

Onychomycosis and IPL: case study

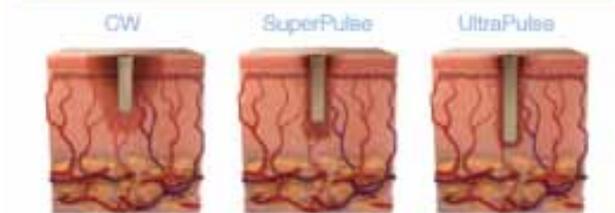
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Background: Onychomycosis is one of the commonest dermatological conditions. It is an infection of the nail apparatus by fungi that include dermatophytes, nondermatophyte moulds and yeasts (mainly *Candida* species). The toenails are affected in 80% of all cases of onychomycosis; dermatophyte infection, mostly due to *Trichophyton rubrum*, is the cause in over 90% of cases. Laboratory diagnosis is required and consists of microscopy to visualize fungal elements in the nail sample and culture to identify the species concerned. Traditional therapy includes both topical and systemic antimycotic agents. The primary aim of treatment is to eradicate the organism as demonstrated by microscopy and culture. This is defined as the primary end-point in almost all properly conducted studies. These pharmacological treatments, however, have high toxicity rate and can cause numerous side effects.

An innovative method of treating Onychomycosis is based on delivering a beam of intense light (IPL) radiation into a target area, to thermally deactivate pathogens microorganism without causing substantial unwanted injury. According to the Selective Photothermolysis principle, such radiation absorbed by the target tissue is converted to thermal energy that cause deactivation of the parasite organism by destroying it or render it unable to grow or reproduce itself.

The quantity of energy and the consequent temperature, applied to the target (nail bed) must be sufficient to achieve the fungus deactivation, but not enough to cause collateral damage on adjacent tissue. This key factor is called "Thermal Relaxation Time" (TRT). This parameter is used for estimating the time required for heat to conduct away from directly heated tissue region. It represents the time taken for heated tissue to lose 50% of its heat through diffusion. The epidermis TRT duration is 10 ms; exposure times should not exceed this value. Pulse duration assumes, therefore, together with its wavelength a critical importance in determination of lesional clearance and minimizing side effects. Pulse duration choice is as important as that of the wavelength.

IMPACT OF PULSE MODE ON TREATMENT OUTCOMES



PULSE MODE	CW	SuperPulse	UltraPulse
Pulse Widths	Long	Short	Shortest
Thermal Zone	Widest	Narrow	Narrowest
Discomfort	High	Medium	Low
Downtime	Long	Short	Shortest

Method: local irradiation therapy with Forma™ (Forma-tk Ltd. Israel) IPL technology using a 530 nm – 1100 nm prism combined with 5 ms pulse duration (within TRT value) delivering 21.8 J/cm² of fluence. A previous mechanical partial reduction of the lesion was performed directly on the nail plate, using a nail milling cutter. Six sessions were then administrated having one week interval between each.



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Case: female 28 Y/O affected by Distal and Lateral Subungual Onychomycosis (DLSO) on her right (Dx) great toe. Microscopic exam and laboratory culture analysis showed a dermatophyte infection caused by *Trichophyton rubrum*.

Results: laboratory culture analysis resulted after 6 sessions (six weeks) negative. 8 weeks later (3½ months from 1st session) the toe nail appears completely renewed without any lesion.

