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An Update on Laser Therapy for Basal Cell Carcinoma

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Basal Cell Carcinoma (BCC) is the most common form of skin cancer worldwide with more than two million cases diagnosed annually in the United States. Although this tumor grows slowly and rarely metastasizes, it can cause significant destruction of local tissue and result in cosmetic and functional morbidity. Standard treatments for BCC include surgical excision, Mohs Micrographic Surgery, cryosurgery, electrodessication and curettage, and topical modalities. Surgical treatments often result in disfigurement, while topical therapies frequently result in recurrence. Thus, there is a need for alternative non-surgical options that are effective and have a lower risk of side effects than existing therapies. This has led to the investigation of laser therapy for the treatment of BCC.

Laser treatment of BCC can be based on selective photothermolysis of the tumor vasculature which has the advantage of minimal damage to normal tissue [1,2]. The microvasculature of BCC is significantly larger compared to normal skin [3,4], allowing for selective targeting of BCC with preservation of surrounding structures. Destruction of the tumor's vascular supply seems to lead to tumor regression. However, a mass heating effect may play a role in destruction of the tumor at higher energies.

The ideal wavelength for the treatment of BCC has yet to be determined. Preliminary investigations for laser treatment of BCC have primarily been with the pulsed-dye laser (PDL). A pilot study with the PDL reported a 92% regression rate of nodular BCC less than 1.5 cm after 4 treatments [5]. This regression was maintained long-term through 21 month follow-up [6]. A single treatment with the PDL has shown 56% clearance of BCC [7]. It has previously been shown that pulse stacking may increase the depth of injury [8]. Thus, clearance rates have been shown to increase to 71% with a single treatment with the PDL with stacked pulses [9].

While the PDL is well absorbed by oxyhemoglobin, its depth of penetration into the dermis is limited. Lasers with longer wavelengths that target vessels deeper into the dermis such as the 755 nm long-pulsed alexandrite laser, or 1064 nm long-pulsed neodymium yttrium aluminum garnet (Nd:YAG) laser, may potentially decrease the risk of sub dermal recurrence seen in treatment of BCC with more superficial lasers such as the PDL. A case of basal cell nevus syndrome reported a decrease in tumor burden with the alexandrite laser [10]. The tumor vessels of BCC are arterialized, whereas the alexandrite laser wavelength is more strongly absorbed by deoxygenated blood, making this laser suboptimal for the treatment of BCC. A study investigating a combined PDL and long-pulsed Nd:YAG laser achieved only 58% tumor clearance after 4 treatments [11]. However, this study used low Nd:YAG laser fluencies.

The long-pulsed 1064 nm Nd:YAG combines deep penetration of tissue, with preferential arterial blood absorption, which may be a more optimal non-surgical approach to the treatment of BCC. A small, prospective, open-label pilot study of 10 patients showed an 80% histological clearance rate overall after one treatment with a long-pulsed 1064 nm Nd:YAG laser [2]. The clearance rate increased to 100% after the fluence was increased from 80 J/cm^2 to 120 J/cm^2. To our knowledge, this is the only investigation of laser treatment of BCC reporting 100% clearance.

There are many potential benefits to laser treatment of BCC including ease of treatments, lack of significant downtime, and absence of a surgical scar. Another benefit to laser treatments is potential improvement of the initial biopsy scar as a result of collagen remodeling from heating of the dermis. Laser treatment also decreases the risk of complications such as infection or bleeding.

Laser therapy of BCC is a promising, non-invasive therapeutic modality that may offer a safe, scar less and efficient alternative for treating patients with inoperable tumors or those who are inappropriate surgical candidates. Clearance rates with laser treatments appear to be at least comparable to standard treatments for BCC. Another consideration which may affect the clearance rates is the role of anticoagulation when using vascular targeted lasers. Larger studies with long-term follow-up are warranted to determine the optimal treatment parameters for the treatment of BCC.

References

1. Anderson RR, Parrish JA (1983) Selective photothermolysis: precise microsurgery by selective absorption of pulsed radiation. Science 220: 524-527.
2. Ortiz AE, Anderson RR, Avram MM (2013) 1064 nm Nd: YAG Laser Treatment of Basal Cell Carcinoma. October 3-6, Hyatt Regency, Chicago, Illinois.
3. Bedlow AJ, Stanton AW, Cliff S, Mortimer PS (1999) Basal cell carcinoma--an in-vivo model of human tumour microcirculation? Exp Dermatol 8: 222-226.
4. Gonzalez S, Tannous Z (2002) Real-time, in vivo confocal reflectance microscopy of basal cell carcinoma. J Am Acad Dermatol 47: 869-874.
5. Shah SM, Konnikov N, Duncan LM, Tannous ZS (2009) The effect of 595 nm pulsed dye laser on superficial and nodular basal cell carcinomas. Lasers Surg Med 41: 417-422.
6. Konnikov N, Avram M, Jarell A, Tannous Z (2011) Pulsed dye laser as a novel non-surgical treatment for basal cell carcinomas: response and follow up 12-21 months after treatment. Lasers Surg Med 43: 72-78.
7. Ballard CJ, Rivas MP, McLeod MP, Choudhary S, Elgart GW, et al. (2011) The pulsed dye laser for the treatment of basal cell carcinoma. Lasers Med Sci 26: 641-644.
8. Ortiz AE, Lewis W, Anderson RR (2011) Pulse Stacking with a 1450 nm Laser cans Increase Depth of Treatment. Gaylord Texan Resort and Convention Center, Grapevine, Texas.

ISSN: 2373-1044

9. Tran HT, Lee RA, Oganesyan G, Jiang SB (2012) Single treatment of non-melanoma skin cancers using a pulsed-dye laser with stacked pulses. Lasers Surg Med 44: 459-467.

10. Ibrahimi OA, Sakamoto FH, Tannous Z, Anderson RR (2011) 755 nm alexandrite laser for the reduction of tumor burden in basal cell Nevus syndrome. Lasers Surg Med 43: 68-71.

11. Jalian HR, Avram MM, Stankiewicz KJ, Shofner JD, Tannous Z (2013) Combined 585 nm pulsed-dye and 1,064 nm Nd:YAG lasers for the treatment of basal cell carcinoma. Lasers Surg Med.