### GENDER DIFFERENCES IN ARM SKIN WATER ASSESSED VIA 300 MHz TISSUE DIELECTRIC CONSTANT (TDC) MEASUREMENTS

#### By

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### **Background Information:**

- \*Tissue Dielectric Constant (TDC) is directly related to the amount of free and bound water contained in the area where the probe is placed (Alanen, 1998)
- \*TDC is a noninvasive measure and indicator of skin tissue water in healthy individuals and in those with lymphedema, post-mastectomy lymphedema, and individuals with swollen extremities of undetermined cause (Mayrovitz, 2008)

\*Measured using the MoistureMeter-D



#### **Previous Research**

- \* Demonstrated that TDC values in healthy male subjects are greater than female counterparts at a depth of 1.5mm below the skin surface at the anterior forearm site
- \* Only the Epidermis and the Dermis are included in this measurement

#### Current Research

- \* Goal is to determine if those male-female TDC differences also exist at a depth of 5.0mm below the skin surface at the same anterior forearm site
- \* Epidermis, Dermis and hypodermis tissue are included in this measurement





### Inclusion Criteria

- Subject must attest to overall good health with no cardiac or vascular complications
- Between 18-48 years of age

### 100 research subjects:

- 50 males: Ages 26.2+3.1 years
- 50 females: 26.6<u>+</u>3.1 years

### Exclusion Criteria

- Anyone with implanted wires, cardiac pacemaker or any other electronic medical device
- Anyone with an open wound on the anterior forearm
- EtOH consumption within the past 24 hours
- Diuretic use
- Pregnancy

# Methods

### TDC Measurements

- Location: 10cm below the antecubital fossa on the anterior forearm bilaterally
- Measurements taken in triplicate and averaged
- Device: MoistureMeter-D (by Delfin Technologies)
  - OBattery operated handheld device utilizing gold plated brass probes
  - OMeasures TDC at a frequency of 300MHz
- 2 probes used: 1.5mm and 5.0mm





# Methods

#### Bioimpedance data

- Percentage of arm fat (Fat%)
- Muscle mass as a percentage of body weight (MM%)
- Device: Ironman InnerScan (Figure 3)





Ironman InnerScan being used to measure Fat% and MM%

### Results









#### **TDC Values**

- Male TDC values > than female values at 1.5mm depth (p<0.001)</p>
  - Male: 37.0 <u>+</u> 2.6
  - Female: 32.3 <u>+</u> 3.9
  - Male TDC values were > than female values at 5.0mm depth (p<0.001)</p>
  - Male: 35.4 <u>+</u> 7.1
  - Female: 25.3 <u>+</u> 4.3
- Within each gender, differences between depths of 1.5mm and 5.0mm
  - Highly significant for females (p<0.001)</p>
  - Marginally significant for males (p=0.028)

### **Bioimpedance**

- Female Fat% > than Males (p<0.001)</p>
  - Male: 16.0 <u>+</u> 5.1%
  - Female: 28.0 <u>+</u> 7.2%
- Female MM% < than Males (p<0.001)</p>
  - Male: 4.61 <u>+</u> 0.38%
  - Female: 3.17 <u>+</u> 0.25%

### CONCLUSIONS

\*TDC decreases with increased depth in both males and females

- \*Results demonstrate that Male TDC values are greater than female values at both 1.5mm and 5.0 mm depths
- \*Based on the arm fat percentages and muscle mass percentages measured in each gender, we can tentatively conclude that gender differences partially explain the TDC values.
- \*TDC values at 1.5mm and 5.0mm depths in male subjects maybe due to a combination of greater male skin thickness and muscle mass

## Conclusions

### How is this information useful?

When considering hydration assessments, we must take into consideration differences in gender

### References

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