

Experiment HH-7: Electrocardiograms (ECGs) from the Six Chest Leads

Exercise 1: ECG from the Chest Leads of a Resting Subject

Aim: To record ECGs from the six chest leads and determine the transition point.

Approximate Time: 20 minutes

Procedure

1. The recording of ECGs from Lead I and the six chest leads (V1 through V6) will be made with the Scope application of the LabScribe2 software. The settings file, ChestLeadECG, has configured the software to record a ten second sweep of data each time the Record button is clicked. Make sure the lead wires are attached correctly for recording from Lead I on Channel 1 and chest lead V1 on Channel 2.

Note: While data is being recorded using the Scope, a progress bar is displayed on the LabScribe Main window; data will not appear in the window until the recording ends.

2. After the subject has been sitting quietly for at least one minute, click the Record button on the LabScribe Main window. The recording will proceed for ten seconds. The ECG will appear after the recording ends. Click the AutoScale All button to display the ECG data.
3. After the ECG has been successfully recorded from chest lead V1, move the brown “-2” lead wire from the active electrode for the V1 lead to the active electrode for the V2 lead. Have someone other than the subject move the lead wire because the subject must remain in the same position for each segment of the recording.

Note: Before recording an ECG from the next lead position, it is important to let the electrodes equilibrate. Wait at least thirty seconds after the lead wire has been moved before recording.

4. Click the Record button on the LabScribe Main window to record another ten second sweep of data. In this particular sweep, ECGs from Lead I and chest lead V2 are recorded.
5. Repeat Steps 3 and 4, moving the brown “-2” lead wire from the active electrode of one chest lead to the next (V2->V3, V3->V4...) until ECGs have been recorded from all six chest leads.
6. Select Save As in the File menu, type a name for the file. Click on the Save button to save the data file.

Data Analysis

1. Click the 2-Cursor icon so that two vertical lines appear over the recording window.
2. Click the Analysis icon to display the data from each sweep in the Analysis window.

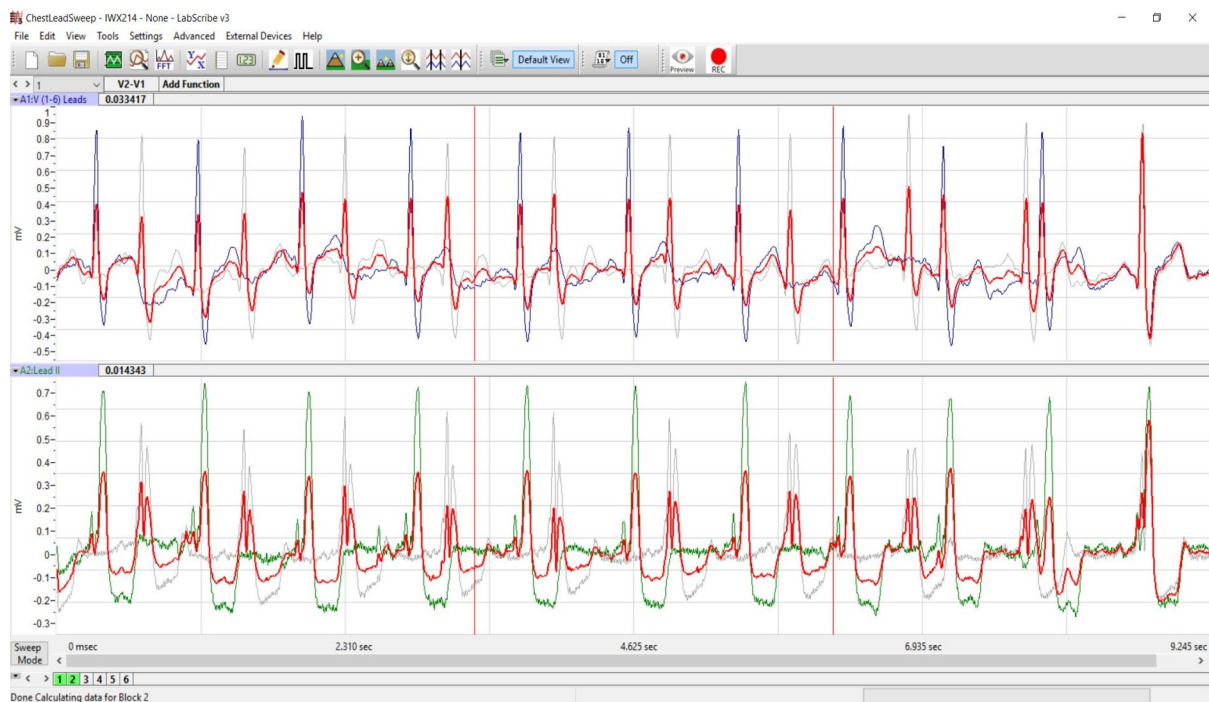


Figure HH-7-L2: In the Analysis window, the ECG showing the overlapping of Sweeps 1 and 2.

7. Use the mouse to click and drag the cursors across Sweep 1 to measure:
 - the amplitude, V2-V1, of three adjacent R waves in the ECG from Sweep 1 (V1 chest lead). The amplitude is measured from the onset of the Q wave to the peak of R wave.
 - the amplitude, V2-V1, of three adjacent P waves in the ECG from the same selected sweep. The amplitude is measured from the baseline, between the T and P waves, to the peak of P wave.
 - the amplitude, V2-V1, of three adjacent T waves in the ECG from the same selected sweep. The amplitude is measured from the baseline to the peak of T wave.
8. Measure and record the amplitudes of three P, R, and T waves from each chest lead and one sweep of Lead I.
 - Choose another sweep from the other chest leads by clicking on the sweep number at the bottom of the Analysis window.
 - You can also overlap all the sweeps by clicking the sweep number and the Control key at the same time.
9. Calculate the average amplitudes of the P, R, and T waves for each lead. Enter these values into the Table 1.
10. Find the transition point of the subject by examining the recordings from the six chest leads. Find the lead where the R wave is equal in magnitude to the S wave but in the opposite direction.

Questions

1. From which leads are inverted P and T waves recorded? From which leads are inverted R waves recorded?
2. From which lead is the amplitude of the R wave equal, and opposite in direction, to the S wave?
3. Which lead is over the anterior edge of the interventricular septum?

Table HH-7-L1: The average amplitudes (in millivolts) for each of the waves recorded from each lead.

Average Amplitudes	P Wave	R Wave	T Wave
V1			
V2			
V3			
V4			
V5			
V6			
Lead I			

Exercise 2: ECG from the Chest Leads of Other Students

Aim: To record ECGs from the six chest leads of other subjects and determine their transition points.

Approximate Time: 20 minutes per subject

Procedure

1. Disconnect the leads from the first volunteer's electrodes and place them on the electrodes of a second student.
2. Follow the procedures in Exercise 1 to record ECGs from the six chest leads of the new subject.
3. Repeat the procedures until all subjects have recorded their chest lead ECGs.

Data Analysis

Make the same measurements as done in Exercise 1.

Questions

1. Do the R waves, from the same lead position, go in the same direction for all subjects? The P waves? The T waves?
2. What would cause the same type of wave from the same lead to go in the opposite direction in different subjects?
3. Do all subjects have the same transition point? Which leads were found to be the transition points in the subjects tested? What could cause a difference in the transition points?