Lab Report Comments

# Lab III: ECG Measurement and Analysis

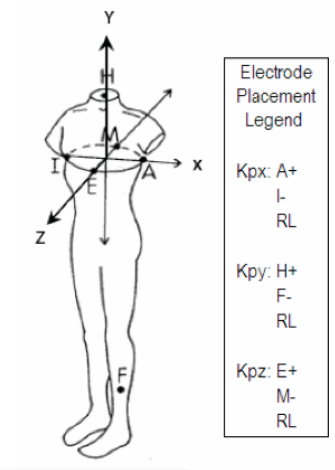
BIOEN 6000

Spring 2011



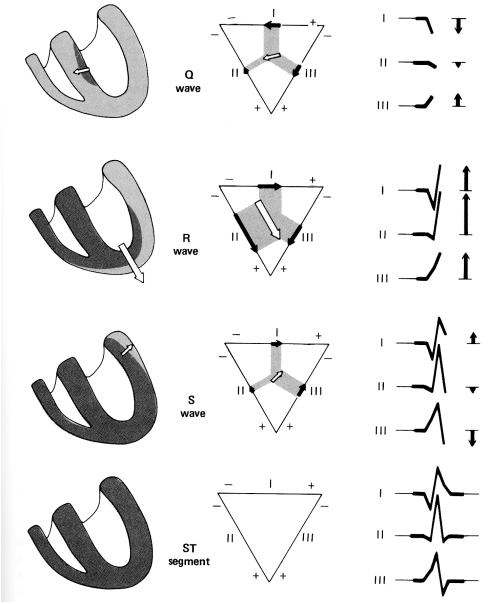
# Methods

- Define the three dimensional coordinate system employed
- For each system:
  - Electrode locations
  - Polarity of leads
  - This is best described concisely with a figure (example at right taken from a classmate)



# General Elements

- Nomenclature (do not interchange):
  - Limb Leads: Lead I, II, or III
  - Frank Leads: $Kp_x$, $Kp_y$, $Kp_z$
  - Precordial Leads: V1-6.
- Unipolar vs. Bipolar
- Above all else understand the figure at right:

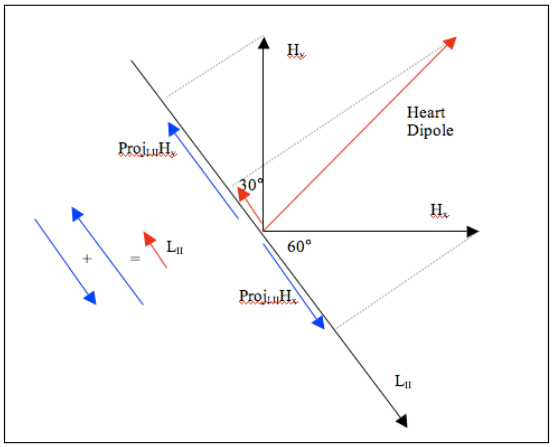





## Results

# Derivation of $H_x$ and $H_y$

- Several Approaches
- Trick was noting sign conventions
  - Lead II:
    - $+H_x \rightarrow +L_{II}$
    - $+H_y \rightarrow -L_{II}$
  - Lead III:
    - $+H_x \rightarrow -L_{III}$
    - $+H_y \rightarrow -L_{III}$




$$L_{II} = \cos(60)\cdot H_x - \cos(30)\cdot H_y \quad (1)$$

$$L_{III} = -\cos(60)\cdot H_x - \cos(30)\cdot H_y \quad (2)$$

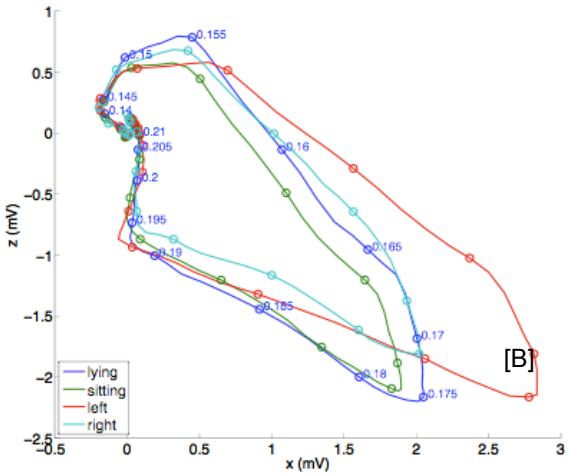
$$H_x = L_I = L_{II} - L_{III} \quad (3)$$

$$H_y = -\frac{1}{\sqrt{3}}(L_{II} + L_{III}) \quad (4)$$

Results

# Vector Loop Plots

- Consistent scaling
- Compare loop morphology across various lead systems.
- Compare planes




[B]



# Discussion

- Suitability of representing heart's electrical activity as a dipole
  - A gross oversimplification

    (as many of you correctly noted in context of differences btw/ systems and the complexity that arose with BSPM)
  - Not without its merits… a valuable clinical diagnostic
- Differences between vector loop plots of various systems
  - Primary cause: different electrode placement on torso
- Influence of physical orientation on BSPM
  - Shift in heart position
  - Shift in additional tissues/fluid that serves as volume conductor
  - Which positions caused the greatest changes?

# Specifics, Specifics, Specifics…

- If you are presenting a result with any room for interpretation…CLARIFY
  - Leads selected to define the precordial xz plane (why should you choose leads off of torso instead of heart?)
  - Leads selected to define planes for BSPM data