Get It Right the First Time, Measure Twice, or Third Time's a Charm? Single vs. Multiple Tissue Dielectric Constant (TDC) Measurements

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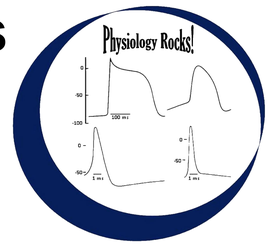


Background

TDC measurements are used to estimate skin water content changes in various conditions including breast cancer related lymphedema and lower extremity edema. Prior studies used triplicate averages because the suitability of single measurements was not known. However, if the accuracy of one measurement was shown to be adequate, then some clinical measurement time could be saved.

Measurement Locations

MoistureMeter-D Compact

Anterior Forearm

Lateral Calf

Hand Palm

Medial Calf

Foot Dorsum

Average Dominant-to-nondominant Side TDC Ratios (triplicate values)	1.013±0.090	1.019±0.163	1.019±0.112	1.052±0.134	1.029±0.108

Objective

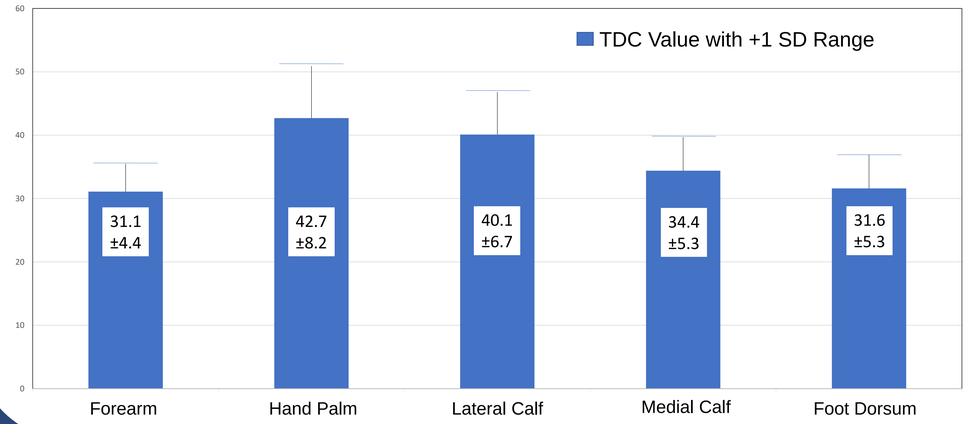
The purpose of this study was to determine the differences in absolute and relative TDC values based on one measurement per anatomical site versus averaging duplicate or triplicate values.

Methods

TDC measurements were done using the MoistureMeter-D compact at five anatomical sites representative of lymphedema development areas: anterior forearm, hand palm, lateral calf, medial calf, and foot dorsum. TDC values obtained with single measurements were compared to duplicate and triplicate values at each site (N=100). TDC dominant-to-nondominant side ratios (N=50) were also compared.

Results

Triplicate Average TDC Values



Average Percentage Difference Between Triplicate and Single TDC Measurement Values at All Anatomical Sites
<0.75%
Maximum SD
4.7% (medial calf)
Minimum SD
2.2% (forearm)

Dominant-to-nondominant Side TDC Ratio Difference Maximum
1.5%

Conclusion

Single TDC measurements or dominant-to-nondominant side ratios based on single TDC measurements can be utilized if a deviation from triplicate averages of ±5% or ±1.5% is acceptable, respectively.

References

1. Mayrovitz, HN, S Davey, E Shapiro: Local tissue water changes assessed by tissue dielectric constant: Single measurements versus averaging of multiple measurements. Lymphology 41 (2008), 186-188.
2. Mayrovitz, HN, S Davey, E Shapiro: Suitability of single tissue dielectric constant measurements to assess local tissue water in normal and lymphedematous skin. Clin. Physiol. Funct. Imaging. 29 (2009), 123-127.