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The Effect of Vasectomy and Oviduct Section on Mouse Behavior (38554)

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Attention has been given to the effect of vasectomy and Fallopian tube section on gonad function and behavior in animals but some confusion does exist. For example, Sackler (1) reported that vasectomy decreased androgen excretion and testis weight in rats, but, on the other hand, Leydig cell hyperplasia and enhanced testosterone secretion have also been observed (2, 3). Despite this, Phoenix (4) could find no effect of vasectomy on animal behavior. In hamsters, bilateral removal of oviducts reduced ovulation. In fact, a biological fraction was isolated from the oviduct which decreased ovarian function (5). In the present study, we have attempted to determine the effect of vasectomy and tubal section on spontaneous locomotive movement and exploratory behavior in mice which we feel should reflect an alteration of endocrine function.

Materials and Methods. Adult Swiss Webster mice (25 g; 8–16 animals per group) were either vasectomized, tubectomized, sham-operated or castrated. Some of the animals were not operated on and they served as normal controls. Bilateral vasectomy was performed by making a 0.5 in. incision on the ventral abdominal surface in front of the penis so that the vas deferens was exposed. The middle third of the duct was removed using optical aid and the cut ends were ligated with 3–0 black silk. Bilateral removal of the middle third of the Fallopian tubes was performed in a similar fashion.

For castrations (ovary or testis) a small hemostat was applied to the tubes or vas deferens so that the gonads could be removed and the cut ends were tied. Sham-operations were subject only to surface and muscle layer incisions and inspection of the reproductive tracts. Care was taken to close the peritoneum. Anhydrous ether anesthesia and aseptic surgical procedures were employed.

After 45 postoperative days, we measured spontaneous locomotive movement and the open field exploratory behavior of individual mice (6–9). In the first test, a mouse was put in a polypropylene box (15 $\times$ 13 $\times$ 7 in.) and placed on an Electronic Activity Monitor for five minutes. Any movement made by the animal disturbed an electronic field which was sensed and recorded as a count. The results were recorded as movements/minute. For the open field study three lines were drawn on the floor of the polypropylene box (floor area 11.5 $\times$ 13.5 in.) forming six squares. A mouse was placed in the box and allowed to run for 5 min and we calculated the number of lines the animal crossed in one minute. One hesitates to talk about emotionality in rodents but the open field test has been considered to be a valid measure of emotional behavior (9). The standard errors of the various means were calculated using the formula $SE = (\Sigma d^2/N(N-1))^{1/2}$ and the P values using the Student's t test.

Results and Discussion. The spontaneous movement of sham-operated adult Swiss Webster male mice was 1.7 times greater than vasectomized animals ($P < 0.001$) and 1.3 times greater than castrate animals ($P < 0.05$). The movement of normal nonoperated males was similar to sham-operated controls (Table I). The effect of tubectomy and ovariectomy on female movement tended to be similar to that recorded for vasectomy and castration except that the means were not significantly different due to a larger variability. The open field test revealed that vasectomy or oviduct section had no significant influence on mouse exploratory behavior. However, the mean number of lines crossed by tubectomized mice was one-half the number crossed by vasectomized animals.

If animal behavior as measured by locomotive movement (6–9) reflects gonad secre-

TABLE I. THE EFFECT OF VASECTOMY AND FALLOPIAN TUBE SECTION ON SPONTANEOUS MOVEMENT AND EXPLORATORY BEHAVIOR (45 DAYS POSTOPERATIVE) OF ADULT SWISS WEBSTER MICE.

	Male			Female		
	Number of mice	Spontaneous movement movements/min	Open field test lines crossed/minute	Number of mice	Spontaneous movement movements/min	Open field test lines crossed/min
Control (sham-operated)	8	83.9±5.8[a]	13.7±1.2	10	72.1±21.0	9.3±3.1
Control (normal)	12	77.5±8.5	11.1±2.0	8	64.6±24.9	8.6±3.2
Castration or ovariectomy	9	62.1±9.1	9.8±1.8	16	56.2±6.0	6.7±1.7
Vasectomy or tubal section	9	50.1±6.6	13.1±2.5	9	38.3±13.1	6.0±2.1

[a] ± = Standard error of the mean.

tion, our data does not support the findings of Baillie (2) Harrison and Macmillan (3) or Steinach (10), that vasectomy enhances testosterone secretion or rejuvinates the organism. In fact, the decreased mobility of vasectomized mice suggests the opposite degenerative effect as suggested by Joshi and his associates (11) as well as Kuntz (12). Moore (13) stated that his data was consistent as long as the testis were returned to the normal position in the scrotum after vasectomy. We took extreme care to avoid such an error. The open field test results showed that vasectomy or tubectomy had no effect on mouse exploratory activity. Both operations serve somewhat as controls for each other. The slower movement of female mice 45 days after oviduct section might be considered as a trend.

Summary. The spontaneous movement of vasectomized adult Swiss Webster male mice was 60% less than sham-operated controls 45 days after the operation. A similar trend was recorded for tubectomized females. Exploratory behavior as measured by the open field test was not significantly influenced by either surgical procedure.

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