

Table 1. The effect of gonadectomy on the larval recoveries from male and female mice infected with 1000 filariform larvae of *Ancylostoma caninum*, during the 40-day experimental period

Day post-inoculation	Number of larvae recovered (Mean \pm SE)							
	Male Control	Orchiectomized	% decrease	p-value	Female Control	Ovariectomized	% increase	p-value
3	585 \pm 19 (5)	562 \pm 19 (5)	4.00	< 0.25	518 \pm 15 (5)	592 \pm 19 (5)	14.29	< 0.01
7	563 \pm 23 (5)	528 \pm 18 (5)	6.20	< 0.25	492 \pm 16 (5)	609 \pm 14 (5)	23.78	> 0.001
11	533 \pm 28 (5)	461 \pm 25 (5)	13.50	< 0.05	425 \pm 20 (5)	533 \pm 22 (5)	25.41	< 0.001
15	508 \pm 13 (5)	435 \pm 13 (5)	14.37	< 0.001	435 \pm 24 (5)	550 \pm 21 (5)	26.44	< 0.001
20	486 \pm 11 (5)	373 \pm 26 (5)	23.25	< 0.001	359 \pm 16 (5)	497 \pm 17 (5)	38.44	> 0.001
25	521 \pm 13 (5)	401 \pm 23 (5)	23.03	< 0.001	288 \pm 14 (5)	471 \pm 9 (5)	63.54	> 0.001
30	464 \pm 16 (5)	337 \pm 10 (5)	27.37	> 0.001	311 \pm 14 (5)	426 \pm 17 (5)	36.98	> 0.001
40	427 \pm 19 (5)	294 \pm 5 (6)	31.17	> 0.001	254 \pm 17 (6)	444 \pm 16 (4)	74.80	> 0.001

Table 2. Cross-comparison (p-values) between the larval recoveries from gonadectomized and control male vs female mice, infected with *Ancylostoma caninum*, during the 40-day experimental period

Duration of infection (days)	Male vs female Orchiectomized vs control	Control vs ovariectomized	Control vs control
3	=0.1	< 0.5	< 0.01
7	< 0.1	< 0.1	< 0.025
11	< 0.25	0	=0.01
15	0	< 0.1	< 0.01
20	< 0.5	< 0.5	> 0.001
25	< 0.001	< 0.01	> 0.001
30	< 0.1	< 0.1	> 0.001
40	=0.05	< 0.25	> 0.001

recovered from orchiectomized and control mice were (562–294) and (585–427) during the 40-day experimental period.

Ovariectomy in female mice significantly increased their susceptibility to infection, as revealed by a 14–75% increase in the survival and retention of infective larvae. But no sign of growth and development of filariform larvae was observed during these experiments. The average numbers of larvae recovered from ovariectomized and sham-operated-controls were (592–444) and (518–254) respectively, with ($p > 0.001$ to < 0.001) excepting ($p < 0.01$) on post-infection 3 days (table 1).

The cross-comparison (in p-values) between the larval recoveries (table 2) from sham-operated control male vs

female mice revealed that males were significantly more susceptible ($p > 0.001$ to < 0.025) than females, throughout the infection period. The differences in the larval burdens between castrated male and control female groups were insignificant except on the 25th ($p < 0.001$) and 40th ($p = 0.05$) day of infection. The number of larvae recovered from control males was slightly greater than from ovariectomized females, but the differences were not significant, except on the 25th day ($p < 0.01$). Thus removal of gonads eliminated the significant differences ($p > 0.001$ to < 0.025) in the size of larval populations shown between the sexes in normal mice, by remarkably altering the host susceptibility. An important factor in the pathogenicity of parasitic diseases is the sex of the host; pathogenicity depends at least to some extent on the sex hormones. The present findings clearly indicate the involvement of male and female gonadal hormones, testosterone and estrogen, in the susceptibility of mice towards *Ancylostoma caninum* infection, as extirpation of testes successfully decrease the susceptibility of the host and removal of the ovaries increased it.

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Effect of rabbit antiserum to ovine LH on reproductive organs in male hamsters and guinea-pigs

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Summary. Administration of rabbit antiserum to ovine luteinizing hormone to immature hamsters and guinea-pigs resulted in a significant decrease in the weights of testes, seminal vesicle and ventral prostate.

Studies using antiserum to LH have shown that LH has an important role in regulating reproduction in both male and female mammals²⁻⁴. The neutralization of endogenous LH by way of active or passive immunization leads to atrophy of testes and accessory reproductive organs in rats and rabbits⁵⁻⁷. However, studies by Greenwald⁸ using hypophy-

sectomized pregnant hamsters reported that in this species, unlike the rat, FSH and prolactin from the luteotropic complex and LH supplementation could not maintain pregnancy in hypophysectomized pregnant animals; this suggested that LH has no significant role in this species. In contrast, studies from this laboratory using specific antisera

to ovine FSH and LH showed that LH has a very critical role in the initiation of ovulation, induction of implantation and maintenance of pregnancy in the hamster^{9,10}. In view of this observation, based on immunological studies, that the female hamster can also be included with rat and rabbit in a group in which LH has a critical role in reproduction, it was considered to be of interest to investigate the need for LH to maintain the reproductive organs and function in the male of this species. In the present study, preliminary results for the effect of administration of antiserum to ovine LH in pubertal male hamsters and immature guinea-pigs has been reported. Immature 30-day-old male guinea-pigs and 50-day-old male hamsters of the Institute colony were employed in the study. They were housed in groups of 5 or 6 in polypropylene cages and were fed with pelleted food from Hindusthan lever, Bombay. Water was available ad libitum.

The preparation and characterization of antiserum to ovine LH and its cross reaction with hamster pituitary LH was done using agar gel diffusion and a quantitative precipitation test. The details have been described in earlier publications^{9,10}. In the agar gel diffusion test, the hamster pituitary extract when tested against ovine LH antiserum showed a precipitation line which formed a spur with the line between LH and its antiserum. Similar results were obtained with guinea-pig pituitary extract also. The quantitative precipitation test revealed 30–40% cross-reaction between ovine LH antiserum and hamster pituitary LH.

In both cases, treatment was continued for 20 days. As it has been shown¹¹ that male hamsters reach puberty by about 50 days, and also because the requirement for LH in the case of the female has been studied earlier using 50-day-old females, for the study in the male 50-day-old animals were chosen. In the case of guinea-pig, also^{11,12}, puberty is attained by 50 days of age; treatment of a 30 day guinea-pig for 20 days would facilitate the examination at the time it attains maturity. Antiserum was administered by the s.c. route. Animals which received normal rabbit serum served as controls. Autopsy was done 24 h after the last

injection and the weights of the testes, seminal vesicles and ventral prostate was recorded in a torsion balance to the nearest 0.2 mg. Results of gross external examination revealed that no testes was visible externally in LH deprived animals. Animals treated with normal rabbit serum showed well descended testes. It can be seen from the results presented in tables 1 and 2 that administration of rabbit antiserum to ovine LH caused a significant reduction in the weight of testes, seminal vesicle and ventral prostate in hamsters and guinea-pigs as compared to the normal rabbit serum treated controls. In fact, in the antiserum treated groups, the testes attained only 12% of the weight found in the controls in hamsters, and only 30% in the case of guinea-pigs. Morphologically the testes, epididymus and seminal vesicles of the experimental group showed marked atrophy. Histological examination of the testes of treated animals revealed small tubules with arrested spermatogenesis and poor interstitial development.

The results of the present study show that in the male hamster, LH is obligatory for the maintenance of gonads and accessory reproductive organs and thus the male hamster also belongs to the same category as rats and rabbits, requiring LH for maintenance of gonads and accessory reproductive organs. No studies have been reported so far on the gonadotropic hormone requirements in the guinea-pig and the present study shows that in these species also LH has an important role.

The present results do not provide direct proof for involvement of LH in the maintenance of reproductive function in male hamster and guinea-pigs, as a decrease in testosterone, which is involved in the maintenance of testicular and accessory reproductive organ weight and function, has not been demonstrated. However, other studies from this laboratory using pregnant female hamster and rat as a model have shown that administration of LH a/s causes a decrease in ovarian weight as well as serum progesterone concentration^{13,14}. Thus the results of the present study using LH a/s do suggest that the decrease in the weight of testis and accessory reproductive organs in hamster and guinea-pig must be due to decreased production of testosterone by the testis.

Table 1. Effect of LH antiserum on the reproductive organs in male hamsters

Treatment	Testes weight	Seminal vesicle weight	Ventral prostate weight
0.1 ml of NRS (6)	1978 ± 212	880 ± 117	113 ± 41
0.1 ml of LH a/s (8)	296 ± 47	154 ± 27	77 ± 17

All values are in mg, mean ± SD. Numbers in parenthesis indicate number of animals per group. Injections were given by s.c. route for 20 days from day 55 onwards and autopsy was done on day 75. All values $p = 0.01-0.001$. NRS, normal rabbit serum.

Table 2. Effect of LH antiserum on the reproductive organs in male guinea-pigs

Treatment	Testes weight	Ventral prostate	Seminal vesicle
NRS 0.2 ml/day (6)	269 ± 32	57 ± 11	43 ± 9
LH antiserum 0.2 ml/day (8)	78 ± 6	17 ± 3.0	14 ± 4

All values are in mg, mean ± SD. Numbers in parenthesis indicate number of animals per group. Injections were given by s.c. route for 20 days from 30th day. Autopsy was done on 50th day. All values are significant $p = 0.01-0.001$. NRS, normal rabbit serum.

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