Bidirectional Skin Tension Creates Subcutaneous Fascia Movement

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BACKGROUND Can manual bidirectional tension to the skin create subcutaneous movement? The skin and fascia exhibit tensegrity (intrinsic tension). Gracovetsky has considered the issues relating to the transfer of forces, from the skin surface to deeper tissues, and suggested “While it is not known how much energy can be transferred from the skin surface to the deeper layers, it can be speculated that at least some of the therapist’s energy, applied to the skin, will end up being transferred”.
Gracovetsky points to video illustrations of Jean Claude Guimberteau that demonstrate how a force applied to the surface of the skin ends up being dissipated deep into the tissues via a densely interconnected network of collagenous tissues[1]. Viscoelastic responses to mechanical forces are determined by their connective tissue (CT) extracellular matrix (ECM) composition and architecture. Mechanical tension can induce changes in the ECM subsequently modulating biological functions [2]. CT fibroblasts play a pivotal role in both immediate and long term CT responses to mechanical forces. Ultrasound elasticity imaging is emerging as a powerful non-invasive technique to quantify biomechanical tissue behavior [3].

METHODS Using ultrafast high frequency elastography we video imaged a relaxed (non-contracting) prone positioned hamstring with the knee fully extended. We lightly gripped the skin with latex finger cots to avoid downward compression and applying a bidirectional slow cyclical rotational torqueing of the skin. The ultrasound transducer head was placed between the bidirectional forces.

RESULTS Imaging captured significant subcutaneous and deeper fascial sliding and movement. This quantifiable movement was observed at depths greater than 3 cm.

CONCLUSION Skin is directly connected to the underlying subcutaneous and superficial fascia through the reticular cutis fibers. Bidirectional mechanically manipulated skin facilitated sliding and movement. The effect of mechanical forces on connective tissue fibroblasts may be key to the therapeutic mechanism of manual therapies by causing important cellular effects both immediate (activation of signaling mechanisms) and delayed.

REFERENCES