

ASSESSING LYMPHEDEMA BY TISSUE INDENTATION FORCE AND LOCAL TISSUE WATER

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ABSTRACT

Tissue water and mechanical property changes accompany lymphedema, however the relationship between these changes, if any, is unclear. Local tissue water is quantifiable using the tissue's dielectric constant (TDC), but a non-gravity dependent handheld clinical assessment tool to easily quantify corresponding local tissue properties is not widely available. Herein such a tool is described along with results obtained with it and with TDC measurements made in healthy legs and in lymphedematous legs before and after one manual lymphatic drainage (MLD) treatment.

Using the handheld device, tissue indentations to various depths could be completed and corresponding indentation forces (IF) recorded. Following tests in gels, foams, and 24 healthy human legs to confirm linearity and repeatability, IF and TDC were measured in 22 legs of 18 lymphedema patients prior to and after one MLD treatment. Results showed that pre-MLD both IF and TDC were significantly ($p < 0.001$) greater in lymphedematous legs compared to healthy legs and that both IF and TDC significantly ($p < 0.001$) decreased after MLD. However, no correlation was found between pretreatment IF and TDC nor between post-MLD changes. Thus, measurements of local IF and tissue water provide useful but apparently independent information as to lymphedematous status and its potential change with therapy.