



High frequent muscle stimulation as a treatment for painful neuropathy for type 2 diabetes improves the micro vascular endothelial cell function

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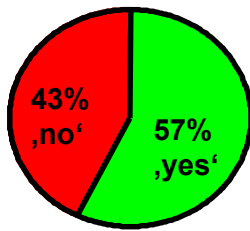
Patient characteristics (n=27)

Age	66,1 (±6,9)
Sex (f/m)	11/17
Duration of Diabetes	10 (±8)
HbA1c	6,7 (± 0,8)
BMI	31,3 (±5,3)
NDS	5,4 (±2,6)
NSS	7,5 (±1,2)

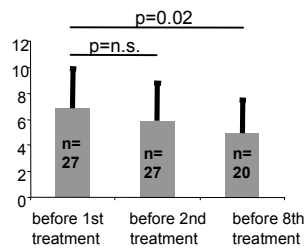
Methodology: High tone therapy was applied to the patients twice a week for 60 minutes and for a total of eight weeks. With the aid of visual analog scales (1= no pain, 10 = very strong pain) the participants' extent of the symptoms (prickle, burning, pain, numbness) before and after high tone therapy was evaluated.

Technically speaking the classical electrotherapy is an amplitude modulation: The frequency of the applied current remains constant while the current intensity is modulated, i.e. varies over time. In Low Frequency region modulation frequencies of 0 to 200 Hz are being used while the middle frequency range uses carrier frequencies of typical 4.000 Hz. In High Tone Therapy both, amplitude (intensity of the current) and frequency, are modulated at the same time. According to the individual threshold curve for current sensation the higher the frequency the higher is the energy that can be introduced to the body. Therefore it is a „Simultaneous Frequency and Amplitude Modulation“. The HITop High Tone Therapy unit uses the frequency range from 4.000 to 32.000Hz.

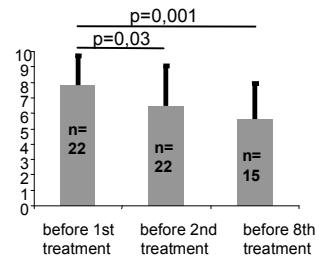
1. Subjective improvement of the pathology



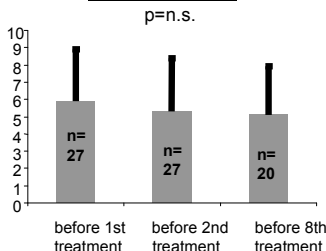
2. Pain, Foot Complete cohort



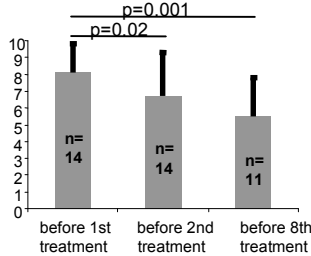
3. Pain, Foot Pain scale > 5



4. Prickle, Foot Complete cohort

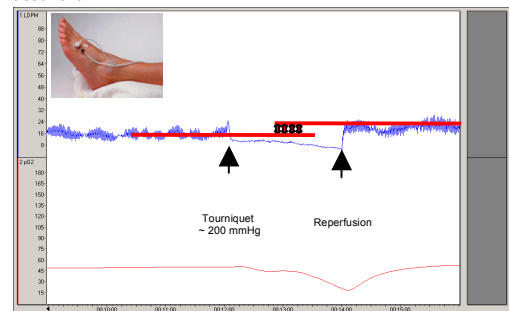


5. Prickle, Foot Scale > 5

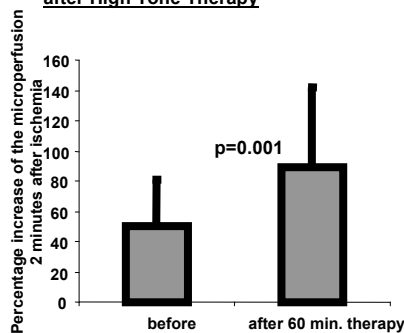


6. Laser Doppler – Measurement of the Microcirculation on the back of the foot

With a Laser Doppler Unit the relative increase of the capillary blood flow in the skin on the back of the foot after a 2 minute vessel occlusion was measured before and after a 1 hour High Tone treatment.



7. Improved micro vascular endothelial cell function after High Tone Therapy



8. Conclusions:

- High Tone therapy reduces pain sensation and prickle paraesthesia for patients with diabetes type 2
- High Tone therapy improves the micro vascular endothelial cell function
- The effect of the treatment on symptoms and micro circulation have to be correlated in larger cohorts in order to analyze the patho-physiological connection

• Limitations of the study: no placebo intervention possible