Non-Ablative Rejuvenation

Denise Baker, MD

The following potential conflict of interest relationships are germane to my presentation.

Aging Skin

- Intrinsic Aging
  - Inevitably occurs as an organism progresses in chronological age
- Extrinsic Aging
  - Results from environmental effects such as UV exposure
Intrinsic Aging

• Chronological Aging
  – Primarily occurs in the dermis
  – Changes take place in the extra cellular matrix
  – Skin naturally loses rigidity, elasticity
  – More fragile and more easily bruises or tears
  – Higher incidence of skin cancer

Extrinsic Aging

• Up to 90% of the visible skin changes attributed to aging are caused by sun exposure.
• Everybody regardless of race or ethnicity is vulnerable.

UV Radiation

• UV rays have a number of harmful effects on the skin
  – Accumulation over time
  – UVA + UVB linked to skin cancer
• UVB rays impact the surface of the skin
  • Primary cause of sunburn
• UVA rays penetrate deep into the skin
  • Heavily contribute to premature aging
• Free radical mechanism
15 years sun exposure through glass
UVA damage on left cheek

Photodamage

UV Photoimaging
Extrinsic Aging

Other Contributing Factors to Extrinsic Aging

- Smoking
- Pollution
- Stress
- Alcohol consumption
- Extreme diets

Twin Study

Matrix Metalloproteinases (MMPs)

- Involved in Skin Repair/Damage
- Collagenase (eg MMP-1 & 13)
  - Increased with smoking/photodamage
  - Non-Ablative or Ablative Thermal Injury Stimulates Collagen & Collagenase
- Gelatinase (eg MMP-9)
- Matrilysins (eg MMP-7)
**Inflammatory Cytokines**

- Express matrix proteins such as:
  - Collagen I
  - Fibronectin
  - Decorin

**The Balance**

- The balance of reactive fibroplasia and collagen remodeling is determined by the oxidative balance and the hormonal balance of the tissue.
- This explains the individual variability of the response

**Non-ablative Lasers**
Skin Rejuvenation

• The skin rejuvenation market will expand from 8.1 million procedures in 2006, to 19.3 million procedures in 2011. These procedures will generate approximately 6.6 billion dollars annually

Global Aesthetic market survey

Non-Ablative Lasers

• Stimulate growth of new dermal collagen by subclinical injury that activates fibroblasts and shrinks the collagen molecule
• Uses near infrared wavelength which does not “see” melanin, unlikely to burn skin
• Non-invasive compared to CO2 or Er:YAG
• No downtime, but subtle results


Non-Ablative Lasers

• Gradual results seen over several months
• Requires considerable patience and lower overall expectations compared with surgical facelift or ablative laser procedures
• Treat fine lines, acne scars, and elastosis through gradual collagen stimulation and shrinkage rather than resurfacing tissue destruction and regeneration

Non-Ablative Indications

• Wrinkles
• Acne scars
• Striae
• Skin laxity

Non-ablative Rejuvenation

• In clinical practice is best used in combination with other modalities which affect the skin surface and appearance such as Botulinum Toxin A, Filler, IPL, or superficial resurfacing.

Water is the Chromophore

Water Chromophore

- 1319nm/1320nm
  - Cooltouch/Thermascan
- 1450nm
  - Smoothbeam
- 1064nm
  - Gentleyag, profile
- IR
  - Titan/Sciton ST/Alma

First Generation

- Modify upper dermis while protecting epidermis
- Thermal approach
- Water chromophore
- Delayed collagen response
  - Cooltouch 1319nm/Sciton 1320nm
  - Smoothbeam 1450nm

Cool Touch

- 1320 nm wavelength
- Pulse durations: 50-100 ms
- Epidermal protection: cryogen
- Penetrates .5-1.0 mm into the dermis
- Significant discomfort
- Indications: facial rhytides, acne scars, active acne
**Sciton Thermascan**

- Operates at 1319 nm
- Pulse durations of 50-100ms
- Penetrates .5-1.0 mm into the dermis
- Epidermal protection with contact cooling
- No discomfort
- Indications: Facial rhytids, acne scars, active acne

**Candela Smooth Beam**

- Operates at 1450nm (mid infrared)
- Pulse width of 200ms
- Penetrates to .5 mm
- Epidermal protection with cryogen cooling
- Moderately painful
- Indications for facial rhytids and active acne

**Collagen Remodeling**

- Thermally insult a region in the skin
- Initiate an inflammatory response
- Stimulate fibroblast activity
- Exercise the skin’s wound healing ability to remodel or replace collagen
**Fibroblast Stimulation**

James Newman, M.D.

3 weeks post 1200 tx

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**Infrared Laser Method**

• Introduce energy into the upper dermis to cause a beneficial, collagen stimulating reaction
• Protect the epidermis and the dermis from thermal injury

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**Laser Irradiation + Chilled Plate**

Equilibrium with targeted layer depends on:
- contact time
- target depth
- plate temperature
- ~ 50 - 200 ms
Contact Plate Temperature Control

Current Generation

- Modify the upper and deep dermis while protecting the epidermis
- Thermal approach to achieve this goal
- Bulk heating - water chromophore or radiofrequency
- Immediate and delayed collagen response

Collagen Shrinkage

Temperatures of 65°C for several seconds
Cause the collagen fibers to unravel into an amorphous arrangement of denatured collagen. As the chains rearrange, fibers become shorter and thicker. Heat induced collagen contraction and fibroblasts stimulation are the basis for non-ablative aesthetic treatments.
Collagen Shrinkage

- For every 5°C incremental increase in temperature, there is a 10-fold increase in collagen denaturation. Above 70°C there is permanent damage to the collagen.
- There is a time and temperature relationship that must be maintained. Longer exposure requires lower fluences and shorter exposures require higher temperatures.

Treating Skin Laxity

- Sustained heating of the dermis
- Goals:
  - Immediate collagen contraction
  - Long-term collagen stimulation
  - Protection of the epidermis

Thermal Effects on Dermis

- Collagen shrinkage
- Collagen deposition and remodeling
Collagen Contraction due to Sustained Heating

Infrared Bulk Heating Devices

- Cutera- Titan
- Sciton - ST
- Alma - Harmony

Cutera Titan

- Broad band infrared light that operates at 100-1800 nm
- 6 sec exposure allows for bulk heating stimulating collagenesis and collagen shrinkage
- Minimal discomfort / no down time
- Appropriate for both facial and non-facial skin
- Consumable costs/direct to consumer marketing
Treatment of Facial Laxity

Pre-treatment

8 weeks after 1 treatment

Treatment of Cheek and Neck Facial Laxity

Pre-treatment

6.5 weeks after 1 treatment

Treatment of Cheeks & Submental Area

Before

1 month after 2nd treatment

3 months after 2nd treatment
Sciton-ST

- Broad Band Light in the infrared spectrum
- Operates at 800 to 1400nm
- Stimulates collagenesis and collagen shrinkage
- Large spot size allows faster treatments
- Appropriate for facial and non-facial skin
- No consumable costs

Sciton ST

Before and after 3 treatments - 5 passes 35-40j/cm²

Sciton ST

Before and after 2 treatments - 5 passes 35-40j/cm²
Sciton ST

Before and after 1 treatments - 4 passes 40j/cm²

Sciton ST

Before and after 1 treatments - 4 passes 40j/cm²

Sciton ST

Before and after 3 treatments - 5 passes 35-40j/cm²
Sciton ST

Before and after 1 treatment at 1 month - 5 passes 35j/cm²

Alma-Harmony

• Broad band light
  ST - near infrared spectrum 780-1000
    bulk heating for skin laxity
  Long pulse -mid infrared spectrum 1320
    stimulates reactive fibroplasia in the superficial dermis
Consumable costs

Alma Harmony

Combination 6 tx. AFT 540, 570 and ST 3 passes
Complications

• Complications occur with excess heat or inadequate epidermal protection
• Excessive heat can occur from either prolonged exposure or inappropriate fluences, or both

Complication

not enough cooling/excess energy

1320 nm Treatment: Blistering