Recording Muscle Activity in Human Subjects using Indwelling Electromyography

# *ETHICS-SOP\_METHODS\_Indwelling EMG--023*

# Document Sign-offs

|  | Name/ Title | Date |
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# Current Status

Approved

# Revision information

Revision No: 1.0

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# Glossary of Terms

EMG - Electromyography

# Purpose

To establish safe procedures for the recording of electrical signals in muscle tissue using an indwelling electrode.

# Scope

As required

# Responsibility

Investigators using indwelling electrodes must ensure that the electrodes are sterilized before use according to, at a minimum, Provincial Infectious Disease Advisory Committee (PIDAC)

# Distribution of Copies

Posted on Research Ethics Website

# Procedure

**Background**

Much like surface EMG, Indwelling Electromyography (EMG) is a technique that records the electrical signal as it travels down the surface of the muscle membrane. The advantage of indwelling EMG when compared to surface EMG is the ability to record activity from small populations of muscle fibres and therefore individual motor units. However, this technique is considered invasive since the electrodes are placed under the surface of the skin and is only used when single motor unit recordings are necessary for the experiment. The standard operating procedure for this technique is as follows.

1. The subject is seated in a comfortable chair where they will remain for the entirety of the procedure.
2. The subject may be asked to wear loose clothing that can be moved aside in order to provide easy access to the muscle desired for recording.
3. The target muscle is cleaned thoroughly with an alcohol swab and 2 small sterilized electrodes (low impedance-200 microns diameter, 20-30mm length) will be inserted just under the skin and then advanced into the muscle belly. The insertion of the electrodes may be accompanied with a sharp pin prick sensation. This is brief and dissipates after a few seconds (as with a temporary pin prick). The two electrodes are placed along the direction of the muscle fibres.
4. All experimenters who manipulate the electrodes are required to wear gloves for the safety of both the participant and the investigator.
5. The subject may then be asked to perform a variety of static or dynamic tasks involving contraction of the target muscle while the electrical activity is recorded. Recordings using the indwelling technique will be limited to two hours in duration as that is the duration of a previous experiment using this technique (REB #: 09AU013). There are no reports to date of any adverse affects for recordings of this duration.
6. Immediately after the removal of the electrodes, the area is swabbed with alcohol to decrease the minor risk of infection. There is a very slight chance of local infection and/or local inflammatory response/bruising post treatment, which typically lasts less than 12 hours.
7. On the very rare occasion (estimated at one in every 20 experiments) a small drop of blood is drawn due to compromising a small capillary providing the surface of the skin with blood. In this event a cotton swab is used to wipe the blood, followed by an alcohol swab. The experimenter continues to wear gloves during this procedure. The electrode is immediately thrown away into a biohazard sharps container and the swabs and gloves are disposed of in a biohazard bag.
8. Indwelling electrodes are sterilized at the Guelph General Hospital using the autoclave method. According to a letter from GGH, they adhere to federal and/or provincially developed standards and guidelines when it comes to the hospital’s sterilization policies and procedures. Please see attached letter.

# Wording for Consent Forms

The potential risks are as follows:

* Indwelling electrodes will be used to read muscle activity. *Mild skin sensitivity may exist at the sites of electrode placement due to the adhesive substance.* The cleansing of all sites prior to electrode placement is intended to prevent or minimize this irritation.

# Exclusion Criteria

* a musculoskeletal or neuromuscular disorder (i.e. carpal tunnel, tendinitis, ALS, diabetes, dystrophy etc
* if you get light headed and might faint at the sight of blood or needles

# Wording for Website

To be posted on the Ethics Office website

# Documentation/Record Keeping

N/A

# External Regulatory Requirements

N/A

# Internal Related, or Referenced Policies, Procedures

ETHICS-SOP\_METHODS\_Surface\_Electromyography-010

# References

N/A

# Revision History

| Revision # | Reviewer | Reason | Date Last Reviewed | Next Review Date |
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| 1.0 |  |  |  |  |

# Review Cycle

Annual

# Appendix

Guelph General Hospital letter regarding sterilization.