
Tissue Structure and Edema Fluid Events during Treatment of Lymphedema of Limbs with a Manual Pressure-Calibrated Device, Linforoll

Marzanna T. Zaleska, and Waldemar L. Olszewski, Lymphatic Research and Biology

Setting the scene:

Linforoll is a device composed of hand piece with roller and pressure sensor connected wireless to the computer displaying the pressure curve of the applied force. In a previous studies, researchers proved it to regulate the applied force according to the hydro-mechanic conditions of the massaged tissues. Standardization of massage based on applied force was repeatable in the same patient; it decreased limb volume and provided evident increase in tissue elasticity.

What did they do?

Linforoll is a hand piece with a roller containing pressure sensor transmitting wireless the signal to the computer software program displaying on the screen the values of applied force during the whole rolling cycle. It is calibrated from 0 to 150 mmHg. The number of cycles/time unit is recorded. Rolling at pressures of 40–150 mmHg is signalled by green light, whereas exceeding the top pressure lights up red light. The pressing surface of the roll is 10 cm². In this study, researchers measured additional parameters useful for the understanding of tissue and fluid events and approval of the device for general practice. These were skin stiffness, subcutaneous tissue stiffness independent of skin, skin water concentration, changes in skin temperature, skin capillary blood flow, subcutaneous tissue fluid pressure, volume of the moved edema fluid, and visualization of movement on indocyanine green (ICG) lymphography. Measurements were done before and during the massage. The data were obtained from a group of 20 patients with obstructive lymphedema of lower limbs during the Linforoll massage. There was a lack of significant changes in skin stiffness, skin water concentration, skin surface temperature, and capillary blood flow, but evident increase in the subcutaneous tissue elasticity (tonometry) and lymphography-shown flow of the edema fluid.

Takeaway message:

The skin tissue hydro-mechanic parameters remained normal proving lack of destructive changes under high massaging pressures. The obtained data evidently show that not the skin but the sub-cutis accumulated edema fluid that can successfully be moved proximally under pressures of 80–120 mmHg.