1: Photodermatol 1985 Oct;2(5):303-9

Lasers in dermatology: a selective historical review.

Morelli JG, Parrish JA

Lasers have been used in dermatology for over 20 years. Multiple lesions including port wine stains, decorative tattoos, malignant tumors, and keloids have been treated with various lasers. Initial therapy exploited the laser property of spatial confinement of an extremely high energy density to create a localized thermal effect. With increased understanding of laser technology, skin optics, and laser-tissue interactions, other laser properties such as monochromaticity and pulsewidth variability have been exploited to even further confine damage to pathologic tissue while maximally sparing surrounding normal tissue. This increased knowledge has led to a vast improvement in the results of dermatologic laser therapy. Despite this, laser therapy still remains a surgical art, with wound healing playing a large part in the final outcome.

Publication Types:
Review

PMID: 3906597

1: J Am Acad Dermatol 1996 Jan;34(1):1-25; quiz 26-8

Lasers in dermatology.

Spicer MS, Goldberg DJ

New Jersey Medical School, Newark 07065, USA.

The use of dermatologic laser therapy is rapidly expanding. Thirty years of experience has produced advances in the technology, techniques, and therapeutic efficacy of dermatologic lasers. The original lasers have been improved and modified, and new types of lasers have expanded the dermatologist's therapeutic repertoire. Extensive research has provided a greater understanding of the skin's clinical and histologic response to laser treatment. This has allowed dermatologists to expand their therapeutic options and techniques and to improve clinical outcome.

PMID: 8543678

1: J Dermatol 2000 Nov;27(11):700-5

Lasers in dermatology--a critical update.

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[Medline record in process]

Lasers are accepted for treating nevus of Ota, other pigmented lesions, hair removal, vascular lesions, leg veins, tattoos, and for skin resurfacing. These are photothermal treatments, in which certain skin "targets" are heated, followed by selective wound healing. Small pigmented targets such as the dermal melanocytes in nevus of Ota, are best treated with short (< 1 microsecond) laser pulses. Large targets, such as hair follicles, have long thermal relaxation times and are best treated with longer pulses. In general, the ideal pulse duration is about equal to the thermal relaxation time for pigmented targets. However, sometimes the actual target is not pigmented and is at some distance from a pigmented structure. For example the follicular stem cells, which are not pigmented, line the outer root sheath far away from the pigmented hair shaft. These cells appear to be an important target for permanent hair destruction. Pulses longer than the thermal relaxation time of the hair shaft allow heat conduction and better damage of follicular stem cells. Epidermal cooling works far better with pulses longer than about 10 ms, delivered through a cold medium (e.g., cold sapphire in contact with the skin). Thus, the combination of cooling and long near-infrared laser pulses allows safe and effective pigmented hair removal in all skin types. In contrast, epidermal protection from short pulses is best with dynamic pre-cooling (e.g., cryogen spray), for example during portwine stain treatment. A major challenge for the future of photothermal laser treatments is to develop ways of treating non-pigmented skin "targets". New uses for lasers are emerging. Diagnostic laser imaging and spectroscopy will soon emerge in dermatology. A near-infrared laser confocal microscope provides histology-like images of human skin. Imaging is painless and takes only a few minutes. Lesions including melanoma, basal cell and squamous cell carcinoma, microvascular and inflammatory lesions, dermatophytes, verrucae, etc, have distinct appearances. However, sensitivity and specificity of laser-based diagnostic imaging has not yet been compared with histopathology. Laser phototherapy is also emerging in dermatology. The 308 nm excimer laser has recently been shown to clear psoriasis faster than conventional phototherapy. Scalp psoriasis may soon be treated by fiber-optic delivery of this UV laser. The variety and utility of lasers in dermatology will probably continue to grow.

PMID: 11138535

1: *Arthroscopy* 1997 Apr;13(2):151-5 Related Articles, Books

Mutagenic effects of the Excimer laser using a fibroblast transformation assay.

Hendrich C, Siebert WE

Department of Orthopaedic Surgery, University of Wurzburg, Germany.

For over 10 years fiber-guided laser systems have been used in arthroscopic surgery. The possibility of a mutagenic risk by the use of lasers has not been sufficiently repudiated, especially for the Excimer laser at a wavelength of 308 nm, which is close to the absorption spectrum of DNA. The aim of this study therefore was to approximate the mutagenic risk of UV-laser wavelengths using an in vitro transformation assay. BALB/3T3 fibroblasts were irradiated with Excimer laser wavelengths of 248 nm and 308 nm. The resulting transformation rates were compared to those of untreated cells and to cells that were subjected to an x-ray dose of 1 Gy. Pulse energy, frequency, and irradiation time were varied over a wide range, from sublethal fluences to total cell death. Furthermore, the effect of repeated irradiation (split-dose) was analyzed. The results for the 248 nm irradiation showed a highly significant transformation rate ($P < 10(-9)$). In contrast, results for the 308 nm irradiation were not at all significant ($P < .18$). The transformation rate of cells that were treated with x-rays was increased exponentially compared with the controls. Although an increased transformation rate was found after 248 nm irradiation, that of the wavelength 308 nm was not enhanced. The study therefore shows that the use of the Excimer wavelength 308 nm in arthroscopic procedures does not imply a specific mutagenic risk.

PMID: 9127071

1: *Clin Orthop* 1995 Jan;(310):72-81 Related Articles, Books

The excimer laser in orthopaedics.

Glossop ND, Jackson RW, Koort HJ, Reed SC, Randle JA

Department of Orthopaedics, Baylor University Medical Center, Dallas, TX 75246, USA.

This review details clinical and laboratory experience with the 308 nm XeCl excimer laser. This ultraviolet laser is not approved yet for use in arthroscopy, but has been shown to be extremely proficient for debridement of degenerate articular cartilage and meniscus. It has fewer advantages than conventional techniques for synovectomy, meniscectomy, and lateral release. Preliminary in vitro and in vivo studies were performed to investigate the character of laser-irradiated articular cartilage and to search for evidence of regeneration. A model of arthritis was created in rabbits to test the effects of the laser. Partial-thickness cuts in articular cartilage also were irradiated to test for cartilage regeneration. In vitro results indicated that the cartilage was sealed, with only a negligible loss in thickness. The results of live rabbit studies initially showed a similar sealing under scanning electron and light microscopy; however, it tended to break down in time. The results of autoradiographic and histologic studies showed no evidence of cartilage regeneration. Recent evidence suggests that the laser may adversely affect chondrocyte vitality in a region beyond the region of visible damage. There is no evidence to suggest that the laser is mutagenic.

Publication Types:
- Review
- Review, tutorial

PMID: 7641463

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1: Lasers Surg Med 1984;4(1):73-7

Response of psoriasis to red laser light (630 nm) following systemic injection of hematoporphyrin derivative.

Berns MW, Rettenmaier M, McCullough J, Coffey J, Wile A, Berman M, DiSaia P, Weinstein G

Systemically injected hematoporphyrin derivative (HPD) in combination with red laser light (630 nm) was used to treat a patient with intraepithelial neoplasia of the vulva. Since the patient had psoriasis in the mons pubis area this region also was exposed to the red light. The psoriasis treatment area was divided into two regions receiving 40 and 20 J/cm2. Both psoriatic zones responded vigorously to the HPD + light treatment, forming eschars by 1 week postirradiation. All three treatment zones (the neoplastic area and the two psoriatic areas) underwent normal reepithelialization by 17 days.

PMID: 6235419

1: Br J Dermatol 1984 Aug;111(2):243-4

Lasers, psoriasis and the public.

Colver GB, Cherry GW, Ryan TJ

Publication Types:
Letter

PMID: 6466561

1: Lasers Surg Med 1985;5(5):453-6

Preliminary investigative studies with PDT in dermatologic and plastic surgery.

Goldman L, Gregory RO, La Plant M

PDT has been shown to be of value in inoperable basal and squamous skin cancers and in cutaneous metastases. Azone, a new investigative vehicle for HpD, is of value more for intralesional injections than for topical applications in tumors, except perhaps for superficial mucous membrane lesions. The more flexible gold head vapor is of definite value in the PDT program. For test models for PDT studies in dermatology and plastic surgery with HpD and other fluorochromes, single thickened resistant plaques of psoriasis and the common baso squamous acanthoma (seborrheic warty growth) have been used. In all these studies, adequate controls are necessary.

PMID: 4068877

1: Lancet 1985 Sep 28;2(8457):725

Laser surgery for psoriasis.

Bekassy Z, Astedt B

Publication Types:
Letter

PMID: 2863705

1: Br J Dermatol 1986 Apr;114(4):489-92

Carbon dioxide laser vaporization of plaque psoriasis.

Bekassy Z, Astedt B

The treatment of circumscribed plaque psoriasis with a carbon dioxide (CO2) laser as an outpatient procedure is reported in three patients. The growth of new tissue over the healed laser vaporized area was similar to normal skin and has remained free of psoriasis during a follow-up of 3 X 5 years. Laser vaporization appears to be a simple and effective alternative to conventional therapy in cases of plaque psoriasis.

PMID: 3964547

1: Ann Acad Med Singapore 1987 Oct;16(4):713-5

Initial experience with CO2 laser in treating dermatological conditions.

Lee CT, Tham SN, Tan T

Middle Road Hospital, Singapore.

CO2 laser was first used in the treatment of melanomas in animals. Since then, it has been successfully used in treating many dermatological conditions. A total of 47 patients were treated once as outpatients in Middle Road Hospital by using Model 720 Sharplan CO2 Laser System and Yoshida Opelaser-01 CO2 Laser System to determine the usefulness of CO2 laser in the treatment of various dermatological conditions. The laser was used mainly in the defocused mode at 10 watts. Local anaesthetic with 1% lignocaine HCL was employed in all cases. 3 patients defaulted follow-up. Of the 30 patients with warts, most of which were recalcitrant, 14 were cured and the remaining 16 showed marked improvement. 4 of the 5 patients with lichen simplex chronicus were cured. 1 patient each of the following conditions were also treated; prurigo nodularis, psoriasis, solar keratosis, ingrowing toe nail, Bowen's disease, infected callosity and lichen amyloidosis; cure was achieved in the former 4 conditions. The laser failed to cure 2 patients with pyogenic granuloma. Side effects included hypopigmentation (62%), mild post-operative pain (11%), scarring (11%), excess granulation tissue (11%), and infection (2%). CO2 laser is a potentially useful, effective and safe treatment modality for many dermatological conditions.

PMID: 3128157