



THE SPERM DEFECTS AND EXPRESSION OF ANDROGEN RECEPTOR IN REPRODUCTIVE TISSUES OF DOGS FROM POST-PUBERTY TO ADVANCED AGE

Introduction

The canine reproductive functions and semen quality gradually decline with aging, but when the risk develops is poorly defined. Androgen receptors (AR) are target sites of androgen essential to initiate and maintain spermatogenesis⁽¹⁾ and epididymal secretory function⁽²⁾. In rodents and men, AR declines with aging^(3,4). This study aimed to determine when senescence results in changes in sperm morphology and AR in reproductive tissues.

Materials and Methods

48 healthy medium-sized dogs (5) were divided into 4 groups; young (1-3 y/o), adult (>3-6 y/o), old (>6-9 y/o) and senile (>9 y/o). After routine castration, caudal epididymal sperm, testes, epididymides (head, body, tail) and vas deferens, were collected. Sperm morphology was evaluated (Table 1). AR expression was investigated by immunohistochemistry; H-score was evaluated using NuclearQuant (3DHISTECH), image analysis software.

Results

In Figure 1, the primary, secondary, major and minor sperm defects (%) were significantly higher in senile dogs compared to young dogs. Pearson's correlation revealed significant positive correlations ($p < 0.05$) between age and sperm defects: primary; $r = .42$, secondary; $r = .57$, major; $r = .42$ and minor defect; $r = .48$. Testicular AR localization was observed in the nucleus of sertoli, leydig's and peritubular myeloid cell but not in germ cells. It was observed in all epithelium, lamina propria and smooth muscle cell of epididymis and vas deferens. Although the AR H-score in reproductive tissues did not differ among age groups, a positive correlation was found between age and AR expression in testicular tissue; $r = .32$ (Figure 2). There was no correlation between AR expression and sperm defects in this study.

Conclusions

Senescence is associated with sperm quality and AR expression in testis. Sperm defects increased with age and, in this study, significant differences were found at age >9 y/o.

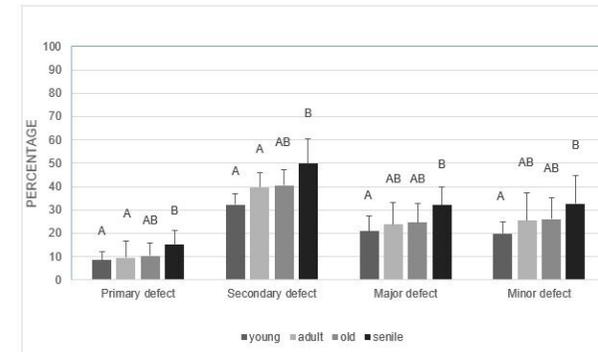


Figure 1 The percentage of primary, secondary, major and minor sperm defects in each age group. Different superscripts indicate a significant difference between groups ($p < 0.05$).

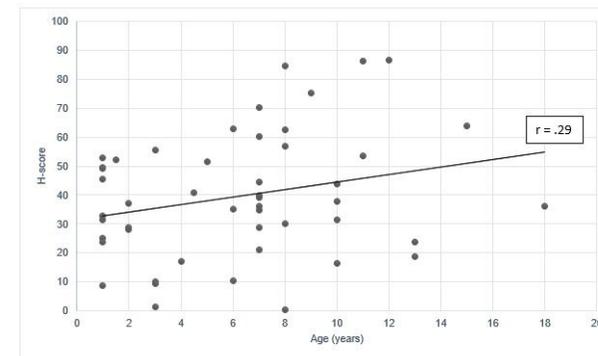


Figure 2 The correlation between age (years) and AR expression in testicular tissues (H-score) ($p < 0.05$).

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Table 1 Sperm head and tail morphology defects; primary defects, secondary defects major defects and minor defects (Blom, 1973)

Abnormality	Primary defects	Secondary defects
sperm heads and neck	macrocephaly, microcephaly, double heads, pointed heads, indented heads, and finally opaque heads	free heads, bent or detaching heads, swollen or detaching acrosomes
	thickened neck, eccentric insertion	disintegration of the neck region, cytoplasmic droplets
sperm midpieces and tail	irregularly thickened or thinned midpiece, coiled midpiece, kinked midpiece, double midpiece	bent midpiece, extraneous material surrounding midpiece, proximal, mid, or distal cytoplasmic droplets
	thinned tail, double or treble tail	coiled tail, looped tail, kinked tail, folded tail, detached tail, cytoplasmic droplets
Abnormality	Major defects	Minor defects
Acrosomal	lipped, cysts, abnormal distribution	acrosome reaction, swelling, severe damage, loss
Head	macrocephalic (large-headed); microcephalic (small-headed); pyriform (pear-shaped); diadem (crater) defects; other nuclear vacuoles; ridged sperm; double-forms; severe pleiomorphism or bizarre forms (multiple heads)	narrow heads; head-base defects; detached heads; nuclear decondensation
Midpiece	retained cytoplasmic droplets; ruptured midpiece; pseudo-droplet defect; kinked midpiece	distal droplets
Tail	"Dag" defect (tight coiling); double tails	simple bent or coiled tail; terminally coiled tail

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