

Age-Related Changes in the Penile Reflex of Rats

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Introduction

It is well known that, age-dependent changes are prominent in the reproductive systems. Normal men experience a gradual decrease not only in sexual activity with age, but also in libido and interest in sexual activity (Kinsey 1948). In spite of the fact that occasional cases of fertility persisting in men in their nineties have been reported, fertility rates decline in men during the normal aging process (Harman 1978). Similarly, in normal nonhuman primates and in other mammals such as rats, male sexual activity decline with aging. Rates of contact with females, mounting, intromission and ejaculation all decrease in normal old animals (Larsson & Essberg 1962, Phoenix & Chambers 1982). Saito et al. (1991) and Hokao et al. (1992, 1993) demonstrated that conception rates after copulation in aged adult rats decreased compared with young adults.

Sachs (1995) reported that similar to other mammalian species, male rats display penile erection in several contexts, reflexive erections can be evoked from supine, conscious rats by the tonic stimulation of the retracted penile sheath at the base of the glands penis (Meisel & Sachs 1994, Sachs 1995). The question addressed here was whether the potency of penile reflex, like the sexual activity, in male rats would decrease with age.

The aim of the present study was to determine the penile reflex in aged male rats, and to compare these data with young adults.

Materials and Methods

Subjects

Sexually experienced male specific-pathogen-free Iar: Wistar-Imamichi rats (Research Information Section, Office for Life Science Promotion, The Institute of Physical and Chemical Research 1981), approximately 10 and 44 weeks old respectively at the start of the experiment, were used. The animals were seronegative for *Mycoplasma pulmonis*, *Bacillus piliformis*, *Bordetella bronchiseptica*, *Streptococcus pneumoniae*, and Sendai virus. The rats were housed in suspended wire-mesh cages (width X depth X height, 310 X 440 X 230 mm) in groups of 4 animals / sex / cage, kept in an animal room with controlled temperature (22 - 26 ° C) and humidity (40 - 60 %). A 14 : 10 - hr light : dark cycle, with lights off at 1900 was used. Pelleted diet (Oriental MF, Oriental Yeast Co., Ltd., Tokyo, Japan) and tap water were always available.

Behavioral testing

At the ages of 10 and 44 weeks males were tested for penile reflexes between 1600 and 1700. Penile reflexes were tested after a method developed by Hart (1968) and modified by Sachs & Garinello (1978). Briefly, the male was placed on his back with the anterior portion of his body loosely enclosed with a belt around his midsection. The penile sheath was retracted to the extent possible and held in position with a thin dowel (Figure 1).

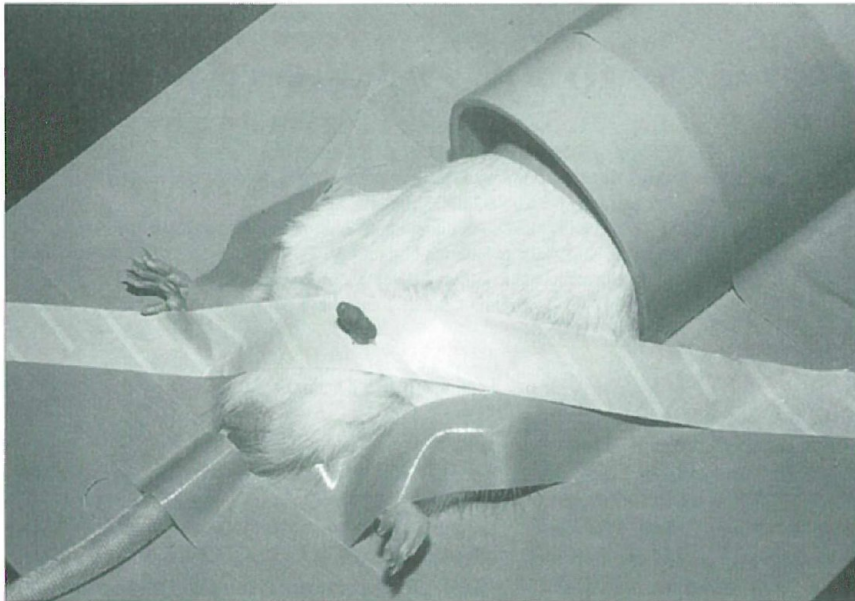


Fig. 1. Method used to restrain and sheath back

Males were tested for 20 min following sheath retraction in the event no reflexes occurred.

Erections, cups and flips were recorded on an event recorder as they occurred. Erections are extensions and / or distensions of the penis. Cups are intense erections during which the glands of the penis flares so that it is more trumpet-shaped than tubular. Flips are a dorsal flexion of the penis. A record was made of the number of each type of reflex and the reflex latency, elapsed time from the set of sheath retraction to the first display of erection, was measured.

Statistics

The results are expressed as means \pm s.e.m. and analyzed using the Mann-Whitney U test (*Mann & Whitney 1947*) and Fisher's exact probability test (*Gad & Weil 1982*).

Results and Discussion

The comparison of reflex latency, numbers of

erections, cups and flips in aged and young adult males is shown in Table 1. The latency to first erection recorded in aged adults was significantly longer than that recorded in young adults. Of 5 aged adults two showed erections, but no cups and flips were observed. In contrast, in young adults all 7 showed erections, cups and flips. The mean number of erections in aged adults was significantly lower, compared with that in young adults.

In summary, the potency of penile reflexes decreases with aging.

In aged adults the reflex latency increased and numbers of erections, cups and flips decreased, compared with young adults. Also the activity of copulation decreases with aging. This is evident in the longer intromission and ejaculation latency, and lower intromission and ejaculation frequencies (*Hokao et al. 1992*).

Table 1. Comparisons of penile reflexes (Mean \pm s.e.m.) between aged and young adult rats

Age (weeks)	n	Latency (sec.)	Frequency					
			Erections	%	Cups	%	Flips	%
44	5	-	0.4 \pm 0.2	40	-	0	-	0
10	7	652.3 \pm 66.7	16.1 \pm 4.0	100	8.9 \pm 2.7	100	4.0 \pm 2.4	100
P value			0.01	0.05		0.01		0.01

- = not observed

Summary

The penile reflex in sexually experienced male rats aged 10 and 44 weeks was observed for 20 min following sheath retraction. All 7 males aged 10 weeks showed erections, cups and flips, while of 5 males aged 44 weeks only 2 showed erections. Frequencies of the above behaviors in aged males were significantly lower than that in young males. The decrease of penile reflexes with aging was similar to that of copulatory behavior with aging, when paired with receptive females. The present study is the first to clearly establish the pattern of penile reflexes in aged rats.

Acknowledgment

The authors thank Dr. N. Moritani, Department of Laboratory Animal Science, Nippon Veterinary and Animal Science University, for technical assistance. This study was supported in part by grants-in-aid for Scientific Research from the Ministry of Education, Science and Culture of Japan (No. 09460148) to TRS. A preliminary report of this research was presented at the 15th Annual Meeting of the Japan Society of Andrology, Kurashiki, Japan, July 1996.

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