ABSTRACTS

ISCFR 2012

July 26-29, Whistler, Canada

7th International Symposium
on
Canine and Feline Reproduction

In a joint meeting with

EVSSAR 2012

15th Congress of the
European Veterinary Society for Small Animal Reproduction

Editors: Gary England, Michelle Kutzler, Pierre Comizzoli, Wojciech Nizanski, Tom Rijsselaere and Patrick Concannon

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Concentrations of testicular steroid hormones, prolactin and relaxin as well as prostate gland markers in peripheral blood and seminal plasma of dogs with normal and hyperplastic prostate gland

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OBJECTIVES AND METHODS: Prostatic integrity and function are known to directly depend on testicular testosterone and estrogen secretion. 5α-dihydrotestosterone (DHT) is accepted as a key hormone in stimulating enlargement of the canine prostate gland, but the pathogenesis of benign prostatic hyperplasia (BPH) is not completely understood. Prolactin (PRL) seems to be involved in prostate development, growth and differentiation and displayed independent hypertrophic effects on the prostate in experimental models (1). Immunoreactive relaxin (RLX) of prostatic origin has been detected in seminal plasma of man, but its role in male reproduction is still debated (2). Therefore measurement of concentrations of PRL and RLX in peripheral blood serum or seminal plasma may be of scientific and clinical relevance in dogs. According to clinical observations prostatic enlargement in Rhodesian Ridgeback (RR) dogs seems to occur at an earlier age than in other breeds. In the present study concentrations of 17β-estradiol (E2), testosterone (T) and DHT as well as of PRL and RLX were determined in peripheral blood serum or plasma and prostatic secretion of 77 physically healthy intact male dogs [10 Beagles and 67 dogs from private owners (19 RR, 48 dogs of other breeds), 1-9 years (yrs) of age, 8-83 kg body weight]. Furthermore the concentrations of acid phosphatase (AP) in prostatic secretion and canine prostate specific esterase (CPSE) in peripheral blood plasma were determined.

All dogs were submitted to a complete breeding soundness examination including semen collection and evaluation as well as B-mode sonography. Diagnosis of the prostate gland status was based upon findings raised by rectal palpation and sonography including haemospermia and classified according to the related literature (3). Prostatic volume was estimated using the formula volume = length x width x height x 0.523 for an ellipsoid body. The dogs were grouped according to age (≤2 yrs, n=27; >2-4 yrs, n=25; >4 yrs, n=25), prostate gland status (normal, n=40; BPH, n=37) and breed (RR, n=19; other pure-bred dogs with similar body weight, n=37). Wilcoxon’s signed-rang test for independent samples was used to compare the differences in the various parameters between groups. Results are presented as median. P<0.05 is considered significant.

RESULTS: Prostatic volume differed among dogs with normal prostate gland (20.7 cm³) and dogs with BPH (53.1 cm³), age groups (≤2 yrs 21.0 cm³ and >4 yrs 47.9 cm³) and breeds (RR 61.9 cm³ and other breeds 31.0 cm³) (P<0.05). No differences were found in blood serum concentrations of T and DHT between any of the constituted groups. The E2/T ratio in blood plasma of dogs with BPH (1.89) was higher than in dogs with normal prostate gland (1.75) (P<0.05). In prostatic secretion median T concentrations differed between dogs with normal prostate (0.05 ng/ml) and BPH (0.07 ng/ml) (P<0.05). Highest median concentrations of DHT and E2 in prostatic fluid were measured in dogs >4 yrs (DHT: ≤2 yrs 246.9 pg/ml, >2-4 yrs 270.8 pg/ml, >4 yrs 409.1 pg/ml; P<0.05; E2: ≤2 yrs 6.5 pg/ml, >2-4 yrs 7.1 pg/ml, >4 yrs 10.2 pg/ml; P<0.05). Median PRL concentrations in blood serum and seminal plasma did not differ between age groups (≤2 yrs 5.0 ng/ml and 2.6 ng/ml; >2-4 yrs 5.1 ng/ml and 2.7 ng/ml; >4 yrs 4.2 ng/ml and 3.2 ng/ml) and prostate gland status (normal 5.0 ng/ml and 2.6 ng/ml; BPH 4.3 ng/ml and 3.0 ng/ml). In RR median PRL concentration in blood serum (5.4 ng/ml) but not in seminal plasma (2.6 ng/ml) was higher than in the other breeds (blood serum 4.8 ng/ml, seminal plasma 3.1 ng/ml) (P<0.05). Median RLX concentrations were similar in all groups (≤2 yrs 0.5 ng/ml, >2-4 yrs 0.53 ng/ml, >4 yrs 0.63 ng/ml; normal prostate gland 0.51 ng/ml, BPH 0.56 ng/ml; RR 0.42 ng/ml, other breeds 0.53 ng/ml). In prostatic fluid RLX was at undetectable level (assay sensitivity 0.03 ng/ml). Median CPSE concentration differed among dogs with normal prostate gland (109.4 ng/ml) and dogs with BPH (1010 ng/ml) (P<0.05), age groups (≤2 yrs 117.3 ng/ml and >4 yrs 1010 ng/ml; P<0.05) and breeds (RR 1572.8 ng/ml, other breeds 1467.1 ng/ml; P<0.05). Median concentration of AP increased slightly with age (≤2 yrs 802.5 U/l; >2-4 yrs 958.8 U/l; >4 yrs 1331.0 U/l) and was significantly lower in dogs with normal prostate (685.4 U/l) compared to dogs with BPH (1806.8 U/l) (P<0.05).

CONCLUSION: As expected the prostatic volume was larger and blood plasma levels of CPSE were higher in aging dogs and dogs with BPH compared with young dogs and dogs with normal prostate. The higher E2/T ratio in dogs with BPH was another expected finding. Concentrations of T and E2 are at similar levels as in our previous study (4), whereas median DHT concentrations are about ten times higher, probably resulting from using different hormone assays as the ratio between the DHT concentrations in peripheral blood and prostatic secretion is almost identical. Despite clear differences in PRL concentrations among age groups and prostate gland status, the slight increases in PRL concentrations in the prostatic secretion observed both with increasing age and in dogs with BPH may indicate a possible role of PRL in the pathogenesis...
of canine BPH. The higher PRL concentrations in blood serum of RR dogs indicate likewise our previous study potential breed differences in pituitary PRL secretion (5). Blood serum RLX concentrations did not show any pattern related to the prostate gland status. High RLX immunoreactivity has been found in canine hyperthrophic prostate gland tissue depending on the presence of a perineal hernia, whereas little and no RLX was detected in prostatic tissue in normal dogs and in dogs with prostatic atrophy, respectively (6). The lack of RLX in prostatic secretion verified in our study may indicate a local action of this hormone in the canine prostate in an autocrine/paracrine manner. Furthermore in our study the third ejaculate fraction representing almost pure prostatic secretion was analysed whereas in the studies on RLX content in human ejaculates, seminal plasma derived from centrifugated whole semen (2). Regarding breed differences an appreciably larger prostatic volume and higher concentration of CPSE was verified in RR than in other purebred dogs, confirming our suspicion of a premature enlargement of the prostate gland which may result from a genetic disposition for BPH in this breed.