

SAMPLE SUBMISSION INSTRUCTIONS

900. Complete Muscle Profile

Useful links: [July 2002](#), [December 2006](#)

The Complete Muscle Profile includes the histopathological and histochemical evaluation of a single muscle biopsy specimen utilizing 10-12 different stains and enzyme reactions including fiber typing. A biopsy approximately 0.5 X 0.5 X 1.0 cm should be taken by from an affected but not end-stage muscle by an open biopsy procedure. Wrap the muscle specimen in a saline dampened (not dripping, just moist) gauze sponge, place into a dry water tight container (5 or 10 ml red top tube, dry urine cup) and keep refrigerated until shipped to the laboratory on cold packs. Collect a second smaller biopsy and immersion fix in 10% neutral buffered formalin. For optimal results the specimens need to stay chilled and be received by the laboratory within 24-48 hours of collection.

- Do not ship specimens on Friday for Saturday delivery as the laboratory is closed
- Please call with questions PRIOR to collecting biopsy specimens
- Federal Express and UPS Red Label provide dependable overnight service within the USA. For international shipments Federal Express is recommended
- Please note the following University holidays for 2009. Do not ship packages for arrival during these days as the laboratory will also be closed. **January 1st & 19th, February 16th, March 27th, May 25th, July 3rd, September 7th, November 11th, 26th & 27th, December 24th, 25th & 31st.**

901. Each additional muscle or nerve

Additional charges apply if biopsies are submitted from more than 1 muscle or peripheral nerve specimen.

902. Peripheral Nerve Profile

Useful reference: Muscle and Nerve Biopsy. Vet Clinics North America (2002) 32: 63-102.

The Peripheral Nerve Profile includes evaluation of resin embedded 1 μ m thick sections for determination of axonal degeneration, demyelination, and nerve regeneration. The fixed nerve specimens can also be further processed for ultrastructural analysis and teased nerve fibers on a case-by-case basis. Frozen nerve biopsy sections are used for immunohistochemical analysis on a case-by-case basis. A biopsy specimen approximately 2.5 cm (1 inch) in length should be divided with 2/3 placed on a tongue depressor to maintain length (do not stretch) and immersion fixed in 10% neutral buffered formalin. 1/3 of the biopsy specimen should also be placed a tongue depressor, wrapped in a saline dampened gauze sponge, placed into a water tight container, and kept chilled during shipping.

- Peripheral nerve biopsy should only be performed by a veterinarian experienced in this procedure

903. Muscle and Peripheral Nerve Profile

A special rate applies to a single muscle and peripheral nerve submitted together from the same case. Additional fees will apply if multiple muscles and nerves are submitted (901).

904. 2M Antibody Test (Masticatory Muscle Myositis)

Useful links: [May 1999](#), [January 2002](#), [May 2004](#), [October 2004](#), [July 2005](#), [December 2005](#)

Useful reference: [Masticatory Muscle Myositis: Pathogenesis, Diagnosis and Treatment. Comp Contin Ed Pract Vet 2004;26:590-605.](#)

The 2M antibody test is a serum assay for the detection of autoantibodies against canine masticatory muscle type 2M fibers or proteins. A positive antibody titer is diagnostic of masticatory muscle myositis. Since this is an antibody based test, collect the serum sample PRIOR to initiation of corticosteroid or other immunosuppressive therapy. Submit 1-2 ml of serum by an overnight service.

905. Acetylcholine Receptor Antibody Test (Myasthenia Gravis)

Useful links: [November 1999](#), [December 1999](#), [April 2001](#), [October 2004](#), [May 2005](#)

The acetylcholine receptor (AChR) antibody test is a serum assay for the detection of autoantibodies against nicotinic AChRs at the neuromuscular junction. A positive antibody titer is diagnostic of acquired myasthenia gravis in both dogs and cats. Since this is an antibody based test, collect the serum sample PRIOR to initiation of corticosteroid or other immunosuppressive therapy. Submit 1-2 ml of serum by an overnight service.

906/911. Plasma Lactate and Pyruvate (NOTE: Special collection and handling required)

To obtain the most information, paired samples (collected at rest and following 10 minutes of strenuous exercise) for lactate and pyruvate determination should be submitted. These tests are indicated for detection of lactic acidemia and abnormalities of oxidative metabolism resulting in exercise intolerance.

Lactate – Plasma samples should be collected at rest and following 10 minutes of strenuous exercise. Collect blood samples in sodium fluoride/potassium oxalate (grey top) tubes at both time-points and label appropriately. Mix the samples well, centrifuge, then separate the plasma and place into labeled red top tubes. Send immediately to the laboratory by an overnight service on cold packs (if lactate alone) or on dry ice if paired with samples for determination of pyruvate concentrations.

Pyruvate – As pyruvate is unstable unless collected appropriately, please carefully follow instructions. Plasma samples should be collected at rest and following 10 minutes of strenuous exercise. Make up an 8% solution of perchloric acid (PCA, Perchloric acid 60% Fisher FA-228-6) by diluting 13.3 ml of 60% PCA to 100 ml of distilled water. This solution is stable refrigerated for 6 months. An 8% solution of trichloroacetic acid (TCA) can be substituted if PCA is not available. Immediately after blood collection, add exactly 2 ml of blood to 2 ml of 8% PCA or TCA. Mix and place on ice for 10 minutes to insure complete precipitation of protein. Centrifuge, pull off clear supernatant, place into separately labeled red top or plastic tubes and freeze. The frozen samples should be shipped on dry ice by an overnight service.

907. Special Immunohistochemistry

Useful links: [July 2000](#), [February 2003](#), [May 2007](#), [July 2007](#)

Immunohistochemical testing procedures are performed on fresh frozen muscle biopsy sections, usually following the complete muscle profile. Individual antibody staining can be chosen from the dystrophy panel (907.1). Staining for CD8+ T cells/MHC Class I can be performed for a diagnosis of polymyositis.

907.1 Dystrophy Panel: This is an expanded immunohistochemistry panel for detection of many proteins that result in muscular dystrophy including dystrophin, sarcoglycans, laminin α 2, dysferlin, α - and β - dystroglycans, utrophin and spectrin.

907.2 Dystrophy Immunoblotting: Protein extracts from submitted muscle biopsies are probed with various monoclonal and polyclonal antibodies against dystrophy associated proteins to detect an absence or abnormality in size or amount. This testing procedure further confirms the results of the dystrophy panel by immunohistochemistry.

908/909/910. Plasma (908), Urine (909), and Muscle (910) Carnitine Quantifications

For complete evaluation of carnitine status, carnitine should be quantitated in plasma, urine and muscle (in fresh frozen biopsy specimens). Ideally samples should shipped by an overnight service on dry ice.

Plasma (or serum) carnitine – 3 ml of heparinized plasma or serum

Urine carnitine – 10 ml of urine (free catch, catheterization or cystocentesis)

Muscle biopsy – 100 mg minimum of muscle tissue placed directly into a water tight container. If muscle tissue for a Complete Muscle Profile was submitted, part of this tissue block, if large enough, can be used for carnitine quantification.

913. Quantitative Urine Organic Acid Screen

Useful links: [September 2008](#)

This is a limited screen for detection of abnormal organic acids indicative of abnormalities in major metabolic pathways. This screen is useful for diseases associated with inborn metabolic errors or in acquired metabolic disorders. A comprehensive organic acid analysis is available upon request. Testing is performed in conjunction with the Biochemical Genetics Laboratory, University of California, San Diego. Urine (10 ml) should be submitted frozen on dry ice or by an overnight service on a cold pack.

913.1. Metabolic Panel

The metabolic panel includes the quantitative urine organic acid screen and quantitative plasma or serum amino acids. Urine (10 ml) and plasma (3 ml of heparinized plasma) or serum (3 ml) should be submitted frozen on dry ice or by an overnight service on a cold pack.

(Revised 01/01/2009)