# BioCapture™
RESEARCH SYSTEM

Skin conductance level recording with the BioRadio and BioCapture software

This document details the process of setting up and recording skin conductance level (SCL) and outlines, as an example, a procedure for governing SCL per various breathing exercises.

BioRadio

1. **Preparing a subject for a SCL recording**
   - You will need three cloth silver-silver chloride (Ag-AgCl) electrodes and one alcohol wipe.
   - Wipe the entire back of the hand with the alcohol wipe.
   - Using two cloth Ag-AgCl electrodes, place electrodes on the thenar and hypothenar eminences of the palm. These are the muscle groups that control the thumb and little finger, respectively.

thenar   hypothenar
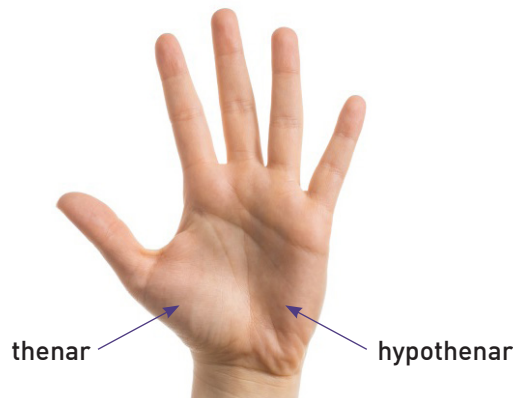
   - Place a third cloth Ag-AgCl electrode in the center of the back of the hand. This will serve as the Ground (GND) electrode.

2. **Connecting subject to the BioRadio**
   - For these set of steps, you will need three electrode cables of any color.
   - Using two electrode cables, connect the electrodes on the palm to a differential input channel on the BioRadio.
   - Using the third electrode cable, connect the electrode on the back of the hand to the GND input of the BioRadio.

Programmable Channels   ○ Single-Ended ● Differential   Sample Rate: 1K ▼ Hz

Ch.	Name	Type	Resolution	Input Range
☑ 1	SCL	GSR ▼		
☐ 2	Enter Name	Custom ▼	1 µV ▼	+/- 0.187 V
☐ 3	Enter Name	Custom ▼	1 µV ▼	+/- 0.187 V
☐ 4	Enter Name	Custom ▼	1 µV ▼	+/- 0.187 V

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3. **Wait 5-10 minutes!**
   - This allows for the electrode's conductive gel to be absorbed. Note that cloth Ag-AgCl electrodes purchased from Great Lakes NeuroTechnologies contain water-base hydrogel, are medical grade and latex free.

4. **Configuring the BioRadio and BioCapture software**
   - Ensure that your BioRadio is on and connected to BioCapture software.

   - Ensure the configuration is set to Differential, and the Sample Rate is at least 1 kHz.

   - Program the BioRadio for 1 channel of SCL by selecting GSR from the selection of presets, within the device configuration window.

   - Change the channel name to SCL.

   - Before starting acquisition, use the software's Events feature to create event markers for the following activities and steps:

        - Normal breath

        - Fast short breaths

        - Long deep breaths

        - Hold breath

        - End test

   - Enable auto-scale continuous for the SCL channel.

5. **SCL recording**
   - Based on the following procedure, BioCapture recordings will be approx. 3 minutes (180 sec.) in duration.

   - Create a recording.

   - Add a Normal breaths event marker and instruct the subject to breathe normally for 30 sec.

   - Add a fast short breaths event marker and instruct the subject to breathe twice as fast for 30 sec.

   - Add a long deep breaths event marker and instruct the subject to take long deep breaths for 30 sec.

   - Add another normal breaths event marker and instruct the subject to breathe normally for 30 sec.

   - Add a hold breath event marker and instruct the subject to try to hold their breath for 30 sec.

   - Add another normal breaths event marker and instruct the subject to breathe normally for 30 sec.

   - Add an end test event marker and stop recording.

6. SCL review

- Open the newly recorded BCRX file and you should observe a significant increase in SCL over the duration of the test, similar to the figure below. Calculated SCL averages are in italics.
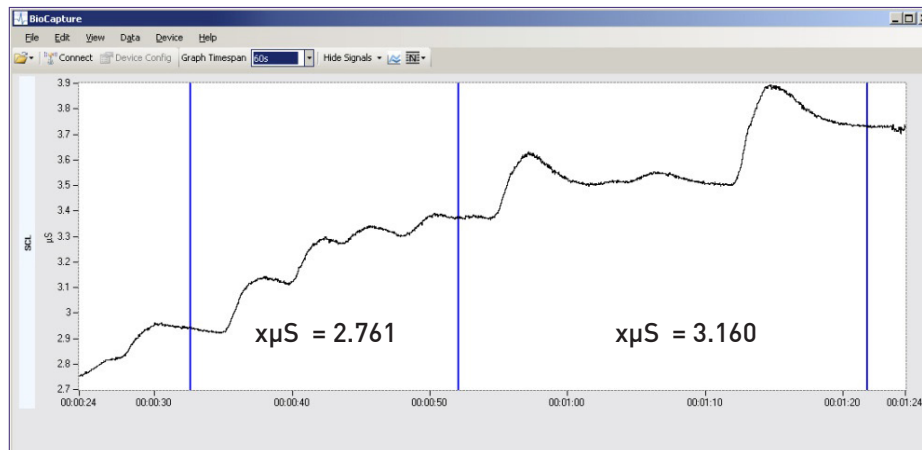
- Notice how some breathing exercises create a gradual change, while others appear more intense, and yet some convey no change at all. Also, observe the particular contours of the SCL waveform that coincide with certain breathing exercises.

- Understand how we breathe affects the sympathetic nervous system that in turn sends impulses to the sweat glands, causing an increase in skin conductance level.

7. Going forward

- With an understanding of the changes in skin conductance level, under the most banal of exercises, consider other exercises that may or may not influence SCL. This could include tests of muscle tension by squeezing a rubber stress ball, or testing how different temperatures affect SCL. Testing the effects of relaxation, fright, anxiety, word association etc. are all possibilities.