

# Low Intensity Laser Therapy in the Treatment of Periphero-Arterial Occlusive Disease

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This study consists of two patients who had previously been subjected to amputation of a lower extremity and were facing a similar situation at time of presentation in March 2004. Both had suffered from a longstanding history of arterial insufficiency, accompanied by multiple dermal ulcers.

In each instance, the forefoot was deeply cyanotic and edematous, the mid foot demonstrated violent erythema and both feet were cold to the touch. There was a history of unrelenting pain and inability to sleep. Symptoms were being managed by the utilization of multiple pharmaceuticals including analgesics, medications for sleep and depression, along with aggressive oral and intravenous antibiotic therapy, and various ointments applied locally.

## Case No. 1: WLF

**Diagnosis:** Buerger's Disease  
(Thromboangiitis Obliterans)

**Surgical Procedures:** Amputation left leg April 2003.

**Therapy/Medications:** Analgesics, vasodilators, antidepressants, sleeping medications, localized wound care consisting of anti-inflammatory, antibiotic ointments.

**Age:** 58

**Medical/Social History** Property Manager  
Confined to a wheelchair  
Has left prosthesis  
Unemployed one year  
Depressed/Suicidal.

## Case No. 2: DM

Diabetes Mellitus with advanced atherosclerosis.

Amputation right leg May 1999.  
Amputation left 5<sup>th</sup> toe Sept 1999.  
Bilateral femoro-popliteal bypass grafts 1998.  
Penile implant 1984.

Antibiotics: Ceftazidime IV, Clindamycin orally.  
Other: Altace, insulin injections twice daily, debridement by home care daily, dressings and utilization of copious amounts of antibiotic, anti-inflammatory ointments.

**Age:** 61

Semi-retired, manager of a delivery business  
Has right prosthesis  
Walking minimal due to intermittent claudication and pain in foot.  
Depression, anger, fear, uncooperative.

# Patient Case Profile



Diagnosis: Buerger's Disease (Thromboangitis obliterans)  
12 treatments over 3 weeks

Case No. 1

Initial: (photos 1-3)



**Final photo:**  
June 11, colour normal, one ulcer totally healed, 2nd ulcer almost healed, foot warm to the touch, ready for weight bearing.



**Interim:** (photos 4-5)  
2 days after initiating treatments, foot no longer in jeopardy. Improved arterial circulation and venous filling.

# Patient Case Profile



Diagnosis: Atherosclerosis with multiple dermal ulcers  
10 treatments over 2 weeks

Case No. 2

Initial: Photos (1-3) demonstrating dermal ulcers of diabetic extremity



**Interim:** (4) Five days after initiating treatment, 4 ulcers on forefoot healing rapidly.



**Final photo:** (5-6) Colour normal, improved circulation, all ulcers (initially 8) except 1 on anterior tibia and heel, resolved. Weight bearing comfortably

## Discussion of Progress:

In both cases, following two treatments of Low Intensity Laser Therapy over consecutive days, the feet became relatively warm and pain diminished markedly along with the cyanosis and erythema. The mobility of both feet and toes was largely restored and the extremities were no longer deemed to be in jeopardy.

## Method of Treatment:

- I. Laser was applied over the lower spinal cord including the nerve roots, in addition to the autonomic nervous system and the ganglia. It should be noted that the autonomic nervous system has significant systemic effects on tissue, specifically, an increase in:
  - a) Arterial pressure.
  - b) Blood flow to active muscles.
  - c) Rate of basal cellular metabolism throughout the body.
  - d) Blood glucose concentration.
  - e) Glycolysis in the liver and muscle.

Preganglionic motor neurons of sympathetic nerve fibers originate in the spinal cord between cord segments T1 and L2, passing via the sympathetic ganglia chain to synapse with the postganglionic neurons in the tissue and organs of the body.<sup>(1)</sup> This explains the decision to treat the sympathetic and central nervous system which regulate the vascular structures of the lower extremities.

- II. Low Intensity Laser Therapy was also applied to the tissues locally. It has been well documented that laser has significant anti-inflammatory and analgesic effects in addition to stimulating angiogenesis.<sup>(2)</sup>

Treatments were applied initially for 3 consecutive days and subsequently on alternate days until a state of stability had occurred and the limbs were felt to be satisfactorily healed to sustain weightbearing. Medications were gradually discontinued with the exception of insulin injections in the diabetic situation. The ulcer on the heel of the diabetic patient had decreased in size by 70% and was healing satisfactorily after 2 weeks of treatment. All other ulcers had healed almost completely.

## Conclusions:

1. These cases illustrate the dramatic effectiveness of Low Intensity Laser Therapy in the treatment of periphero-vascular occlusive disease.
2. Moreover, they indicate the need for practitioners to re-evaluate the current therapeutic approach based on the use of high doses of antibiotics, analgesics, vasodilators, anti-inflammatory agents and local ointments applied to the ulcers. It is clear that this approach is totally ineffective and indeed, may be counterproductive as ulcers continued to enlarge despite aggressive drug therapy.
3. It appears based on the evidence that the previous amputations may have been avoidable.
4. A superior approach of the treatment of arterio-vascular occlusive disease is demonstrated and the recommendation is that it should be more widely employed.

## References

1. Guyton, A.C. and Hall, J.E.: *Textbook of Medical Physiology*. 10<sup>th</sup> Edition, Philadelphia: W.B. Saunders Company, 2000.
2. Karu, T.: *The Science of Low Power Laser Therapy*. Gordon and Breach Science Publishers, 1997.