Hyperspectral evaluation of efficiency of decongestive therapy for lymphedema: the L-ratio

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ABSTRACT

Background and objectives: Increasing awareness for need for better care of lymphological diseases in clinical practise discovers current deficits in its exercise, especially in case of the first phase of the complex physical decongestive therapy (CDT). Clear controlled supply structures are needed. Hyperspectral imaging is able to record light spectra from 500 to 1000 nm, provides information about physiologic parameters of the recorded tissue area (e.g., tissue water, fat and oxygenation).

Design, setting and measurements: The role of the L-ratio for evaluating of efficiency of decongestive therapy for lymphedema was pioneering analysed. Absorption spectra before, during and after decongestive therapy were documented. The L-ratio (absorption 960 nm [water] / absorption 930 nm [fat]) was made for the time points: 0 minutes, after 60 minutes and in one case after 120 minutes. Decongestive therapy was standardized made by using a lympha-mat® GRADIENT.

Results: Hyperspectral data were won in 3 cases of chronic decompensated lymphedema of the lower leg, baseline absorptions: 930 nm mean ± s.d. 0.41 ± 0.06, 960 nm mean ± s.d. 0.52 ± 0.07, after 60 minutes: 930 nm mean ± s.d. 0.47 ± 0.04, 960 nm mean ± s.d. 0.56 ± 0.05, after 120 minutes: 930 nm 0.48, 960 nm 0.55, baseline L-ratio mean ± s.d. 1.26 ± 0.02, after 60 minutes mean ± s.d. 1.20 ± 0.02, after 120 minutes: 1.15.

Conclusion: L-ratio could be a non-invasive, easy made tool for the evaluation of efficiency of decongestive therapy for lymphedema.
Figure 1: Follow up L-ratio for the time points: 0 minutes, after 60 minutes and in one case after 120 minutes.