

### *Script to video on semi-open muscle biopsy using a conchotome*

The semi-open muscle biopsy technique or percutaneous conchotome technique was developed in Scandinavia (Henriksson KG, 1979) and has been adopted as a routine biopsy method in many rheumatology and neurology centers, particularly in Northern Europe. It gives a good yield of muscle tissue for routine histopathology, immunohistochemistry staining and for biochemistry analyses as well as for research on muscle tissue (Dorph C et al 2001). Make sure to establish contact with your local muscle pathologist in order to get feed-back on your biopsies; this is essential to have a good result of your muscle biopsy.

Advantages with the semi-open biopsy are:

- (1) It causes a minor trauma to the patients as the incision in the skin is only 10 mm or less. It can be repeated if needed, e.g. due to non-responsive disease and for research purpose.
- (2) The biopsies are sufficient for routine histopathology and immunohistochemistry and the amount is 50-100 mg per sample. From the same incision several samples can be taken, 3-8, depending how much is needed for the analyses. The samples can be taken from different directions to reduce sampling errors with negative biopsies.
- (3) Compared to needle biopsies, the cross sectional area of a sample is adequate for histopathologic evaluation.
- (4) Can be used in adults with a suspicion of muscle disease as well as in children, but children would require full anesthesia.

The muscles that can be subject to semi-open muscle biopsy are muscles where no sensitive structures such as large blood vessels or nerves are expected to be present e.g.: m. vastus lateralis, m. tibialis anterior, and m. deltoideus. If the patient is being treated with an anticoagulant or NSAID, take general precautions to avoid unnecessary bleeding.

The conchotome is a device that was developed to take biopsies from the mucosa in the nose. We ordered our conchotomes through the ENT surgery department. Remember that they need to be sharpened with some regularity.

#### **Muscle biopsy procedure:**

1. Work under sterile conditions. A clean room in the outpatient clinic can be utilized. Wash your hands carefully and put on sterile gloves. An assistant is needed for the procedure.
2. Mark your site of biopsy in the skin.
3. Clean the skin.
4. Put a sterile cloth around the planned site for biopsy.
5. Local anesthetic, without adrenalin, is injected in the skin and subcutaneously at the site of the planned biopsy down to the fascia and on the surface of the fascia. Avoid going through the fascia with your needle as the fluid in the needle may affect the muscle tissue and split up the fibers. (Approximately 7-10 ml of 1% xylocaine is needed, more if the subcutaneous layer of fat is deep. Thereafter, give two more injections with a total volume of approximately 8- 10 ml of xylocaine at two injection sites proximal to the site for the planned biopsy.

6. Wait at least 1 minute for the local anesthetic to start to work. Test that the skin is numb before making the incision in the skin. The procedure is often experienced as some pressure on the site of biopsy but is generally not painful. If the patient experiences pain, be sure to add some more anesthetic.
7. Make an incision in the skin, approximately 8-10 mm. Test with a forceps how deep the subcutaneous layer is between the skin and the fascia.
8. Take the knife again and make an incision in the fascia.
9. Take the conchotome, go down through the skin and fascia along the axis of the fiber direction, twist the conchotome 90 degrees, open the mouth of the conchotome, grab a part of the muscle, slowly pull back and twist a little so the muscle sample is removed using the sharp edges of the conchotome.
10. Handle the muscle biopsy sample with care, avoid squeezing it. Put the sample on a moist tissue. Check the sample to make sure it contains muscle tissue, by eye or by a microscope. Avoid soaking the sample on a wet tissue as this may damage the muscle and cause freezing artifacts.
11. Several samples can be taken from different directions through the same incision in the skin and fascia.
12. When you are satisfied with your tissue samples, put three to four steri-strips over the incision and cover with a plastic film which will allow the patient to have a shower the following day.
13. We suggest that the patient sits down and rests for 30 minutes before going home. We also suggest that the patient avoids strenuous walking or running the first hours after the procedure to diminish the risk of bleeding and swelling. The following days the patient will experience some tenderness at the site of the biopsy and may need some pain killer. After 7-10 days the patient can remove the steri-strips.
14. The soft tissue with the biopsy samples needs to be kept cool until freezing. For transportation to a laboratory the moist tissue with the muscle sample could be placed in a plastic tube or a small plastic container which can be sent in a thermos or a styrene box with regular ice surrounding the plastic tube. Importantly the tissue must not be frozen during the transportation.
15. Freezing of the muscle biopsy is essential to perform adequate routine analyses of muscle tissue. The freezing procedure is extremely sensitive and should be undertaken by experienced personal to avoid ice-crystal artifacts (often pre-cooled isopentane is recommended). The biopsies could be stored for many years in  $-80^{\circ}$  in a sealed tube.
16. Biopsies for RNA extraction need to be frozen directly after removal to avoid degradation by RNAse . Should be stored at  $-80^{\circ}$ .
17. Some pathologists prefer to prepare paraffin-embedded block to get a better preserved histopathology compared to immunohistochemistry. These decisions are taken by the muscle pathologist.

#### **References:**

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Henriksson KG. "Semi-open" muscle biopsy technique. A simple outpatient procedure. *Acta Neurol Scand* 1979;**59**:317-23.

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Dr Ingrid Lundberg M.D., Ph.D.,  
Professor  
Rheumatology Unit,  
Karolinska University Hospital and Karolinska Institutet  
Stockholm, Sweden

Dr Maryam Dastmalchi, M.D. , Ph.D.  
Consultant

Email addresses: [ingrid.lundberg@ki.se](mailto:ingrid.lundberg@ki.se); [maryam.dastmalchi@karolinska.se](mailto:maryam.dastmalchi@karolinska.se)

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