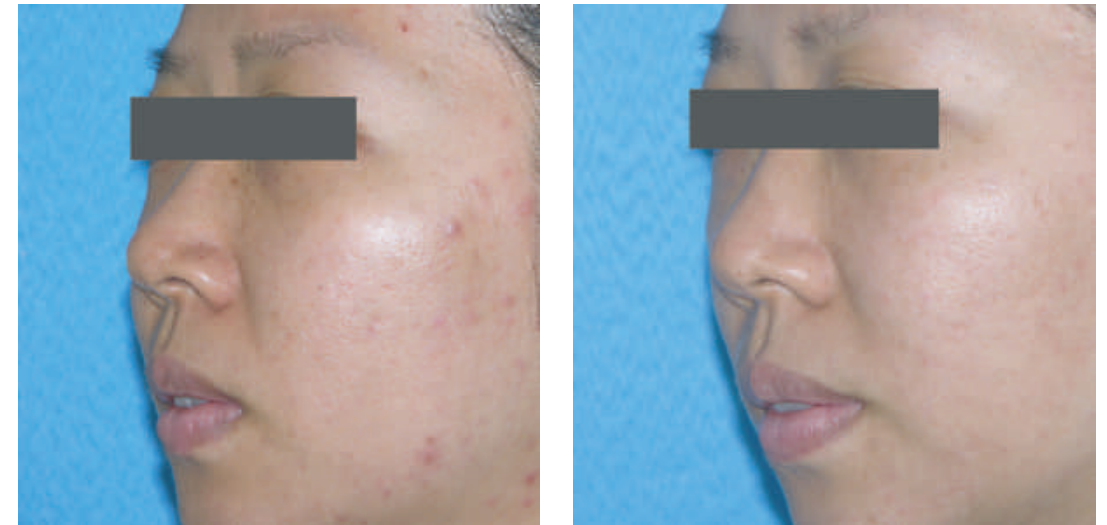
III. Carbon Cream for Cosjet TR



High Quality Carbon Cream

Carbon cream made exclusively for Cosjet TR uses very fine (10µm) and evenly-sized carbon, unlike other carbon cream products (20~40µm), allowing faster absorption and stable and even energy distribution. Carbon cream of Cosjet TR brings safer and better clinical results.

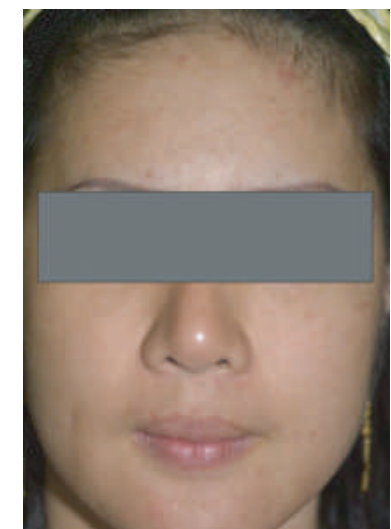
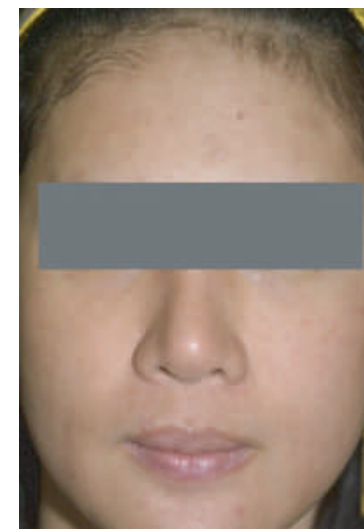
IV. Clinical Case of Soft Peel



Before

After

Soft Peel(2.2J/cm²) with Carbon
8Hz / 6mm
3 times in 8 weeks



Before

After

Soft Peel(2.0J/cm²) & Genesis
8Hz / 8mm
2 times in 6 weeks

8. Operating Cosjet TR

I . Pre-Treatment Cautions

- ☞ Read thoroughly before use for proper operation of Cosjet TR.
- ☞ This manual contains important information regarding proper and safe operation of Cosjet TR. It is advised to store the manual in a safe place.

Notice Cosjet TR uses high voltage electricity.
Do not touch parts or connectors inside the machine.
May cause electric shock.

Notice Cosjet TR emits visible and invisible laser rays.
Always wear protective eyewear and do not look directly into laser radiation.

Notice Cosjet TR is powered by independent 220V, 60Hz power supply.
Electric supply must be grounded and proved safe to use.

Notice Do not store or operate device in areas of dust, humidity, direct exposure to sun, or temperatures of below 10°C or above 40°C.

Notice All personnel in laser operation area must wear safety goggles and operation area must have warning signs at entrance.



II. Device Description

Exterior Description

1. Laser Arm

2. LCD/Control Panel :
Displays device status and controls
user input.

3. Key Switch :
Powers on/off and protects device
from external interference.

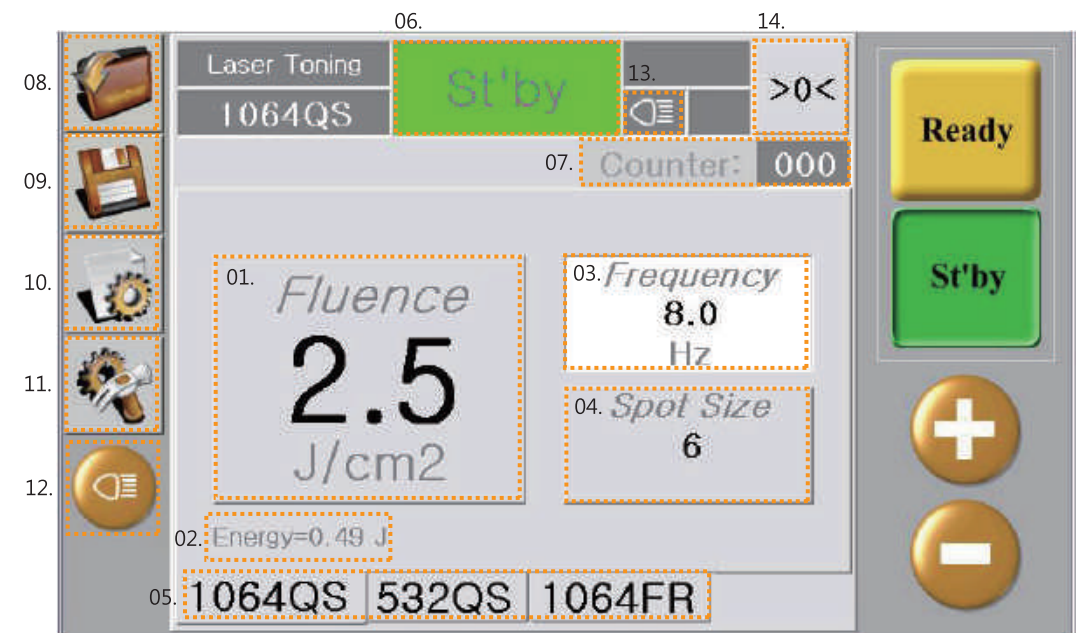
4. Emergency Switch (Reset button) :
Additional on/off switch for
immediate power cycle in
unexpected situations.

5. Foot Switch Connector



Monitor Indicator

01. Fluence : controls pulse energy density (J/cm^2)
02. Energy : controls pulse energy level (J)
03. Frequency : controls pulse duration
04. Spot : controls laser beam diameter (mm)
05. Mode : selects output wavelength (532nm/1,064nm/FR Mode)
06. Device Status
07. Counter : pulse shot counter
08. Load : loads pre-saved parameters
09. Save : saves newly-set parameters
10. Device Information
11. Engineer Mode : Do not use unless supervised by engineer.
12. Guide Beam : pilot beam on / off
13. Guide Beam on / off Status Display
14. Pulse Count Default : Sets pulse count to 0(zero)



Term Description

Emergency Switch

: Stops operation when unexpected situation occurs.

Key Switch

: Controls power supply of device. (prohibits unwanted control by trespasser.)

Touch Pad :

- Fluence : Controls pulse energy density (J/cm^2)
- Frequency : Controls pulse duration (Repetition Rate)
- Spot : Controls laser beam diameter
- READY : Sets device ready for laser radiation
- STBY : Sets device in hibernation mode

Foot Switch : Radiates laser when device in ready mode

Additional Information

Specifications : 490 X 220 X 750mm (W X D X H)

Laser Class : Class 4

Weight : 40 kg

III. Cautions and Laser Safety

Cautions

- (1) Cosjet TR must be operated by trained expert.
Always check device condition before use.
- (2) Check for the following before operating Cosjet TR.
 - Keep away from extreme conditions of temperature, humidity and sun exposure.
 - Keep away from air or liquid containing dust, salinity or sulfur.
 - Protect device from vibration and impact.
 - Transport, store, and operate on flat surface.
 - Do not transport, store, and operate near dangerous chemicals or gas.
 - Pay attention to power voltage and electric consumption of device.
 - Check polarity, switch connection, and parameter setting.
 - Make sure all cord and tube connections are precise and safe to use.
 - Use caution when operating with other products during combination treatment.
 - Check laser hand piece and other parts that make direct contact with patients.
- (3) Check for the following while operating Cosjet TR
 - Always check for irregularity in device or patient during laser treatment.
 - If irregularity is observed, discontinue treatment and operation of device.
 - Keep device from contact with patient except for hand piece.
- (4) Call for service expert if device is not functioning properly.
- (5) Do not temper with interior mechanism of device.
- (6) Check for operating condition of device after long absence of use.
- (7) Do not look into hand piece or any other laser output while device is in use.
- (8) Do not apply laser onto skin unless for specific treatment purpose.
- (9) All personnel involved in the treatment must wear protective eyewear.
- (10) Laser system use high voltage electricity. Handle with care.
- (11) Ventilation system must not be blocked and at least 20cm from a nearby object.
- (12) Keep away from combustible anesthetic or other volatile matters.

Laser Safety

- (1) All windows must be shaded in laser operation room.
- (2) Laser operation room must have warning sign at entrance.
- (3) Appropriate ventilation in laser operation room is required.
- (4) Read all cautions before operating Cosjet TR.
- (5) Operate Cosjet TR in proper order as shown in the manual.
- (6) Check for treatment parameter before starting laser procedure.
- (7) All personnel must wear protective eyewear while operating Cosjet TR.

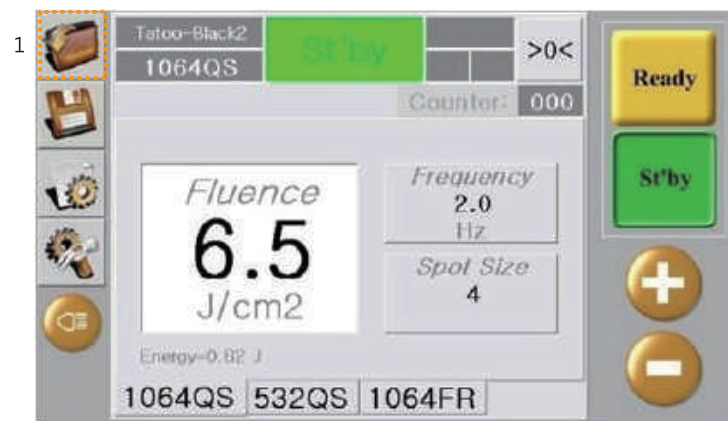
IV. Operation Guide

Booting Up : Switching On Cosjet TR

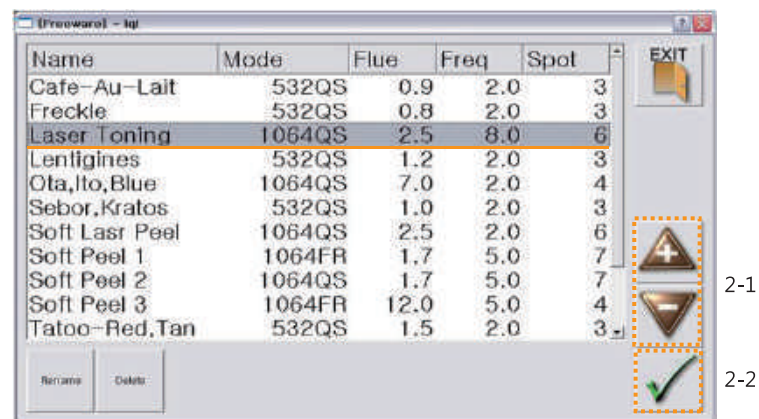
1. Turn Key Switch to turn on the device.
2. Cosjet logo will be displayed while device is being booted.
3. Simultaneously the device will run self-diagnosis. If device is functioning properly, device will automatically display Main Menu.
4. Upon entering Main Menu, device will be set in 'St'by'. All settings displayed are loaded from the last setting of previous use.

Load : Loading Pre-Saved Parameters

1. Click 'Load' in Main Menu.



2. Select wanted parameter using +/- icon and click on ✓ to load selected parameter.



- Exit : Return to Main Menu
- Delete : Delete selected parameter

3. To proceed with loaded parameter without changing specific settings, click 'Ready'.



4. When in 'Ready' mode, spot size check warning window pops up as shown below. adjust spot size on hand piece to match spot size of selected parameter.



5. After checking device in 'Ready' mode, radiate laser by stepping on Foot Switch. (If guide beam is not visible, click on guide beam on/off icon in the lower left corner of screen display.)

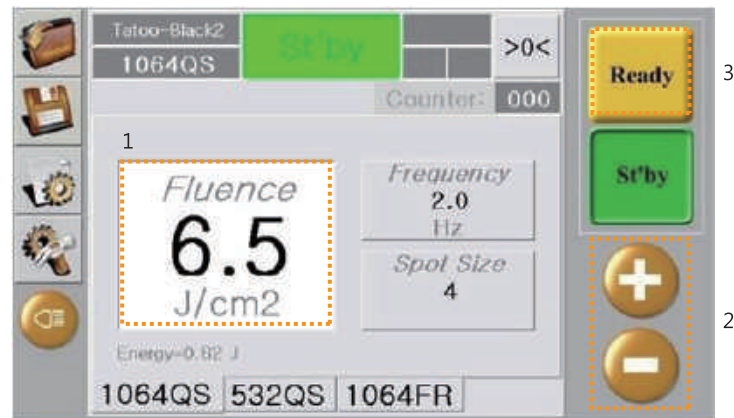


Parameter Adjustment : Adjusting Loaded Parameter Value

Adjusting parameter requires simple operation.
Follow simple steps as shown in examples below.

(Ex. 1)

1. Click on 'Fluence' in Main Menu and observe 'Fluence' window being highlighted.
2. Adjust fluence to desired value by clicking +/- icon.
3. Click 'Ready' and radiate laser by stepping on Foot Switch.



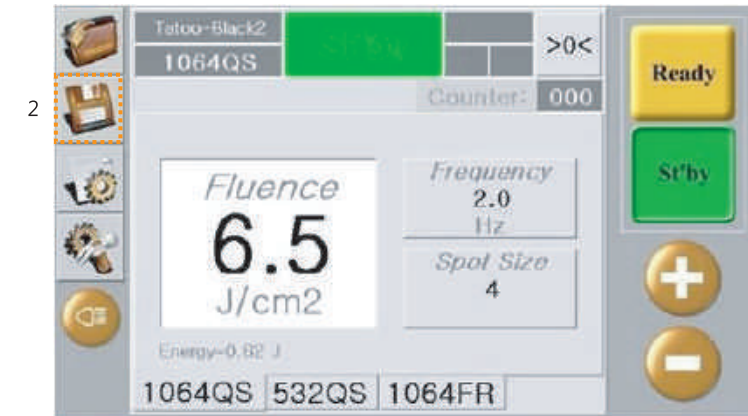
(Ex. 2)

1. Click 'Spot Size' in Main Menu and observe 'Spot Size' window being highlighted.
2. Adjust spot size to desired value by clicking '+/-' icon.
3. Click 'Ready' and adjust hand piece spot size to match selected spot size.
4. Step on Foot Switch to radiate laser.



Save : Saving Adjusted Parameter Value

1. Adjust parameter to desired value.
2. Click 'Save' in Main Menu.



3. Enter parameter title of choice using keyboard.
Press 'Shift' to change to capital font.
4. Click 'Enter' to save desired parameter and to return to Main Menu.



Free Running Mode : Using Genesis Mode

1. Click 'FR' in Main Menu. (Or load pre-saved parameter.)
- Free Running Mode of Cosjet TR does not use Q-switch and its beam has wavelength of 1,064nm and pulse duration of 0.3ms (=300µs).
 - Free Running Mode is useful for collagen regeneration and remodeling. (Refer to Chapter 6. 'Understanding Genesis Mode' for more info.)



1

Switching Off

1. Release Foot Switch and click 'St'by' to switch out of Ready Mode.
2. Turn Key Switch to power off device.
3. Detach power cable from electric outlet.

V. Maintenance and Check Points

Maintenance : Storing and Maintaning after Use

- Keep away from moisture, dust and direct exposure to sun.
- Impact to articulated arm may damage mirrors inside.
- Pay close attention to optical components while transporting device.
- In temperatures below 0°C cooling water may freeze. (Storage and operation in room temperature are recommended.)
- Keep device clean by wiping with soft and dry cloth. (Do not use chemicals such as thinner or benzene.)
- Clean Hand Piece with soft cloth soaked in ethyl alcohol.
- Contact your local distributor if device was idle for extended period of time or in case of the following.
 - (1) Cooling water exchange
 - (2) Consumable part replacement
 - (3) Optical inspection

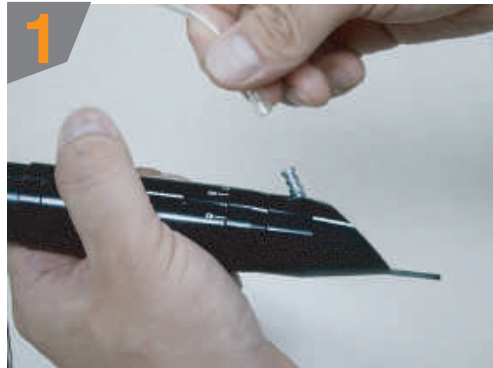
Check Points

1. When device is unresponsive :
 - Check for power connection.
 - Make sure power supply meets power consumption requirement.
 - Check Key Switch status.
 - If the above are ineffective there maybe irregularity in Key Switch, CPU Board or Power Cord. Call for maintenace service.
2. When Foot Switch is not generating laser radiation :
 - Check if device is in Ready Mode.
 - Check Foot Switch connection.
3. When error message is displayed :
 - Reboot device after several seconds.
 - If problem remains after reboot, contact your local distributor for maintenance service.

Hand Piece must be cleaned after Soft Peeling

Hand Piece maintenance is directly related to device life span. Maintain optimal condition of device by following easy steps of cleaning as shown below.

MEMO



1 Detach Air Tube from Hand Piece.



2 Twist Ending Tip to detach it from Hand Piece body.



3 Use alcohol and soft cloth or Q-tip.



4 Clean Safety Glass in a circular motion starting from its center.



5 Clean interior of Ending Tip using soft cloth or Q-tip. Reassemble Hand Piece after cleaning.

MEMO