MUSCLE BIOPSY (MB) SAMPLING AND SHIPPING GUIDELINES

I-SAMPLING

General indications of MB

diagnostics: evidence of myopathy, motor neuropathy, systemic vascular/interstitial (e.g. SLE) or metabolic disorders with muscle involvement (e.g. Lafora body disease)

follow-up: therapy control

Specific indications of MB

muscle signs: neuromuscular weakness, exercise intolerance, muscle atrophy, muscle hypertrophy, myalgia, abnormal contraction/relaxation (cramps, rippling etc.)

laboratory changes: elevated CK, myoglobinuria

electrodiagnostics: abnormal EMG, abnormal motor NCV

Selection of biopsy site

The muscle to biopsy should be

1. affected!
2. likely to show active lesions (no endstage fibrosis or fat replacement)
3. spared from iatrogenic changes (needle EMG, injection) and trauma.

Multiple biopsies should be considered in systemic myopathies, neuromyopathy and motor nerve involvement. For example….

in **masticatory muscle disorders**, the involvement of other muscles may warrant exclusion.

assessment of **systemic myopathies and length-dependent neuropathies** require the comparison of **1.** type I fibre-rich postural or proximal limb muscles and **2.** type II fibre-rich fatigable distal limb muscle.

How much tissue per biopsy is needed?

There is no easy answer to this question. Our in-house recommendation is a minimal volume of **0.5x1.0x0.5 cm tissue that grossly appears like typical muscle**. That way, even myofibrosis and necrosis are unlikely to impede the histological diagnosis.

Clinically, the size of the animal, progression of the disease, the volume of residual functional muscle and, hence, the impact of procedural morbidity all comprise important determinants.

Do not forget to add a nerve biopsy in any case of any of the following

neuromuscular weakness

cranial nerve changes

reflex abnormalities

EMG denervation pattern

abnormal NCS

Always add

1. EDTA blood sample
2. Serum sample

…for possible serology and molecular testing.

II-SHIPPING

Keypoints

Interstitial and vascular muscle diseases may be identified using standard paraffin histology after formalin fixation. The diagnosis of neurogenic changes and of muscle fibre disorders in far most cases is not possible in formalin-fixed paraffin embedded (FFPE) tissue. Instead, it requires **cryosections of unfixed snap-frozen tissue**.

Do not expect reliable muscle histology results from a lab that does not perform cryohistology on daily base!

Settings

S-1 Muscle lab nearby

Put the sample in a tube or petri dish, label it and pass it on to the pathology lab.

S-2 External lab – express courier available

Split the sample lengthwise. Stretch one **part (A)** on a cardboard and put it in a tube containing 10% neutral buffered formalin. Enwrap the other **part (B)** in gauze moistened by saline or phosphate buffer and put it in a sterile tube. Make sure, both tubes are sealed and appropriately labelled. Send them off for overnight delivery.

CAVEAT 1: the gauze should be damp, not wet! Otherwise, there will be extensive artefacts!

CAVEAT 2: do NOT place the unfixed sample on a wooden tongue depressor unless you wish to fix immediately. Contact to wood otherwise will accelerate exsiccation of the tissue and growth of a biofilm.

S-3 External lab – delayed delivery

If delivery to the lab within 48 hours is unlikely, put the entire sample in formalin. Be aware, however, that muscle fibre typing, enzyme activity measurements, diagnosis of neurogenic changes and storage disorders as well as several immunohistochemical investigations may not be possible after fixation!

S-4 Enzymology & biochemical testing

Reliable assessment of muscle biochemistry and metabolism warrants snap-freezing of unfixed muscle tissue in liquid nitrogen and storage at -80°C until further use.

These investigations should be preceded by the standard screen, including muscle histology and histochemistry, as snap-frozen tissues need to be sent on dry ice and biochemical screening is very expensive.

For a complete metabolic screen you should consider to submit urine samples and use blood cards.

III-COMMUNICATION & DOCUMENTATION

Unless sampling and shipping became routine and the collaboration with the lab has proven successful, make sure to contact the diagnosticians before you send the material. Interpretation of data in muscle and peripheral nerve disorders requires a concise clinical history. Most important data ideally are checklisted on a special muscle/nerve biopsy submission form.

IV-COSTS & TURNAROUND

Myopathy protocols are laborious and require histological, histochemical and immunohistochemical processing. Our lab foresees reporting of histological results within less than 76 hours. Standard prices can be obtained from our test list.

For further queries, feel encouraged to send you request to **info@neuropathologie.de**

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