Surface Electromyography (sEMG)

Short Title	Surface EMG
Effective Date	July 4, 2017
Approved by REB	July 4, 2017
Version Number	1

A. PURPOSE AND BACKGROUND

Surface electromyography (EMG) is the recording of muscle electrical activity through the use of non-invasive electrodes affixed to the surface of the skin. This can include: passive or active (non-conducting) recording electrodes, and disposable or reusable electrodes, used for the purposes of recording voluntary or involuntary activity. This SOP only covers the preparation, application, use, and removal of non-conducting surface EMG electrodes.

B. PROCEDURES/STUDY PROTOCOL

Are there any controlled act(s) to be performed: Yes **X No**

Procedures

1. Explain procedure to the participant as follows. Ensure at every step that the participant has no known allergies to anything that will be applied to the skin. If the participant has an allergy to tape (e.g., Transpore tape) a hypoallergenic tape should be applied instead. If a participant has an allergy to any other solution, they should be excluded from participating, as hypoallergenic variations do not typically exist.
2. Surface electrodes **cannot** be applied to an area with broken skin (i.e., cuts or abrasions), a rash, scarring, or scabbing.
3. Using a new, disposable razor, shave the area of the skin where the electrodes will be placed. Disposable razors are single use only. Any other type or use of razors must be cleared by the REB on a case-by-case basis.
4. The surface of the skin will be lightly abraded using a skin preparation paste (e.g., NuPrep) applied with a cotton ball or gauze pad (as per NuPrep MSDS). This will cause slight redness of the skin, care should be taken to not over-abrade as this can cause skin abrasion.

5. The surface of the skin will be cleansed with isopropyl alcohol applied with a cotton ball or gauze pad to remove any oils. This will likely cause stinging when applied to the recently shaved and abraded skin.

Note: the order of steps 4 (skin abrading) and 5 (isopropyl alcohol) is at the discretion of the researcher.

6. Surface electrodes will be applied to the cleansed skin. If electrodes are not self-adhesive, then self-adhesive electrode collars/washers and signal conductance gel will be used. To secure the electrode in place, tape (hypoallergenic if necessary) and Velcro strapping may be used.
7. At least one ground electrode will be placed on a bony prominence(s) on the body (nearby the electrodes where applicable).
8. Upon removal of the electrodes the skin should be wiped with isopropyl alcohol to remove any signal conductance gel and wiped with water to minimize irritation and dryness.
9. Participants should be instructed that redness or skin irritation may occur and that the application of unscented lotion may be advised precluding any allergies.
10. Disposable electrodes should be disposed of and reusable electrodes should be cleansed according to manufacturer recommendations.

C. EQUIPMENT

1. Electrodes, electrode collars, tape
2. Isopropyl alcohol
3. Abrasive skin prep paste (e.g., NuPrep)
4. Signal conductance gel (e.g., Signagel)
5. Disposable razors (single use only)

D. TRAINING REQUIRED FOR RESEARCHERS

- First Aid

E. DESCRIPTION TO STUDY PARTICIPANTS

1. Describe in writing (consent form) and orally (during study) how a study participant would experience the procedures and equipment.

2. Explicitly state that the area over the muscle(s) will be shaved.
3. Inform the participant of each solution / material that will be applied to the skin before application in case of allergies.

F. RISKS

PARTICIPANTS

1. Skin irritation may result from mildly abrading the skin, cleaning the skin with alcohol, then applying surface electromyographic (sEMG) recording electrodes with electrolyte gel.
2. Laceration from shaving due to dry contact or repeated shaves.

RESEARCHERS

N/A

G. SAFEGUARDS/SAFETY PROCEDURES

PARTICIPANTS

1. Skin irritation: Washing the electrolyte gel from skin surface and applying unscented skin lotion after the test session can minimize the irritation.
2. Lacerations: first aid will be applied as necessary and the sEMG application will be discontinued in that area.

RESEARCHERS

N/A

Remember to report any adverse events to the Research Ethics Office (reb@brocku.ca).

H. REFERENCES (if applicable)