



Equine PPID and EMS testing

A. Equine metabolic syndrome testing

Equine metabolic syndrome (EMS) has been described as a condition affecting young to middle-aged horses, commonly associated with **insulin dysregulation** (ID), and often with altered circulating adipokine concentrations, dyslipidemia, predisposition to laminitis and possible regional or generalized adiposity.¹

Insulin dysregulation encompasses both tissue insulin resistance, and persistent or intermittent hyperinsulinemia without concurrent tissue insulin resistance. In the clinical setting, **insulin status may be easily assessed by “resting” or “dynamic” testing (Fig. 1)**. Increased baseline serum insulin concentration in horses without access to grain for 4 hours supports hyperinsulinemia. The test has low sensitivity but high specificity; however, **it is important to keep in mind that conditions other than EMS can cause hyperinsulinemia, including pituitary pars intermedia dysfunction (PPID), pregnancy, stress, illness, and high energy forage**. A result within reference intervals in a horse with strong clinical signs of EMS is considered equivocal. In these cases, dynamic testing is recommended due to higher sensitivity, including the oral sugar test (for details, please see: <http://sites.tufts.edu/equineendogroup>).

Serum glucose concentration by itself is insensitive and influenced by many factors, thus concomitant testing for serum glucose and insulin concentrations is recommended.

Ancillary tests that may be considering in the assessment of horses with EMS include leptin, a hormone produced by adipocytes. The hormone is not specific for EMS, as it may be elevated with an increased body condition score but it may be helpful to assess internal adiposity and/or to monitor response to management. In addition, a marked increase in serum leptin values has been shown to correlate with the future development of laminitis.

As horses with EMS age, concurrent PPID may develop; however, to our knowledge, there are no currently published studies establishing a causal relationship between the 2 conditions. Because PPID may also be associated with insulin dysregulation, testing endogenous ACTH, insulin and glucose concentrations may be indicated if clinical signs are supportive.

Reference

Bertin FR, de Laat MA. The diagnosis of equine insulin dysregulation. *Equine Vet J* 2017;49:570-576.

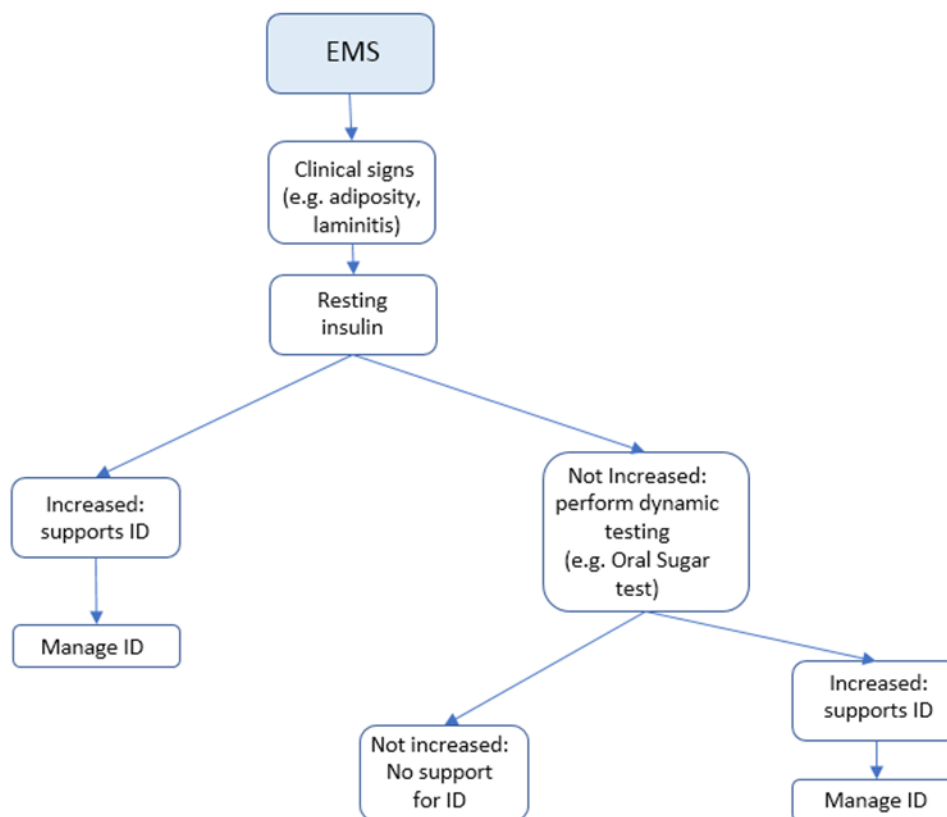


Figure 1. Assessment of insulin dysregulation (ID) - adapted from the Equine Endocrinology Group recommendations.

B. Pituitary pars intermedia dysfunction (PPID) testing

Pituitary pars intermedia dysfunction (PPID; “Cushing’s disease”) is an endocrine condition commonly identified in aging horses and ponies. It is considered to result from loss of dopaminergic inhibition of the pituitary gland causing excessive release of ACTH into plasma and subsequent hypercortisolemia. The diagnosis may be based on clinical signs in “full-blown” cases, but it is often more difficult in animals with subtle signs or inconclusive laboratory data.

Multiple endocrinology tests have been proposed to support a diagnosis of PPID. The 2017 Equine Endocrinology Group (<http://sites.tufts.edu/equineendogroup>) recommendations **suggested the use of endogenous ACTH for moderate and advanced cases of PPID, and the TRH-stimulation test for equivocal or early PPID (Fig. 2)**. Protirelin (a synthetic analog of TRH) may be available from veterinary compounding pharmacies, however it is advisable to contact the pharmacy directly to confirm, and establish pricing.

The AHL offers a **chemiluminescent ACTH test**, individually and within endocrine profiles. There are no fasting requirements related to sampling, however specific sample handling requirements must be adhered to. In addition to PPID, endogenous ACTH may be increased with other illness, excitement and stress.

A “**seasonal increase**” in ACTH has been documented during the fall months, with median concentrations
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~2 times the upper reference limit (although some healthy horses showed significantly higher values). This seasonal increase has an impact in the interpretation of laboratory results. Reference intervals at the AHL (2-10 pmol/L) were developed outside the seasonal rise; thus, as an example, an ACTH result of 18 pmol/L could be unremarkable in the fall but would be interpreted as increased for the remainder of the year. The seasonal rise in ACTH may also be exaggerated in early PPID, increasing the sensitivity of the test, however seasonally adjusted reference intervals would be required for accurate interpretation.

Further, **some of the clinical and laboratory findings of PPID overlap with other endocrine conditions, such as equine metabolic syndrome, occasionally making diagnostic interpretation challenging.**

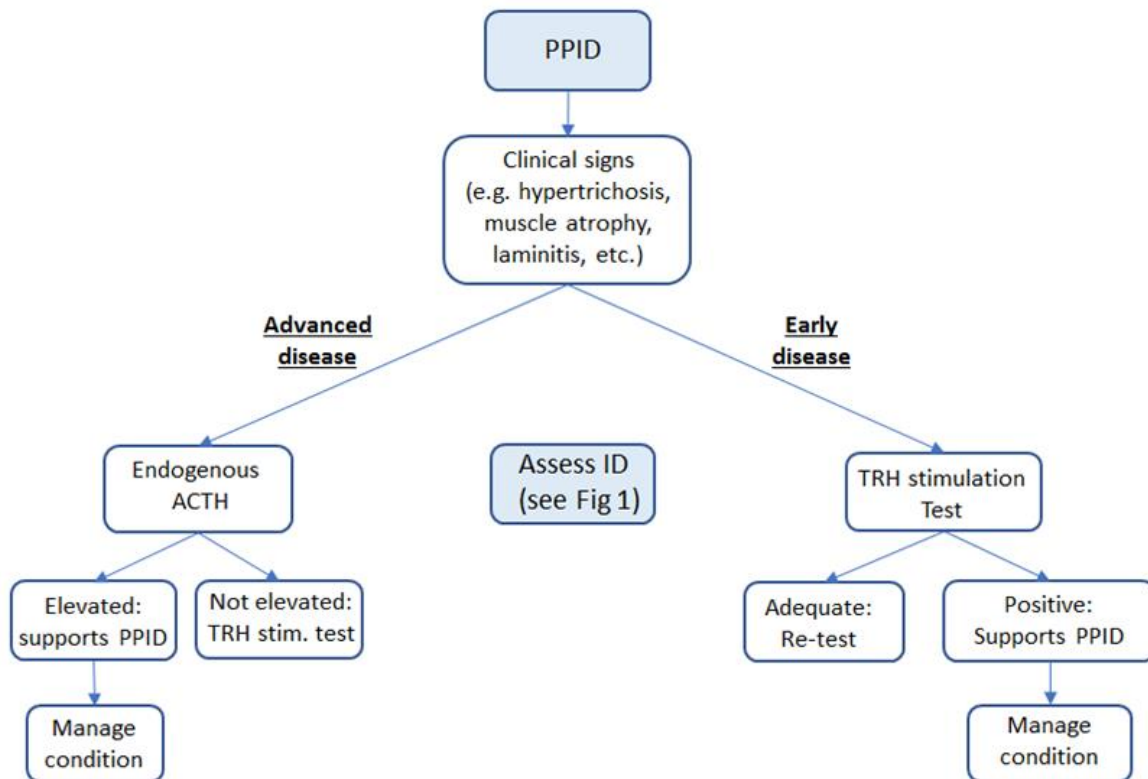


Figure 2. Assessment of PPID - adapted from the Equine Endocrinology Group recommendations.