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Claim for Thyroid Subnormality in Vitamin E-Low Rats.*

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Singer[1] described a marked hypoplasia of the thyroid in rats 12 to 18 months of age maintained on a vitamin E-low diet.

Barrie[2, 3, 4] observed a similar condition at the end of the lactation period in the young of vitamin E-low mothers; a condition that did not exist when the young were transferred to foster mothers receiving a stock ration.

Relatively large numbers of young are occasionally produced in this laboratory as a result of "first litter fertility," in mothers reared and held on E-low diets. There are good reasons for believing that in these cases of fertility, the mother possesses stores of vitamin E barely sufficient for the birth of living young. The reasons are:

1. The majority of the mothers of a group handled at the same time were sterile.
2. On rebreeding, these females invariably resorb.
3. A high proportion of the young from "first litter fertilities" show a characteristic deficiency picture toward the end of the lactation period consisting of: the paralysis described by Evans and Burr,[5] a characteristic configuration of the head, general puffiness, roughness of fur in spite of normal body weight, a corneal film, etc.

Young from 3 differently treated groups of rats were examined by us.

Group 1. The mothers were reared on vitamin E-low diet 427[6] and were bred at the first pro-estrus after 60 days. Each mother was allowed to suckle 6 young, and at 10 days a part of each litter

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1 Singer, E., *J. Physiol.*, 1936, **87**, 287.

2 Barrie, M. M. O., *Nature*, 1937, **139**, 286.

3 Barrie, M. M. O., *Nature*, 1937, **140**, 426.

4 Barrie, M. M. O., *Lancet*, 1937, **2**, 251.

5 Evans, H. M., and Burr, G. O., *J. Biol. Chem.*, 1928, **76**, 273.

6 Emerson, G. A., and Evans, H. M., *J. Nutrition*, 1937, **14**, 169.

was given 2 drops of a standardized wheat germ oil 6 times weekly. There were 24 animals in the untreated group and 19 in the treated.

Group 2. Vitamin E-low females that had undergone a typical resorption gestation were given 1 g of wheat germ oil on the day of the second positive mating. Six young from each litter were kept, of which three were suckled by the mother and the remaining 3 were given to a foster mother that received an additional 1 g of wheat germ oil on the day of littering. Three young from the foster mother were in turn given to the original mother.

Group 3. Mothers with a history of a resorption gestation were handled as in group 2 except that half of the young from each mother received by stomach tube from day 5 or 10, 0.2 cc of wheat germ oil. There were 17 untreated and 14 treated animals.

Group 4. Six normal young, 21 days of age, from the stock colony.

The size of the thyroid vesicles, their content of colloid and especially the height of the epithelium were items charted for each animal in all groups. Characteristic differences between the groups were not observed. Variations within the group fully equalled the group differences claimed by Singer and Barrie.

If vitamin E deficiency imposes subnormality on the thyroid, increased evidence of this might legitimately be expected in older animals, in those reared and held for their entire life on a vitamin E-low ration. Two groups of animals were observed: 6 rats that were 22 months of age and had been maintained on a vitamin E-low ration since weaning, and 5 controls of the same age reared on a stock diet.

As in the case of the suckling young, these animals showed no histological evidence of hypothyroidism.

It occurred to us as entirely possible that functional subnormality might be detectable even with histological normality; consequently a preliminary study was made of the oxygen consumption of 4 vitamin E-low, and 4 normal, rats. No significant differences were observed, the average figure being slightly higher for the experimental than for the control group.

Conclusion. Histological subnormality of the thyroid was not observed in the paralyzed suckling young of vitamin E-low mothers or in old animals (22 months of age) chronically deprived of vitamin E.