

Name:

Date:

Class:

Applications of ECG and EMG Design Activity

Directions

In this activity, you will use what you know about ECG/EMG waves and applications of ECG/EMG wave analysis to **design your own portable healthcare device** that uses **either ECG or EMG** data monitoring. You should begin your design by identifying **one** of the heart or neuromuscular disorders/diseases discussed in the lectures (or found from a reputable online source) that you would like your device to monitor or detect. Then, describe how you will detect the disease/disorder you chose using your notes from lecture, and by completing research on the internet. Finally, determine how/where your device will be worn—be creative!

You will complete your design in steps based on the Engineering Design Process. Since we won't actually be implementing these designs for use, we won't be using all the steps of the Engineering Design Process. As you work, complete the questions below and make additional notes as needed. This activity will be graded based on three pillars: **creativity**, **proper use of information from lecture**, and **completeness**.

List of **heart disorders/diseases** discussed in lecture:

- Heart arrhythmia
- Ventricular hypertrophy

List of **neuromuscular disorders/diseases** discussed in lecture:

- ALS
- Muscular dystrophy

1. **Ask: Identify the need and constraints.** Choose a heart/neuromuscular disorder/disease that your device will address. Then, briefly describe what abnormalities in the data your device will detect to identify or monitor the disorder/disease.

Name:

Date:

Class:

2. **Research the problem.** Perform a Google search on your heart/neuromuscular disorder/disease. Identify 3-4 bullet points of information about the disorder/disease that would be helpful to consider in designing the device. For each point, list your source. (Example: 65,000,000 people worldwide have epilepsy – The Epilepsy Network)

3. **Imagine: Develop possible solutions.** Create three basic designs for your device. For each design, include a small, basic sketch of the design on the body and list the following:
 - a. Where is it worn on the body?
 - b. How do the electrodes needed to measure the ECG/EMG connect to the device? (Here you can assume that the electrodes may be connected wirelessly, or by a wired connection—your choice.)
 - c. How are the electrodes kept on the person's body? (Go to OpenBCI.com for some examples—there are bands that hold electrodes, electrodes that stick to skin, or you can invent your own!)

Name:

Date:

Class:

(Additional space for #3)

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4. **Plan: Select a promising solution.** From your three designs, select the one you think is best. What about this design makes it stand out from your other two? To aid your decision, list the pros and cons of each design in the table below:

Design 1:		Design 2:		Design 3:	
Pros	Cons	Pros	Cons	Pros	Cons