Disclosures

- No financial interest in any of the products or companies discussed

- Previously lectured and/or conducted paid research for Alcon, Allergan, Bausch & Lomb/Valeant, Pfizer, & Inspire
Surgery – from Greek & Latin for "hand work"

- an ancient medical specialty that uses operative manual & instrumental techniques on a patient to investigate &/or treat a pathological condition (such as disease or injury) to help improve bodily function or appearance, or to repair unwanted ruptured areas (e.g. perforated ear drum)
- a technology consisting of a physical intervention on tissues
Definitions

Surgery (cont.) -

- As a general rule, a procedure is considered surgical when it involves cutting of a patient's tissues or closure of a previously sustained wound.
- A procedure involving major incisions to remove, repair, or replace a part of the body.
- Other procedures (e.g. angioplasty, endoscopy) may be considered surgery if involve "common" surgical procedure or settings (e.g. use of sterile environment, anesthesia, antiseptic conditions, typical surgical instruments, & suturing or stapling.)
Surgery (cont.) –

- All forms of surgery are considered invasive procedures; "noninvasive surgery" usually refers to an excision that does not penetrate the structure being excised (e.g. laser ablation of the cornea) or to a radiosurgical procedure (e.g. irradiation of a tumor)
Definitions

Surgery (cont.) –

• Types:
  - Elective - correcting a non-life-threatening condition, at patient’s request (e.g. cataract sx)
  - Cosmetic - done to subjectively improve the appearance of an otherwise normal structure
  - LASER - use of a LASER for cutting, instead of a scalpel or similar surgical instrument
  - Excision(al) - removal (of a tumor, etc.) by cutting
  - Incision(al) – the act of cutting into a substance, especially via a scalpel or similar medical instrument in the context of a surgical procedure
Definitions

Surgery (cont.) –

• Types (cont.):
  – Ablation - surgical removal of a body part, an organ, or especially a tumor (an abnormal growth)
  – Cautery - the process of using extreme heat or extreme cold to either cut or seal body tissue
  – Fulguration - cauterization with electricity

*Desiccate – to dry
• **Electrocautery** – heats tissue using *electrode as the heating element*
  • Think curling iron or branding iron

• **Electrosurgery** – passes high frequency current through tissue, using the *tissue as the heating element*
  • Radiofrequency Surgery
What is Radiofrequency (RF) & Radiofrequency Surgery?
Radiofrequency (RF) Surgery

Radio Waves & Their Properties
Radio Waves

- First predicted in 1867 by Scottish mathematical physicist James Clerk Maxwell
  - Noted wavelike properties of light, & similarities in electrical & magnetic observations
  - His mathematical theory (Maxwell's equations) describe light waves & radio waves as “waves of electromagnetism that travel in space, radiated by a charged particle as it undergoes acceleration”
Radio Waves

- 1887 - Heinrich Hertz confirmed Maxwell's theory of electromagnetic waves by experimentally generating radio waves in his laboratory, showing that they exhibited the same wave properties as light:
  - Standing waves
  - Refraction!
  - Diffraction
  - Polarization!

(Different frequencies experience these in different combinations in Earth's atmosphere, so certain radio bands are more useful for specific purposes)
Radio Waves

- 1st used for communication mid-1890s by Guglielmo Marconi, who developed 1st practical radio transmitters & receivers
- Radio waves travel at speed of light
- When passing through an object, are slowed according to object's permeability & permittivity
- *Wavelength* is the distance from one peak of the wave's electric field (wave's peak/crest) to the next, & is inversely proportional to the *frequency* of the wave
Wavelength ($\lambda$)

A wavelength ($\lambda$) is the distance between two adjacent points in a wave that are in phase.

Longer wavelength

Shorter wavelength

distance
Frequency (f)

Lower frequency

Higher frequency
Relationship b/t Wavelength & Frequency

\[ \lambda = \frac{300}{f} \]

- \( \lambda \) = wavelength (in meters)
- \( f \) = frequency (in MegaHertz = MHz)

Distance a radio wave travels in 1 sec in a vacuum = 299,792,458 meters (983,571,056 ft) which is \( \lambda \) of a 1 Hz radio signal

A 1 MHz radio signal has \( \lambda = 299.8 \) m (984 ft)
Radio Waves

- A type of electromagnetic radiation
  - Wavelengths (\( \lambda \)) in electromagnetic spectrum (longer than infrared light) ranging from 100 micrometers (0.0039 in) to 100 kilometers (62 mi)
  - Frequencies (f) from 3 THz to as low as 3 kHz
  - Like all electromagnetic waves, travel @ light speed
  - Naturally occurring radio waves made by lightning & by astronomical objects
  - Artificially generated radio waves are used for fixed & mobile radio communication, broadcasting, radar & other navigation systems, communications satellites, computer networks & numerous others
Radio Waves

- Generated by radio *transmitters*
- Received by radio *receivers*
- Different radio wave frequencies have different characteristics in Earth’s atmosphere
  - Long waves can *diffract* around obstacles like mountains and follow the contour of the earth (ground waves)
  - Shorter waves can *reflect* off the ionosphere & return to earth beyond the horizon (skywaves)
  - Much shorter wavelengths bend/diffract very little & travel on a line of sight, so propagation distances limited to the visual horizon
Radio Waves

• Diagram of a half-wave dipole antenna radiating radio waves, showing the electric field lines.
• Antenna in center is 2 vertical metal rods, with alternating current applied at its center from a radio transmitter (not shown): the voltage charges the 2 antenna sides alternately (+) & (−).
• Loops of electric field (black lines) leave the antenna & travel away @ light speed (these are radio waves).
Radio Waves

- To prevent interference between different users, use of radio waves strictly regulated by law (FCC) & coordinated by International Telecommunications Union (ITU)
  - Defines radio waves as: “electromagnetic waves of frequencies arbitrarily lower than 3000 GHz, propagated in space without artificial guide”
Radio Waves

- The distance over which radio communications is useful depends significantly on things other than wavelength, too, such as transmitter power; receiver quality; type, size, & height of antenna; mode of transmission; noise; & interfering signals.

- Radio spectrum divided into number of radio bands on basis of frequency, allocated to different uses.
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Wavelength</th>
<th>Designation</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–30 Hz</td>
<td>$10^5$–$10^4$ km</td>
<td>Extremely low frequency</td>
<td>ELF</td>
</tr>
<tr>
<td>30–300 Hz</td>
<td>$10^4$–$10^3$ km</td>
<td>Super low frequency</td>
<td>SLF</td>
</tr>
<tr>
<td>300–3000 Hz</td>
<td>$10^3$–100 km</td>
<td>Ultra low frequency</td>
<td>ULF</td>
</tr>
<tr>
<td>3–30 kHz</td>
<td>100–10 km</td>
<td>Very low frequency</td>
<td>VLF</td>
</tr>
<tr>
<td>30–300 kHz</td>
<td>10–1 km</td>
<td>Low frequency</td>
<td>LF</td>
</tr>
<tr>
<td>300 kHz – 3 MHz</td>
<td>1 km – 100 m</td>
<td>Medium frequency</td>
<td>MF</td>
</tr>
<tr>
<td>3–30 MHz</td>
<td>100–10 m</td>
<td>High frequency</td>
<td>HF</td>
</tr>
<tr>
<td>30–300 MHz</td>
<td>10–1 m</td>
<td>Very high frequency</td>
<td>VHF</td>
</tr>
<tr>
<td>300 MHz – 3 GHz</td>
<td>1 m – 10 cm</td>
<td>Ultra high frequency</td>
<td>UHF</td>
</tr>
<tr>
<td>3–30 GHz</td>
<td>10–1 cm</td>
<td>Super high frequency</td>
<td>SHF</td>
</tr>
<tr>
<td>30–300 GHz</td>
<td>1 cm – 1 mm</td>
<td>Extremely high frequency</td>
<td>EHF</td>
</tr>
<tr>
<td>300 GHz – 3000 GHz</td>
<td>1 mm – 0.1 mm</td>
<td>Tremendously high frequency</td>
<td>THF</td>
</tr>
</tbody>
</table>
Radiofrequency (RF)

- Refers to alternating current with characteristics such that if the current is input to an antenna, an electromagnetic field is generated suitable for wireless broadcasting and/or communications.
The Spectrum

- **HOUSEHOLD CURRENT**
- **AM RADIO**
- **ELECTROSURGERY LOW RF**
- **Surgitron Dual RF**
- **TV**
- **MICROWAVE**
- **LASER**

---

- 60 Hz
- 300 Hz
- 500 kHz
- 700 kHz
- 1.7 MHz
- 4.0 MHz
- 2500 MHz

---

- **High Temperature**
- **Low Temperature**
Interesting Side Note...

Long-term human exposure to high-levels of microwaves is recognized to cause...

- **cataracts** (according to experimental animal studies & epidemiological studies)
  - mechanism unclear but may include changes in heat sensitive enzymes that normally protect cell proteins in the lens
  - another proposed mechanism is direct damage to the lens from pressure waves induced in the aqueous humor
RF In Medicine

- RF energy, in the form of radiating waves or electrical currents, has been used in medical treatments for >75 yrs...
  - generally for minimally invasive surgeries
  - using RF ablation & cryoablation, including the treatment of sleep apnea
  - Magnetic Resonance Imaging (MRI) uses RF waves to generate images

- RF at non-ablation energy levels are sometimes used to tighten skin, reduce fat (lipolysis), or promote healing
Diathermy (British term for Electrocautery)

- Medical treatment using RF-induced heat as form of physical or occupational therapy & in surgical procedures
  - commonly used for muscle relaxation
  - also a method of electromagnetically heating tissue for therapeutic purposes
  - to deliver moderate heat directly to pathologic lesions in the deeper tissues of the body
Surgically, the extreme heat that can be produced by diathermy may be used to:

– Destroy neoplasms, warts, & infected tissues
– To cauterize blood vessels/prevent excess bleeding
– Particularly valuable in neurosurgery & ocular surgery

Diathermy (i.e. electrocautery) equipment typically operates in the short-wave radio frequency (range 1–100 MHz) or microwave energy (range 434–915 MHz)
Pulsed electromagnetic field therapy (PEMF)

- is a medical treatment that purportedly helps to heal bone tissue per a recent NASA study
- method usually employs electromagnetic radiation of different frequencies {ranging from static magnetic fields, through extremely low frequencies (ELF) to higher radio frequencies (RF) administered in pulses}
High frequency radiowave energy (has strong affinity for water)
Targeted tissue/cells readily absorb energy due to high water content
Intracellular pressure increases as water molecules expand.
Volatilization results in cell conversion to vapor, also emitting low-temperature steam which aids in coagulation.
Science of Radiosurgery

Cell-specific interaction enables extremely precise dissection with surrounding tissue preservation.
• Electric field causes vibration of water molecules in tissue
• Higher power = more violent vibration
• Vibration causes heat buildup between molecules
• Once enough heat, water vaporizes to steam, which depending on rate of heating, either:
  • Explodes the cell = CUT
  • Desiccates (dries) the cell = COAG
Clinical Benefits of Radiosurgery

**Precision** cutting with minimal applied pressure

**Versatility** for both surgical & nonablative procedures

Minimal lateral heat, minimal charring effect

Allows for readable histological results

Pinpoint coagulation with minimal lateral heat spread

Permits controlled modification of soft-tissue layers

Provides a clear & improved view of the operative site

Reduces surgical time vs. traditional scalpel surgery

Minimal (if any) postoperative pain, bruising, edema

Great accessibility due to flexible, malleable fibers

Wide range of electrodes & probes available

Technology validated by >100 clinical publications
Does frequency matter?
Low Temperature: controlled absorption & surgical precision

Minimal wave penetration: High Frequency radiowaves absorbed in cellular water result in shallow absorption, reducing risk of injury to surrounding tissue & structures
A study at Univ. of Iowa compared 3 leading low frequency ESU generators. Purpose: to accurately measure the thermal damage between all 3 generators.

<table>
<thead>
<tr>
<th></th>
<th>ValleyLab ForceFx</th>
<th>Bovie 1250</th>
<th>ellman Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thermal Damage</strong></td>
<td>190 µm</td>
<td>190 µm</td>
<td>110 µm</td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td>40 µm</td>
<td>40 µm</td>
<td>20 µm</td>
</tr>
<tr>
<td><strong>Standard Error</strong></td>
<td>10 µm</td>
<td>10 µm</td>
<td>10 µm</td>
</tr>
<tr>
<td><strong>Number of Samples</strong></td>
<td>15</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td><strong>P-value (vs. ellman)</strong></td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td><strong>Frequency of Generator</strong></td>
<td>390kHz</td>
<td>350-800 kHz</td>
<td>4 MHz</td>
</tr>
</tbody>
</table>
• Each generator used the ellman Vari-Tip™ electrode with 0.007” diameter wire
• Each generator was set by the research staff to the optimum power setting to minimize drag on the tissue
• All skin incisions were made on a porcine abdomen & all incisions from the ellman®, Bovie®, & Valleylab® generators looked similar with naked eye
• However, when tissue samples were histologically examined with Hematoxylin Eosin stain, a difference was seen
Conclusion

- Results showed statistically significant advantage for 4.0 MHz = 73% less thermal spread
RF Units

- Bovie
  - Created in 1920s
RF Units

- Valleylab
# RF Units

## Table 1. Overview of the four RFA systems used

<table>
<thead>
<tr>
<th></th>
<th>Cool-Tip</th>
<th>1500X RF</th>
<th>RF 3000</th>
<th>CelonPower LAB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Radionics</td>
<td>AngioDynamics</td>
<td>Boston Scientific</td>
<td>Celon</td>
</tr>
<tr>
<td><strong>Energy transmission</strong></td>
<td>Monopolar(^a)</td>
<td>Monopolar</td>
<td>Monopolar</td>
<td>Bi-, multipolar</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>480 kHz</td>
<td>460 kHz</td>
<td>480 kHz</td>
<td>470 kHz</td>
</tr>
<tr>
<td><strong>Maximum power</strong></td>
<td>200 W</td>
<td>250 W</td>
<td>200 W</td>
<td>250 W</td>
</tr>
<tr>
<td><strong>Applicators</strong></td>
<td>1(^a)</td>
<td>1</td>
<td>1</td>
<td>1-3</td>
</tr>
<tr>
<td><strong>MR-compatible electrode</strong></td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td><strong>Active tip</strong>(^c)</td>
<td>3/2.5 cm</td>
<td>3/5 cm</td>
<td>3/5 cm</td>
<td>3/4 cm</td>
</tr>
<tr>
<td><strong>Induced energy control mechanism</strong></td>
<td>Impedance-controlled</td>
<td>Temperature-controlled</td>
<td>Impedance-controlled</td>
<td>Impedance-controlled</td>
</tr>
</tbody>
</table>

\(^a\)The cluster electrode contains three electrodes in one applicator.

\(^b\)The RF generators must under any circumstance remain outside the scanner room.

\(^c\)For the 3/2 cm target ablation volumes, respectively.

RFA, radiofrequency ablation.
ellman RF Unit

Uses 4.0MHz radio waves to deliver electrical current to tissue for excising/incising with hemostasis.
Alternatives to RF: Fugo Plasma Blade

- First portable, electrosurgical nanomedical incising device employing plasma for ablation (yields nanotechnological arrangement of molecular lattice)
- Numerous ophthalmic applications:
  - Cataract Surgery (anterior capsulotomy)
  - Glaucoma Surgery (transciliary filtration)
  - Peripheral Iridotomy
  - Lesion Removal
Comparison of Incisions on Soft Tissue

Courtesy of Constantin Stan, MD

Low Radiofrequency (1.7 MHz)

Classical Electrosurgical Unit (0.36 MHz)

Ellman Dual RF (4.0 MHz)
Joe Niamtu III. 4.0MHz Radiowave Applications in Cosmetic Surgery. *Cosmetic Dermatology* 2003; 16(11) 33-46 (LIT-71-20)

Shows the ellman RF vs. CO2 Laser comparison (Figure 2-4)

- An Empire Needle on CUT and CUT/COAG is used on the patient’s left eyelid, and the CO2 laser was with an 8-watt, continuous wave setting on the patient’s right eyelid.
- Both modalities provided a virtually bloodless surgical field.
• Radiowave surgery on the patients’ left side showed a more aesthetic scar in the early postoperative period.

• 12 wk comparison of the blepharoplasty scars were judged equal by Dr. Niamtu, partners, & staff members in his practice, as well as by the 10 patients.
ESU vs RF: The heat comes from tissue resistance not the electrode itself

- (Pg. 34, 3rd paragraph) “Unlike electrocautery machines (or diathermy machines as they are referred to in the United Kingdom), the radiofrequency electrode does not provide resistance, & it remains cold. It is the tissue that provides the resistance. A cautery machine, however, uses lower frequencies & the passage of current through the electrode filament, which provides resistance & heats up. In the purest sense, this arrangement is similar to a soldering iron or wood-burning tip, & it causes significant lateral tissue damage. Since radiofrequency generates less heat than conventional cautery, there is less collateral damage, & healing is faster.”
Generally accepted advantages of radiowave surgery:

- Incision without applying pressure
- Simultaneous hemostasis
- Artifact reduction in biopsy vs. electrocautery
- Ability to bend or shape cutting electrode for anatomical variation or working in cavities
- Produces scarring ≤ scalpel or laser incisions
- No need for scalpel blades (resulting cost savings)
- No accidental scalpel injuries/dull scalpel blades
- Minimal safety precautions needed vs. lasers
Cleaning the electrode during a procedure

• “The electrode may be “steam cleaned” by holding the tip between layers of moistened gauze and activating the current, causing the unit to vaporize the liquid on the gauze and thus, self-clean. Surgical debris may be easily removed from the electrode in this manner, unlike the electrocautery tip, which is cleaned with abrasives”
Lesion Removal: RF (ellman) vs. cryosurgery (Pg 42)

- “Practitioners often see patients with hypopigmented depressed scars on the face from the liquid nitrogen ablation of lesions. This all too frequent scenario can be prevented by using radiowave surgery to ablate lesions”
Minimizes heat dissipation/cellular alteration

Clinical Benefits include:

- Controlled, precise tissue effect
- Maximum readability of histological specimen
- Enhanced healing
- Excellent aesthetic results

Other parameters have also to be considered for reducing the accumulation of lateral heat.
The Lateral Heat Formula
Lateral Heat Formula

\[ \text{Lateral Heat} \propto \frac{\text{Time} \times \text{Power}}{\text{Frequency}} \]

- \( T = \) Time that electrode contacts tissue
- \( P = \) Intensity of power
- \( F = \) Frequency

Electrode type and selected waveform also impact thermal build up
Names and Characteristics of Waveforms
• 90% Cut - 10% Coagulation
• Micro-smooth cutting
• Negligible lateral heat

Ideal for optimal aesthetic results
Produces least amount of lateral heat & cellular destruction
Creates clean edges (easy to suture & quick to heal)

*Ideal for obtaining biopsy specimens
• 50% Cut - 50% Coagulation (blend)
• Cutting with *simultaneous Hemostasis*

Ideal for skin incisions & planing of soft-tissue
Increased coagulation allows for clean cutting & good aesthetic result
Partially Rectified – HEMO

- 10% Cut - 90% Coagulation

Optimal for subcutaneous tissue dissection with maximum hemostatic control

Ideal for monopolar direct & indirect coagulation & soft tissue ablation

HEMO produces **more lateral heat** than CUT/COAG due to 90% Coagulation
HEMO with the Ball Electrode
(VCD/PC5IEC3)
Indirect Coagulation with Metal Forcep
(VCD/PC5IEC3)
FULGURATION

Ideal for Intentional Tissue destruction/carbonization
Used for killing potentially cancerous cells, Basal Cell Carcinoma, & Verrucae (viral lesions)
Maximum penetration & hemostasis

*Fulguration is totally different from the other waveforms. It is designed to replicate spark gap current.
Fulguration with Broad Needle
(VCD/PC5IEC3)
Bipolar Coagulation

✓ Radiowaves travel only between the 2 poles of the forceps (no antenna needed)
✓ Pin-point accuracy, micro-coagulation in a wet field
✓ No tissue adherence to forceps
✓ No charring or tissue necrosis in/around critical anatomy

* For Surgitron Dual RF & S5 units, BIPOLAR waveform operates at 1.7 MHz. This produces slightly more lateral heat than 4.0MHz, due to increased coagulation
Bipolar Tissue Coagulation

- 1.7 MHz radiofrequency technology
- Pin-point accuracy
- Micro-coagulation even in wet fields
- Minimal tissue adherence to forceps
- Minimal charring or tissue necrosis
- Ideal in and around critical anatomy
Tissue Cutting with Less Thermal Damage

- 4 MHz monopolar radiofrequency technology
- Five waveforms for customized procedures

Transmission Electron Microscopy Showing Lateral Thermal Damage on Human Oviducts

Vast Array of Electrodes

B1D Round Loop Electrode
- You may also want to consider: A8D, A2D Fine wire, B2D Loop

A2D Fine Wire
- You may also want to consider: Empire electrodes

A8D Vari-Tip™
- You may also want to consider: Empire TEE327, J3 Bipolar, A1D Electrode

Empire TEE327
- You may also want to consider: A8D, J11 Bipolar, Mini Mono Stan forceps
  IEC-MJ11/M, GE1 Goisis elevator

Biopsy

Scar revision/Earlobe repair

Blepharoplasty

Face-lifts

Lesion/Mole/Skin tag

Keloids

Breast augmentation

133D Pin Electrode
- You may also want to consider: B1D Round loop, DBD Ball, A8D, C3D Diamond loop

F1D Broad Needle Electrode
- You may also want to consider: Empire electrodes, Round Loop electrodes

IEC-MJ11 Mono Stan Forcep
- You may also want to consider: Empire electrodes, E3D Scalpel electrode

Ellman offers hundreds of monopolar and bipolar electrodes as well as many other accessories so you can maximize the versatility of your S5 platform.
Autoclavable Electrodes

Hundreds of autoclavable electrodes available
Empire® microIncision & Dissection Electrodes
(Over 30 sizes, shapes & angles available)

Ultra-Fine Tapered Tip high concentration of energy at the tip

Enables precise cutting with minimal thermal damage larger surface area sides for immediate spot coagulation with a simple shift of the wrist

Polished needle surface reduces tissue adherence

Sterile/Single-use
Sterile Single-Use Electrodes
Bipolar Forceps

A variety of shapes and sizes

ACe-Tip™

Standard
Handpieces

IEC-X3FHPB 3-Button Fingerswitch Handpiece

IEC-XBHP3 3-Button Blade Handpiece

IEC-XHP1 Foot-controlled Handpiece

IEC-3FHPBA/D 3-Button Fingerswitch Handpiece Setrile / Single-use

IEC-XRHP Rodin™ Microsurgery Handpiece with
IEC-SP020 Quick-Connect™ Cable
<table>
<thead>
<tr>
<th>Lesion</th>
<th>Electrode</th>
<th>Mode</th>
<th>Setting</th>
<th>Misc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat Mole or SK</td>
<td>Ball Tip or Broad Tip</td>
<td>Coag</td>
<td>18-22</td>
<td>light tapping motion</td>
</tr>
<tr>
<td>Raised Mole</td>
<td>Small Round Loop</td>
<td>Blend</td>
<td>12-15</td>
<td>pick up lesion with forceps; pull loop through the base of the mole, parallel to the skin</td>
</tr>
<tr>
<td>Skin Tag</td>
<td>Vari-Tip or Small Loop</td>
<td>Cut</td>
<td>8-10</td>
<td>cut at base</td>
</tr>
<tr>
<td>Angioma/Hemangioma</td>
<td>Broad Tip</td>
<td>Coag</td>
<td>18-22</td>
<td>lesion should turn dark</td>
</tr>
<tr>
<td>Mucosal Lesion</td>
<td>Vari-Tip or Empire</td>
<td>Blend</td>
<td>12-15</td>
<td>make an elliptical incision at base of lesion and stitch; least scar</td>
</tr>
<tr>
<td>Facial Lesion</td>
<td>Vari-Tip or Empire</td>
<td>Cut</td>
<td>8-10</td>
<td>this mode will cause sparking; used to destroy virus</td>
</tr>
<tr>
<td>Wart</td>
<td>Broad Tip</td>
<td>Fulgurate</td>
<td>60-80</td>
<td>light pressure; do not puncture vessel</td>
</tr>
<tr>
<td>Small Telangiectasias</td>
<td>Cosmetic Treatment Pkg</td>
<td>Coag</td>
<td>1-3</td>
<td>light pressure along vessel</td>
</tr>
<tr>
<td>Small to Medium Blood Vessels</td>
<td>Broad Tip</td>
<td>Coag</td>
<td>1-3</td>
<td>light pressure along vessel</td>
</tr>
</tbody>
</table>
### ellman RF Settings: Pre-Operatively

<table>
<thead>
<tr>
<th>Electrode Settings</th>
<th>Cut</th>
<th>Blend</th>
<th>Coag</th>
<th>Bi-Polar</th>
<th>Fulgurate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vari Tip</td>
<td>8-12</td>
<td>12-15</td>
<td>18-22</td>
<td>None</td>
<td></td>
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<tr>
<td>Empire Straight</td>
<td>12-15</td>
<td>12-15</td>
<td>18-22</td>
<td>None</td>
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<tr>
<td>Empire Angle</td>
<td>12-15</td>
<td>12-15</td>
<td>18-22</td>
<td>None</td>
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<tr>
<td>Loop Electrode</td>
<td>8-12</td>
<td>12-15</td>
<td>18-22</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Ball Tip</td>
<td>None</td>
<td>None</td>
<td>18-25</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Broad Tip</td>
<td>None</td>
<td>None</td>
<td>18-25</td>
<td>None</td>
<td>60-80</td>
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<tr>
<td>Bi-Polar Forceps</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>5-15</td>
</tr>
<tr>
<td>Cosmetic Treatment Package</td>
<td>None</td>
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Skin Lesion Removal

Before | After
---|---

Before | After
---|---

Courtesy of Joe Niamtu III, DMD
Peri-Operatively

- Informed Consent
- Photodocument lesion
- Verify proper ellman settings
- Proper Personal Protective Equipment (gloves, sterile field, tissue sample container, etc.)
- Prep procedure area (isopropyl alcohol or betadine)
- Anesthetize (topical &/or injectable lidocaine)/test area
- Sterile technique (instruments, periop. area, field)
- Proper handling of tissue sample, sharps & biohazardous disposal post-procedure
- Hemostasis
- Post-op instructions (e.g. steroid-antibiotic, pain meds)
- Schedule f/u & c/b if pain/redness/edema
- Clean & sterilize all non-disposable equipment post-op
**Trichiasis**

- **Treatment Options:**
  - Forceps Epilation
  - Electrolysis*
  - Cryotherapy*
  - Eyelid surgery (including Yag Laser option)*
  - Treat any primary/secondary conditions (e.g. SPK, blepharitis, etc.)

* Definitive Therapy
Hair Follicle Epilation for Trichiasis
microInsulated™ Needle Electrodes

- Distal 0.5mm exposed
- Insulated shaft protects pathway

- Microinsulated Tip
- Advance to base of follicle
- Coag @~18-22

Epilation of Eye Lashes
Applications in Dermatology

- Skin incisions / excisions
- Biopsy for pathology
- Lesion removal
  - Skin tags, carcinomas, nevi, flat lesions, warts, verrucae etc
- Special tip can be used for punctal occlusion
- Coag @ ~18-22
Ectropion

- Involutional (i.e. age-related):
  - Affects lower lid
  - Due to horizontal lid laxity, medial canthal tendon laxity, and/or disinsertion of lower lid retractors

- Signs:
  - Epiphora & erythema
  - Chronic inflammation
  - Thickened lid margin
  - Keratinized tarsal conjunctiva
Ectropion

- Cicatricial: Caused by scarring or contraction of skin & underlying tissues, pulling lid away from orbit; may be local or general
  - Mild/Local: trauma with assoc. scar tissue
  - Severe/Generalized: burns, dermatitis, & severe dermatologic ds.
Ectropion

- Paralytic: caused by ipsilateral facial nerve palsy; associated with upper & lower lid retraction & brow ptosis
  - May be temporary if nerve palsy resolves
  - Temporary treatment to protect the cornea
    - Lubrication
    - Botulinum toxin injection?
    - Temporary cyanoacrylate tarsorrhaphy?
Ectropion

- Mechanical: caused by tumors on or near the lid margin, mechanically everting the lid; refer to Oculoplastics

Secondary to metastatic prostate cancer
Ectropion

- For illustrative purposes only, if this were not so severe & not from space-occupying mass...

Coag @ ~18-22
Pin or Broad Needle Tip
Entropion Repair – Sx Summary

- Cautery punctures are applied horizontally resulting in tissue shrinkage & contraction
- Puncture sites are approximately 2-3mm deep & apart
- Alternatively, Pelleve’ tx

- **Coag @ ~18-22**
- **Pin or Broad Needle Tip**
Removal of Skin Lesions
Elliptical Incision/Excision

- Outline with Skin Marker
- Vari-Tip, Pin, or Empire
- Cut @ ~5-10
- Suture/Dermabond/Butterfly?
Removal of Skin Lesions
Shaving of Flat Lesions

- Pin, Ball, or Broad Tip with light tapping motion
- Coag @ ~ 18-22 (or Cut @ ~5-10)
Lid Lesion Removal

- Small Round Loop or Pin Electrode
- Blend ~@ 8-10
Some Benign Eyelid Lesions

- Telangiectasia
- Hemangioma
- Nevi (Nevocellular Nevi)
- Papilloma
- Seborrheic Keratosis
- Xanthelasma
- Cutaneous Horn
- Epidermal Inclusion Cyst
- Sebaceous Cyst
- Molluscum Contagiosum

- Syringoma
- Apocrine Hydrocystoma
- Trichoepithelioma
- Keratoacanthoma
- Hemangioma
- Pyogenic Granuloma
- Chalazion
Telangiectasia & Keloids
Telangiectasia

- Microinsulated Needle, Coag @ ~1-3
- Lid: use corneal shield and/or pull lid over bone
- Very light pressure
microInsulated™ Needle Electrodes

- 0.003” diameter needle
- Insulated shaft with only distal 0.5mm exposed

Telangiectasia
Hemangioma

- Broad Tip, Coag @ ~18-22
- Lesion should turn dark
- If done on lid, use corneal shield and/or pull lid over orbital bone
Nevus

- **Raised**: small round loop, Blend @ ~12-15
- **Flat**: Ball/broad tip, Coag @~18-22

Junctional Nevus at lid margin (courtesy West TN Eye)
Nevi (Nevocellular Nevi)

Watch closely before/after (ABCDE’s) secondary to low risk transformation to malignancy

A= Asymmetry?
B= Borders (irregular?)
C= Color (not flesh-colored?)
D= Diameter (larger?)
E= Elevated?
• Pin, Ball, or Broad Tip
• Coag @ ~18-22
• Light, tapping motion
Papilloma/Skin Tags

- Flesh-colored, tan, or brown; round or oval, often pedunculated
- Variable size
- More common in obese
- More common with age
- Females > males?

- Vari-Tip, Loop, or Pin
- Cut @ ~8-10 (or Blend)
- Excise at stalk base

Courtesy: West Tennessee Eye
Seborrheic Keratosis

- Appear “stuck on”
- Often slightly darker than flesh color
- Vary in size & location
- More common as age

- Pin, Ball, or Broad Tip
- Coag @ ~18-22
- Light, tapping motion

Courtesy: West TN Eye
Seborrheic Keratosis
Seborrheic Keratosis
Cutaneous Horn

- Lesion elevated, usually with stalk
- Hyperkeratotic center
- Often grows rapidly, then may stop
- Watch base for suspicious areas (BCC, SCC, etc.)
- Best to get path report

- Vari-tip or Empire
- Cut @ ~5-10 or Blend
- Excise at base

Courtesy: West TN Eye
Epidermal Inclusion Cyst

- Round, elevated cyst
- Translucent yellow center
- May grow slowly

- Pin Electrode or Vari-Tip
- Cut @ ~5-12 or Blend
- Horizontal base incision

Courtesy: West TN Eye
Sebaceous Cyst

- Vary in size/location
- Harder yellow center vs. inclusion cyst

- Pin Electrode or Vari-Tip
- Cut @ ~5-12 or Blend
- Small, horizontal base incision & express
Molluscum Contagiosum

- Pearly white to skin-colored with umbilicated central keratin plug
- Single or multiple
- 1-2 mm papules
- More common in kids
- Viral etiology
- Spread by contact
- OTC meds (Zymaderm)
- May resolve if needle
- May excise or electrodessicate

Broad or Pin Tip, Fulgurate @ ~60-80
  - or Coag @~18-22 with Ball Tip
Must use corneal shield!
Xanthelasma

• Slightly raised, soft, yellowish-orange skin plaques
• Located medially on eyelids
• May slowly enlarge
• More common in elderly
  (if in kids, consider elevated LDL)

• Pin, Ball, or Broad Tip
• Coag @ ~18-22
• Light, tapping motion
• Use Corneal Shield &/or pull lid over bone

Courtesy: West TN Eye
Xanthelasma

- Pin, Ball, or Broad Tip
- Coag @ ~18-22
- Light, tapping motion
Syringoma

- Benign eccrine sweat duct neoplasms
- Skin-colored to yellowish
- Multiple, 1-2 mm
- Common on lower eyelid/periorbital area
- More common in females after puberty

Pin Tip
Coag @~18-22
Use Corneal Shield if lids

Courtesy: West TN Eye
Apocrine Hydrocystoma

- May be on any lid & multiple locations
- Usually near lid margin
- Fluid filled, cystic lesion
- Tend to re-fill if not adequately treated

- Vari-Tip or Pin Electrode
- Cut @ ~5-10 or Blend
- Corneal shield
- Horizontal base incision

 Courtesy: West TN Eye
Keratoacanthoma

- Single, dome-shaped nodule with a hallmark central keratin plug
- Firm & slightly red to light brown in color?
- More common in elderly men
- May grow quickly at onset
- Watch closely to rule out malignancy (send for path report if excise)

Vari-Tip or Empire
Cut @ ~5-10, wound closure
Corneal Shield
Consider referring out

Courtesy: West TN Eye
Hemangioma (Cherry Angioma)

- Bright red (cherry colored)
- Elevated, blood-filled
- Can occur anywhere
- May be multiple

- Ball, Pin, or Broad tip
- Coag @ ~18-22
- Lesion should turn dark

Courtesy: West TN Eye
Pyogenic Granuloma

- From mechanical irritation or infection?
- Reddish color
- Often stalk
- Usually from conjunctiva
- May resolve with topical anti-inflammatory

- Vari-Tip or Small Round Loop
- Cut or Blend @ ~8-10
- Excise at base

Courtesy: West TN Eye
Chalazion

- A firm, non-tender, palpable nodule on lid (may have previously been painful)
- Usually residual effect of hordeolum
- Can do steroid ung with warm compress, then if unresolved, consider I/L Kenalog or incision & curettage
- Be suspicious of malignancy if recurrent in same spot

Vari-Tip or Empire
Cut @ ~5-10 or Blend
Incise vertically thru chalazion clamp

Courtesy: West TN Eye
Pre-Malignant/Malignant Lid Neoplasms

- Actinic Keratosis
- Lentigo Maligna
- Basal Cell Carcinoma
- Squamous Cell Carcinoma
- Sebaceous Cell Adenocarcinoma
- Malignant Melanoma
- Kaposi’s Sarcoma
Actinic Keratosis

- Sun exposure
- More common: males
- Rough, minimally elevated, skin-colored to light brown lesions with “scaly appearance” from hyperkeratosis
- Is Pre-Malignant
- Refer Oculoplastic/Derm

Courtesy: West TN Eye
Lentigo Maligna

- Often appear as a dark “stain” on skin with defined borders
- Sun exposure
- Is Pre-Malignant
- Refer Oculoplastics

Courtesy: West TN Eye
Basal Cell Carcinoma

- Preference for lower lid (basal = bottom)
- Sun exposure
- Round-oval, firm lesions with depressed center
- Center may be ulcerated
- More males, >40 y.o.
- Can rarely be cystic
- Is Malignant
- Refer Oculoplastics or Derm

Courtesy: West TN Eye
Squamous Cell Carcinoma

- 2nd most common lid malignancy
- Slight preference for upper lid?
- Aggressive
- Is Malignant
- Refer Oculoplastics or Derm

Courtesy: West TN Eye
Sebaceous Adenocarcinoma

- Nodular
- Mimics chalazion
- Unilateral chronic blepharitis
- Destructive/ulcerative lesion at lid margin
- Refer Oculoplastics or Derm

Courtesy: West TN Eye
Sebaceous Adenocarcinoma

• When the eyelid is everted there is an infiltrative lesion of the tarsal conjunctiva
• Highly Malignant & potentially fatal
• Urgent referral to Oculoplastics

Courtesy: West TN Eye
Malignant Melanoma

- From sun exposure
- >3rd decade
- Irregular pigmented lesion
- May ulcerate & bleed
- Highly Malignant & potentially fatal
- Urgent referral to Oculoplastics or Derm

Courtesy: West TN Eye
Kaposi’s Sarcoma

- Vascular neoplasm
- Males > Females
- Can be sequelae of HIV/AIDS
- Elevated dermal lesions that are reddish-purple
- Malignant, not curable, & potentially fatal
- Urgent referral to Oculoplastics

Courtesy: West TN Eye
Pelleve’

How Pellevé™ Works

Untreated Skin

Collagen Synthesis Begins

39°C to 42°C

Collagen Remodeling Occurs

2-6 weeks Post-Treatment
Skin Anatomy

The Skin

- **Epidermis**
- **Sensory Nerve Ending**
- **Dermis**
- **Fibroblast**
- **Subcutaneous Tissue**
- **Collagen Fiber**
- **Capillaries**
- **Fibroblast**
- **Arteriole**
- **Collagen Fiber**
- **Fat**
Collagen

- Main component of connective tissue
  - Makes up about 25 – 35% of entire bodies protein content
  - Found in elongated fibrils in skin, tendons, and ligaments

- Over 20 kinds of Collagen
  - Type I – IV found in human body
  - Type I and some type III in skin – provides skin tension

- Collagen exists as a triple helical configuration

- Each collagen chain adopts a left-handed helical configuration, and the three strands intertwine with a right-hand super-helical twist
- Inter- and intra-molecular hydrogen bonds are responsible for the stability of the triple helix of collagen
Elastin

- Insoluble rubberlike protein (connective tissue) conferring elasticity to tissues/organs
- Elastic fibers are composed of a large amorphous central interior (the protein elastin) surrounded by a mesh of microfibrils (made of the protein fibrillin)
- Elastin molecules are hydrophobic, able to slide over one another, to maintain structural integrity and provide recoil
- Individual elastin protein molecules are cross-linked by covalent bond
Collagen Remodeling

Heat applied to skin → Heat liable intramolecular cross links broken ("collagen denaturation") → Residual tension of heat stable intermolecular cross links causes acute collagen shrinkage

Over Time (3-4 weeks) thermally mediated healing response = fibroblast stimulation to enhance new collagen deposition and remodeling ("fibroblast infiltration" "wound healing response")

Remaining elastin demonstrate more uniform orientation, improved quality

Elastotic materials replaced and reorganized by new collagen

Further tightening with increased collagen content

Wound Healing Response

I - Inflammatory phase (1-3 days)

Preserving the stability of the environment

1. Early contraction of blood vessels (5 – 10 minutes)

2. Vasodilation in order to increase supply (multiple hours to 1 – 3 days)

3. Cells (macrophages, neutrophils, polymorphonuclear leukocytes, ...) infiltrate damaged area to remove dead/damaged tissue and destroy bacteria
Wound Healing Response

II - Proliferative phase – 3 weeks

Ongoing processes to repair tissue

1. Day 2-3 - Fibroblasts activity is induced in damaged tissue. Fibroblasts multiply, send mediators to stimulate repair, combined with damaged tissue

2. Day 5-7 - Fibroblasts begin synthesis of collagen. This continues until fibroblast apoptosis (Day 7-21)

3. Day 7-21 - Old collagen is removed by collagenase

III - Maturation phase – up to 6 months and beyond

New collagen is generated
Summary

1. Collagen & Elastin are non-homogeneous, complex structures
   - Goal: increase the amount of collagen and make elastin more uniform
2. We create a ‘mini-wound’ with Pellevé
3. The desirous remodeling is ~4 week process
4. Collagen zone target temperature are 41°C to 53°C
   - If we can get this zone to at least 41°C we are affecting collagen & elastin
5. Outer surface temperature is not always a good indicator of deeper tissue temperature
6. No scientific indication that cooling is more effective than not cooling, but jury still out
Aging Process

Young skin exhibits a rapid turnover of cells

This process slows as early as your 20's, as collagen and elastin are produced at a slower rate.

The majority of age-dependent changes that occur in our skin happen in the dermis, which can lose from 20-80% of its thickness during the aging process.
Aging

Natural aging = collagen diminishes and changes
Sun damage/environmental = elastin changes
Results of declining collagen production
  • Sagging skin
  • Thinner skin
  • Fine lines
Results of decreased elastin production
  • Deep wrinkles
  • Loss of elasticity
Pellevé Mechanism of Action

- RF energy delivered to epidermis and deeper dermal tissues
- Subclinical thermal “injury”
- Heat induces collagen contraction, neocollagenesis and elastin uniformity
- Contraction of skin surface and 3 dimensional tightening of deep dermal structures
Indications for Use

• Ellman International’s RF technology has been used for the treatment of wrinkles and rhytids in Europe since 2006

• Pellevé is cleared by the FDA for
  • Non-ablative treatment of mild to moderate facial wrinkles and rhytids for all skin photo types

• Precautions for Pellevé include
  • Pacemaker
  • ICD (Implantable Cardioverter Defibrillator)
  • Any other implanted electronic device
Warnings & Precautions

Warnings To Highlight With Pellevé

- Corneal Eye Shields (plastic, non-conductive) must be used for any radiofrequency surgical procedure involving the eyelid and the immediate surrounding areas.

- Treatment of wrinkles is dependent upon ongoing patient feedback. Local, oral and systemic anesthetic agents must not be used prior to or during wrinkle treatment.

- Patients with nerve insensitivity to heat anywhere in the treatment area should not be treated for wrinkles. Treatment of patients with nerve insensitivity may lead to patient burns or injury.

* See Pellevé S5 Manual for full list of Warnings & Precautions
Precautions To Highlight With Pellevé

- Do not treat wrinkles on cut, wounded or infected skin.
- All jewelry and makeup, including lotions, eyeliner and eye shadow should be removed from the treatment area.
- Only Pellevé Treatment Gel should be applied to the surface of the patient’s skin prior to or during the treatment.
- Remove beard stubble thoroughly prior to treatment.
- Treatment of wrinkles using the Pellevé S5 is unstudied and unknown for the following populations: pregnant patients, patients with autoimmune disease, diabetes, herpes simplex, and patients with recently applied fillers to the treatment area.

* See Pellevé S5 Manual for full list of Warnings & Precautions
Benefits

- Four handpiece sizes allow customizable treatments
- Easily maneuvers over contours of the face, including the delicate skin around the eyes
- Gold-plated tips efficiently transfer energy and simulate the sensation of a hot stone massage
- Ideal for patients who are looking to revitalize their skin without surgery or injections
- Can be used in conjunction with a variety of aesthetic procedures
- Approved for use by nurses and aestheticians under direction of a licensed medical practitioner in most states*

*check with your local state medical board
Lower Lids

Before

After

Thirty days post sixth treatment
Courtesy of David Goldberg, MD
Four months post fourth treatment
Courtesy of Stewart Bentkover, MD
Upper Eyelids

Before

After

30 days post two treatments
Courtesy of Reynaldo Javate, MD
Periorbital

Before

After

Sixty days post third treatment
Courtesy of Red Alinsod, MD
Procedure
Treatment Technique

- Minimum of 5 passes per area using a corkscrew motion
- Use 2 handpiece sizes:
  - Smaller handpiece for skin temperature elevation and varied contours
  - Larger handpiece for deeper penetration
- Alternate horizontally and vertically
- Maintain skin temperature at 40°- 42° C for approximately 5 minutes

Minimum of three monthly sessions recommended for optimal results
NONSURGICAL TIGHTENING OF SKIN LAXITY: A NEW RADIOFREQUENCY APPROACH

Antonio Rusciani MD, Giuseppe Curinga MD, Giulio Menichini MD, Carmine Alfano MD, Luigi Rusciani MD

a. Division of Dermatology, Plastic and Reconstructive Surgery, University of Rome “La Sapienza,” Italy
b. Division of Plastic and Reconstructive Surgery, University of Perugia, Italy
c. Dermatologic Institute of Rome, U.C.S.C., Italy

- 93 patients followed for 6 months after a single treatment
- 3 independent, blinded assessors (2 facial plastic surgeons & 1 dermatologist)
- Almost 90% retained photographic improvement at 6 months

![Pellevé® Treatment Response Rate Graph]

Clinical Trial Results

- 93 patients evaluated for 6 months following a single treatment\(^1\)
- 3 independent, blinded assessors\(^1\)
  - 2 facial plastic surgeons
  - 1 dermatologist
- Nearly 90% retained photographic improvement at 6 months\(^1\)
- 85% of patients reported overall satisfaction in skin’s laxity, smoothness, and brightness\(^2\)

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TEM (25,000x) shows scattered diffuse changes in collagen fibril architecture with shift from smaller diameter collagen fibers in the untreated samples (A) to larger diameter and loss of distinct borders fibers in the treated samples (B) compared with normal fibrils.

Transmission Electron Microscopy of Neocollagenesis

- Scattered diffuse changes in collagen fibril architecture
- Shift from smaller diameter collagen fibers in the untreated samples to larger diameter fibers in the treated samples
- Loss of distinct borders compared with normal fibrils

Courtesy of Dr. Reynaldo Javate
Univ. of Santo Tomas Hospital, Manila, Philippines
Monopolar RF Drives Energy Deep into Dermal Layer

Pellevé

Energy exited via neutral pad

Bipolar RF

Energy returned to skin electrode
How it works

- GlideSafe® handpiece delivers RF energy to deep dermal tissues
  - Therapeutic levels of heat induce existing type I collagen contraction, neocollagenesis and elastin uniformity
  - Controlled thermal injury attracts fibroblasts and stimulates new collagen formation, contraction of skin surface and 3 dimensional tightening*
• Virtually painless, non-invasive radiofrequency procedure
• Tightens skin* and reduces facial wrinkles in all skin phototypes
• No downtime or restrictions to sun exposure

*via soft tissue coagulation
Set Appropriate Expectations

Multiple treatments suggested for most patients
- Minimum 3-4 treatments spaced 1 month apart

Immediate changes may be noticeable
- Slight erythema
- Mild edema
- Improved skin texture
- Collagen contraction

Neocollagenesis occurs over time
- Evident around 1 month
- Continues for up to 6 months

Pellevé is not a substitute for plastic surgery
Pre-treatment Instructions

- Have patient arrive well hydrated
- Remove all make-up and wash treatment area
  - Make-up and lotions may diminish effect of Pellevé
- Assure that treatment area is free of open lesions or infections
- Remove all metal from around treatment area including jewelry and headbands
- Clinician providing treatment must wear surgical gloves
- Pellevé Treatment Gel is the only approved gel
Heat Sensation Feedback

- Expect gradual warming sensation during treatment

- Important that no anesthetic be used so patient can describe level of heat

- Using a scale of 1-4 or 1-10, instruct patient to indicate when heat level is very hot (level 3 or 8) but tolerable
  - 1 = NO HEAT
  - 4/10 = UNBEARABLY HOT

- Immediately move GlideSafe® Handpiece to a different area

- Continuously move GlideSafe Handpiece
  - Initial movement slow
  - Increase speed as skin temperature reaches 40 - 42°C
How Much Heat is Required?

Not Safe
- Heating sufficient to cause complete collagen fiber dissolution (collagen turns into gelatin)
- Tissue necrosis, scarring, burning, etc.

Safe, Effective
- Heating to partially disrupt collagen fibril structure
- Contraction along the length of collagen fibers occurs
- Thermally mediated healing response causes new collagen formation
- Treatment within Pellévé labeling

Safe, Not Effective
- Heating insufficient to disrupt collagen fibril structure
- No clinical effect observed

Equipment Needed

- Pellevé S5 Generator
- Pellevé Treatment Gel
- Infrared Thermometer
  - Not all temperature thermometers are equal
  - The Fluke device is specially calibrated for Pellevé to +/- 1°C at targeted temperature range
- Neutral Plate / Return Electrode
- GlideSafe Handpieces
  - 7.5 mm – periorcular, forehead
  - 10 mm -- periorcular, forehead, midface
  - 15 mm -- forehead, nasal labial, preauricular
  - 20 mm – midface
Energy Penetration Profiles

- Diameter of handpiece electrode matters
- Smaller electrodes targets shallow to mid-dermal layers
- Larger electrodes target deeper dermal layers with less cooling capacity
- Treating with larger electrode heats deep dermal layer
- The smaller electrode maintains temperature in mid-dermal range
Use of IR Thermometer

- Objective is to reach skin temperature of 40-42° C
- Pellevé IR Temperature Thermometer used for assessment during treatment
- Temperature is averaged over area centered ½” below the red aiming beam
- IR thermometer should be held between 5-10” from skin

Size of measurement area depends on distance from skin

½” diameter circle at 5” distance

1” diameter circle at 10” distance
Equipment Setup

- Set-up Pellevé S5 Generator
  - Foot pedal use optional
- Apply disposable return (neutral) pad to upper back in flat area
  - Assure that pad is firmly affixed to skin with no gaps
- Set to Pellevé/CUT mode
- Apply Pellevé Treatment Gel in thin layer over area to be treated
  - Do not over apply gel
  - Do not dip handpiece in gel – use tongue depressor to remove from container
- Select the 2 Pellevé GlideSafe Handpiece sizes
  - 7.5 & 15 mm
  - 10 & 20 mm
Generator Settings

Generator Setting Guidelines For GlideSafe™

- Mid & Lower Face: 5-10
- Brow & Eyes: 8-15
- Mid & Lower Face: 20-25
- Mid & Lower Face: 15-40

NOTE: Settings may need to be adjusted higher or lower based on patient feedback and type of area being treated.
What to Expect During & After Pellevé

- Patient will feel deep warming sensation each time the Pellevé Handpiece touches area being treated.
- Since no anesthetic is allowed, patient will be able to describe the feeling which will help ensure the best possible results.
- Typical full facial procedure usually takes between 45 to 60 minutes.
- Some patients may experience mild swelling (edema) and redness (erythema), typically resolving within 2 to 24 hours after treatment.
Post Treatment Instructions

- May return to normal activity after Pellevé treatment
- Wash skin with tepid water and gentle cleanser
- If slightly pink or red, avoid hot water until subsided
- Make-up may be applied immediately post treatment
- Soothing non-irritating moisturizers may be used
- Use sunblock with UVA and UVB protection with SPF 30 or greater
  - Prevents further sun damage
  - Pellevé does not cause photosensitivity
Pellevé Eyes & Forehead

Before

30 Days After 4th Pellevé Treatment

Courtesy of Red Alinsod, MD
Upper Arm

Pre-treatment

Post 3 Treatments

Images courtesy Red Alinsod, MD
Periocular Area

Use eye shields if treating over ocular globe

**Vertical**
- Above brow, treat in upward direction from midline with each column moving toward lateral hairline
- Lateral eye/crow’s feet, treat in upward direction from outer eye corner with each column moving toward hairline

**Horizontal**
- Above brow, treat from midline to lateral margin from closest to eyes & moving upward with each row
- Below brow & below eye, treat medial to lateral in arc following eye shape
- Retract periorbital skin over orbital ridge when treating

Total 5 passes
Use 7.5 mm or 10 mm handpiece for total periocular area
Alternate Model

• If OMD leases office, can set up agreement with OMD to have your staff perform Pelleve’ treatments while OMD on-site supervising if scope restrictions
Meibomian Gland Dysfn/Post. Blepharitis
(adapted from Rich Castillo & Kevin Rogers)

- For mod-severe disease, with failure to prior therapy (warm compresses/digital massage, topical anti-inflammatories, time, Doxycycline/Minocycline)
- Present option to patient, then bring back to see tech for therapy
- Uses 10 mm handpiece (7.5mm too intense) @ generator setting of 10
- Corneal shield applied & tech uses horizontal motion with handpiece (medial to lateral only)
- Try to get as warm as can stand, min temp $\geq 37-38^\circ$ C
  - (note: lower lid can handle higher temp)
- Consider monocular treatment sessions (mild blur)
Doctor examines k under slit lamp before discharging (occasionally may see mild k edema)

- Can manually express meibomian glands at this time prn
- Patient returns @ 2 wks (may re-treat prn for severe cases)
For ellman RF:
Any benign lesion that can be removed/destroyed using a scalpel can also be billed using ellman RF mode, (provided the procedure is within scope, of course)
67825 Correction of Trichiasis by Other than Epilation

For Pelleve’ System:
Depending on carrier’s exact definitions, could also be used for:
Ectropion Repair (CPT 67915)
Entropion Repair (CPT 67922)
Express Conjunctival Follicles (CPT 68040)
Repair symblepharon (CPT 68340)
Correct an everted punctum (CPT 68705)
Similarly, the Pelleve’ PelleFirm system may be used to non-invasively repair mild-moderate dermatochalasis, blepharochalasis, & brow ptosis.

All of which have appropriate ICD-10 codes, but no carrier-recognized, applicable CPT codes for using radio frequency in this manner (so patients may have to pay out-of-pocket).
Further, Category III CPT **Code 0207T** can be used with Pelleve’ PelleFirm to evacuate meibomian glands (automated, using heat & intermittent pressure, unilateral), like other commercial units do, but this code is generally not reimbursed by carriers & thus would also result in a direct fee from patient.
Pelleve’ PelleFirm can also be used to treat chalazia with direct heat/massage for several sessions prior to more invasive procedures

Especially for those uncomfortable with I&C, intralesional steroid injection

No CPT, so would be out-of-pocket for patient
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<th>CPT</th>
<th>Description</th>
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<td>11200</td>
<td>Excision, up to 15 lesions</td>
<td>70</td>
<td>115</td>
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<tr>
<td>11201</td>
<td>Each add'l 10 lesions</td>
<td>18</td>
<td>66</td>
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<td>11300</td>
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<td>Lesion &lt; 6-1.0 cm</td>
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<td>11302</td>
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<td>Lesion &gt; 2.0 cm</td>
<td>108</td>
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<td>11305</td>
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<td>11307</td>
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<td>93</td>
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<td>11308</td>
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<td>11310</td>
<td>Face &lt; .5 cm²</td>
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<td>123</td>
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<td>11311</td>
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<td>11312</td>
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<td>11313</td>
<td>Face &gt; 2.0 cm³</td>
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</tr>
<tr>
<td>11200</td>
<td>Excision/destruction up to 15</td>
<td>70</td>
<td>115</td>
</tr>
<tr>
<td>11201</td>
<td>Each add'l 10 tags</td>
<td>18</td>
<td>66</td>
</tr>
<tr>
<td>17110</td>
<td>Destruction, flat warts, molluscs up to 14</td>
<td>87</td>
<td>89</td>
</tr>
<tr>
<td>17111</td>
<td>Destruction, molluscs up to 15</td>
<td>99</td>
<td>142</td>
</tr>
<tr>
<td>46220</td>
<td>Excision of single anal tag</td>
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<td>204</td>
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<tr>
<td>46230</td>
<td>Excision of ext. hem tag</td>
<td>220</td>
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</table>

**Cosmetic Procedures (CASH) depending on clientele**

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
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<tbody>
<tr>
<td>Cosmetic Lesion removal</td>
<td>$100</td>
<td>$500</td>
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<tr>
<td>Earlobe Repair</td>
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<td>$600</td>
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<tr>
<td>Telangiectasias/Hemangiomas</td>
<td>$100</td>
<td>$600</td>
</tr>
<tr>
<td>Skin Tightening</td>
<td>$1,500</td>
<td>$3,500</td>
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</tbody>
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(4 procedures @ 10-15 mins per procedure)

**Epilation**

(producting blond, gray, and dark hair) | $150 | $500  |

**CPT Description Nat'l Care (office) Estim 50% Fee**

<table>
<thead>
<tr>
<th>CPT</th>
<th>Description</th>
<th>Low</th>
<th>High</th>
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</thead>
<tbody>
<tr>
<td>67810</td>
<td>Biopsy eyelid</td>
<td>194</td>
<td>225</td>
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<tr>
<td>67825</td>
<td>Trichiasis epl by forcep</td>
<td>113</td>
<td>204</td>
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<tr>
<td>67840</td>
<td>Excision w/r w/o simple clos</td>
<td>279</td>
<td>345</td>
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<tr>
<td>67850</td>
<td>Destruction lesion eyelid</td>
<td>292</td>
<td>305</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Price 1</td>
<td>Price 2</td>
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<tr>
<td>----------</td>
<td>------------------------------------</td>
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<td>---------</td>
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<tr>
<td>11200</td>
<td>11200 tags, up to incl 15 lesions</td>
<td>70</td>
<td>115</td>
</tr>
<tr>
<td>*11201</td>
<td>tags, ea add'l 10 lesions</td>
<td>18</td>
<td>66</td>
</tr>
<tr>
<td>11400</td>
<td>tal &lt;.6cm</td>
<td>109</td>
<td>138</td>
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<tr>
<td>11401</td>
<td>tal &lt;.6-1.0cm</td>
<td>127</td>
<td>177</td>
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<tr>
<td>11402</td>
<td>tal. &lt;1.1-2.0cm</td>
<td>146</td>
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<tr>
<td>11403</td>
<td>tal. &lt;2.1-3.0cm</td>
<td>164</td>
<td>296</td>
</tr>
<tr>
<td>11404</td>
<td>tal. &lt;3.1-4.0cm</td>
<td>187</td>
<td>396</td>
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<tr>
<td>11406</td>
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<td>11420</td>
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<tr>
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<tr>
<td>11423</td>
<td>snhhf &lt; 2.1-3.0 cm2</td>
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<tr>
<td>11424</td>
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<td>11426</td>
<td>snhhf &gt; 4.0 cm2</td>
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<td>11440</td>
<td>face &lt; .6 cm3</td>
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<tr>
<td>11441</td>
<td>face &lt; .6-1.0 cm3</td>
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<td>11442</td>
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<td>167</td>
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<td>11443</td>
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<td>205</td>
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<td>11444</td>
<td>face - 3.1-4.0 cm3</td>
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<tr>
<td>11446</td>
<td>face &gt;4.0 cm3</td>
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</table>

Benign Skin Destructs

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Price 1</th>
<th>Price 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>11200</td>
<td>tags, less than or = to 15</td>
<td>70</td>
<td>115</td>
</tr>
<tr>
<td>*11201</td>
<td>tags, ea add'l 10</td>
<td>18</td>
<td>66</td>
</tr>
<tr>
<td>17000</td>
<td>benign or PM* one</td>
<td>60</td>
<td>87</td>
</tr>
<tr>
<td>*17003</td>
<td>benign or PM* 2-14 each</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td>17004</td>
<td>benign or PM* greater than =15</td>
<td>196</td>
<td>425</td>
</tr>
<tr>
<td>17106</td>
<td>cut. Vasc les10 sq. cm2(laser)</td>
<td>366</td>
<td>465</td>
</tr>
<tr>
<td>17110</td>
<td>flat warts, molluscum, &lt;14</td>
<td>87</td>
<td>89</td>
</tr>
<tr>
<td>17111</td>
<td>flat warts, molluscum, &gt;15</td>
<td>66</td>
<td>142</td>
</tr>
</tbody>
</table>
THANK YOU!