NHS, Invasive or Clinical Research (NICR) Committee

Physiology, Exercise & Nutrition

Research Group



Title: Taking Percutaneous Muscle Biopsy Samples from Healthy Adult Volunteers

# TAKING PERCUTANEOUS MUSCLE BIOPSY SAMPLES FROM THE VASTUS LATERALIS OF HEALTHY ADULT VOLUNTEERS

1. **SCOPE**

A number of studies performed in the University involve taking muscle biopsy samples from participants. A wide variety of tests may be performed on these samples, which can be used to address a range of research questions.

This approved procedure is intended for use by researchers operating in an appropriate laboratory within the University of Stirling, who wish to collect muscle samples from study participants. The approved procedure covers the taking of the samples - it does not cover the subsequent tests performed on those samples.

This approved procedure is intended for use when the following criteria are met (n.b. the NICR application must explicitly demonstrate how these criteria are met):

* The study involves healthy adults (over the age of 18) who are able to provide informed consent
* Staff involved in the performance of muscle biopsy sampling have received appropriate training

## Appropriate Laboratory Facilities for Muscle Biopsy Sampling

Appropriate laboratory facilities contain the required levels of equipment, staff and services to ensure the biospy procedure conforms to the SOP and participant safety is guaranteed. Specific equipment includes:

Equipment

Sterile gloves, dressing trolley, syringes (5mL and 50mL catheter tipped), sterile needles (26g and 21g), Videne (or similar iodine-based antiseptic skin washing solution), alcohol wipes, sterile gauze swabs, fenestrated drape, sterile scissors, sterile forceps, sterile Bergstrom biopsy needle, white drape, sterile disposable scalpel, sterile suction tube, stitches, steri-strips, sterile gloves, weighing boat, cryotubes, opsite or similar waterproof dressing.

The laboratory must have an appropriately private room with clean, wipeable surfaces and a comfortable bed or physio table upon which the participant may lie supine or semisupine. A pillow or cushion should be available to support the participant when desired.

Staff

At least two members of staff will be present during the muscle biopsy procedure. At least one of these members of staff will be trained in the procedure. The second member of staff will not undertake the muscle biopsy procedure unless they are being trained.

Services

An appropriate sharps disposal service and biohazard waste management system must be in place (i.e. there should be sharps disposal bins and biohazard waste bags available which are regularly checked and safely disposed of). The facility must have a needle stick policy in place, which includes a clear statement about who to contact in the event of a needle stick injury. There must also be an appropriate laboratory for processing the samples, or an established safe system for transporting the samples to such a laboratory.

# TRAINING OF RESEARCH STAFF

It is the responsibility of the study Principle Investigator to ensure that all researchers involved in collecting samples have been adequately trained in the procedures used to collect, handle, transport and store samples.

Researchers who will take muscle samples must have completed formal training in percutaneous muscle biopsy sampling.

# PROCEDURES

## Principle

Using sterile technique a small sample of muscle tissue is removed from the quadriceps (vastus lateralis) muscle. This biopsy can be used to examine a number of biological parameters depending on the study context.

## Procedure

The skin of the vastus lateralis will be cleaned and made sterile with Videne (or similar iodine-based antiseptic skin washing solution). The skin and fascia will be injected with local anesthetic (2% Lidocaine) to eliminate any pain. A small incision ~6 mm wide will be made through the skin and fascia. A 5 mm Bergström needle will be advanced through the skin and fascia into the muscle and suction applied. A piece of the muscle will then be removed with the needle (~50 – 200 mg wet weight depending on the individual study requirements) and the sample will be processed appropriately for the given study. The skin will be closed with a suture and the wound will be dressed.

# POTENTIAL RISKS TO PARTICIPANTS/RESEARCHERS/OTHERS AND WHAT WILL BE DONE TO MINIMISE THE RISKS

## Risks to Participants

All staff performing the technique will have undergone training to minimize all risks. Common risks associated with percutaneous muscle biopsy sampling are pain while the local anaesthetic is administered. Thereafter, the procedure may be associated with a feeling of pressure and/or mild discomfort and possibly the perception of pain, but only for a short time. There is the possibility of bruising (with associated pain afterwards). These risks will be minimised by ensuring that all staff are fully trained in the technique.

Bruising after the event also will be reduced by promptly applying pressure on the biopsy site after the needle is withdrawn. Other risks may include lightheadedness, nausea or insensitivity of the skin, but these risks are very small. There is a small risk of infection at the site. Strict sterile technique is used at all times to minimise the risk of infection. Bleeding from the biopsy site is highly unlikely since no major artery or vein is located in the area of the vastus lateralis. Applying firm pressure over the biopsy site and applying a pressure dressing will further minimize the chance of hematoma.

All participants will be fully informed about these risks in the Participant Information Sheet. Participants will be informed, including written instructions, of how to care for their leg after the biopsy procedure and will be given additional dressings. They also will be made aware of the signs of infection so that they can inform the investigators if they have any concerns.

As participants may sometimes faint before, during or after the muscle sampling, at least one member of staff (present in the building) must be trained in basic life support. Lastly all staff performing muscle biopsy must have Hepatitis B immunity following immunization and be fully up to date with the standard vaccination schedule, including tetanus.

## International Documentation of Risks

The needle biopsy technique has become a standard procedure over the last 40 years and is one of the most important tools for investigating muscle metabolism. Edwards et al (Muscle and Nerve, 6:676 683, 1983) reviewed this procedure. That group reported that from 800 biopsies taken in their laboratory only 3 cases of haematoma occurred and just 1 case of infection, which was a minor skin infection and the group reported no cases of deep muscle infections or insensitivity of the skin. Highstead et al (J Appl Physiol, 98:1202−1206, 2005) further reviewed the muscle biopsy procedure. They reported that from 1,133 biopsies performed on volunteers aged below 60 years, there was a very small chance of haematoma (1.1%) and no incidence of infection. More recently, Tarnopolsky (Muscle and Nerve, 43:717-725, 2011) reported a minor complication rate of 0.015% from 13,626 biopsies using this procedure.

## Risk to Researchers/Other Staff

Taking muscle biopsy samples carries a risk of needle stick injury to the researcher, which in turn carries a risk of exposure to blood borne infections. This risk will be minimised by a) ensuring staff are adequately

trained, b) ensuring staff have been vaccinated against, and show immunity to Hepatitis B. The risk of exposure to infection is increased in all those involved in the collection, transport, storage or processing of any biological material. This risk will be minimised by ensuring all staff involved in these procedures are adequately trained and that the appropriate equipment and facilities for the safe handling of samples is provided.

# METHODS FOR RECRUITING PARTICIPANTS

Potential participants will be recruited as per existing NICR guidelines and the inclusion and exclusion criteria of the particular study.

# INFORMATION PROVIDED TO PARTICIPANTS

Participants should be fully informed of all procedures involved in the research study. For studies involving the taking of biological samples the Participant Information Sheet should describe the number and timing of the samples as well as a brief description of the reason for the sample(s). For muscle samples, the number of samples to be taken must be stated. The PIS should also contain information about what will be done with the samples (i.e. whether they will be stored for any length of time, when they will be destroyed). Lastly, for studies involving muscle samples, the PIS should contain a brief section on the possible risks, most commonly fainting, pain and bruising.

The Information Sheet should be written in simple but non-patronising language. Most word-processing packages provide readability statistics for a document, and one should aim for a 12-year-old (Year 7) reading level for adults.

Current guidelines for the Information Sheet for Participants can be found on the NICR website.

# CONSENT OF PARTICIPANTS

The informed consent of participants should be recorded on a form that includes explicit consent for the taking, storing and testing of the samples. The form must also contain an explicit statement that the participant understands that they will be informed of any unexpected findings and encouraged to report these findings to their GP.

Guidance on the informed consent process can be found on the NICR website.

# MONITORING AND REPORTING OF ADVERSE OR UNFORSEEN EVENTS

Adverse or unforeseen events will be reported to the departmental safety officer in the first instance and may be followed up by the University Safety officer if deemed necessary. The NICR

Committee also will be notified of such events.

# FINANCIAL AND OTHER REWARDS TO PARTICIPANTS

Compensation for time commitments, travel and parking may be offered to participants in line with existing PENRG policy and will be determined separately for each individual protocol.

# COMMUNICATION OF RESULTS

Results of the study will be communicated via the normal channels as per existing PENRG practice.

# DUTY OF CARE ISSUES / CONFIDENTIALITY

Duty of care and confidentiality issues arise largely due to the results of tests on the samples, rather than taking of the samples per se. This approved procedure does not cover issues concerned with the testing of the samples, but it is expected that each study will have a system in place by which the results of the tests performed are reviewed and, where necessary, further investigations or referrals are made. The confidentiality of the results are also expected to be maintained as per NICR guidelines.