Supplemental Table S1. Coefficients of variability (CV) associated with the percentage of the testis occupied by seminiferous tubules or interstitial tissue.

Species	Description	No. of subjects	CV (%)		Ref.[f]
			Seminiferous tubules	Interstitial tissue	
Rat	6 -12 mo. old	3	4.2		1
Rat	255, 265, 345 & 365g	4	0.2	3.8	2
Mouse	78 day old	5	0.9	7.9	3
Hamster	Golden (Syrian)	5	2.0	9.7	4
Rabbit	54 wk old New Zealand	11/22[a]	2.7[b]/2.3[c]	12.7	5
Human	24, 43 & 57 yr old	3	10.1		6
Human	24, 43 & 57 yr old	3		18.4[d]/11.8[e]	7
Human	65 – 87 yr old	6	10.8	17.0	8
Human	18 – 38 yr old	30		22	9
Human	Pre-vasectomy	8	4.2		10

[a] 22 testes from 11 rabbits.
[b] Based on 400 “hits” per testis.
[c] Based on 2000 “hits” per testis.
[d] Frozen, stained tissues.
[e] Fixed tissues.
[f] References: 1 – Johnson et al. (1980), 2 – Mori and Christensen (1980), 3 – Mori et al. (1982b), 4 - Sinha Hikim et al. (1988), 5 – Amann (1970), 6 – Johnson et al. (1980), 7 – Johnson et al. (1983), 8 – Mori et al. (1982a), 9 – Roosen-Runge (1956), 10 – van Dop et al. (1980).

Supplemental Table S2. Coefficients of variability associated with seminiferous tubular diameter within untreated, control populations.

Species	Description	No. of subjects	CV (%)	Ref.[a]
Rat	Sprague-Dawley (~350 g)	13-15	3.4	1
Rat	Inbred hooded Liverpool (21 day old)	6	7.1[b]	2
	Inbred hooded Liverpool (43 day old)	6	9.8[b]	
	Inbred hooded Liverpool (81 day old)	6	8.9[b]	
Rat	Sprague-Dawley (4 mo. Old)	2	2.8	3
Rat	Sprague-Dawley (~100-110 day old)	3-4	4.3	4
Rabbit	New Zealand (54 wk old)	22		5
	Fresh cryostat sections		4.2[c]	
	Fixed		5.2[c]	
	Stage I tubules only		4.8[c]	
Rabbit	Dutch Belted (~2kg)	5	10.2	1
Rabbit	New Zealand White			6
	1 wk old	3	3.0	
	2 wk old	3	2.8	
	3 wk old	3	4.8	
	4 wk old	3	4.4	
	5 wk old	3	4.3	
	6 wk old	3	9.3	
	7 wk old	3	3.0	
	8 wk old	3	6.5	
	9 wk old	3	9.3	
Hamster	Golden Syrian	5	4.3	7
Human	24, 30 & 35 yr old	3		8
	Frozen, unstained		7.4	
	Frozen, stained		6.6	
	Fixed		2.0	

[a] References: 1- Berndtson et al. (1989), 2- de Jong and Sharpe (1977), 3- Huang and Hembree (1979), 4- Sharpe et al. (1988), 5- Amann (1970), 6- Iczkowski, Sun and Gondos (1991), 7-Sinha Hikim et al. (1988), 8- Johnson et al. (1983).

[b]Values for seminiferous tubular cross sectional area.

[c]CV's among 22 testes from 11 rabbits.

Supplemental Table S3. Coefficients of variability associated with seminiferous tubular length in untreated control subjects.

Species	Description	No. of subjects	CV (%)	Ref.[a]
Rat	Inbred Hooded Liverpool			1
	21-day-old	6	15.2	
	39-day-old	6	9.1	
	81-day-old	6	7.9	
Rat	Sprague-Dawley (54, 64, 77 & 77 day old)	4	9.0	2
Rabbit	New Zealand White			3
	1 wk old	3	12.9	
	2 wk old	3	21.4	
	3 wk old	3	18.3	
	4 wk old	3	42.9	
	5 wk old	3	37.5	
	6 wk old	3	25.3	
	7 wk old	3	17.3	
Hamster	Golden Syrian	5		4
	Length/g		5.3	
	Length/testis		5.4	
Human	Fertile, pre-vasectomy	8	16.4	5

[a] References: 1- de Jong and Sharpe (1977), 2- Wing and Christensen (1982), 3- Iczkowski et al. (1991), 4- Sinha Hikim et al. (1988), 5- van Dop et al. (1980).

Supplemental Table S4. Coefficients of variability (CV) associated with the percentage of the testis occupied by specific components of the testis.

Species	No. of subjects	Item	CV (%)	Reference
Rat	3	Seminiferous epithelium	2.4	Johnson et al. (1980)
Rat	4	Testicular capsule	29.0	Mori and Christensen (1980)
Hamster	5	Tubular lumen	5.8	Sinha Hikim et al. (1988)
		Blood vessels	21.0	
		Macrophages	26.8	
		Connective tissue cells	25.8	
Human	30	Basement membrane	19.9	Roosen Runge (1956)
		Lumen	30.8	
		Space?	33.1	
Human	8	Intratubular cytoplasm	8.4	van Dop et al. (1980)
		Tubular wall	18.9	
		Blood vessels	100.0	

Supplemental Table S5. Coefficients of variability (CV) associated with the percentage of the testis occupied by germ cells or their nuclei.

Species	Description	No. of subjects	Item	CV (%)	Ref.[a]
Rat	400 – 500 g	14	Type B sp-gonia	43.5	1
			Preleptotene	25.7	
			Pachytene	12.1	
			Round spermatids	12.7	
Rat	6 to 12 mo. Old	3	Germ cell nuclei	10.6	2
			Round spermatid nuclei	10.5	
Rabbit	54-wk-old New Zealand	11/22	Round stage I spermatids	24.4	3
			Round stage V-I spermatids	14.0	
Human	24, 43 & 57 yr	3	Germ cell nuclei	13.6	2
			Round spermatid nuclei	26.6	
Human	26 to 53 yr old	10	Round spermatid nuclei	44.7	4
Human	26 to 53 yr old	10	Pachytene + diplotene nuclei	29.4	5
Human	18 to 38 yr old	30	Spermatogonia	13.8	6
			Spermatocytes	17.9	
			Spermatids + spermatozoa	21.8	
			Abnormal germ cells	55.7	
			Total germ cells	11.6	
Human	Pre-vasectomy	8	Germ cell nuclei	33.6	7

. [a] Reference: 1 – Johnson et al. (1984a), 2 – Johnson et al. (1980), 3 – Amann (1970), 4 – Johnson et al. (1981), 5 – Johnson et al. (1983), 6 – Roosen Runge (1956), 7 – van Dop (1980).

Supplemental Table S6. CV's associated with the diameter of germ cell nuclei.

Species	Description	No.	Type of cell	CV (%)		Ref.[a]
				Dia.	Vol.	
Rat	400 – 500 g	14	Type B spermatogonia	9.8	27.3	1
			Preleptotene spermatocytes	3.5	11.5	
			Pachytene spermatocytes	1.9	5.6	
			Round spermatids	2.9	9.3	
Human	26 to 53 yr old	10	Round spermatids	2.3	6.4	2
Human	26 to 53 yr old	10	Pachytene and diplotene[b]	2.8	8.4	3

[a] References: 1 – Johnson et al. (1984a), 2 – Johnson et al. (1981), 3 – Johnson et al. (1983).
[b] Pachytene plus diplotene primary spermatocytes.

Supplemental Table S7. CV's associated with the volume density of Sertoli cells or Leydig cells and/or their components.

Species	No. of subjects	Item	CV (%)	Reference
Rat	3	Sertoli cells	14.2	Johnson et al. (1980)
		Sertoli nuclei	21.7	
Rat	4	Leydig cells	9.5	Mori and Christensen (1980)
		Leydig nuclei	10.9	
		Leydig cytoplasm	10.2	
Mouse	5	Leydig cells	8.9	Mori et al. (1982b)
		Leydig nuclei	15.4	
		Leydig cytoplasm	9.1	
Hamster	5	Leydig cells	4.7	Sinha Hikim et al. (1988)
		Connective tissue cells	25.8	
Human	3	Sertoli cells	18.1	Johnson et al. (1980)
		Sertoli nuclei	36.1	
Human	14	Sertoli nuclei	19.4	Johnson et al. (1984b)
		Sertoli nucleoli	22.7	
Human	6	Leydig cells	37.8	Mori et al. (1982a)
		Leydig nuclei	65.5	
		Leydig cytoplasm	37.4	
Human	30	Leydig cells	40.6	Roosen Runge (1956)
		Sertoli cells	12.1	
Human	8	Sertoli nuclei	19.1	van Dop et al. (1980)
		Leydig cells	49.7	

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Supplemental Table S8. CV's associated with the dimensions of testicular somatic cells or their components.

Species	Description	No.	Item	CV (%)	Ref.[c]
Rat	65 to 73 day	14	Sertoli cell nuclear area	6.6	1
Rat	22 day	5	Sertoli cell nuclear area	8.9	2
	45 day	5	Sertoli cell nuclear area	5.0	
	45 day	5	Sertoli nucleolar diameter	15.3	
Hamster	Lak:LVG (SYR) strain	5	Leydig cell nuclear vol	11.7	3
			Vol of cytoplasm/Leydig cell	13.3	
			Leydig cell vol.	12.8	
			Sertoli nuclear vol	11.9	
Human	18 – 71 year	14	Sertoli nuclear vol – dia[a]	8.9	4
			Sertoli nuclear vol – serial sect[b].	11.8	
			Sertoli nucleolar volume	11.7	

[a,b] Volumes calculated from nuclear diameter measurements or reconstruction of serial sections, respectively.
[c] Reference: 1- Clegg (1963); 2- Gaytan and Aguilar (1987); 3 – Sinha Hikim et al. (1988); 4 – Johnson et al. (1984b).

Supplemental Table S9. CV's associated with numbers of germ cells per unit of testicular tissue.

Species	Description	No.	Item	CV (%)	Ref.[a]
Rat	Sprague Dawley (400-500g)	14	Type B / g	43.2	1
			PL/g	27.9	
			Pach / g	12.7	
			R. sp/g	9.2	
Rat	Sprague-Dawley (54, 64, 77 & 77 day old)	4	Secon. Sp-cytes/cm	16.4	2
			PL, L & Z/g	20.6	
			PL, L & Z/testis	24.9	
			Pach & Dip/g	17.1	
			Pach & Dip/testis	20.9	
			Secondary/g	33.9	
			Secondary/testis	38.9	
			Step 1-10 tids/g	10.1	
			"/testis	14.5	
Human	26-53 yr old	10	R. sp-tid nuclei/testis	53.5	3
			R. sp-tid nuclei/g	47.2	
Human	26-53 yr old	10	Pach + Dipl nuclei/testis	40.2	4
			Pach + Dipl nuclei/g	34.5	

[a] References: 1 – Johnson et al. (1984a), 2 – Wing and Christensen (1982), 3 – Johnson et al. (1981), 4 – Johnson et al. (1983).

Supplemental Table S10. CV's associated with number of Sertoli cells per unit of testicular tissue.

Species	Description	No.	Item	CV (%)	Ref.[a]
Rat	21-day-old, Hooded Liverpool	6	Sertoli cells/testis	13.5	1
Rat	22-day-old, Wistar	5	Sertoli cells/cm^3	10.2	2
	45-day-old Wistar	5	"	6.3	
	22-day-old	5	Sertoli cells/testis	9.6	
	45-day-old	5	"	6.6	
Rat	Sprague-Dawley (54, 64, 77 & 77 day old)	4	Sertoli cells/g	12.6	3
			"/testis	15.5	
Hamster	Golden (Syrian)	5	Sertoli cells/g	16.2	4
			" /testis	16.2	
Human	18-71 yr old	14	Sertoli cells/g[b]	26.3	5
			Sertoli cells/g [c]	24.2	
			Sertoli cells/g[d]	20.7	

[a] References: 1 – de Jong and Sharpe (1977), 2 – Gaytan and Aguilar (1987), 3 – Wing and Christensen (1982), 4 – Sinha Hikim et al. (1988), 5 – Johnson et al. (1984b).

[b,c,d] Values calculated from data derived via the volume density approach utilizing the diameter of Sertoli nucleoli, Sertoli nuclei, or estimates of Sertoli nuclear size determined from serial sections, respectively.

Supplemental Table S11. CV's associated with number of Leydig cells per unit of testicular tissue.

Species	Description	No.	Item	CV (%)	Ref.[a]
Rat	Sprague-Dawley (255, 265, 345 and 365 g)	4	Leydig cells/cm^3	9.3	1
Hamster	Golden (Syrian)	5	Leydig cells/g	17.2	2
			"/testis	17.1	
Mouse	CD-1, 78-day-old	5	Leydig cells/cm^3	11.5	3
Human	65-87 yr old	6	Leydig cells/cm^3	30.7	4

[a] References: 1 – Mori and Christensen (1980), 2 – Sinha Hikim et al. (1988), 3 - Mori et al. (1982b), 4 - Mori et al. (1982a).

Supplemental Table S12. Replicates Needed per Treatment Group for Experiments of 90% Power at P< 0.05[a]

CV (%)	Difference from control to be detected (%)							
	5	10	15	20	25	30	40	50
5	13	4	2					
10	50	13	7	4	3	2		
15	112	28	13	8	5	4	3	2
20	198	50	23	13	9	7	4	3
25	310	77	35	20	13	10	6	4
30	446	111	50	29	19	13	8	6
40	792	198	88	50	33	23	13	9
50	1,237	309	138	77	50	35	20	13

[a]For one-tailed tests with two-treatment experiments. For experiments with two-tailed tests, the replication shown would provide an experiment of 80% power at P<0.10. See Berndtson (J.Animal Sci. 1991; 69:67-76) for replication tables developed for two-tailed tests, and for details of the method used to generate the values in the table above.

Supplemental Table S13. Replicates Needed per Treatment Group for Experiments of 95% Power at P< 0.05[a]

CV (%)	Difference from control to be detected (%)							
	5	10	15	20	25	30	40	50
5	18	5	3	2				
10	69	18	9	5	4	3	2	
15	154	40	18	11	7	5	4	3
20	274	69	31	18	12	9	5	4
25	434	107	49	28	18	13	8	5
30	617	154	69	40	26	18	11	7
40	1,097	274	122	69	45	31	18	12
50	1,714	429	191	107	69	49	28	18

[a]For one-tailed tests with two-treatment experiments. For experiments with two-tailed tests, the replication shown would provide an experiment of 90% power at P<0.10. See Berndtson (J.Animal Sci. 1991; 69:67-76) for replication tables developed for two-tailed tests, and for details of the method used to generate the values in the table above.

References for Supplemental Tables S1 – S13

Amann RP. The male rabbit. IV. Quantitative testicular histology and comparisons between daily sperm production as determined histologically and daily sperm output. Fertil Steril. 1970; 21:662–672.

Berndtson WE. A simple, rapid and reliable method for selecting or assessing the number of replicates for animal experiments. J. Anim. Sci. 1991; 69:67-76.

Berndtson WE, Neefus C, Foote RH, Amann RP. Optimal replication for histometric analyses of testicular function in rats and rabbits. Fundam Appl Toxicol. 1989; 12:291-302.

Clegg EJ. Studies on artificial cryptorchidism: morphological and quantitative changes in the Sertoli cells of the rat testis. J Endocrinol. 1963; 26:567–574.

De Jong FH, Sharpe RM. The onset and establishment of spermatogenesis in rats in relation to gonadotrophin and testosterone levels. J. Endocr. 1977; 75:197-207.

Gaytan F, Aguilar E. Quantitative analysis of Sertoli cells in neonatally oestrogen-treated rats. J. Reprod. Fert. 1987; 79:589-598.

Huang HFS, Hembree WC. Spermatogenic response to vitamin A in vitamin A deficient rats. Biol Reprod. 1979; 21:891-904.

Iczkowski KA, Sun EL, Gondos B. Morphometric study of the prepubertal rabbit testis: Germ cell numbers and seminiferous tubule dimensions. Amer J Anat. 1991;190:266-272.

Johnson L, Lebovitz RM, Samson WK. Germ cell degeneration in normal and microwave-irradiated rats: Potential sperm production rates at different developmental steps in spermatogenesis. Anat Rec. 1984a; 209:501-507.

Johnson L, Petty CS, Neaves WB. A new approach to quantification of spermatogenesis and its application to germinal cell attrition during human spermatogenesis. Biol Reprod. 1981; 25:217-226.

Johnson L, Petty CS, Neaves WB. A comparative study of daily sperm production and testicular composition in humans and rats. Biol Reprod. 1980; 22:1233-1243.

Johnson L, Petty CS, Neaves WB. Further quantification of human spermatogenesis: germ cell loss during postprophase meiosis and its relationship to daily sperm production. Biol Reprod. 1983; 29:207-215.

Johnson L, Zane RS, Petty CS, Neaves WB. Quantification of the human Sertoli cell population: Its distribution, relation to germ cell numbers, and age-related decline. Biol Reprod. 1984b; 31:85-795.

Mori H, Christensen AK. Morphometric analysis of Leydig cells in the normal rat testis. J Cell Biol. 1980; 84:340-354.

Mori H, Hiromoto N, Nakahara M, Shiraishi T. Stereological analysis of Leydig cell ultrastructure in aged humans. J Clin Endo Metab. 1982a; 55:634-641.

Mori H, Shimizu D, Fukunishi R, Christensen AK. Morphometric analysis of testicular Leydig cells in normal adult mice. Anat Rec. 1982b; 204:333-339.

Roosen-Runge EC. Quantitative investigations on human testicular biopsies. I. Normal testis. Fertil Steril. 1956; 7:251-261.

Sharpe RM, Donachie K, Cooper I. Re-evaluation of the intratesticular level of testosterone required for quantitative maintenance of spermatogenesis in the rat. J Endocrinology 1988; 117:19-26.

Sinha Hikim AP, Bartke A, Russell LD. Morphometric studies on hamster testes in gonadally active and inactive states: light microscopic findings. Biol Reprod. 1988; 39:1225-1237.

Van Dop PA, Scholtmeijer RJ, Kurver PHJ, Baak JPA, Oort J, Stolte LAM. A quantitative structural model of the testis of fertile males with normal sperm counts. Int J Andrology 1980; 3:153-169.

Wing T–Y, Christensen AK. Morphometric studies on rat seminiferous tubules. Am J Anat. 1982; 165: 13-25.