ISSN 1855-9913

Journal of the Laser and Health Academy
Vol. 2018, No.1; www.laserandhealth.com

Limitation of Selective Photothermolysis Theory

Hakeem Eltarky
Sharjah University Laser Training and Research Center, UAE

SUMMARY

Selective photothermolysis (SPT) theory was introduced 35 years ago for laser treatment of pigmented lesions, hair removal, vascular lesions, tattoos and skin resurfacing. The SPT theory suggested that the laser pulse duration must be less than or equal to the thermal relaxation time of the target (TRT).

However, this is may be correct regarding pigmented lesions and tattoos, but may not be correct regarding vascular lesions and hair removal.

In the case of vascular lesions (TRT is about 1 ms), the trend toward longer pulse widths has been driven mostly by the desire to eliminate purpura as an immediate side effect of dye laser treatment. Pulse widths equal to or more than 10 ms produce little or no immediate purpura. Also, 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 TRT of the hair shaft allow heat conduction and better damage to the follicular stem cells. In addition to that, 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 for 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 port wine stain treatment. On the other hand, small targets such as thin hair and small veins are best treated with short laser pulse widths. Large targets, such as thick hair and large veins are best treated with longer pulses. This means that perhaps, we can say that the laser pulse duration does not depend on the TRT of the target, but depends on its size, and we must protect the skin with the right cooling method, but this still remains to be tested in prospective controlled clinical trials.

Laser Treatment in the Management of Hemangiomas and Capillary Vascular Malformations in the Head and Neck Region

Paula Lozanova[1], Simeon Georgiev[2]
[1]USHMFS; Paula Fines Clinical Centre, Sofia, Bulgaria
[1]USHMFS; Sofia, Bulgaria

SUMMARY

Objectives: Vascular lesions of the head and neck have a relatively high incidence. They can be very troublesome to the patient and are often difficult to treat. The use of laser in the management of advanced clinical cases of hemangiomas and capillary vascular malformations in the head and neck can be challenging, but is often the treatment of choice.

Methods: The protocol of treatment consists of both hemostatic and thermal clotting. The light energy emitted by the laser is selectively absorbed by intravascular proteins to heat, aggregate and subsequently damage the vessel, resulting in occlusion and fibrosis.

Results: Treatment settings with pulse durations from 20-25 ms, fluence 120-150 J/cm2, frequency 1.0 Hz and 2-4 mm laser spot are generally required for optimal improvement. Multiple treatments are required.

Conclusions: Significant clinical improvement can be achieved with (Nd:YAG) laser when used transcutaneously and transmucosally. In advanced clinical cases we prefer this treatment, because of its superior efficacy and low prevalence of adverse effects.