

UNIVERSITY OF LIMERICK RESEARCH ETHICS COMMITTEE

PROCEDURES INVOLVING HUMAN SUBJECTS

Procedure No

Title of Procedure

Name of Assessor

Assessment date

Does this procedure already have ethical approval ?

If so, enter ethical number and expiry date

**1**

This procedure involves percutaneous electrical stimulation of human muscle. In this procedure, large surface electrodes are placed at either end of the muscle, and a small current is delivered through the muscle to induce muscle contraction. All electrical human stimulators in PESS, comply with the EU medical directive for safety in human use and must be CE marked. In these stimulators, the stimulator circuit is optically isolated from mains current. The electrical stimulation protocol is used on a number of muscles in laboratory use, but the principal use would be on leg quadriceps and on gastrocnemius muscles. Stimulation would be delivered at varying frequencies, depending upon the protocol (one use is in demonstrating force-frequency relationship in human muscles, which involves ramping up through a frequency range of 1 – 100 Hz). In all experiments with the stimulators, the volunteer is familiarised with the feeling of electrical stimulation before the main experiment begins. In this familiarisation session, the volunteers are asked to increase the current being delivered from zero, so that they set their own threshold of tolerance. The stimulation duration during experiments is rarely more than a few seconds. Participants will wear a waist belt or a seat belt on the testing apparatus to ensure their safety during the test.

Electrical stimulation is unpleasant, and tolerance of the procedure varies greatly between individuals. As in all experiments, the volunteers are informed of their right to withdraw from the experiment at any time.

**2**

Others, please specify

**3****Eligibility of subject(s) to be used**

PESS student (U.G. or P.G.)

University of Limerick staff or campus personnel

Others, please specify

Members of the general public engaged in research projects granted ethical approval.

**4****Potential risks. To be explained before obtaining consent**

None, or minimal discomfort only

Electrical stimulation of muscle is relatively safe, but can be unpleasant for the volunteers. There is a very small risk that if the current were delivered across the chest of a volunteer, that arrhythmia could be induced. However, we would never place electrodes in this configuration, and the total power delivered by the stimulator is far less than that used in defibrillation. Volunteers are asked to adopt a cross armed position and must not on any condition touch the electrodes with their hands.

Volunteers who find the procedure very unpleasant would be encouraged to withdraw from the experiment. **All volunteers would be counseled about the unpleasant nature of the procedure prior to participation.**

High force isometric contractions induced during contractions also carry a small risk of injury to the knee joint. Subjects who respond on the questionnaire that they have recently injured their knee will not be allowed to proceed with the test. If anyone complains of excessive joint pain during the test, the procedure will be stopped.

**5****Action to be taken in the event of a foreseeable emergency**

The procedure will be terminated if the volunteer shows any sign of distress.

Standard first aid procedures may be required depending on the severity of the situation. The following standard procedure should be followed in the event of an incident occurring in the PESS building / UL Facility:

1. Stop the procedure. Position the subject to prevent self-injury.
2. If appropriate, raise the subject's lower limbs to improve blood flow. Should the subject fail to respond summon help immediately.
3. Check vital signs airways, breathing and circulation (ABC)
4. If required attempt CPR as soon as possible.
5. Requesting Help: Emergency Contact telephone numbers are listed on laboratory door:
  - During normal working hours 9am-5pm, use lab phone to contact the Student Health Centre on **061-202534**
  - Outside of normal working hours, or if the Student Health Centre number is engaged/busy, use the laboratory phone to dial 3333 for UL security personnel who will then contact the ambulance service. Contact one of the PESS First Aiders – names are listed on the PESS laboratory door.
6. When contacting the above clearly state: Location, Building, Room Number, Nature of Incident/Accident and provide a contact number.

7. Complete the UL 'Accident & Emergency' form (completed by the investigator, not the volunteer).  
Forms available on UL HR website: <https://www.ul.ie/hr/hr-policies-procedures-and-forms-z>

If an emergency or incident occurs offsite, follow the local procedures for dealing with such an event.

**6** **Level of supervision required for procedure**

<input checked="" type="checkbox"/>	PESS lecturing, research staff and teaching assistants
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<input checked="" type="checkbox"/>	PESS postgraduate researcher
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Others, please specify

<input type="checkbox"/>	
<input type="checkbox"/>	

**7** **Other documentation required for this assessment ?**

<input checked="" type="checkbox"/>	PESS Pre-test subject questionnaire
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<input checked="" type="checkbox"/>	Participant Information Sheet
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Others, please specify

<input checked="" type="checkbox"/>	Participant Consent Form
<input type="checkbox"/>	

For office use only

## PROCEDURES INVOLVING HUMAN SUBJECTS

Procedure No

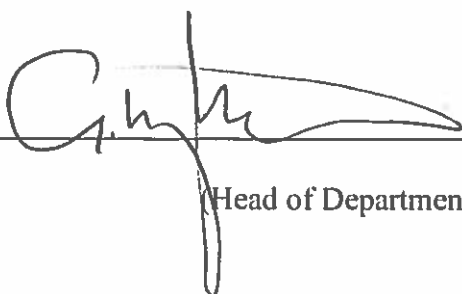
Title of Procedure

Name of Assessor

Assessment date

Others, please specify

Comments/conditions

Signed   
(Head of Department)

Date

## **SS 004**

### **Standard Operating Procedure for Electrical Stimulation of Muscle**

Electrical stimulation causes a muscle to contract directly, i.e. the subject does not initiate the contraction.

1. Two large electrodes are placed on the skin at either end of a particular muscle, e.g. thigh.
2. The electrodes are attached to an electrical stimulator, which can generate different levels of contraction.
3. The participant will be given an opportunity to familiarise themselves with the feeling of electrical stimulation, from the lowest level to a level they feel tolerable.
4. The participant will be asked to slowly increase the current whilst the stimulator is active, to reach a point where the muscle is developing sufficient force. Once this has been done, the current that the participant has set will be used for further stimulation.

**Note:**

- There is no chance of electrocution as the electrodes are isolated from the main current.
- The procedure is relatively safe, however the stimulation may at times be unpleasant for the participant. If the participant finds the procedure very unpleasant they can withdraw from the experiment.
- With high force contractions of the thigh, there may be a small risk of injury to the knee joint.
- If the participant has recently injured their knee, they will not be allowed to proceed with the test.
- If the participant experiences excessive joint pain during the test, the test will be stopped immediately.