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JOURNAL ARTICLE

Quantitative (stereological) study of the normal spermatogenesis in the adult monkey (Macaca fascicularis)

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Germ cell and Sertoli cell numbers were estimated in six normal adult monkeys (Macaca fascicularis) using a contemporary unbiased and efficient stereological method--the optical disector. The data was used to assess the efficiency of spermatogenesis from type B spermatogonia to elongated spermatids. Animals underwent orchidectomy, and the right testis (volume 17.5 +/- 1.7 cm3 [mean +/- SEM], range 13.2-25.1 cm3) was fixed in Bouin's fluid. Blocks were embedded in methacrylate resin and germ cells were counted in thick (25 microm) sections using the optical disector in conjunction with a systematic uniform random-sampling protocol. The total numbers of Sertoli cells and all germ cells per testis were 566 +/- 43 (419-683) million and 12.8 +/- 1.6 (9.0-20.2) billion, respectively. On average, one Sertoli cell supported 12.4 +/- 1.9 (range 8.2-18.4) step 1-12 spermatids, 3.1 +/- 0.4 (2.3-4.5) pachytene spermatocytes, and 23.7 +/- 4.1 (15.0-39.0) total germ cells. Sertoli cell number correlated poorly with both testicular size (correlation coefficient r = -0.12) and germ cell numbers (r = -0.35 with total germ cell number). However, testicular size had a consistent and significant correlation with germ cell numbers (r = 0.97 with total germ cell number). The conversion ratio of pachytene spermatocytes to step 1-12 spermatids was 3.94 +/- 0.19, which is close to the theoretical maximum of 4. Similarly, the conversion between other cell types was consistently close to the maximum theoretical value. We conclude that the efficiency of spermatogenesis in the adult monkey is high, with stepwise conversion being consistently close to the maximal values. The capacity of Sertoli cells to support a cohort of germ cells varies widely between monkeys. Although absolute number of cells per testis is always the preferred parameter, it cannot always be obtained in an experimental situation where cost and ethical constraints mean that biopsies, rather than whole testes, are collected. Thus, if absolute data on germ cell numbers are not available, experimental outcomes impacting on cells beyond preleptonene spermatocytes may be best expressed in terms of changes in germ cell conversion rather than the traditional germ cell: Sertoli cell ratio.

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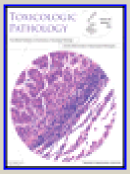

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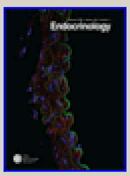

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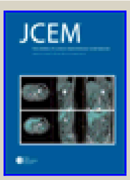

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