

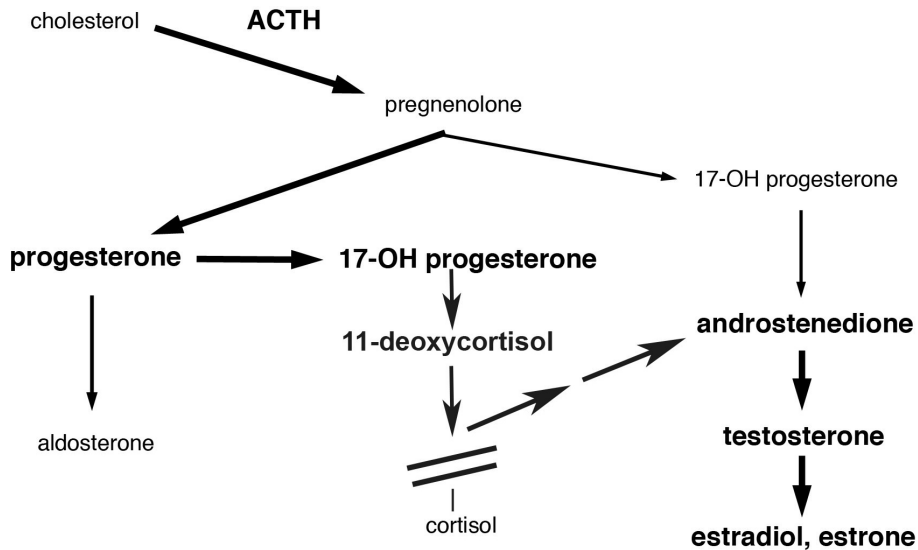
## Overview of Adreno-cortical Fatigue and Resulting Hyperestrogenism

Caroline D. Levin RN

When adrenal glands become exhausted by chronic irritation, cortisol production eventually fails. Precursor hormones such as progesterone accumulate and “spill over” into the adjacent hormone pathway. This results in elevated levels of adrenal estrogen. In other words, when one path is blocked, *hormone activity is rerouted down another pathway.*

A good analogy would be boating down a river. If a dam were built across the river, the water would back up and you would have to steer your boat down a different branch of the river to continue on your trip. This condition in dogs may be diagnosed by a variety of names, including adrenal exhaustion, hyperestrogensim, adrenal hyperplasia-like syndrome, atypical Cushing’s disease (if sex hormones are assayed) or atypical Addison’s disease (if cortisol and aldosterone are assayed.)

### Steroid biosynthesis during adreno-cortical exhaustion



Signs/symptoms of elevated adrenal estrogen closely resemble those of excess cortisol including, fatigue, confusion, depression, incontinence, irritability, seizures, and darkening of the skin. Elevated estrogen raises liver/pancreas enzymes (serum amylase/alkaline phosphatase), cholesterol, and triglycerides. Elevated estrogen also results in kidney degeneration, bone marrow and immunoglobulin suppression (anemia, cancer), increased histamine activity (allergies/itching), and thyroid binding.

Elevated levels of hormone precursors, such as progesterones and androgens cause impaired glucose tolerance (high blood glucose levels), obesity, increased body core temperature (heat intolerance/panting), increased hunger, aggression, thick coats, acne (small flesh-colored bumps), and bald patches.

Severely depleted cortisol results in loss of appetite, vomiting, abdominal pain, diarrhea, weakness, organ failure, and death.

## REFERENCES

- Bagshaw S. The combined oral contraceptive. Risks and adverse effects in perspective (abstract). *Drug Safety* 1995; **12**: 91-96.
- Bianco AC, Nunes MT, Hell NS, Maciel RM. The role of glucocorticoids in the stress-induced reduction of extrathyroidal 3,5,3'-triiodothyronine generation in rats (abstract). *Endocrinology* 1987; **120**: 1033-1038.
- Blum M, Zacharovich D, Pery J, Kitai E. Lowering effect of estrogen replacement treatment on immunoglobulins in menopausal women (abstract). *Revue française de gynécologie et d'obstétrique* 1990; **4**: 207-209.
- Carlberg KA, Fregly MJ, Fahey M. Effects of chronic estrogen treatment on water exchange in rats (abstract). *American Journal of Physiology-Endocrinology and Metabolism* 1984; **247**: E101-E110.
- Derman RJ. Effects of sex steroids on women's health: implications for practitioners (abstract). *American Journal of Medicine* 1995; **1A**: 137S-143S.
- Felman EC, Nelson RW. *Canine and Feline Endocrinology and Reproduction*, Third edition. Saunders, St. Louis, 2004.
- Foldvary-Schaefer N, Harden C, Herzog A, Falcone T. Hormones and seizures (abstract). *Cleveland Clinical Journal of Medicine* 2004; **71**: 11S-18S.
- Goldenberg N, Wang P, Glueck CJ. An observational study of severe hypertriglyceridemia, hypertriglyceridemic acute pancreatitis, and failure of triglyceride-lowering therapy when estrogens are given to women with and without familial hypertriglyceridemia (abstract). *Clinica Chimica Acta: International Journal of Clinical Chemistry* 2003; **332**: 11-19.
- Hart JE. Endocrine pathology of estrogens: species differences (abstract). *Pharmacology Therapeutics* 1990; **47**: 203-218.
- Landau RL, Poulos JT. The metabolic influence of progestins (abstract). *Advances in Metabolic Disorders* 1971; **5**: 119-147.
- Parker WA. Estrogen-induced pancreatitis (abstract). *Clinical Pharmacy* 1983; **2**: 75-79.
- Rogers SM, Baker MA. Thermoregulation during exercise in women who are taking oral contraceptives (abstract). *European Journal of Applied Physiology and Occupational Physiology* 2004; **75**: 34-38.
- Rossi GV. Side-effects and possible complications of oral contraceptive drugs (abstract). *American Journal of Pharmacology* 1966, **138**: 127-136.
- Ruman J, Brenner S, Sauer MV. Severe hypertriglyceridemia and pancreatitis following hormone replacement prior to cryothaw transfer (abstract). *Journal of Assisted Reproduction and Genetics* 2002; **19**: 94-97.
- Shansky RM, Rubinov K, Brennan A, Arnsten AF. The effects of sex and hormonal status on restraint-stress-induced working memory impairment (abstract). *Behavioral and Brain Function* 2006; **2**: 8.
- Terral C, Godard P, Michel FB, Macabies J. Influences of estrogens on histamines liberation by whole blood induced by allergens in vitro (abstract). *Comptes Rendus des Seances de la Societe de Biologie et de ses Filiales* 1981; **175**: 247-252.
- Vasiadi M, Kempuraj D, Boucher W, Kalogeroitros D, Theoharides TC. Progesterone inhibits mast cell secretion (abstract). *International Journal of Immunopathology and Pharmacology* 2006; **19**: 787-794.
- Zayed I, van Esch E, McConnell RF. Systemic and histopathologic changes in beagle dogs after chronic daily oral administration of synthetic (ethinyl estradiol) or natural (estradiol) estrogens, with special reference to the kidney and thyroid (abstract). *Toxicologic Pathology* 1998; **26**: 730-741.