

Diagnostic Criteria for Equine PPID and Differentiation with EMS

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Pituitary *pars intermedia* dysfunction (PPID) is an endocrinopathy of aged horses and ponies. Horses with PPID have hyperplasia of the *pars intermedia* with a single large adenoma or multiple small adenomas. The clinical signs of PPID are abnormal hair coat (hirsutism), muscle atrophy, laminitis, PU/PD, hyperhidrosis, abnormal fat distribution (insulin resistance), opportunistic infections (immunosuppression), infertility and behavioral changes (lethargy).

Diagnostic Tests:

- 1) Overnight Dexamethasone (DEX) Suppression test: Collect serum between 4–6 p.m. Administer DEX at 40 µg/kg BW IM. Collect serum 19–20 h later.

Interpretation: Serum cortisol of >1 mg/dL at 19 h post-DEX administration suggests PPID. A mildly decreased resting cortisol is typical of a PPID-affected horse. A resting cortisol of <1.8 µg/dL is suggestive of iatrogenic adrenal insufficiency.

- 2) Endogenous Plasma ACTH Concentration: Collect EDTA plasma, preferably in plastic blood collection tube. Separate plasma by centrifugation, and freeze for submission to laboratory. Avoid hemolysis and heat. Process sample within 8 h of collection.

Interpretation: Normal reference range depends on methodology and laboratory. Typically an ACTH concentration <35 pg/mL (chemiluminescent immunoassay) or <45–50 pg/mL (radioimmunoassay) is considered normal. Seasons can have a profound effect on ACTH with higher concentrations seen in autumn (there are several biological events like stress that can affect ACTH levels).

- 3) Endogenous Plasma α -melanocyte stimulating hormone (α -MSH) Concentration: Collect EDTA plasma, preferably in plastic blood collection tube. Separate plasma by centrifugation, and freeze for submission to laboratory. Avoid hemolysis and heat. Process samples within 8 h of collection.

Interpretation: Nonautumn reference range: >35 pmol/L suggests PPID. While interpreting the endogenous Plasma ACTH and endogenous Plasma α -MSH hormone levels, season should be considered. High concentrations are observed in autumn.

- 4) Domperidone Response Test: Collect EDTA plasma at 8 a.m. Administer domperidone at 3.3 mg/kg body weight orally. Collect EDTA plasma at 2h and 4 h after domperidone administration. Handle and prepare plasma as before in #2.

Interpretation: A 2-fold increase in plasma ACTH concentration suggests PPID. Higher doses (5 mg/kg PO) may improve response. The 2-h sample is more diagnostic in the summer and autumn, and the 4-h sample is best in the winter and spring.

- 5) Thyrotropin-Releasing Hormone (TRH) Stimulation Assay: Collect base line serum sample and administer TRH, 1 mg IV. Collect serum 30–60 min after TRH. 30%–50% increase in serum cortisol 30 min after TRH administration suggests PPID.

Equine Metabolic Syndrome (EMS) clinical abnormalities share some characteristics with PPID. Both of these disorders alter cortisol metabolism. EMS has no underlying connection to thyroid gland dysfunction. It is thought that EMS results from excess production of active cortisol primarily in fat or adipose tissue. The pituitary gland functions normally in EMS horses.

Regional adiposity and laminitis are clinical signs of PPID as well as EMS, so both endocrine disorders should be considered when these problems are detected.

EMS may be differentiated from PPID by:

- Age: EMS is generally recognized in younger horses, whereas PPID is more common in older horses. These disorders may uncommonly occur simultaneously in the same animal.
- Clinical signs suggestive of PPID, but not EMS, include delayed or failed shedding of the winter hair coat, hirsutism, excessive sweating, polyuria/polydipsia, and skeletal muscle atrophy.
- Endogenous plasma ACTH concentration is normal in EMS cases and elevated in most PPID patients.
- Another difference between EMS and PPID is the result of an overnight Dexamethasone suppression test. EMS patients have normal responses (i.e., normal cortisol suppression following a dose of Dexamethasone) whereas PPID patients have abnormal results (i.e. lack of cortisol suppression).

Recent literature indicates that EMS is similar to human metabolic syndrome with the following clinical abnormalities (similar to type 2 diabetes):

- Hyperglycemia
- Hypertriglyceridemia
- More pro-inflammatory cytokines
- Hypertension
- Altered tissue-level cortisol activity
- Increased leptin concentrations

References: *McFarlane Vet Clin Equine 27 (2011) 93–113. Frank N. AAEP Proceedings, Vol. 52, 2006, pp. 51-54. Schott HC. AAEP Proceedings, Vol. 52, 2006, pp. 60-73. McFarlane D. AAEP Proceedings, Vol. 52, 2006, pp. 55-59. McGowan CM et al. Equine Vet J 2003; 35; pp. 414-418. Meissner et al. J Vet Intern Med 2003; 17:420. Domperidone Causes an Increase in Endogenous ACTH Concentration in Horses With Pituitary Pars Intermedia Dysfunction, Janice E. Sojka et al 2006 Vol. 52 AAEP Proceedings.*