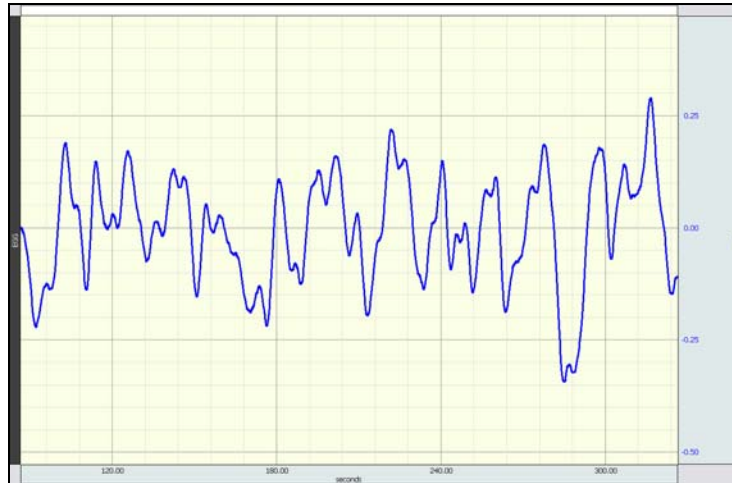


## BSL PRO Lesson H34: Electrogastrogram From a Human Subject



This *PRO* Lesson describes how to record an electrogastrogram (electrical activity from the stomach muscles) from a resting human subject. All data collection and analysis is done via the Biopac Student Lab *PRO* software.

### Objectives

1. To record EGG from a human subject using surface electrodes.
2. Analyze the frequency of the signal using a Fast Fourier Transform.
3. *Optional*: The subject will eat a meal and record the EGG signal before and after eating.

### Overview

In a healthy individual, the stomach muscles contract at regular intervals, giving a rhythmic electrical signal that is recorded by the electrodes. In a healthy subject at rest, the rhythm of the contraction is approximately three cycles per minute (.05 Hz). The power and frequency of the signal changes after a subject eats a meal. Students will place three disposable surface electrodes on the surface of the abdomen above the stomach to record the electrogastrogram (electrical activity from the stomach muscles) from a fasting human subject and, if desired, after eating.

- Read more about the [electrogastrogram](http://www.medicinenet.com/electrogastrogram) at MedicineNet.com

### Equipment

- BIOPAC electrode lead set (SS2L)
- BIOPAC electrodes (EL503)—three per subject
- Electrode gel and abrasive pad (BIOPAC GEL1 and ELPAD)
- Computer running Windows XP or Mac OS X
- Biopac Student Lab *PRO* software (BSL 3.7.3 or higher)
- BIOPAC Hardware (MP36, MP35 or MP45)

**NOTE:** This lesson is not compatible with MP30 hardware.

## Setup

### Hardware

1. Turn your computer ON.
  - If using an MP36/35 unit, turn it OFF.
  - If using an MP45, make sure USB cable is connected and “Ready” light is ON.
2. Plug the Electrode Lead (SS2L) into CH 2.
3. Turn ON MP36/MP35 unit.

### Software

1. Launch the **BSL PRO** software.
2. Open the template file by choosing **File menu > Open > choose Files of type: Graph Template (\*GTL) > File Name: [h34.gtl](#) or H34 Electrogastrogram.gtl**

### Calibration

- None required.

### Subject

1. Prepare the subject. For best results
  - a. Remove all substantial metal jewelry from the **Subject**.
  - b. Make sure that the **Subject** is not touching any metal (metal pipes, chairs etc.).
  - c. Clean and abrade skin around electrode sites.
    - If the skin is oily, clean electrode sites with soap and water or alcohol before abrading.
  - d. Apply a drop of gel to each electrode.
2. Place three EL503 disposable surface electrodes on the **Subject** as indicated below.

#### Electrode Position

- a. Place two electrodes on either side of the upper abdomen above the stomach.
- b. Place a third electrode above one of the first two.

#### Lead Color

- RED** Top (side with two electrodes)  
**BLACK** Bottom (side with two electrodes)  
**WHITE** Opposite (side with one electrode)



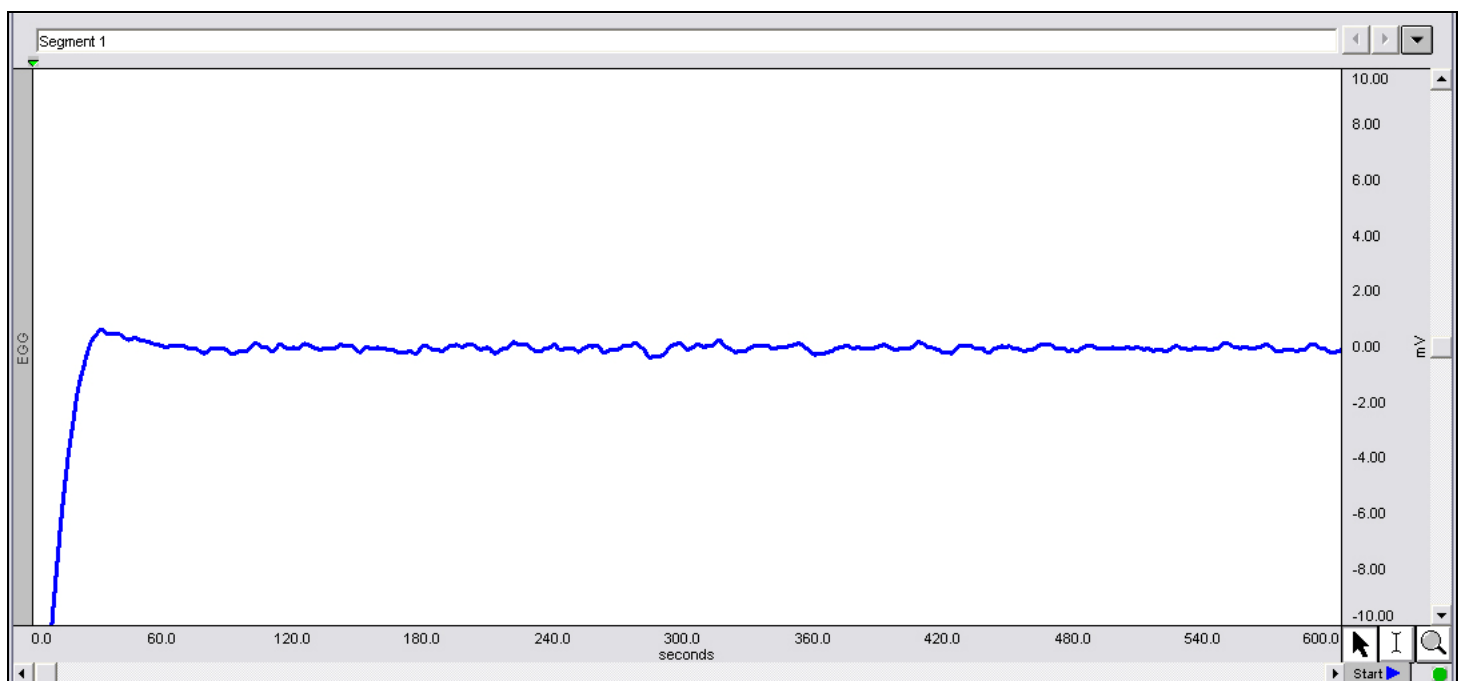
3. Attach the SS2L electrode leads by color as indicated above.
  - The pinch connectors work like small clothes pins; however they will attach to the electrode only on one side. You may have to rotate the pin to make sure the metal on the inside of the clip is connected, touching, and clamped onto the electrode at the base of the nipple.
  - Clip connector cables to subject's clothing, or place so that there is no strain on the electrode clips or the cable wires at any point in the set up.
4. Turn on the MP unit.

5. **Subject** gets in a supine position, with eyes closed. It is important that **Subject** is completely still during the recording.
6. Wait 5 minutes after the electrodes have been attached to the skin to begin recording (this gives the gel time to settle and maximize conductivity).

## Recording

1. Click the **Start** button to begin recording.
2. Record *at least* 10 minutes of continuous EGG data from the Subject at rest and then click **Stop**.
  - o A clinical EGG normally takes 2-3 hours (to record fasting and after a meal), but you can see the essential characteristics of an EGG recording in much less time.
  - o The template is set for 60 minutes of recording, but it can be lengthened or shortened as desired.
3. *Optional*: Ask the Subject to sit up and eat some food. After eating, the Subject should lie down and relax.
4. Click **Start** to begin recording.
5. Record *at least* 10 minutes of continuous EGG data from the Subject after eating and then click **Stop**.

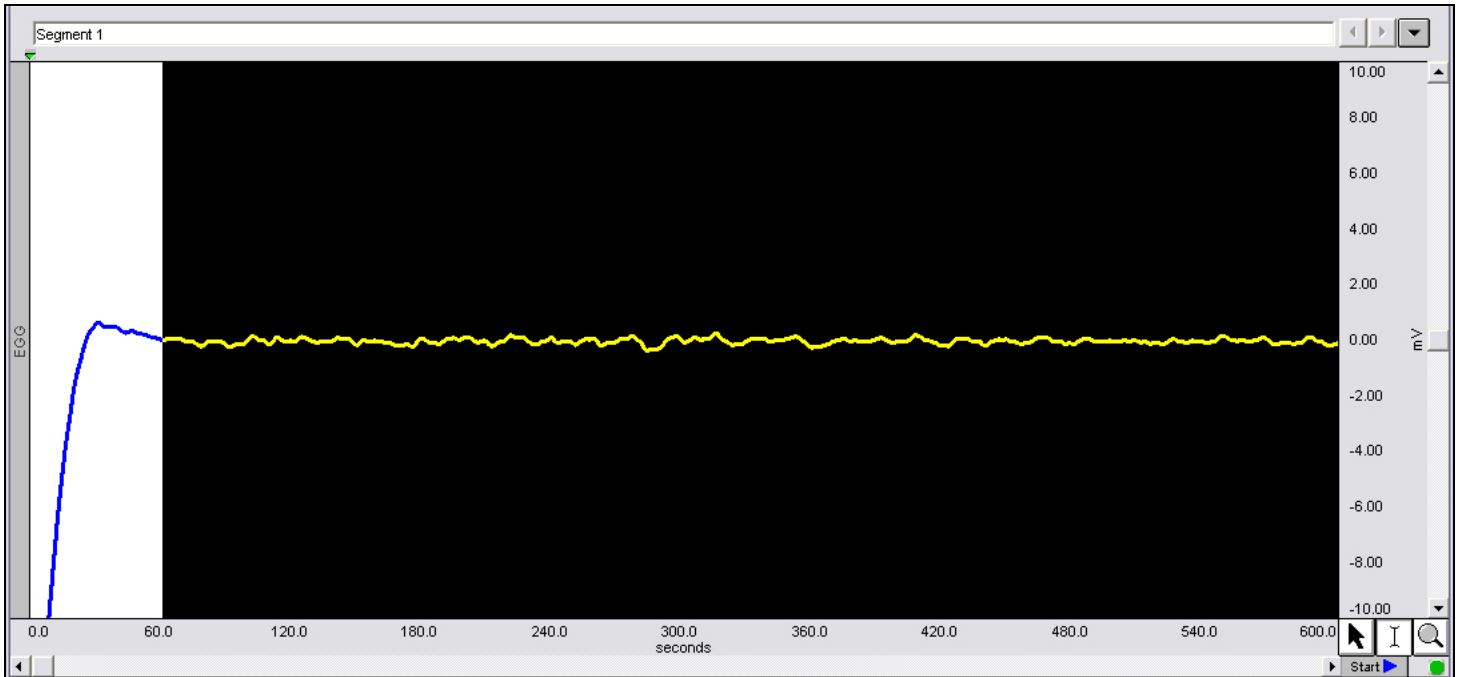
The following shows sample data. Note that the first 30 seconds of data is not valid as the filters are settling.



Sample Data

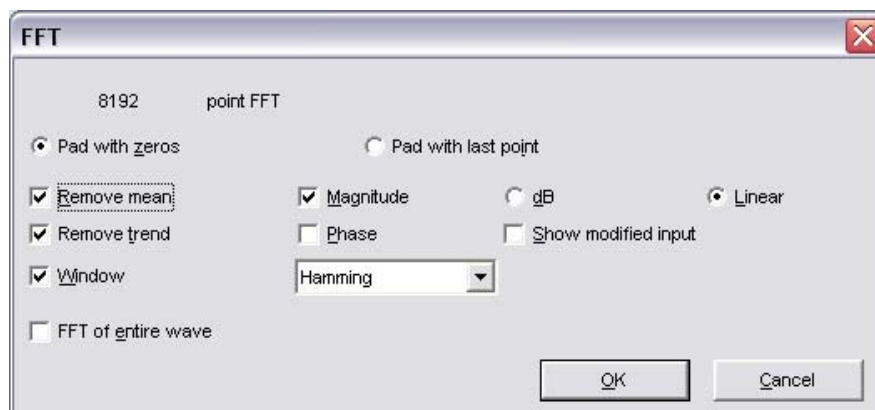
## Analysis

1. To make sure all data is shown, select Display > “Autoscale Horizontal” followed by Display > “Autoscale Waveforms”.
2. Select an area of data (using I-beam tool) that does not include the filter settling time (approx. first 30 seconds). **Note:** If multiple recordings (segments) were performed (i.e. before and after eating), only select data in the first recording. An append event marker (📍) is displayed at the start of each recording.



### Sample Data Selection

3. Select FFT from the Transform menu.
4. Select “Pad with zeros”, “Remove mean”, “Magnitude”, “Linear”, “Remove trend”, and “Window - Hamming”, and then click **OK**.



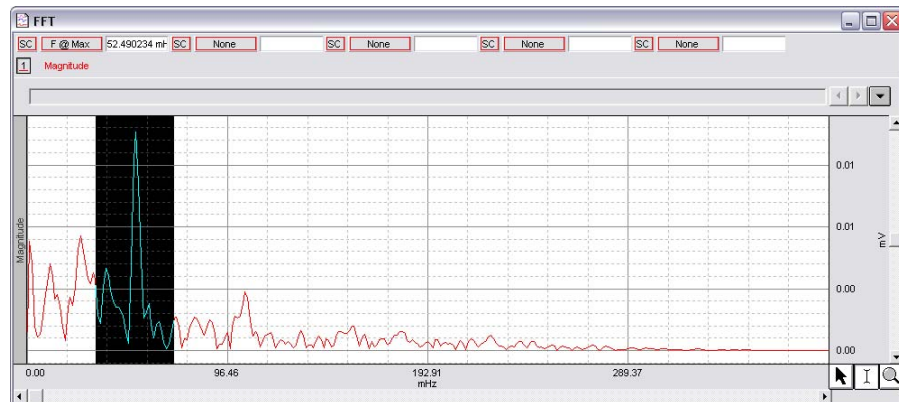
### FFT Dialog Selections

5. The system will perform an FFT over the selected region of data.
6. In the FFT graph, zoom in on the frequencies of interest (0 to approx. 0.5 Hz.)



### Zoom in on frequencies of interest

7. Set the first measurement box for “F@Max” (Frequency at maximum amplitude) from the pull-down menu.
8. Select an area that encompasses the maximum amplitude and record the measurement “F@Max”. Note that the frequency units will vary depending on software used. In the example below, the units are in “mHz” which is milli-Hertz. The measurement should be close to .05 Hz (50 mHz), which represents three contractions per minute.



### Frequency at Maximum measurement

9. If you performed the test before and after eating, repeat the analysis for the second recording segment.
  - o You should notice a change in amplitude and frequency.