

Cytological Studies on Different Effects of Sex Stimulating Hormones on Abnormal Mature Follicles of Several Mouse-strains

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(Text-fig. 1; Table 1)*

INTRODUCTION

A considerable amount of literature has been published pertaining to the follicular atresia in mammals by such authors as ASAMI¹⁾ (1920), ENGLE²⁾ (1927), LANE³⁾ (1938), PLISKE⁴⁾ (1940), SIGEMORO⁵⁾ (1947), ISHIDA⁶⁾ (1953), KENT⁷⁾ (1960) et al. In the previous paper, the author⁸⁾ (1957) has concerned with some cytological studies on abnormal mature ova in mouse ovaries in different phases of oestrous cycle. It seems probable that the disintegration may take place in the egg body and in the granulosa cells under the influence of pituitary gonadotrophic hormones on the follicular apparatus. In another previous study, the author⁹⁾ (1959) reported the effect of sex stimulating hormones on abnormal mature ova in mice. The evidence presented indicates remarkable decrease in number of abnormal follicles in hormone-treated mice.

In the present study, the effects of sex stimulating hormones on abnormal mature follicles were examined cytologically in comparison with the several mouse-strains. The work was practiced to determine whether or not the mouse-strains are of different efficacy on abnormal mature follicles treated with sex stimulating hormones.

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MATERIALS AND METHODS

The material used was mature female mice (*Mus musculus*) in the age of 55-80 days. The strains of mice here used are a group of 20-individuals of Swiss albinos, NC and KK strains respectively. Starting 4 days before the estrus stage, an individual group of mice received injection of sex stimulating hormones from the anterior pituitary and placenta, ("Synaphorin", Teikoku Hormone MFG., Co.) 2 R. U. everyday for 3 successive days. Twenty-four after injection, the ovaries were removed and fixed with Bouin's solution. The sections were made according to the usual paraffin methods and stained with Heidenhain's iron-haematoxylin. Each group of 20-individuals of three strains were reserved as controls.

OBSERVATIONS

The data herein presented were based on observations with the ovaries derived from three strains: they show no remarkable differences in the ratio of number of normal, abnormal mature follicles and polyovular follicles in their ovaries with mouse strains. Microscopical observations reveals that abnormal mature follicles prior to the maturation course and polyovular follicles are abundant in three strains of untreated mice (Table 1).

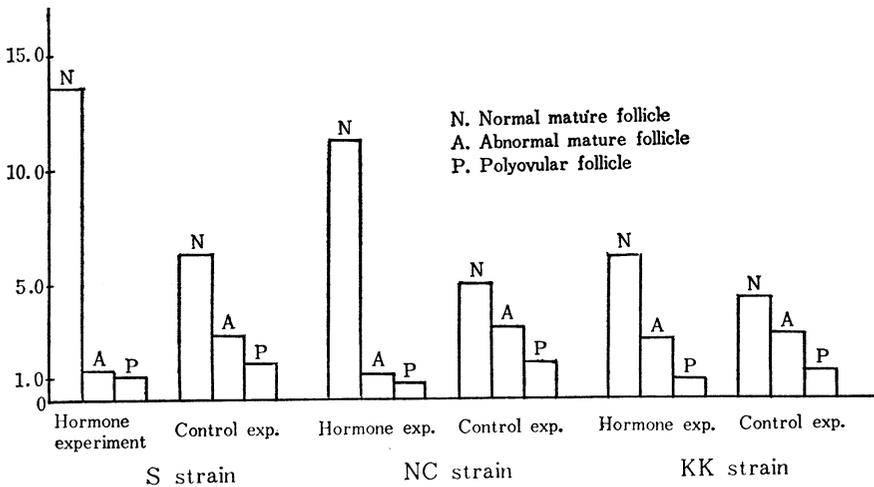
The following work was undertaken to determine whether or not the administration of anterior pituitary sex gland stimulating hormones and the sex gland stimulating hormones of placenta would reduce the number of abnormal mature follicles and polyovular follicles in the three strains (S, NC and KK).

Here the data showed remarkable decrease in number of abnormal follicles and increase in number of normal follicles in hormone-treated mice of S and NC strains. It is evident further that sex stimulating hormones have few effects on KK strain (Text-fig. 1). Namely, 20-individuals of S strain which received an injection of hormones showed 272 normal mature follicles, 26 abnormal mature ones, and 22 polyovular ones in their ovaries in all. 20-individuals of control mice were noticed to have 128 normal, 56 abnormal and 32 polyovular. In 20-individuals of NC strains of hormone-treated mice indicated 226 normal, 22 abnormal, and 14 polyovular. In 20-individuals of control mice signified 102 normal, 62 abnormal, and 32 polyovular. In 20-individuals of KK strain of hormone -treated mice denoted 126 normal, 52 abnormal, and 18 polyovular. In 20-individuals of control mice revealed 88 normal, 55 abnormal, and 23 polyovular (Table1).

Table 1. Total number of normal and abnormal mature follicles in ovaries of three mouse-strains in hormone experiment

Mouse strain	Method	Number of individual	Normal mature follicles		Abnormal mature follicles		Polyovular follicles	
S strain	Hormone experiment	20	272	13.6	26	1.3	22	1.1
	Control exp.	20	128	6.4	56	2.8	32	1.6
NC strain	Hormone exp.	20	226	11.3	22	1.1	14	0.7
	Control exp.	20	102	5.1	62	3.1	32	1.6
KK strain	Hormone exp.	20	126	6.3	52	2.6	18	0.9
	Control exp.	20	88	4.4	55	2.8	23	1.2

Based on the findings in this study, the conclusion is assumed that the decreasing number of abnormal follicles may be explicable through the effect of sex stimulating hormones. And also, the evidence obtained in the experiments has indicated that the different effects of sex stimulating hormones on abnormal follicles were noticeable in relation to the mouse strains. The results denotes that the S and NC mouse-strains



Text-fig. 1. Diagrams showing average number of normal and abnormal mature follicles in ovaries of three mouse-strains in hormone experiment.

are of remarkable decrease in number of the abnormal follicles and increase in number of normal follicles in hormone-treated mice as compared with the untreated. KK strain showed a tendency to few effects on abnormal follicles in hormone injection.

DISCUSSION

Numberous workers have show how, by injection of hormones of various kinds, the number of ova may be considerably increased (PINCUS¹⁰) 1940, PARKES¹¹) 1943, RUNNER & PALM¹²) 1953, HUNTER, ADAM & ROWSON¹³) 1955, GATES¹⁴) 1956, GREEN¹⁵) 1956, OKIGAKI¹⁶) 1958, SATO¹⁷) 1959, MAKINO¹⁸) 1959, HARPER¹⁹), 1963, HAFETZ & ISHIBASHI²⁰) 1964, et al.). In one of the previous paper, the author (1959) reported the effects of sex stimulating hormones on abnormal mature follicles in mice. Evidence presented showed remarkable decrease in number of the abnormal follicles in hormone-treated mice.

In the present study, the different effects of sex stimulating hormones on abnormal mature follicles were investigated cytologically in the three mouse-strains. The results denotes that the S and NC strains are of remarkable decrease in number of abnormal follicles compared with the KK strain.

In this experiment, it is a matter of deep reflection that such matters as age, individual difference, breeding efficiency, and environmental correlation with hormone experiment in connection with mice are of potent influence. Thus, it is highly estimated for the author to continue to study for the solution of these matters. On the other hand, it is of interest related with the results of hormone experiment that the sexual cycle of mice generally was variable according to strain, and NC and S strains showed a considerably normal cycle in contrast to KK strain.

SUMMARY

Different effects of sex stimulating hormones in abnormal mature follicles were examined cytologically in relation to the following mouse-strains: Swiss albinos, NC and KK strains.

The results indicated that both S and NC mouse-strains are of remarkable decrease in number of abnormal follicles and increase in number of normal follicles in hormone-treated mice as compared with the untreated. On the other hand, KK mouse strain showed a tendency to few effects on abnormal follicles in hormone injection.

LITERATURE CITED

- 1) ASAMI, G. 1920. *Anat. Rec.* **18**: 323-343.
- 2) ENGLE, M. T. 1927. *Am. J. Anat.* **39** (2): 187-203.
- 3) LANE, Ch. E. 1935. *Anat. Rec.* **61**: 141-153.
- 4) PLISKE, E. G. 1940. *J. Morph.* **67**: 321-346.
- 5) SIGEMORO, E. 1947. *J. Fac. Sci. Hokkaido Univ.* **VI** (9): 233-241.
- 6) ISHIDA, K. 1953. *Tohoku J. Agric. Res.* **IV** (1): 29-41.
- 7) KENT, H. A. 1960. *Anat. Rec.* **137**: 521-524.
- 8) NAKAMURA, T. 1957. *J. Fac. Fish. Anim. Husb. Hiroshima Univ.* **1** (3): 343-356.
- 9) ———— 1959. *Zool. Mag.* **68**(10): 358-361.
- 10) PINCUS, G. 1940. *Anat. Rec.* **77**: 1-8.
- 11) PARKES, A. S. 1943. *Endocrin.* **3**: 268-280.
- 12) RUNNER, M. N. & J. PALM. 1953. *J. Exp. Zool.* **124**: 303-316.
- 13) HUNTER, G. L., C. E. ADAM & L. ROWSON. 1955. *J. Agric. Sci.* **46**: 46-78.
- 14) GATES, A. H. 1956. *Nature* **177**: 754-755.
- 15) GREEN, J. A. 1956. *Anat. Rec.* **126**: 195-212.
- 16) OKIGAKI, T. 1958. *J. Fac. Sci. Hokkaido Univ.* **VI**: 39-44.
- 17) SATO, A. 1959. *Yamashina Instit. for Ornoth. and Zool.* **14**: 531-534.
- 18) MAKINO, S. 1959. *Science* **29** (8): 419-421.
- 19) HARPER, M. J. K. 1963. *J. Endocrin.* **26**: 307-316.
- 20) HAFEZ, E. S. E. & I. ISHIBASHI 1964. *Cytogenetics* **3**: 167-183.

数系統マウスの異常成熟卵胞に及ぼす性腺

刺戟ホルモンの感受差について

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哺乳動物の閉鎖卵胞に関する報告は多い。著者は先にマウス卵巣内の成熟分裂過程の排卵不能な異常成熟卵胞について研究し、その過程に二つの型のある事を報告した。更にこれ等の異常卵胞の出現に性腺刺戟ホルモンの影響が考えられ、ホルモン処理による異常卵胞の減少を認めた(中村1957, 1959)。本研究は数系統マウスで実験を行い、ホルモン処理による異常卵胞の減少の系統による感受差を検討した。

実験に用いたマウスは S, NC 及び KK 系の 3 系統であり、成熟卵巣内の異常卵胞の性腺刺戟ホルモン効果につき実験した。ホルモン処理の結果 S 及び NC 系は成熟分裂過程にある正常成熟卵胞の著しい増加と異常卵胞の減少を認めたが、KK 系はその効果低く、感受性の低い傾向が観察された。

この実験ではマウスの年令、個体差、繁殖率、環境条件等が重要な問題となる。これ等の点は更に検討を要する問題もあるが、マウスは一般に性周期、繁殖率は系統によって差異が有り、S 及び NC 系は KK と比べて性周期の正しい点、繁殖率良好等の点は実験結果と関連して興味ある点である。