

Protocol 3: Human ECG

The equipment required for ECG measurement is:

- PowerLab with BioAmp front end connected
- Finger pulse transducer
- Three-lead Bio Amp cable & three skin electrodes
- Alcohol and cotton swabs
- Abrasive pads
- The push-button switch
- A stethoscope.

Subject and BioAmp preparation

1. The student volunteering for the experiment should remove any watch or jewelry from his or her wrists and ankles.
2. Connect the push-button switch to the BNC socket for Input 1. This is to mark events.
3. (old setup) Connect the BioAmp front end BNC connector to Input 2 on the PowerLab. (New case setup) Connect to the BioAmp connector on the Powerlab (channel 3/4)
4. Connect the finger pulse transducer to Input 3 on the PowerLab (input 2 on new unit)
5. Connect the ECG leads to Earth (green), positive (black) and negative (white), on the Bio Amp cable.
6. If alcohol swabs are available, firmly swab the skin with them in each area where electrodes will be placed (Figure 4). Lightly abrade the skin at these areas with an abrasive pad. This decreases the electrical resistance of the outer layer of skin and ensures good electrical contact.
7. Attach the ECG electrodes to the volunteer in the positions described below. Ensure good electrical contact between the electrode and the skin: use conductive gel and make sure there are no air bubbles or hair under the electrode which will reduce electrical conductivity.
8. Attach the finger pulse transducer. The volunteer is relaxed and sits as still as possible.

Attaching the electrodes

For the classical placement of electrodes for ECG, attach the positive electrode to the left wrist, the negative to the right wrist, and the ground to the right leg. If after looking at the signal in the Bio Amplifier dialog box during the first exercise you find that this does not produce a good signal, you can use the alternative method shown. (Figure 4)

The electrodes should not be placed over the major muscles of the upper arm (that is, the biceps or triceps) because muscle activity produces electrical signals that interfere with the signal recorded from the heart. Attach the electrodes on the outer side of the arm, midway between the elbow and the shoulder.

Remember to ensure that the volunteer is relaxed and sits as still as possible, arms at rest, hands in lap, to minimize any signal from movement.

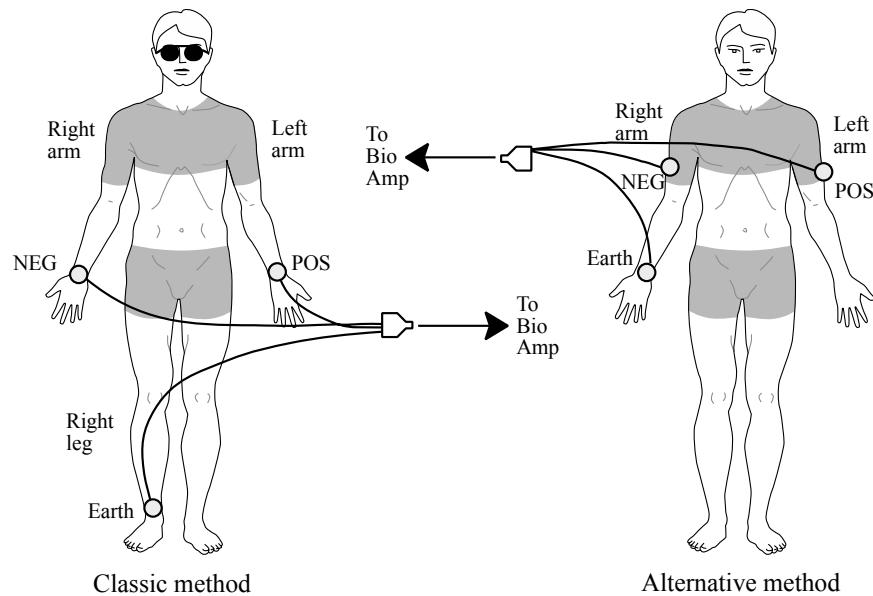


Figure 5. Connecting the electrodes to the volunteer: two alternative methods.

Software settings

Load the ECG settings file. If you are using the new setup (silver case), you will have to change the channel settings in the chart software. By default, it is set up to have the ECG on channel 2 and the finger pulse transducer on channel 3. You will have to switch this. Find the “Channel Settings” menu item, and set the ECG to channel 3 (Bioamp), and set the finger pulse and blood flow channels to channel 2 (the blood flow is a computed channel based on the finger pulse transducer — the integral of the finger pulse signal).

Troubleshooting

If you are not seeing an ECG trace, check that all three electrodes are correctly attached. Adjust the range if necessary. Try autoscale. If the signal is noisy, make sure that the volunteer is relaxed. Try the alternative electrode positions (Fig. 4).