

NEEDLE MUSCLE BIOPSIES

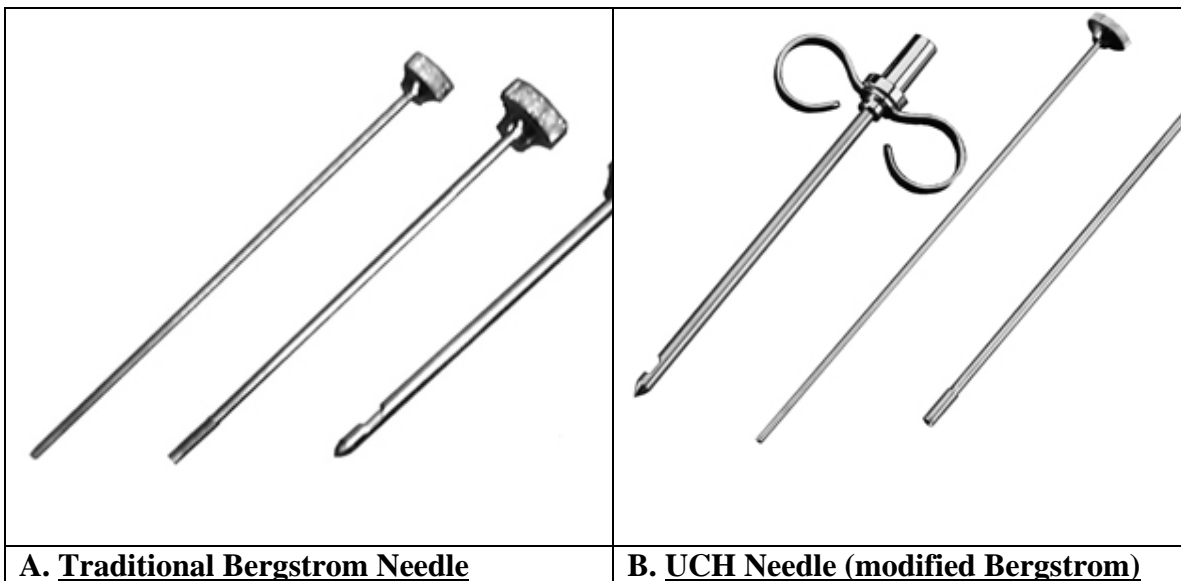
Background:

Needle muscle biopsy sampling offers a less invasive, more rapid alternative to conventional open muscle biopsies for sampling muscle for research purposes. The smaller size of the sample obtained is no longer an important limitation as the sensitivity of emerging molecular technologies has improved exponentially and small amounts of substrate can go a long way. Using the sampling techniques described below, up to 300 mg of tissue, depending on muscle bulk, can be obtained with three passes into the muscle. Such a sample, divided into three, is more than adequate for flash freezing in liquid nitrogen for expression studies, placement in appropriate media for myoblast culture as well as histologic studies.



Biopsy Needle:

The two common needle biopsy instruments used are the Bergstrom needle (see below) and the modified Bergstrom needle also known as the UCH muscle biopsy needle (see below). At the University of Rochester we use the UCH needle. Perhaps the most important modification of the UCH is the addition of a Luer lock attachment to the inner cannula to allow the application of suction during the procedure. Suction applied during the procedure results in consistently larger samples.



Muscle Biopsy Needle Suppliers:

- Bergstrom and UCH needles: Dixons, a surgical instrument manufacturer in the UK: <http://www.dixons-uk.com/index.asp>
- Bergstrom needles only: Stille, a surgical instrument manufacturer in Sweden: <http://www.stille.se/> . Unlike Dixons, Stille has a US distributor: <http://www.stille.se/contact/customer-service/>

Needle Muscle Biopsy Procedure:

The following muscles are readily and safely accessible by needle muscle biopsy:

- Vastus Lateralis: Most commonly and most easily biopsied muscle because of its size. Site of biopsy: With subject supine, make sure leg is positioned so that toes are pointing upwards. Palpate vastus and mark a spot typically about 4-6 inches proximal to the patella and just lateral to the femur. Enter perpendicularly with the needle for sampling.
- Biceps: Typically the lateral head of the biceps in the mid-section of the biceps muscle. Requires entry into the biceps at an angle (about 45 degrees or less).
- Tibialis anterior: Accessed at the middle of the body of the tibialis anterior at the point where it appears to have largest bulk on palpation of the contracted muscle. The needle is inserted at 45° either proximally or distally.
- Other accessible muscle groups: Deltoid, gastrocnemius.



After appropriate prepping, 8-10 cc of 1% Lidocaine is drawn into a syringe. The biopsy site is infiltrated with about 2cc intradermally and subcutaneously with a 25g needle.

Change to a 22g, 11/2

inch needle; introduce the needle to its hub at 45 degree proximal to the biopsy site and infiltrate with lidocaine as you withdraw. Repeat the same procedure at 45 degrees distal to the biopsy site. This will insure that the subcutaneous tissue and muscle fascia is anesthetized without distorting the muscle sample to be biopsied.

Following lidocaine infiltration, a stab incision is made with a #11 surgical blade making sure it is inserted far enough to nick the muscle fascia. The needle is attached to wall suction and introduced perpendicularly (for vastus biopsies) into the incision. The needle will encounter resistance at the fascia. Push through the fascia and make sure the needle

is deep enough so that the upper edge of the cutting window is pushed past the fascia (if not a piece of fascia will be caught and will make it difficult to extract the needle). Once the needle is in place, pull out the inner cannula to open the cutting window. Hold the inner cannula open for about 30-45 second, allowing the suction to draw in a muscle sample, at the same time push the vastus lateralis externally with the free towards the needle. Once the time is up, push the inner cannula all the way in to cut the sample. Ask the attendant to disconnect the needle from the suction and slowly pull out the needle with a steady force as you rotate the needle from side to side. Place the needle on the sterile tray, remove the inner cannula and gently lift the sample with hypodermic needle tip. Make sure there is not another sample stuck in the inner cannula. Repeat the procedure 2-3 times until an adequate sample is obtained.

Pressure is applied for several minutes to the incision site for hemostasis. The incision site is cleaned with hydrogen peroxide and closed with either Steristrips and covered with Tegaderm or sealed with Dermabond. A pair of folded, 4x4 gauze pads is then placed on top of the incision and the site is wrapped snugly with an Ace bandage. Following the procedure, the subject is to remain supine for 15-20 minutes with biopsied limb slightly elevated to further insure hemostasis and minimize the chance of developing a hematoma. The Ace bandage should be taken off within 2-3 hours.

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