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JOURNAL ARTICLE

The development of the baboon prostate: ultrasound methodology, modelling, and natural history

B. Jin, L. Turner, B. Crawford, A. Birrell and D. J. Handelsman

Andrology Unit, Royal Prince Alfred Hospital, University of Sydney, Sydney, Australia.

In order to evaluate the potential of ultrasound for serial, nontraumatic estimation of prostate size in the hamadryas baboon (*Papio hamadryas*), we adapted the technique of planimetric ultrasound to study a captive-bred colony of 30 male baboons (median age 8.4 years, range 3.3-17 years) including 4 long-term castrates. Most (19) were studied on another two occasions (at 33-and 43-day intervals) to estimate reproducibility of the prostate size (dimensions, volume) measurement. Prostatic dimensions were measured with a B-mode sector ultrasound using a 7.5-MHz transrectal transducer by planimetry at 2.5-mm steps from base to apex as well as the maximum three dimensions of the prostate. The planimetric volume estimate was reproducible (intraclass coefficient 0.81) with coefficient of variation (CV) of 24.3% for all, and 16.0% for mature, baboons. The prostate dimensions were also reproducible (CVs 7.9-13.4%). Prostate volume estimates based on the general ellipsoidal model were reasonably reproducible (19.9% for all, 12.9% for mature) but were biased in relationship to the planimetric volume (0.57 ± 0.19 , $P = 0.004$). Using the independent estimates of prostate volume and dimensions, we developed an empirical power-function model of prostate shape based on the generalized ellipsoidal model that was robust and unbiased (-0.07 ± 0.15 , $P = 0.64$) with respect to the planimetric volume. This model provides a simpler and accurate formula for prostate volume based on its three maximal dimensional measurements. The natural history of prostate growth in the hamadryas baboon was illustrated by sigmoidal correlations with age (ED50 = 6.0 years, plateau ED95 = 8.3 years), body weight (ED50 = 14.6 kg, ED96 = 16.1 kg), and testis volume (ED50 = 7.8 ml, ED95 = 18.4 ml). Between-animal variability among mature baboons was greater for prostate weight (27%) than body weight (10%), raising the possibility that a subgroup of these baboons may develop spontaneous age-related prostatic hyperplasia. These findings suggest that ultrasonic evaluation of prostate size in the hamadryas baboon may constitute a suitable model for spontaneous benign prostatic hyperplasia and for experimental studies of prostate growth, development, and hormonal regulation.

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