

Reproductive hormones in the dog: *friends or foes?*

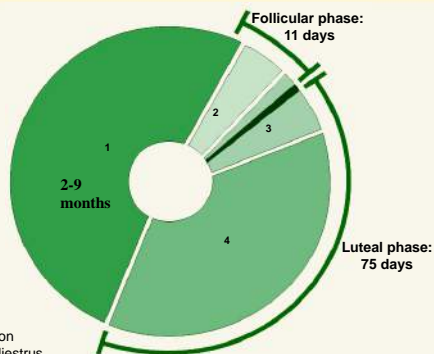


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Reproductive cycle of the bitch



Knowledge about positive and negative aspects of reproductive hormones

Comes from:

- Comparison of ovari(o-hyster)ectomized and intact bitches
- Effects of the administration of progestins or estrogens
- Consequences of incomplete ovariectomy



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Estrus prevention in bitches by ovariectomy is often wanted

- Alleviation or prevention of pet overpopulation: the need depends on the situation in a country
- For owner convenience
- For health issues in later years, by preventing progesterone influence

Also depends on country "laws" or "what people find normal"



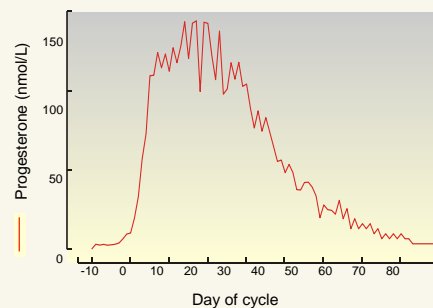
% of neutered bitches in Europe? Different in diverse countries!!

Sweden: → ovx of healthy bitches previously prohibited by law,
Now: 10% ovx

The Netherlands: > 50% ovx

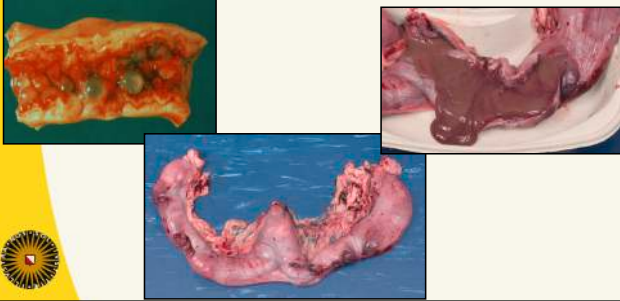


Health issues in later life: Progesterone influence



Health issues in later life (1) Progesterone influence: risk of

- Cystic endometrial hyperplasia
- Endometritis/Pyometra: ± 20% of the bitches



Health issues in later life (2) Progesterone influence: risk of

Mammary tumors

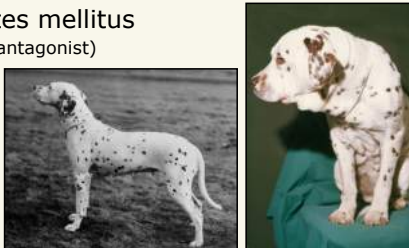
Swedish study in 260,000 intact bitches:

The risk for mammary tumors in intact bitches during the first 10 years of their life appeared to 13%, but an enormous difference between breeds, with >40% in some breeds including the Dobermann, Leonberger and Irish Wolfhound.

Health issues in later life (3) Progesterone influence: risk of

Growth hormone excess, which may result in:

- acromegaly
- diabetes mellitus (insulin antagonist)



Health issues in later life

Interpretation of research data not easy

- Mammary tumors: bitches < 10 year
- Early age neutering: What is early age?
- Longevity study: only Rottweilers (breed specific differences? repeatable?) Waters et al. Aging Cell, 2009
- Species comparison: always realistic?
 - Women versus bitches after ovx

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Administration of progestins or estrogens

- Progesterone influence dependent on the type of progestin and dose
 - Proligestone comparable with the progesterone influence of a bitch in the luteal phase
- Estrogen influence (exogenous or endogenous) may lead to bone marrow suppression or endometritis



Ovariectomy

Lot of advantages:
no progesterone and estradiol influence!



Disadvantages of ovariectomy

- Urinary incontinence (percentage dependent on breed, size, age at neutering)
- Obesity (is controllable with diet)
- Cancer: bone cancer (large and giant breeds), haemangiosarcoma, transitional cell carcinoma, lymphosarcoma
- Other problems such as tearing of the cranial cruciate ligament

But much lower incidence than e.g. endometritis and mammary tumors!

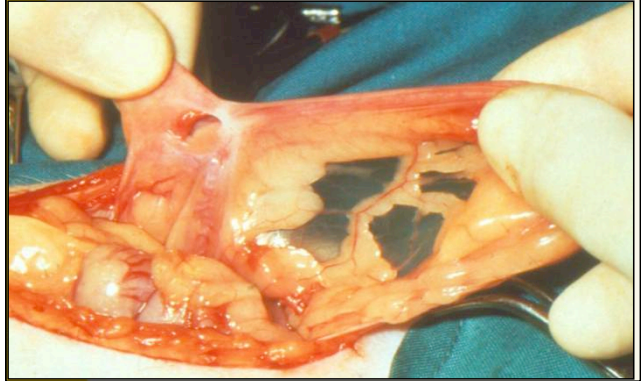


Is a hysterectomy preferable to ovariectomy????

What happens if hysterectomy is performed?



Hysterectomy



Consequences of hysterectomy

- Risk for mucometra/pyometra in case of incomplete hysterectomy
- **A major risk for mammary tumors remains (average 13%, sometimes much higher!)**
- Possibly an increased risk of cystic ovaries or the development of a granulosa cell tumor (gct)



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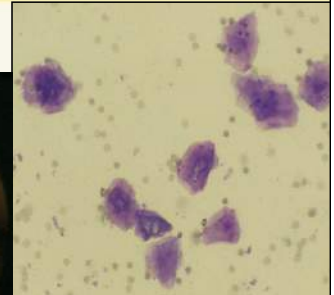
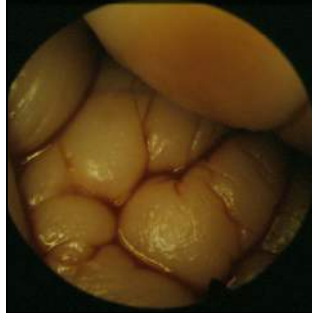
Incomplete ovariectomy: Remnant ovarian tissue (ROT)

Sometimes, soon or maybe even years after surgery, bitches may show estrous behavior, vaginal discharge, etc. after an incomplete ovari(o-hyster)ectomy



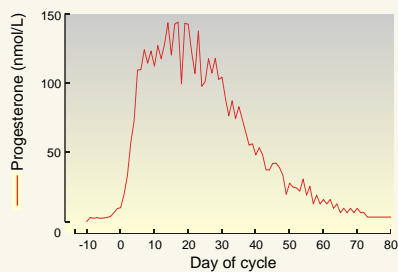
Diagnosis of Remnant Ovarian Tissue: estradiol influence

Vaginoscopy



Vaginal smear

Diagnosis of ROT



Luteinization/ovulation: plasma progesterone concentration↑



Suspected remnant ovarian tissue (ROT)

- Plasma progesterone concentration < 1 ng/ml; vaginoscopy, cytology not clear
- **GnRH stimulation test:**
 - basal and stimulated concentrations of LH and estradiol were determined in 18 bitches with ROT
 - in another study bitches with granulosa cell tumors (GCT) were examined



**Two third of the bitches with ROT:
cystic ovarian tissue**



**Granulosa cell tumors: 7
Intact bitches (n=3)
Bitches with ROT (n=4)**



**Conclusions GnRH stimulation
tests in bitches with ROT and GCT**

Pituitary - Ovarian axis is affected

characterized by:

- Higher basal plasma LH conc. in bitches with ROT and GCT than in bitches in anestrus, despite higher basal estradiol concentration
- LH response to GnRH stimulation is less in bitches with ROT and in GCT than in anestrus bitches

GCT in ROT bitches

The relatively high proportion of dogs with remnant ovarian tissue among the GCT bitches may point to a pathogenetic role for elevated gonadotropin secretion in the pathogenesis of GCT

The same phenomenon is true for women

In general

Withdrawal of ovarian hormones in the bitch leads to a longer healthier life



The male dog: A different story



Male hormones: friends or foes?

Knowledge comes from

- Castrated versus intact dogs
- Intratesticular injection with zinc gluconate neutralized by arginine
 - To manage pet overpopulation (usually less effective than neutering of bitches)

Testosterone: influence on health?



Castration Invasive surgery

- Manage pet overpopulation
- Male aggressive behavior ↓
- People think that it's "normal"

Health effects:

- Benign prostate hyperplasia ↓
- Prostatitis ↓
- Anal adenoma ↓
- Prostate cancer ↑
- Bone cancer ↑



Castrated versus intact dogs

Plasma testosterone concentration ↓

→ No significant advantages for health in later life



Intratesticular Zinc gluconate

- Administration frequently without anesthesia
- Less invasive than castration
- No longer fertile (overpopulation)
 - testosterone secretion often still present: advantage for free roaming dogs (inter male behavior)?
- However, if not properly injected.....



Castration / zinc gluconate...

In general:
neither treatment results in health advantages in later life

Another possible treatment if “male aggression” is the problem?



GnRH agonist implant

- Only effective for 6-12 months, thus not suitable for pet overpopulation/free roaming dogs
- Study: comparison castration (n=18) and GnRH agonist treatment (n=24)

Before and 4-5 months afterwards, assessment of:

Endocrinological parameters and aggression, fear/insecurity, play behavior and sexual behavior



Castration / GnRH agonist treatment

- No significant differences between the two approaches in terms of low plasma testosterone concentration and behavioral parameters

Effective treatment for male aggressive behavior



Reproductive hormones in the dog: friends or foes?

In general:

Prevention of gonadal hormone influence has positive health effects for bitches but the same is not true for males

For females it is therefore important for research concerning non-surgical contraception to focus on:

preventing gonadal hormone influence



Thanks for your attention

