

## CANCER

- > **CO<sub>2</sub>** The CO<sub>2</sub> laser has been used for making bloodless excisions of invasive malignant melanomas. This may also be theoretically beneficial by sealing lymphatics to reduce in transit cancer cells from metastasizing. The ablative use of the CO<sub>2</sub> laser coupled with curettage has been demonstrated to permit rapid, bloodless treatment of many superficial BCC's in a single treatment session.
- > **PDT** Photodynamic therapy has been performed for decades on both internal and external malignancies. The treatment of large numbers of actinic keratoses is now possible with pretreatment topical application of aminolevulinic acid (ALA) followed by exposure to blue fluorescent light, LELs or LEDs. The systemic use of the photosensitizer hematoporphyrin derivative (HPD) is limited due to the prolonged photosensitivity it produces.
- > **CHEMOTHERAPY DRUG DELIVERY** Enhancing the percutaneous delivery of cisplatin chemotherapy is possible by pretreating the site with either ablative or non-ablative fractional laser therapy

## REJUVENATION

- > **CARBON DIOXIDE (CW)** The CO<sub>2</sub> laser provided improved control over dermabrasion and chemical peels, but long healing times, persistent erythema and possible permanent depigmentation proved limiting.
- > **CO<sub>2</sub> ULTRASHORT PULSED** Tissue-tightening for rejuvenation was first obtained using this device.
- > **CO<sub>2</sub> SCANNING** Scanning devices gave faster treatment times, improved precision and accuracy.
- > **ERBIUM** Reduced tightening was the result of the shallow penetration of this wavelength.
- > **FRACTIONAL ABLATION** Improved results and more rapid healing with fewer complications made this device more acceptable even though retreatments were commonly required for best results.
- > **NON-ABLATIVE** PDL, IPL, 1320 nm Nd:YAG, Erbium: glass (1540 nm), and light emitting diodes (LED) all required a series of treatments
- > **COMBINATION THERAPIES** Often nonablative laser or fractional ablative laser treatments followed by the topical application of growth factors, platelet rich plasma or stem cells increase the potential for improving rejuvenation results in the near future.
- > **LIGHT EMITTING DIODES (LED)** Using an array of LED's multiple times can improve sun damaged skin texture and rhytides non-invasively.

## VASCULAR LESIONS

- > **ARGON** The first laser to be successfully used to treat vascular lesions was so sufficiently imprecise in its absorption that it caused epidermal injury, significant pain, long healing times, incomplete removal and sometimes, permanent scarring and depigmentation.
- > **COPPER VAPOR LASER** This large, cumbersome device produced a small beam of yellow or green light which often gave better results than older technologies, but required long, painful treatments.
- > **PULSED DYE LASER** This laser used the new concept of selective photothermolysis to permit the safe and effective treatment of children. The large spot sizes coupled with dynamic cooling allowed rapid treatment and reduced pain. It remains the gold standard for treating children with vascular lesions.
- > **POTASSIUM TITANYL PHOSPHATE (KTP) CRYSTAL** This frequency-doubled Nd:YAG laser gave good results especially in the treatment of facial telangiectasia.
- > **INTENSE PULSED LIGHT (IPL)** This non-laser used a large beam of filtered light of different wavelengths to treat large areas of solar damage and telangiectasia in adults.
- > **ND:YAG** Longer pulses of 500 msec light at 1,064 nm was beneficial in the treatment of facial reticular veins in adults.
- > **ALEXANDRITE** Long pulses of 2-20 msec light at 755 nm is effective in the treatment of facial reticular veins in adults.

# Chronologic Laser Advances & Applications

## ▶ ACNE & ACNE SCARRING

- > Using non-invasive LELs, non-laser blue fluorescent light, LEDs alone or in combination with topical aminolevulinic acid (ALA), resistant acne can be improved. Mid-infrared lasers (1320 nm, 1450 nm and 1540 nm) can non-selectively damage sebaceous glands by heat to temporarily improve acne. Acne scars can be improved with multiple retreatments with pulsed dye laser.

## ▶ BODY ODOR

- > There have been preliminary reports of successfully reducing axillary body odor by heating apocrine glands with the 1444 nm Nd: YAG laser.

## ▶ HAIR

- > **HAIR REMOVAL** Permanent hair reduction has been achieved with many prescription devices including normal mode ruby, normal mode alexandrite, diode, Nd: YAG and IPL. All are minimally painful and require multiple retreatments for maximum hair reduction. Several over-the-counter diode laser devices have received FDA clearance for home use and have proven to be safe and effective, although, like the prescription device, multiple retreatments are required.

Regrowth of androgenetic alopecia has been reported following multiple treatments with an over-the-counter light-emitting diode (LED) device.

## ▶ SCARS

- > **CO<sub>2</sub>** Can be used to bloodlessly excise larger keloids to reduce the size and density which makes steroid injections more effective, but recurrences are common.
- > **PDL** Excellent results following pulsed dye laser (PDL) treatments have been demonstrated with presternal hypertrophic scars. A series of treatments is typically required.

## ▶ WOUND HEALING

- > The stimulation of wound healing through a process known as biomodulation, increases the motility of both keratinocytes and fibroblasts using low-energy lasers (LEL) and light-emitting diodes (LED).