

## Client Information

### ADRENAL STEROID PROFILES IN THE DIAGNOSIS OF ADRENAL DISEASE

Dr. Jack W. Oliver, D.V.M., Ph.D.

Clinical Endocrinology Service (865-974-5638; FAX 865-974-7147)

<http://www.vet.utk.edu/diagnostic/endocrinology>

College of Veterinary Medicine, The University of Tennessee

The Clinical Diagnostic Service at the University of Tennessee provides *adrenal steroid profile testing*. The *adrenal hormone profiles* are determined in dogs, cats, ferrets and other species that are suspected of having adrenal disease. The profiles provide a more complete evaluation of adrenal function by assessing hormone levels that arise from different parts of the hormone synthesis pathways.

Most tests of adrenal function in animals involve the measurement of the hormone cortisol to determine whether or not the adrenal glands are functioning in a normal fashion. Excessive production of adrenocorticotrophic hormone (ACTH) from the pituitary gland results in bilateral enlargement of the adrenals, with excess release of cortisol (and also sex steroids). Excess release of ACTH from the pituitary is the usual disorder that results in adrenal disease of animals. However, perhaps 20% of adrenal disease is caused by a primary tumor of one of the adrenal glands that spontaneously secretes excess cortisol and/or sex steroids into the bloodstream. For ferrets, adrenal disease is due to primary adrenal tumors, and hormones other than cortisol are involved. The tumors are under the control of luteinizing hormone, a gonadotropin from the pituitary (so anti-gonadotropin drugs are useful in controlling the disease). Whether or not an animal (other than ferrets) has adrenal disease is usually determined by stimulating the adrenal glands with synthetic ACTH (*ACTH stimulation test*), or by suppressing the release of ACTH from the pituitary gland (*low dose dexamethasone suppression test*). Using the *stimulation test*, one is looking for excessive release of cortisol from the adrenal glands; and using the *suppression test*, one is looking at whether or not cortisol levels can be completely suppressed for a prolonged period of time. However, in some individuals, these usual tests of adrenal function give normal results even though the animal has very suggestive clinical signs of adrenal disease. In these latter cases, adrenal steroid profile testing is very helpful to determine if hormones other than cortisol are involved (sex steroids) and causing problems for the animal. Steroid profiles for ferrets will determine whether or not a suspected adrenal tumor is present.

*Congenital adrenal hyperplasia* is a syndrome that occurs in humans where inherited defects of adrenal hormone synthesis occur, with steroids other than cortisol (sex steroids) being secreted in excess. *Congenital hyperplasia-like syndrome* can occur in animals due to inherited defects of hormone synthesis, tumor presence in the adrenal glands that affects the enzymes involved with adrenal hormone synthesis, or other factors that are ill-defined at present. In these atypical cases of adrenal disease, the adrenal steroid profiles are very effective in assessing the status of the adrenal glands. This is because different areas of adrenal hormone synthesis are being examined, and not just the end product of the synthetic pathway (cortisol). Clinical signs are similar in animals that have increased levels of cortisol or the adrenal intermediate hormones (sex steroids). These signs include frequent and excessive drinking and urination, temperament changes, thin skin, hair loss, changes in tests of liver function, and frequently, concurrent diabetes. In ferrets, where adrenal tumors are associated with high serum levels of the hormones androstenedione, 17-hydroxyprogesterone, and estradiol, clinical signs include the occurrence of hair loss, swollen vulvas, return to male sexual behavior and enlarged prostate glands that cause difficult urination.

The *congenital hyperplasia-like syndrome* that occurs in animals, now more commonly referred to as *Atypical Cushing's Disease*, where adrenal intermediate hormones (sex steroids) are elevated, certainly occurs in both intact and neutered individuals. However, the majority of dogs submitted to the University of Tennessee Clinical Endocrinology Service have been spayed or neutered. This eliminates difficulty with interpretation of results due to presence of similar secretory tissues (adrenals/gonads) and hormones. Ferrets are nearly always spayed or neutered at a very young age to prevent problems with estrogen toxicity, and odor from the accessory sex glands. A basal serum sample is all that's needed for ferret assays. For dogs and cats, it is most meaningful to perform an ACTH stimulation test so that comparisons of both basal and stimulated hormone concentrations can be made. Treatment options should be discussed with a veterinarian. *From: J.W. Oliver, Proc. ACVIM Forum, Dallas, TX, 2002, and Seattle, WA, 2007.*