Pathology of the Female Reproductive System

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Uterine Cancer in Zoo Cats from Hormonal Implants

Introduction
Domestic cat owners do not typically think of hormone-based birth control when preventing their pet from having offspring. However, in an environment such as a zoo, reproductive management of threatened or endangered zoo-maintained felids requires safe and reversible contraception. One common method of contraception is the use of melengestrol acetate (MGA) in the form of an implant, which is effective in preventing pregnancy; however, long-term use has been associated with endometrial hyperplasia, endometrial cancer, and mammary cancer.

The Implant
Progestin, a natural or synthetic steroid hormone, promotes endometrial growth and secretion, and smooth muscle relaxation in the uterus. Thus, progesterin-induced contraception is thought to work via inhibiting uterine motility and decreasing endometrial receptivity. MGA, a steroid progestin, is administered in a silastic implant, and when placed subcutaneously or intramuscularly, provides extended release of a potent progestin that prevents reproduction.

Clinical Signs
- Anorexia
- Purulent discharge
- Rear limb weakness
- Hard mass when palpating lower abdomen

Clinicalpathological Findings
- Endometrial hyperplasia
- Endometrial mineralization
- Hydrometra
- Endometrial cancer
- Leiomyosarcoma
- Mammary cancer

MGA is an effective means of providing contraception to zoo felids, however it is not without consequences, which may be severe. Recently, other contraceptives have been investigated in zoo animals, including Supreflor®, with promising results; however, it is associated with significantly prolonged time to return to estrus.

Human Connections
While MGA is not approved as a human contraceptive, similar conditions can result from the manipulation of reproductive hormones. Doctors have found that using estrogen alone can lead to endometrial cancer in women. Progesterone-like drugs must be given along with estrogen to reduce the increased risk of endometrial cancer. This approach is called combination hormone therapy.

References

Mansur, Linda. Endometrial Hyperplasia and Mineralization in Zoo Felids Treated with Melengestrol Acetate Contraceptives. Veterinary Pathology Online. 2002; 39:419–427

Endometriosis in Non-human Primates

Introduction
Endometriosis is one of the most common reproductive disorders in Old World nonhuman primates. Due to the high occurrence rate of the disease and similarity to human anatomy, the nonhuman primate has been proposed as a naturally occurring model of this disease in humans, and the condition has been induced experimentally in macaques and baboons through endometrial autografts to the peritoneal cavity.

The Disease
Endometriosis is defined as the presence of both endometrial glands and stroma outside the uterine cavity and musculature. Exposure to ovarian hormones is required for the development of disease, which grows gradually as the female matures. Clinical studies indicate that retrograde menstruation is the probable mechanism by which endometriosis occurs. Risk factors include frequent X-rays, ovarian steroids, and uterine surgery that may seed the abdomen with endometrial tissue.

Clinical Signs
- May be asymptomatic
- Pain and failure to conceive
- Cyclical anorexia, weight loss, depression
- Absence of feces for several days
- Abdominal distention
- Large mass upon palpation of lower abdomen

Diagnosis Techniques
- Serum/peritoneal fluid testing (CA-125)
- Imaging techniques (US and MRI)
- Surgical examination of peritoneal cavity
- Cytology of peritoneal fluid consistent with endometriosis

Treatment
- Hysterectomy (surgical removal)
- Danazol, drug promoting chronic inflammatory response

Human Connections
In women and baboons with severe endometriosis, abnormally HOX10 expression was associated with hypermethylation of the HOX10 gene, indicating that the disease may be due to post-transcriptional modifications as a method of gene silencing or activation. The baboon model is an important model for exploring therapeutic targets for reducing disease development and improving pregnancy success rates. Another finding indicates that the inflammatory cytokine TNF-α is a potent modulator of the inflammatory process and has been shown to be elevated in the peritoneal fluid of women with endometriosis.

References

uterine motility:
sperm or fertilized zygote?
Liana Yates, 3/7/2014