Depth of Penetration and Nature of Interferential Current in Cutaneous, Subcutaneous and Muscle Tissues

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Abstract : The aims of this study were to investigate the depth of interferential current (IFC) penetration through soft tissue and to investigate the area over which IFC spreads during clinical application. Premodulated IFC and 'true' IFC at beat frequencies of 4, 40 and 90Hz were applied via four electrodes to the distal medial thigh of 15 healthy subjects. The current was measured via three Teflon coated fine needle electrodes that were inserted into the superficial layer of skin, then into the subcutaneous tissue (≈1 cm deep) and then into muscle tissue (≈2 cm deep). The needle electrodes were placed in the middle of the four IFC electrodes, between two channels and outside the four electrodes. Readings were taken at each tissue depth from each electrode during each treatment frequency then digitized and stored for analysis. All voltages were greater at all depths and locations than baseline ($p < 0.01$) and voltages decreased with depth ($P=0.039$). Lower voltages of all currents were recorded in the middle of the four electrodes with the highest voltage being recorded outside the four electrodes in all depths ($P=0.000$).For each frequency of 'true' IFC, the voltage was higher in the superficial layer outside the electrodes ($P \leq 0.01$).Premodulated had higher voltages along the line of one circuit ($P \leq 0.01$). Clinically, IFC appears to pass through skin layers to depth and is more efficient than premodulated IFC when targeting muscle tissue.

Keywords : electrotherapy, interferential current, interferential therapy, medium frequency current
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