Cortisol:ACTH Ratio for Hypoadrenocorticism Diagnosis

Presently, an ACTH stimulation test is required for definitive diagnosis of primary hypoadrenocorticism (HAD). This test requires synthetic ACTH, which has become expensive, so alternatives are desirable. Baseline cortisol measurements are useful in ruling out disease but cannot be used alone for definitive diagnosis. Previous studies have demonstrated that measurement of baseline ACTH and cortisol—and subsequent calculation of a cortisol-to-ACTH ratio (CAR)—differentiates normal dogs from those with HAD. However, it was unknown whether CARs differ between dogs with HAD and those with nonadrenal illness (NAI).

This retrospective study sought to determine whether CARs could differentiate between normal dogs and those with HAD or NAI. Eight healthy dogs, 19 dogs with NAI, and 15 dogs with HAD were included. NAI diagnoses included diseases of GI, urinary, pancreatic, and miscellaneous origin. Baseline cortisol concentrations were significantly lower and ACTH concentrations significantly higher in the HAD group than in other groups, but there was overlap between the NAI and HAD groups for cortisol and among all 3 groups for ACTH. CAR (cortisol µg/dL divided by [ACTH pg/mL]) was significantly lower in the HAD group than in the other 2 groups, with no overlap between the HAD and the other 2 groups. Thus, CAR can be used for definitive diagnosis of primary HAD. CAR can be obtained from a single blood sample, although ACTH measurement requires freezing or addition of aprotinin to the sample. CAR would be less useful for diagnosing secondary HAD, as these dogs would have low ACTH levels.

Commentary

Recognizing HAD can be difficult, especially in patients that do not display classic clinical signs. Laboratory confirmation is straightforward when an ACTH stimulation test, considered the gold standard for diagnosis, is used to document an absent adrenal response but may prove problematic when ACTH is not available or is too expensive for routine use. In this study, baseline cortisol and endogenous ACTH levels were measured as an alternative for the ACTH stimulation test. The CAR is shown to distinguish dogs with HAD from normal dogs and, most importantly, from dogs with nonadrenal disease that may mimic clinical signs of HAD. The CAR is a promising test for HAD diagnosis because of its relative simplicity (only a single blood sample is needed) and accuracy. —Thomas Schermerhorn, VMD, DACVIM (SAIM)

Source