

# Forearm Skin Water Assessed by Tissue Dielectric Constant

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**Objective:** To quantitatively characterize forearm skin tissue water (STW) and its variability using tissue dielectric constant (TDC) measurements.

**Background:** Previous work showed forearm TDC useful as an indicator of local STW in patients with lymphedema. However, TDC dependence on arm anatomical site is unknown. Knowledge of normal patterns of variations is needed to help interpret future clinical studies.

**Methods:** Variations in STW were assessed by measuring the TDC of epidermal-dermal tissue in triplicate at nine sites on the non-dominant forearm of seated female volunteers. TDC values depend on tissue water content (pure water = 78) and on the depth of the tissue included in the measurement. Herein measurements to depths of 1.5 and 2.5 mm were made at sites 4, 8 and 12 cm distal to the antecubital crease along the midline, and one cm medial and lateral to the midline. Measurements were done by touching skin with a probe for 10 seconds.

**Results:** Results to date (based on 10 subjects) show an overall significant difference among sites ( $p < 0.001$ ) but insignificant site-probe interactions ( $p = 0.861$ ). TDC midline values (mean $\pm$ sd) increased from proximal to distal sites ( $p < 0.001$ ) being  $27.2 \pm 2.9$  at 4 cm,  $28.7 \pm 3.0$  at 8 cm and  $29.6 \pm 3.6$  at 12 cm at the 1.5 mm depth. Corresponding values at the 2.5 mm depth were  $25.4 \pm 3.5$ ,  $27.4 \pm 4.8$  and  $28.8 \pm 5.8$ . TDC values obtained at a 1.5 mm depth were all significantly greater than at a 2.5 mm depth ( $p < 0.001$ ).

**Conclusions:** These seminal findings provide data needed for clinical comparisons and assessing departures from normal.