Arm skin water assessed via 300 MHz tissue dielectric constant (TDC) measurements:

Dependence on total body water, fat and arm muscle mass

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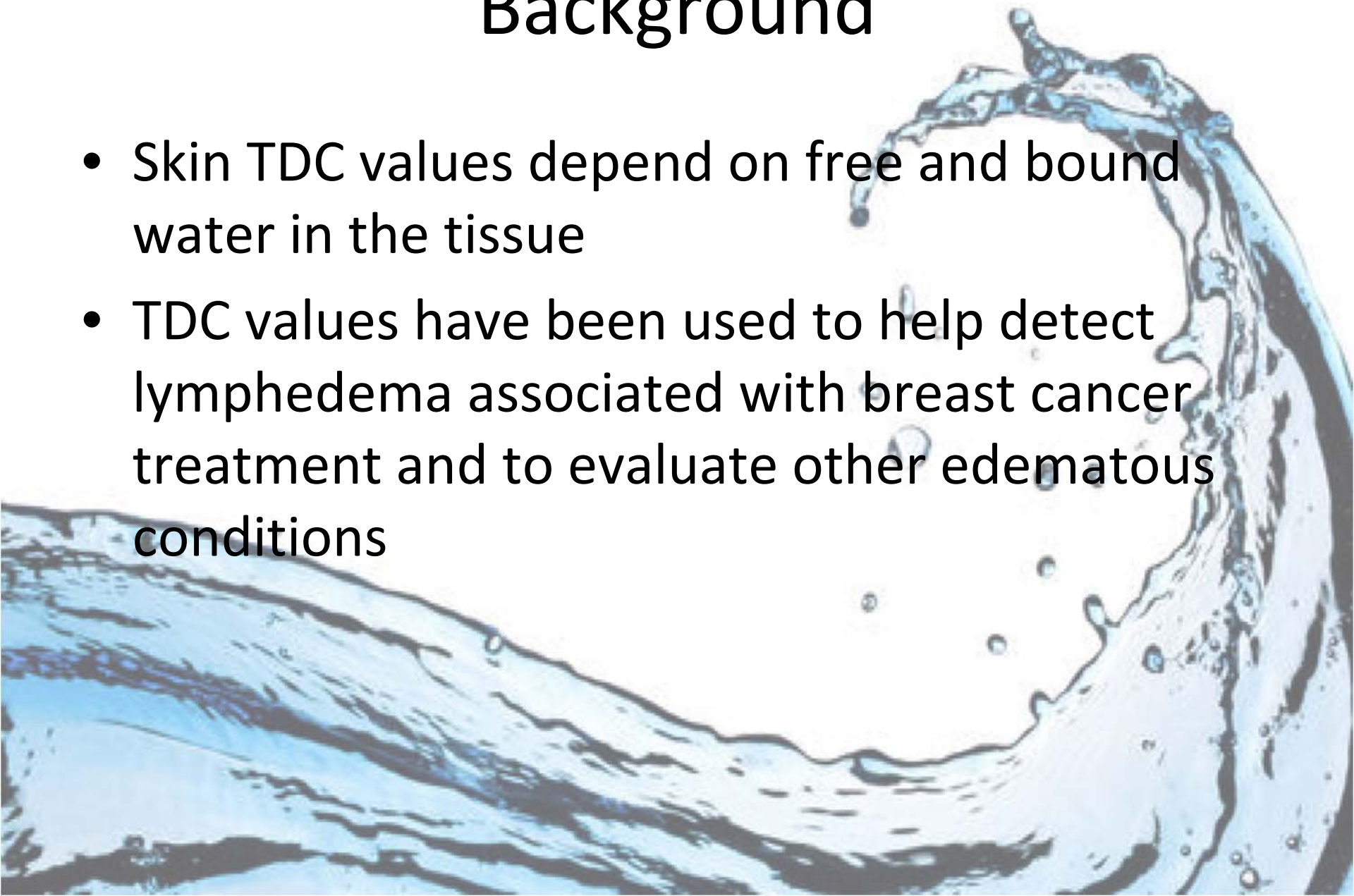
Background



- Skin TDC values depend on free and bound water in the tissue
- TDC values have been used to help detect lymphedema associated with breast cancer treatment and to evaluate other edematous conditions

Unilateral lymphedema

Unilateral lymphedema

- When only one arm is affected, we have a normal arm to use as a control
- These TDC arm ratios can be used to screen patients who may be at risk for developing lymphedema
- TDC arm ratios are not helpful for bilateral cases

Bilateral lymphadema

- How do we evaluate a patient without a “control” limb?

We must use absolute TDC values

What parameters are quantifiably linked to TDC values?

- We believe that tissue water likely varies with total body fat and water
- Until now, there has been no systemic determination of possible TDC dependencies on percentages of total body water (TBW%), total body fat (FAT%), arm muscle mass (MM) or percentage arm fat (FATARM%)

Methods

SUBJECTS:

- 30 male and 30 female adult seated subjects
- Age 28.0 ± 9.8 years

Measurements:

- Bilateral anterior forearm and bicep TDC measurements to depths of 1.5 and 2.5 mm below the epidermis to determine tissue water

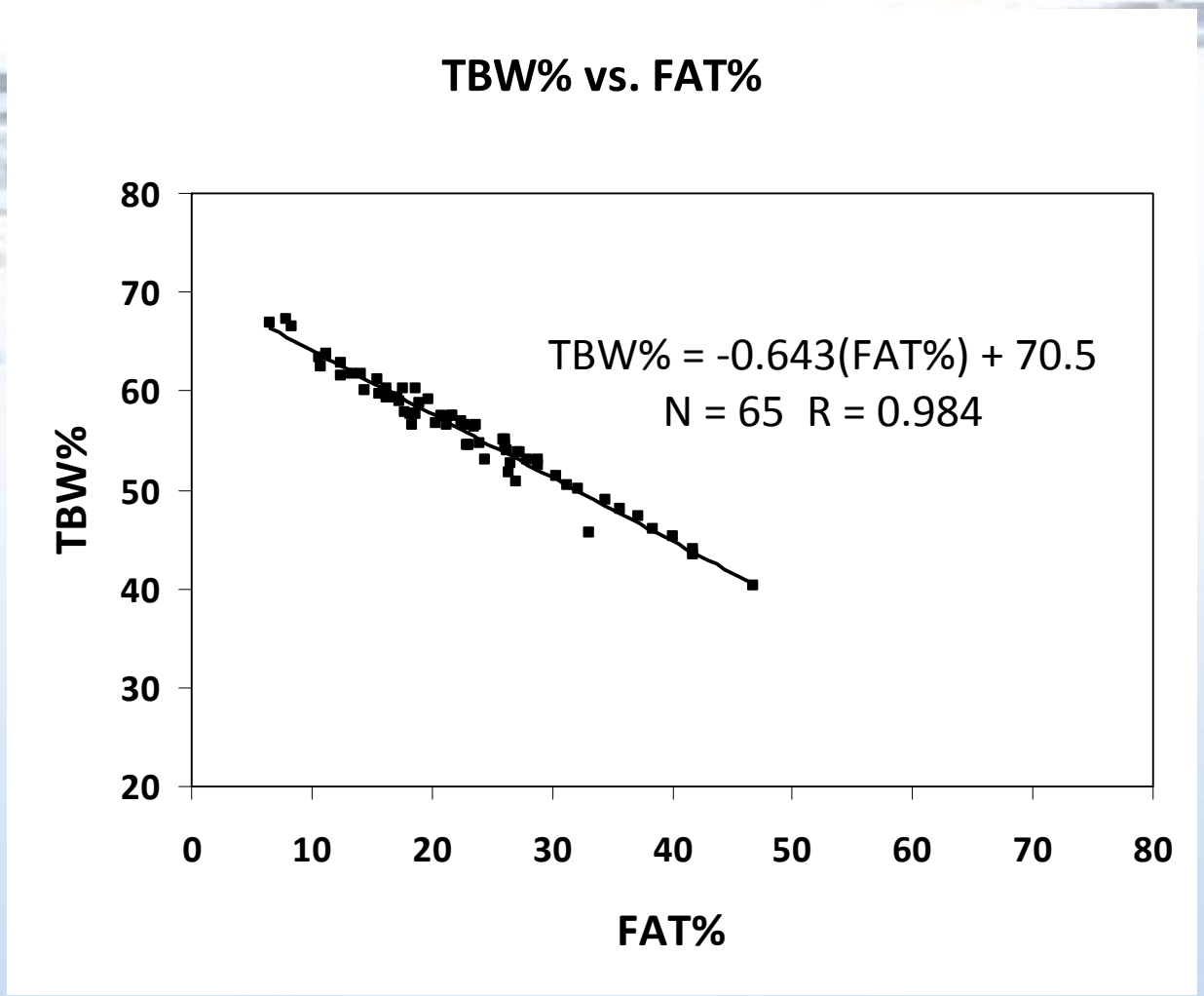
MoistureMeterD:
Small 1.5 mm probe
Medium 2.5 mm probe

Ironman Innerscan Bioimpedance Scale used to determine TBW%, MM%, FAT% and FATARM%

TANITA

Results

Inverse relationship between TBW% and FAT%, as expected



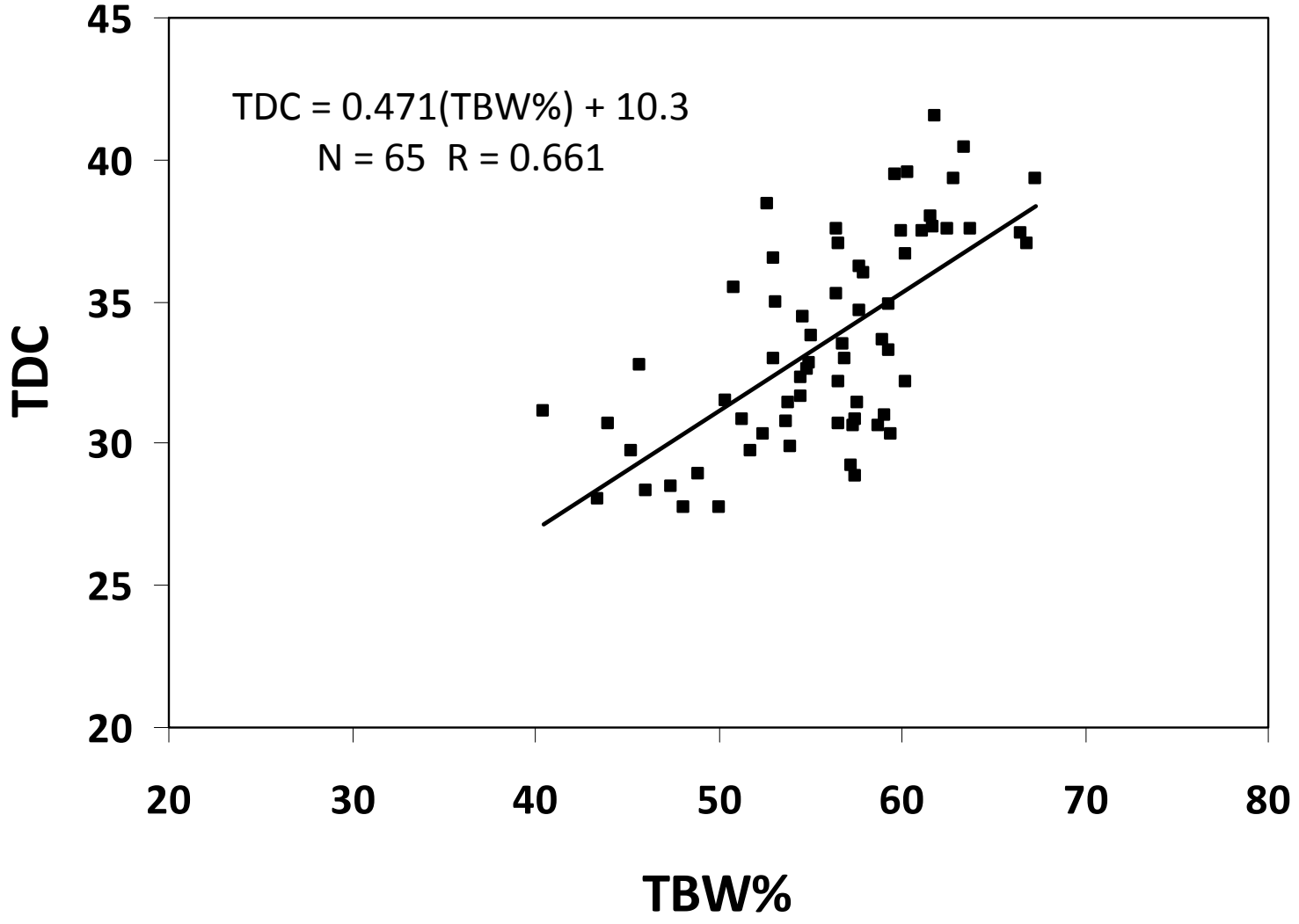
Results

- TDC values at forearm and biceps are most strongly positively correlated to MM% at forearm and bicep and are significantly negatively correlated to FATARM%.
- TDC values are positively correlated with TBW% and negatively correlated to FAT%

Results

- Strongest correlations were for forearm 1.5 mm depth TDC values yielding linear regression equations:
- TDC= 0.465 (TBW%) + 7.94 (r=0.700)
- TDC= -0.319(FAT%) + 41.2 (r=0.736)

Forearm TDC AT 1.5 mm Depth



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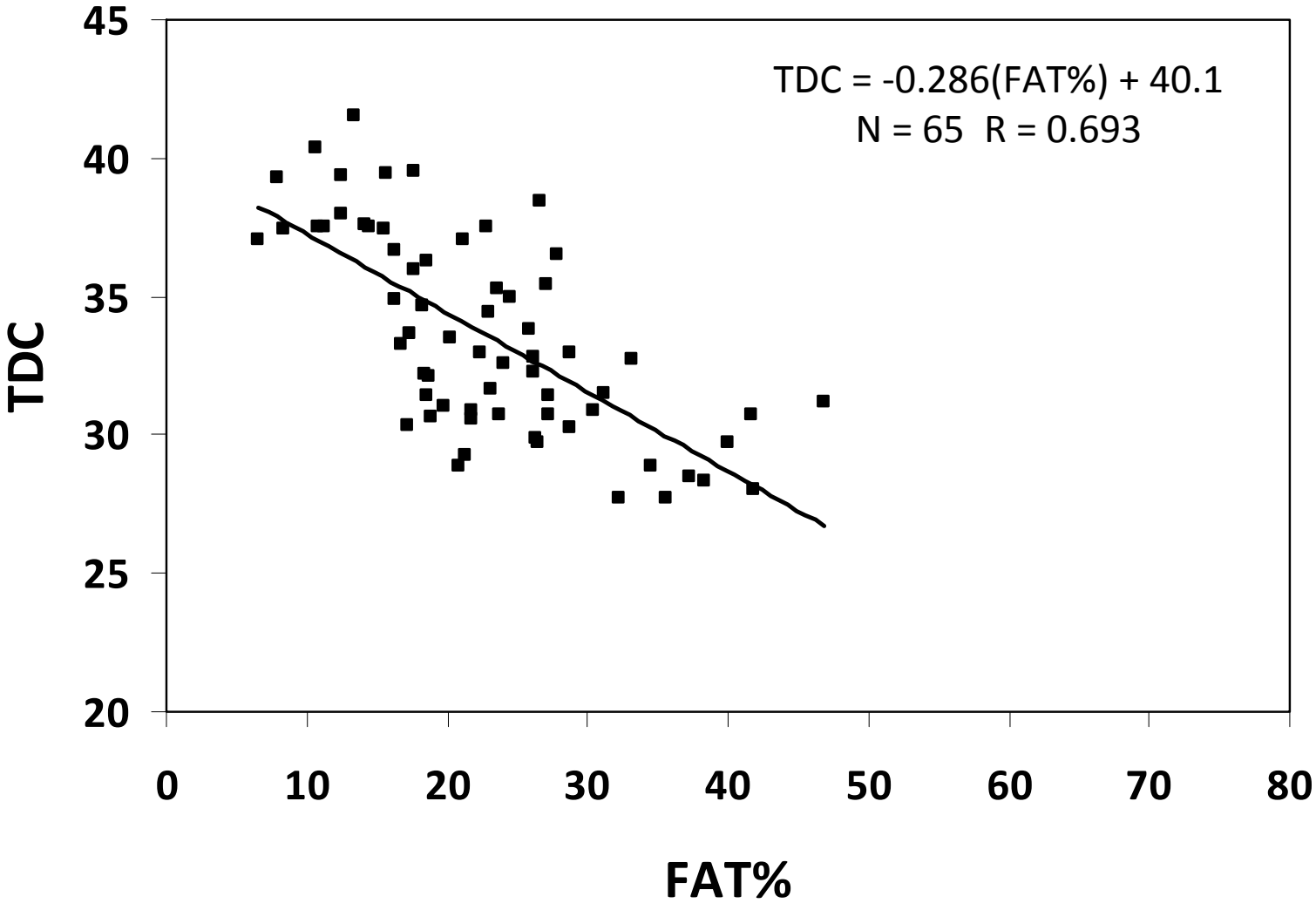

Conclusions

When absolute TDC values are needed, our findings provide a basis to individualize TDC reference values using a patient's body habitus, including their TBW% and FAT%


Questions?