The following treatment parameters were created for the Nd:YAG on the Xeo or CoolGlide systems ONLY and are not to be used for the Nd:YAG on the GenesisPlus or ExcelV systems.
The Cutera, Inc. Nd:YAG 1064nm is FDA-cleared for:

- Coagulation and hemostasis of benign vascular lesions such as:
  - Telangiectasia
  - Venous lakes
  - Leg veins
  - Poikiloderma of Civatte
  - Hemangiomas
  - Port-wine stains
  - Warts
  - Scars

**PREREQUISITE**

Review Operator Manual and Clinical CD with Laser Physics, Safety and Maintenance presentations prior to operating the laser.

**REFLUXING OR INCOMPETENT VEINS**

- Veins have valves that act as one-way flaps that prevent blood from flowing backwards as blood is returned to the heart.
- Venous reflux or incompetence is a diseased or abnormal valve that is no longer able to close when subjected to pressure. This failure to close prevents the valve from stopping the backward flow of blood. In response to gravity, blood pours backward (like a waterfall), overloading the vein with volume and pressure which leads to the development of varicose veins.
- Ultrasound may be ordered to diagnose possible reflux of the Greater or Lesser Saphenous Vein which is usually treated surgically.

**VASCULAR TREATMENT PROCESS**

- The purpose of the treatment is to selectively treat the target of hemoglobin (chromophore) without causing thermal damage to the surrounding tissue.
- Laser light is absorbed by hemoglobin in the veins and the heat produced causes photocoagulation.
- This heat is transferred to the vessel wall which affects the collagen and ultimately helps to destroy the vessel and prevent recanalization.
- The laser treats individual veins but new veins may appear due to an underlying disorder

**TYPES OF VEINS**

- Varicose veins – usually requires surgery
  - Vary in diameter
  - Bulging and twisting veins of the lower extremity caused by increased venous pressure as a result of venous incompetence
  - Bulging varicose veins should be evaluated by a vascular surgeon

- Reticular veins or “feeder veins” – treated by laser
  - 1 – 3. mm in diameter
  - Superficial collecting veins that are blue green

- Telangiectasias or spider veins – treated by laser
  - Up to ≤1 mm in diameter
  - Superficial, small veins; pink to purple in color
PATIENT ASSESSMENT

Contraindications for this device are Pregnancy and Skin Cancer

Obtain a medical history and signed consent.

Determine ethnicity and skin type by using the attached Fitzpatrick Skin Type scale
- Re-evaluate patient prior to each treatment
- Treatment settings may need to be decreased due to sun exposure
  - Sun exposure may increase melanin content of the skin

Patient Considerations including but not limited to are below.
- Current Medications (both routine and occasional use)
  - Accutane – do not treat if taken in the last 6 months
  - Gold Therapy – may cause blue-gray discoloration
  - Photosensitizing drugs (Tetracycline, etc) – may have to adjust treatment parameters according to clinical response from the test are(s)
  - Anticoagulants – may increase risk of purpura or bruising
- Vitiligo – heat from the treatment could induce a flare-up
- Herpes – pre-treatment with an antiviral may be indicated
- Wound infections
- History of coagulopathies
- History of keloid or hypertrophic scarring
- Diabetes – may impede wound healing
- Do not treat dysplastic nevi or questionable pigmented lesions.
  - Online Melanoma resources include (www.aad.org), (www.cancer.org)

Avoiding Complications:
- **Pre-cooling is essential to prevent burns!**
- Darker skin types have an increased risk of complications and/or pigmentary issues
- Always treat outside the orbital rim of the eye aiming the beam away from the orbit
- Do not treat over or close to tattoos or permanent make-up
- No self-tanners for at least 2-4 weeks prior to treatment.
- The Nd:YAG can crack a tooth if teeth are exposed.
  - Moist gauze may be placed between the lips and teeth.
- Implants
  - Avoid metal implants in thin skinned areas; clavicle, jaw, orbit
  - Ask about surgical implants and threads
  - Do not treat over Pacemaker implant
  - Reaction to fillers and neurotoxins unknown
- Ice should NEVER be applied to a suspected burn as it may cause unwanted side effects. Frozen gel packs or cool compresses can be used.
SELECTING TREATMENT PARAMETERS

Parameters should be selected in the order listed below, keeping the vessel characteristics in mind. Always start with the least aggressive settings for a specific vessel. Observe laser-tissue interaction and clinical response to determine appropriate settings for each patient.

1. **Spot Size** – measured in millimeters (mm), based on vessel depth and size
   - Superficial vessel (fine pink to red) = Smaller spot size
   - Larger, deeper vessel (thick blue to purple) = Larger spot size

2. **Pulse Duration** - measured in milliseconds (ms), based on vessel size and color.
   - Smaller diameter, lighter vessel = Shorter pulse duration
   - Larger diameter, darker vessel = Longer pulse duration
   - Darker/tan skin = Longer pulse duration

3. **Fluence** - measured in J/cm², based on the vessel size, color and depth.
   - Smaller diameter, lighter vessel = Higher fluence
   - Larger diameter, darker vessel = Lower fluence
   - Deeper vessel = Higher fluence (energy dissipates to the surrounding tissue)
   - Darker/tan skin = Lower Fluence

4. **Repetition Rate** – measured in Hz. Number of pulses per second with foot pedal depressed.
   - For increased epidermal safety use single pulses (0.0 Hz) with pre & post cooling
   - Repetition Rate should only be used with the 3mm spot size as described in following Treatment Parameters

5. **Cooling** – Copper tip provides pre and post cooling. BOTH pre-cooling and post-cooling are required.
   - **Pre-cooling is the most important step** to protect the epidermis by reducing initial temperature allowing safe temperature rise during treatment
     - Larger, darker vessels = Longer pre-cooling
   - Post-cooling extracts heat from tissue to prevent epidermal injury.
     - Larger, darker vessels = Longer post-cooling.

![Diagram showing Spot Size, Pulse Duration, and Fluence with corresponding descriptions and adjustments]
TREATMENT PARAMETERS

These parameters are provided as a guide only. Observe laser-tissue interaction and clinical endpoints to determine appropriate settings.

The following guidelines are based on physician feedback from vascular treatments primarily on patients with Fitzpatrick skin types I–IV. Treatment Parameters have not been developed for skin types V & VI. The increased melanin in darker skin is a competing chromophore with the vessels increasing the risk of an adverse event.

<table>
<thead>
<tr>
<th>VESSEL TYPE</th>
<th>EXAMPLE PICTURE</th>
<th>SPOT SIZE</th>
<th>FLUENCE</th>
<th>PULSE DURATION</th>
<th>REP RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial Telangiectasia</td>
<td><img src="image1" alt="Facial Telangiectasia Thumbnail" /></td>
<td>3 mm</td>
<td>120 – 180 J/cm²</td>
<td>10 – 20 ms</td>
<td>0.0 – 1.0 Hz**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 mm*</td>
<td>110 – 160 J/cm²</td>
<td>15 – 35 ms</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td>Fine Leg Telangiectasia &lt; 0.5 mm diameter</td>
<td><img src="image2" alt="Fine Leg Telangiectasia Thumbnail" /></td>
<td>3 mm</td>
<td>140 – 200 J/cm²</td>
<td>10 – 20 ms</td>
<td>0.0 – 1.0 Hz**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 mm</td>
<td>120 – 170 J/cm²</td>
<td>15 – 25 ms</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td>Spider Leg Veins 0.5 to 1 mm</td>
<td><img src="image3" alt="Spider Leg Veins Thumbnail" /></td>
<td>5 mm</td>
<td>130 – 170 J/cm²</td>
<td>20 – 40 ms</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td>Reticular Leg Veins 1 to 3 mm</td>
<td><img src="image4" alt="Reticular Leg Veins Thumbnail" /></td>
<td>7 mm</td>
<td>130 – 170 J/cm²</td>
<td>30 – 60 ms</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td>Cherry or Spider Angioma</td>
<td><img src="image5" alt="Cherry or Spider Angioma Thumbnail" /></td>
<td>3 mm</td>
<td>140 – 180 J/cm²</td>
<td>10 – 15 ms</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 mm</td>
<td>100 – 160 J/cm²</td>
<td>20 – 40 ms</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td>Venous Lake</td>
<td><img src="image6" alt="Venous Lake Thumbnail" /></td>
<td>5 or 7 mm</td>
<td>60 – 100 J/cm²</td>
<td>30 – 60 ms</td>
<td>0.0 Hz</td>
</tr>
</tbody>
</table>

*Use caution when using a 5mm spot size on facial telangiectasia. Gain experience with the 3mm spot size before advancing to the 5mm.

** The 3mm spot size can be used to treat 3-4 directly adjacent consecutive pulses using lower fluences without cooling in between each pulse. Cooling MUST be done before and after each sequence.
ADVANCED TREATMENTS

Port Wine Stain
The treatment of Port Wine Stains (PWS) should only be performed by experienced practitioners.
- Extreme caution should be used
- There are no universal parameters for all the different types of PWS.
- PWS vary greatly in size and depth – diagnostic studies may be required
- PWS require significant pre-cooling
- Several treatments may be necessary
- Additional information can be found on the Vascular Clinical presentation (D0147)
  - Located at cutera.com/education or on the Clinical CD

Periorbital Vessels
The treatment of large periorbital vessels should only be attempted by experienced practitioners. Parameter recommendations are not provided.
- Extreme caution should be used when treating near the eye.
- Patient eye protection is required to avoid ocular damage.
- The laser beam should ALWAYS be pointed away from the eye and only applied to the skin outside of the orbital rim.
- Distance from the orbit can often be increased by pulling the skin away from the eye for treatment.
The laser system should only be operated by qualified practitioners who have received appropriate training and have thoroughly read the operator manual.

Selecting Parameters:
- Select spot size by rotating the ring on the handpiece
- Select appropriate parameters.
  - The last used parameters will be displayed when restarting the laser.
  - Navigation (Xeo systems) only provides the range of treatment parameters on the screen. The operator is required to choose the correct parameters. Consult operator manual for Navigation information.
- Laser should be placed in standby when not actively in use

RECOMMENDED TECHNIQUE

Prepping the Patient:
- Clean skin removing all make-up and/or topical anesthetic.
- Shave the treatment site if there is excessive hair.
- Pre-operative photographs should be taken prior to the initial treatment for future reference.
- Treatment of a test area should be performed and observed prior to the treatment.
- Topical anesthetic is optional and must be removed before treating
- CAUTION: Toxicity may result from overuse. Consult the manufacturer’s labeling. Safety eyewear must be worn by ALL people in the treatment room.
  - Check the wavelength and optical density (>=6.1 @ 1064nm) marked on all operator goggles.
TREATMENT TECHNIQUE

- Pre-cool and start with “test” pulse
  - Treatment of a test area is recommended observing tissue reaction.
  - Potential adverse reactions may take 24-48 hours to appear.
- Apply a thin layer of clear gel (such as ultrasound gel) for increased epidermal protection and easy gliding of the handpiece.
- Pre-cooling the skin is required to prevent epidermal damage.
  - **Pre-cooling is the most important step of the procedure**
  - Place the copper cooling tip of handpiece on the treatment area ensuring FULL CONTACT with the skin
    - When treating the nose or any curved area, ensure all portions of skin (example: ala) are in full contact with the copper tip
  - Length of pre-cooling time required will vary according to size, color and depth of vessel.
    - Larger, darker vessels require longer pre-cooling.
- Gradually decrease pulse duration or increase fluence to reach desired endpoint
  - Do not stack pulses
- Pull the handpiece back at least 1 full spot size to deliver the laser pulse.
- Post-cool by placing the copper tip of the handpiece back onto the treated area.
- Endpoints will vary based on type, size, color, volume, pressure or location of vein
  - Common endpoints are color change, vein disappearance or constriction.
  - If clinical endpoint is not reached, the pulse duration may be shortened or the fluence may be increased without stacking pulses.
  - Endpoint may not be evident when treating larger reticular veins.
- Always observe the epidermis during the treatment, watching for signs of damage (blanching or a gray coloration of the tissue).
  - If this occurs, quickly apply cooling with the back of the handpiece (do NOT ice).
  - May require wound care.
- Never “double pulse”.
- “Popping” and extravasation may occur when the vessel is ruptured
  - Reduce the fluence or lengthen the pulse width and cool and compress the area.
  - Purpura may develop
- For smaller vessels, place treatment pulses adjacent to one another so that there is no overlap between pulses.
- For larger vessels, leave a space between pulses as an area of the vessel that is greater than the spot size will be impacted from the laser (constriction or darkening of the vessel).
POST-TREATMENT CARE

- Cold compresses or chilled gel-packs may be applied post treatment.
- Compression stockings (30-40 mm Hg Pressure) are optional and may increase patient comfort and help reduce bruising.
- Avoid heat for a minimum of 24 hours – hot tubs, saunas, etc.
- Avoid sun exposure and apply sunscreen to the treated area
- The recommended time interval between treatments is 6 weeks or longer, depending on the rate of clearance.
- Larger reticular vessels may take months to resolve and should not be re-treated before then.

POSSIBLE REACTIONS

- Erythema and bruising are common and resolve with time.
- An urticarial (hive-like) reaction may occur with smaller vessels
- If a blister or crusting develops, treat as a wound
- Hemosiderin staining (iron leaking into tissue from blood breakdown) may occur and usually resolves over time
- Dark coagulum in larger vessels can be removed 1 to 2 weeks post treatment by nicking the vessel with a needle and applying pressure to force out the coagulum.
TREATING WARTS

Prepping the Patient

- Clean treatment area
- Shave the treatment area if there is excessive hair
- Anesthetics may be used for patient comfort
  - Local anesthesia (lidocaine without epinephrine) is optional
- Recommend that laser operator follow Universal Precautions (gloves, masks, etc.)
- A smoke evacuator is recommended
  - Laser plume masks filtered to 0.1 microns optional
- Pre-treatment photographs should be taken prior to the initial treatment for future reference
- Safety eyewear must be worn by ALL people in the treatment room
  - Check the wavelength and optical density (≥6.1 @ 1064nm) marked on all operator goggles

Selecting Treatment Parameters

- Start with low fluence and longer pulse duration and adjust to epidermal response
- The target chromophore for the wart is the vascular component
- Parameters need to be adjusted according to location, size and/or color of wart
- Pulse Duration – measures in milliseconds (ms),
  - Smaller, lighter target = Shorter pulse duration
    - Recommended when treating over bottom of foot or over calloused area
    - More aggressive treatment
  - Larger, darker target/skin = Longer pulse duration
    - Recommended when treating over bony areas, near joints or cuticles
    - Less aggressive treatment
- Fluence – measured in J/cm²
  - Smaller, lighter target = Higher fluence
    - Recommended when treating over bottom of foot or over calloused area
    - More aggressive treatment
  - Larger, darker target/skin = Lower fluence
    - Recommended when treating over bony areas, near joints or cuticles
    - Less aggressive treatment

<table>
<thead>
<tr>
<th>Spot Size</th>
<th>Skin Type</th>
<th>Fluence</th>
<th>Pulse Width</th>
<th>Repetition Rate</th>
<th># Treatments</th>
<th># of Pulses</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 mm</td>
<td>I-VI</td>
<td>160-200 J/cm²</td>
<td>6 – 15 ms</td>
<td>N/A</td>
<td>1+</td>
<td>1+</td>
</tr>
<tr>
<td>5 mm</td>
<td>I-VI</td>
<td>160-190 J/cm²</td>
<td>8 – 15 ms</td>
<td>N/A</td>
<td>1+</td>
<td>1+</td>
</tr>
</tbody>
</table>
Performing the Treatment
- Handpiece should be flush with the skin
- Warts may need to be debrided prior to treatment
- Gel is not used
- Wart may “spark” when treated
- Some warts may require more than one pulse
  - Do NOT stack pulses (Stacking pulses is placing one pulse directly on top of another with no cooling time)
  - Pause for a few seconds between pulses
  - Cool with ice/frozen gel pack in between pulses

Individual Warts Treatment Steps
- Pulse over the wart
- Do not treat outside the wart border
- Cool treatment area in between pulses
- If wart is smaller than laser beam:
  - Assess surrounding tissue before placing additional pulses to avoid overtreatment of normal tissue
- If wart is larger than laser beam:
  - Use less aggressive parameters
  - May require multiple treatments (treat small sections over multiple visits)
  - Place pulses with approx. 10%-50% overlap
    - Lighter/Smaller Warts = more overlap
    - Larger/Darker Warts = less overlap

Mosaic Wart Treatment Steps
- Usually require multiple treatments
- Use less aggressive parameters
- Do NOT treat entire area of mosaic wart in one session
  - Only treat the darker/thicker area; usually near center of wart
  - Do NOT overlap pulses; pulses should be placed adjacent or spaced out
  - Cool treatment area in between pulses
- At each subsequent visit, repeat treatment steps

End Point
- Check for end point after first pulse
- Desired endpoint is a slight ashen color that should occur immediately after pulse
  - Can be a subtle color change to grey
  - If surrounding skin becomes white or edematous, it was probably overtreated and should be treated as a wound
- If endpoint not reached:
  - Increase fluence by 5J and shorten pulse duration by minimum until you reach end point
  - Cool treatment area prior to next pulse
  - Repeat “Treatment Steps”
- Immediate post cooling with handpiece copper tip, cold gel pack, Zimmer, etc. may be used for patient comfort

Post Operative Care
- Warts usually have a black or crusty appearance within 24-72 hours after treatment
- May apply ointment of choice and non-stick dressing for patient comfort
- If a blister develops, treat as a wound
- Treated tissue usually sloughs within 1-4 weeks
- Deep tissue injury and prolonged wound healing may occur
- More then 1 treatment may be necessary (4-6 weeks apart)
- Cold gel packs or cool compresses may be applied post-treatment
LASER CARE

- Turn the unit off or place in standby.
- Disinfect the entire handpiece and cord between patients with a germicidal disposable wipe, such as Sani-Cloth®.
- The laser window must be cleaned after each treatment to avoid damage.
  - Use a small amount of acetone and a wooden cotton tip applicator to clean the window.
  - Do not use Q-Tips as they contain an adhesive that dissolves when in contact with acetone.
  - If the window is damaged, a replacement must be purchased.
- Clean the bottom of the laser (air intake).
- See the operator manual or the System Maintenance Presentation for additional information on care of the laser.
# Fitzpatrick Classification Questionnaire

<table>
<thead>
<tr>
<th>SCORE</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the natural color of your hair?</td>
<td>Sandy red</td>
<td>Blond</td>
<td>Chestnut, dark blond</td>
<td>Dark brown</td>
<td>Black</td>
</tr>
<tr>
<td>What is the eye color?</td>
<td>Light blue, Gray, Green</td>
<td>Blue, Gray, Green</td>
<td>Blue</td>
<td>Dark Brown</td>
<td>Brownish Black</td>
</tr>
<tr>
<td>What is the color of sun unexposed skin areas?</td>
<td>Reddish</td>
<td>Very pale</td>
<td>Pale with beige tint</td>
<td>Light brown</td>
<td>Dark brown</td>
</tr>
<tr>
<td>How many freckles on unexposed skin areas?</td>
<td>Many</td>
<td>Several</td>
<td>Few</td>
<td>Incidental</td>
<td>None</td>
</tr>
<tr>
<td>What happens when you are in the sun TOO long without sunblock?</td>
<td>Painful redness, blistering, peeling</td>
<td>Blistering followed by peeling</td>
<td>Burns, sometimes followed by peeling</td>
<td>Rarely burns</td>
<td>Never had a problem</td>
</tr>
<tr>
<td>How well do you turn brown?</td>
<td>Hardly or not at all</td>
<td>Light color tan</td>
<td>Reasonable tan</td>
<td>Tan very easily</td>
<td>Turn dark very quickly</td>
</tr>
<tr>
<td>Do you turn brown within one day of sun exposure?</td>
<td>Never</td>
<td>Seldom</td>
<td>Sometimes</td>
<td>Often</td>
<td>Always</td>
</tr>
<tr>
<td>How does your face respond to the sun?</td>
<td>Very sensitive</td>
<td>Sensitive</td>
<td>Normal</td>
<td>Very resistant</td>
<td>Never had a problem</td>
</tr>
<tr>
<td>When did you last expose yourself to the sun or artificial sun treatments?</td>
<td>More than 3 months ago</td>
<td>2-3 month ago</td>
<td>1-2 months ago</td>
<td>Less than 1 month ago</td>
<td>Less than 2 weeks ago</td>
</tr>
<tr>
<td>Do you expose the area to be treated to the sun?</td>
<td>Never</td>
<td>Hardly ever</td>
<td>Sometimes</td>
<td>Often</td>
<td>Always</td>
</tr>
</tbody>
</table>

- 00-07 points = Skin type I
- 08-16 points = Skin type II
- 17-25 points = Skin type III
- 25-30 points = Skin type IV
- 30-40 points = Skin type V & VI