Baudenbacher

- Device that measures skin impedance
- "Proof of Concept" trials
- Potentially take over as the advisor of our project
  - Dr. Sexton has yet to meet with us
  - Dr. Baudenbacher has set a weekly meeting with us
Revised Plan

● Literature review
  ○ determine range of frequencies with an impedance response correlated to hydration
● Scan this range with Baudenbacher’s device
● Construct device using neonatal electrodes
  ○ optimally contained in a patch
Dunkelmann et al. (2012) scanned a number of frequencies
  ○ 50 kHz shows the most difference (~100 Ohm)
  ○ arm and leg on same side
Utter et al. (2012) investigated the usefulness of skin impedance as a hydration monitor - cross body
  ○ changes in impedance at 5-500 kHz are sensitive to acute changes in dehydration
  ○ 20 kHz and 100 kHz returned to baseline more quickly following rehydration - better acute response
Literature Review

- Bioimpedance analysis (BIA) - TBW as linear function of resistance index $H^2/Z(50 \text{ Hz})$ (Jaffrin 2008)
  - 50 Hz doesn’t penetrate completely into cells but can fairly accurately predict TBW

- Most single-frequency BIA analyzers operate at 50 kHz (Kyle et al. 2004)

- 200 kHz optimal to measure TBW, 5 kHz optimal to measure ECW (Shanholtzer & Patterson, 2003)
Experimental Design

● Create procedure for dehydrating ourselves and monitor with urine specific gravity for comparison
● Scan impedance at multiple frequencies before and after dehydration
  ○ Current device takes 1 second to perform the measurement for each frequency
  ○ Device can scan frequencies of 5 - 200 kHz
● Compare impedance values at different frequencies
● Try to miniaturize our device to a small patch in comparison to previous cross-body studies
Bioimpedance Models

- Skin impedance can be modeled by electrical circuits
- Components and circuit response are frequency dependant
- Dr. Eagle
Frequency Response

Hydrated

Dehydrated
Dr. Baudenbacher was in favor of getting IRB approval for testing the device, even if we tested on ourselves
- Necessary for self testing?
- Time is money (weeks or more)
- New proposal versus amendment (to a proposal by Dr. Baudenbacher or Dr. Sexton)
Electrodes

- Four needed per trial

Case of 600 = $173

http://www.vermed.com/products/a10040-60

Case of 300 for $308

http://www.tigermedical.com/Products/MEDITRACE-KITTYCAT-Pre-Wired-Neonatal-Cloth-Electrodes--Case_COV31424768--.aspx?
utm_source=Become&utm_medium=cpc&gdftrk=gdfV27285_a_7c881_a_7c2351_a_7c4650e1c6_d_1976_d_4c30_d_bd00_d_45dcf87106c3
Specific Gravity Test

Detection Range: 1.000-1.050
Healthy Range: 1.000-1.030
Dehydration Range: > 1.035 [1]
Cost: $32


Questions?