

## Experiment IXECG12: 12-Lead Electrocardiograms (ECGs)

### Equipment Required

PC or Mac Computer

IX-ECG-12

Electrode lead wires

Alcohol swabs

Disposable ECG electrodes (12)

Optional - A-ECG-SIM-1200 – ECG simulator

### Start the Software

1. Click on LabScribe
2. Click Settings → Human Heart → IXECG12-12LeadECG
3. Once the settings file has been loaded, click the **Experiment** button on the toolbar to open any of the following documents:
  - Appendix
  - Background
  - Labs
  - Setup (opens automatically)

***Note:** It is suggested that students dress appropriately for these exercises. A button-down shirt will make it easier to position the chest leads.*

### Electrode Placement

1. The subject should remove all jewelry from his or her neck, wrists, and ankles. Cell phones should be removed from pockets.
2. Use an alcohol swab to clean and scrub regions on each wrist and ankle, under the lateral end of each clavicle and, on the chest ([Figure HH-13-S1](#)). Let the areas dry.
3. Obtain 12 disposable electrodes. Remove each electrode from its protective plastic sheet and apply it to one of the following scrubbed areas on the subject's body:
  - under the lateral ends of each clavicle; for use as the positive and negative electrodes of Lead I.
  - on each wrist and each ankle; for use as the ground and the three electrodes that form the indifferent point for the chest leads.

- over the right border of the sternum at the 4th intercostal space; for use as the active electrode of the V1 chest lead.
- over the left border of the sternum at the 4th intercostal space; for use as the active electrode of the V2 chest lead.
- on the left mid-clavicular line at the 5th intercostal space; for use as the active electrode of the V4 chest lead.
- halfway between V2 and V4; for use as the active electrode of the V3 chest lead.
- on the anterior axillary line at the same horizontal level as V4; for use as the active electrode of the V5 chest lead.
- on the mid-axillary line at the 5th intercostal space; for use as the active electrode of the V6 chest lead.

### ECG Cable Setup

1. Locate the IXECG12 unit ([Figure HH-13-S2](#)). Insert the USB connector into a USB port on the computer.
2. Snap the other ends of the lead cables to the electrodes on the subject, so that:
  - the white snap lead wire is connected to the electrode below the right clavicle,
  - the black snap lead wire is connected to the electrode below the left clavicle,
  - the green snap lead wire is connected to the electrode on the right ankle,
  - the red snap lead wire is connected to the electrode on the left leg.
3. Attach the six color-coded snap chest leads (red, yellow, green, blue, orange, purple) to the electrodes on the subject, so that:
  - the red “V1” lead wire connects to the electrode at the fourth intercostal space (between ribs 4 & 5) just to the right of the sternum (breastbone).
  - the yellow “V2” lead wire connects to the electrode at the fourth intercostal space (between ribs 4 & 5) just to the left of the sternum.
  - the green “V3” lead wire connects to the electrode between leads “V2” and “V4”.
  - the blue “V4” lead wire connects to the electrode at the fifth intercostal space (between ribs 5 & 6) in the mid-clavicular line (the imaginary line that extends down from the midpoint of the clavicle (collarbone)).
  - the orange “V5” lead wire connects to the electrode horizontally even with V4, but in the anterior axillary line. The anterior axillary line is the imaginary line that runs down from the point midway between the middle of the clavicle and the lateral end of the clavicle; the lateral end of the collarbone is the end closer to the arm.
  - the purple “V6” lead wire connects to the electrode horizontally even with V4 and V5 in the mid-axillary line. The midaxillary line is the imaginary line that extends down from the middle of the patient's armpit.

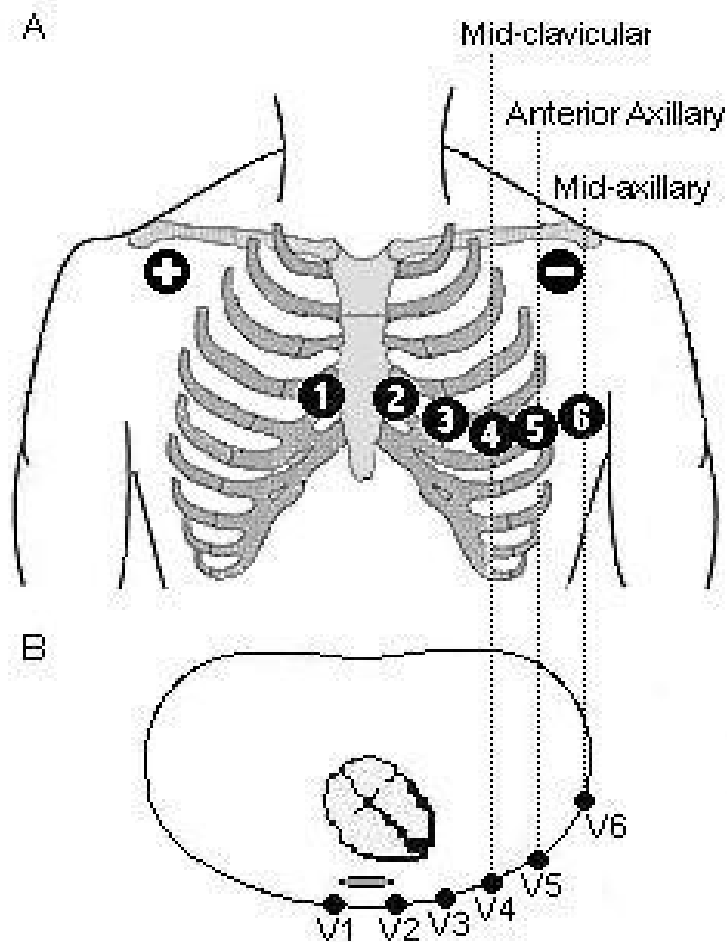


Figure HH-13-S1: A: Frontal view of the electrode positions for Lead I and the six chest leads. B: Top view of the electrode positions for the chest leads.



Figure HH-13-S2: The IX-ECG12.

