

## **Race-Related Differences in Tissue Dielectric Constant (TDC) Measured Noninvasively at 300 MHz in Male and Female Skin at Multiple Sites and Depths**

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**Objectives:** Goals were to (1) test the hypothesis that race-related differences in skin water are measurable by skin TDC values, (2) test if TDC inter-side ratios are race-dependent and (3) determine if TDC depends on total body water (TBW) and fat (TBF).

**Background:** Reports indicate race-related differences in skin properties that are influenced by skin water. However, the role of skin water has not been evaluated in this context nor has the role of TBW or TBF been evaluated.

**Methods:** TDC was measured to 1.5 or 5.0 mm depths bilaterally on chest, forearm and ankle in 100 young (19-39 years) adults with 10 male and 10 female per race. Races were African-American, Asian, Asian-Indian, Caucasian and Hispanic.

**Results:** TDC values decreased from chest-to-forearm-to-ankle ( $p < 0.001$ ) independent of race with most values greater for males but with inter-arm TDC ratios independent of gender, site, depth or race. For females forearm TDC values differed among races ( $p < 0.01$ ) with Asian and Asian-Indian values tending to be least. For males, chest TDC values differed among races ( $p < 0.01$ ) mainly due to larger African-American TDC values. For the composite group TDC was strongly ( $p < 0.001$ ) positively correlated with TBW and negatively correlated with TBF.

**Conclusions:** TDC dependence on race should be considered in assessing skin hydration comparisons. Further the demonstrated relationship between TDC and body composition should be considered as an important covariate. However, despite these variations, the inter-arm TDC ratio remains robust as a potential indicator of unilateral tissue water changes including assessing unilateral edema and lymphedema.