DEVELOPMENT OF FERRET EGGS AFTER 2 TO 3 DAYS IN THE RABBIT FALLOPIAN TUBE

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Summary. When 4- or 6-day ferret eggs were transferred to the Fallopian tubes of rabbits for 2 or 3 days and retransferred into uteri of pseudopregnant ferrets, only 4 to 8% of transferred eggs developed into foetuses. Following storage at 1 to 5° C for 2 or 3 days in a medium containing 20% of ferret serum, no 4-day ferret egg implanted but 8% of the 6-day eggs developed into foetuses. Following culture at 38° C in the same medium for 2 to 3 days, none of the 4-day eggs, but 59% of the 6-day eggs could have implanted.

It has been shown that sheep eggs can survive for several days in the genital tract of rabbits and develop into foetuses or lambs when retransferred into the uteri of synchronized sheep (Hunter, Bishop, Adams & Rowson, 1962). Although ferret eggs were able to survive and develop in the tubes of rabbits for 2 to 4 days (Chang, 1966), it is not known whether these eggs could develop into foetuses if retransferred into the uteri of synchronized ferrets. This paper compares the development in ferret uteri of ferret eggs that have either spent 2 to 3 days in the rabbit tube, or been kept for a similar period in diluted ferret serum held at low temperature or at body temperature.

Oestrous ferrets were injected intraperitoneally with 90 i.u. of HCG to induce ovulation and were inseminated with epididymal spermatozoa according to the description of Chang (1965). They were killed 2, 4 or 6 days after the injection of HCG and the eggs, termed 2-, 4- or 6-day eggs, were recovered from the tubes or uteri with 20% ferret serum in a tissue culture medium (TC 199—Difco Lab.) as described by Chang & Yanagimachi (1963). Some eggs were transferred within 1 hr of recovery into the tubes of rabbits 1 day after an intravenous injection of HCG. At operation, the utero-tubal junction was ligated in some of the rabbits. The rabbits were killed 2, 3 or 4 days after the operation and the eggs were recovered by flushing the Fallopian tubes and uteri with 20% rabbit serum in TC 199. The eggs were then transferred into the uteri of pseudopregnant ferrets as described elsewhere (Chang, 1968). For the storage or culture of ferret eggs, the recovered eggs were placed in a medium containing 20% ferret serum in TC 199 and either stored in a 1-ml Carrel flask at 1 to 5° C or cultured in a 5-ml Carrel flask at 38° C. After 1, 2 or 3 days of storage or culture, the eggs were transferred into the uteri of pseudopregnant ferrets. The

recipient ferrets were injected intraperitoneally with HCG in order to induce pseudopregnancy. Synchronization between the age of eggs and the stage of pseudopregnancy was as follows. The 4-day eggs, for example, after transfer to the rabbit tubes for 2 days or after culture for 2 days, were transferred to the uterus of a 5-day pseudopregnant ferret; thus, the stage of egg development was 1 day more advanced than that of the endometrium. After storage at 1 to 5° C, however, 2-, 4- or 6-day ferret eggs were transferred to the uteri of 2-, 4- or 6-day pseudopregnant ferrets. The recipient ferrets were killed 22 to 25 days after the transfer had been made and the numbers of foetuses and of uterine swellings without embryo were counted.

TABLE 1

DEVELOPMENT OF FERRET EGGS AFTER THEIR TRANSFER TO THE RABBIT FALLOPIAN TUBES, OR AFTER STORAGE OR CULTURE

Age of eggs (days)	Treatment	Recipient (days after HCG)	No. of recipients	No. of eggs transferred	No. of uterine swellings (%)	No. of foetuses (%)
2	To rabbit tubes for 4 days	5	2	7	0	0
4	To rabbit tubes for 3 days	6	4	20	2 (1)	1* (5)
4	To rabbit tubes for 2 days	5	5	36	10 (28)	3 (8)
6	To rabbit tubes for 2 days	7	5	28	12 (43)	1 (4)
2	Storage at 1 to 5° C for 1 day	2	2	24	9 (38)	0
4	Storage at 1 to 5° C for 2 to 3 days	4	3	22	0	0
6	Storage at 1 to 5° C for 2 to 3 days	6	3	26	1 (4)	2 (8)
4	Cultured at 38° C for 2 to 3 days	5, 6	3	29	0	0
6	Cultured at 38° C for 2 to 3 days	7, 8	3	22	13 (59)	0

* An abnormal foetus.

The following points of interest can be made from the limited data presented in Table 1. Although the ferret eggs could survive and develop to a certain degree in the rabbit Fallopian tubes for 2 to 3 days, as shown by their expansion observed at recovery and by their ability to become implanted (1 to 43%), the chance of their future development was very low (only 4 to 8%). About 25% of sheep eggs could develop to term after transfer to the rabbit tubes for 4 to 5 days (Hunter *et al.*, 1962). Since between 15 and 62% of ferret eggs, depending

partly on age, could implant and develop into foetuses when transferred directly to uteri of ferrets at various stages of pseudopregnancy (Chang, 1969), an adverse effect of rabbit tubes on ferret eggs is obvious. The survival and subsequent development of ferret eggs in the rabbit tubes, however, appeared to be better than in culture: there was almost no development of the eggs during the 2- to 3-day period of incubation in a mixture of ferret serum and TC 199, and not one foetus was obtained when the eggs were retransferred to ferret uteri, although some of the older eggs implanted. In contrast to the relatively high proportion (6 to 37%) of fertilized rabbit eggs showing normal development after storage or culture in rabbit serum for several days (Chang, 1948), the ferret eggs appeared to be unable to withstand storage or culture in a medium containing ferret serum. The present results, however, indicate that the older eggs could survive during storage or culture better than the younger ones: thus, after storage at 1 to 5° C for 2 to 3 days, 8% of the 6-day eggs but none of the 2- or 4-day ones developed into foetuses; after 2 to 3 days in culture, 59% of the 6-day eggs could have implanted as compared with none of the 4-day ones. The factors that allow better survival of sheep eggs than ferret eggs in the rabbit tubes and poorer survival of ferret eggs than rabbit eggs in storage and culture are worthy of consideration for our understanding of early embryonic development and implantation.

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