erals (ash). With respect to the latter, our studies suggest that it is a combination of elements rather than any single element which contributes to the pro-oxidant property of the yeast.

In other experiments, it was found that 1% of the ash of dried brewer's yeast when fed with 1% of tall oil produced a high incidence of exudative diathesis similar to that of *Torula* yeast ash plus tall oil. On the other hand, feeding an additional 2% of the salt mixture used in the C47B diet, together with 1% of tall oil, gave a low incidence of exudates. Thus, it appears that the combination of elements in *Torula* yeast, and possibly also that in brewer's yeast, has a remarkable pro-oxidative property. It is unlikely that any constituents of *Torula* yeast, other than the lipid and ash, contribute significantly to its anti-vit. E effect.

Summary. When added to a purified basal diet low in vit. E and selenium, the ash of *Torula* yeast was found to promote exudative diathesis. This effect could not be demonstrated by any of the minor elements, nor by any of the major components, of the ash. The lipid isolated from *Torula* yeast also promoted exudates; this effect could be duplicated by tall oil. A combination of lipid and ash from *Torula* yeast produced an incidence of exudative diathesis similar to that produced by an equivalent amount of the intact yeast. A combination of tall oil and a synthetic ash was just as effective. It is concluded that the anti-vit. E property of *Torula* yeast is due essentially to both its unsaturated fatty acid and mineral contents. The relatively high content of dienoic acid in the lipid of *Torula* yeast was confirmed.

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Lactic Dehydrogenase Activity in Human Semen.* (24317)

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The lactic dehydrogenase (LD) is present in normal human blood plasma and in increased concentration in myelogenous leukemia(1). The enzyme is present also in serous effusions and cerebrospinal fluid and in elevated amounts when these fluids contain or bathe growing malignant cells(2). Similarly, the proliferation of neoplastic human cells in tissue culture is accompanied by increasing lactic dehydrogenase (LD) activity of the bathing medium(2). The rapid cellular proliferation which is characteristic of human spermatogenesis, the high zinc content of human semen(3) and the presence of zinc in the molecule of LD, suggested LD activity might be present in semen. Accordingly, this possibility was investigated in the normal ejaculate and in semen derived from infertile and sterile individuals.

Methods. Lactic dehydrogenase activity of semen was estimated using 0.025 ml of a 1:10 dilution of human semen. The aliquot of semen was added to 0.6 ml 0.1 molar phosphate buffer, pH 7.4, and 0.05 ml reduced diphos-

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phopyridine nucleotide (2 mg per ml). After an incubation period of 20 minutes, 0.1 ml of sodium pyruvate (0.5 mg per ml) was added and the change in optical density was measured at 340 mμ using a 0.8 ml capacity cell with a 1 cm light path. One unit of semen LD activity is defined as that which results in a change in optical density of 0.001 per minute per 1.0 ml semen at 26°C under specific conditions. Normal semen specimens were obtained from young healthy adults and specimens of varying degrees of potential fertility from individuals attending the out-patient clinics of The New York Hospital. Estimation of sperm count, motility and morphology were done by standard methods(4). Lactic dehydrogenase activity was measured in whole semen, the centrifuged supernatant cell-free fluid and in the "split" ejaculate. The "split" ejaculate describes the semen derived when the ejaculate is partitioned into 2 or more aliquots at the time of ejaculation. This method has been used to determine the contributions of the prostate and ampulla of the ductus deferens, and of the seminal vesicles to the cellular and fluid constituents of semen(5).

Results. LD activity of the whole semen of 65 individuals ranged from 1600 to 18,000 units with a mean activity of 5600 ± 470 units. When these values are compared with those obtained in normal human blood plasma (range 200-500 units) it is obvious that the LD activity of human semen is very high. In 10 instances, the spermatozoa were separated from the seminal fluid by centrifugation. Mean LD activity of the supernatant fluid (3900 units) while lower than the whole semen (4900 units), suggests that a considerable amount of LD activity is present in the non-cellular fluid component. In 4 patients with azoospermia, LD activity of the semen was 1600, 2400, 4000, and 2400 units respectively, and mean LD activity of 8 semen specimens which were either azoospermic or which contained only an occasional sperm cell was 2700 units. In 20 semen specimens in which the sperm count ranged from 1 to 50 million sperm per cc, mean LD activity was 4400 units. In 24 specimens with sperm counts above 50 million per cc, mean LD activity was 6000 units. In this group, 13 semen specimens with counts above 100 million per cc had mean LD activity of 7800 units. There appears to be a semiqualitative relationship between LD activity of semen and its sperm count, although sperm-free seminal fluid contains significant LD activity. No relationship between motile activity of spermatozoa and LD activity of semen was apparent. From 2 normal individuals, semen specimens showed high LD activity which bore no apparent relationship to semen quality or sperm count; 2 semen specimens obtained 3 days apart from a normal individual had LD activities of 19,000 and 13,000 respectively while specimens from another individual had LD activities of 36,000 and 16,000 respectively.

Comparison of LD activity of the first and second portions of the "split" ejaculate reveals the mean activity to be 13,000 and 4100 units respectively. The first third to one-half of the ejaculate is known to be derived primarily from the prostate and the ampullae of the ductuli deferentia and contains the bulk of the spermatozoa(5). In view of the fact that azoospermic semen contains LD activity, it appears that the prostatic secretions contribute a considerable portion of the total LD activity of human semen.

Although the significance of these observations has yet to be clarified they serve as a baseline for study of the clinical significance of LD alterations of prostatic secretions and of semen in diagnosis of prostatic and testicular malignant neoplasia.

Summary. 1. Lactic dehydrogenase is present in high concentration in normal human semen and in seminal fluid of azoospermic individuals. 2. As compared to normal human blood plasma, LD activity of seminal fluid is high and is comparable to values obtained from tissue fluids which contain or bathe growing malignant cells. 3. There appears to be a semi-qualitative relationship between LD activity of semen and its content of spermatozoa but a considerable portion of LD activity is present in sperm-free seminal fluid. The latter activity seems to be derived principally from the prostatic secretions.

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Essential Role of Hypophysis in Hypercorticism and Hyperovarianism in DBA x CE and Reciprocal Mice.* (24318)

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In a number of inbred strains of mice (DBA (1), CE(2), A, C_{57}BL and C_3H(3)) and in some of their hybrid offspring (C_3H x A(4), DBA x CE(5)) adrenal cortical hyperplasia and/or adenocarcinoma develop in both sexes subsequent to early gonadectomy. Similar adrenal tumors develop in intact NH mice due to spontaneous failure of the gonads at about 9 to 10 months of age(6). That these cortical tumors are endocrinologically active is evidenced by their growth-stimulating effect on the atrophied reproductive organs after they develop in the gonadectomized mice. In some instances the growth induced may become hyperplastic in nature. Hyperplasia of the reproductive tract also occurs in intact DBA x CE and reciprocal hybrid female mice due to spontaneous hyperovarianism that begins to manifest itself at 6 to 7 months of age and which persists throughout the life of the animals(7).

It has been the general consensus of the several authors cited that the hypophysis is involved in both spontaneous and induced adrenal and ovarian endocrinopathies. No direct evidence, however, has been offered in support of this contention. The following experiments were designed to determine whether or not the hypophysis is essential to development of hyperovarianism in intact mice and to development of hypercorticism in neonatally ovariectomized mice.

Procedure. The present study was begun with 82 virgin female DBA x CE and reciprocal hybrid mice, born in the Jackson Laboratory colony and maintained at 70°F and on a diet of Purina laboratory chow and water *ad libitum*. The mice were divided into 4 groups: (1) 24 received no treatment, (2) 8 were ovariectomized within 72 hours after birth, (3) 25 were hypophysectomized at weaning, *i.e.* at approximately 30 days of age,‡ and 25 were ovariectomized shortly after birth and were then hypophysectomized at weaning. The operated animals were weighed occasionally but were subjected to no other treatment.

The mice were sacrificed at from 6 to 9 months of age, the earliest period during which hyperplasia of the ovaries, adrenals and uterus is consistently present in intact animals. Whereas all the operated animals survived the immediate post-surgical period, there was a high delayed mortality rate among the hypophysectomized mice, particularly at from 60 to 90 days of age. Several of the surviving hypophysectomized mice, although much lighter in weight than the intact animals, gained 4 to 5 g and consequently were eliminated from the study because of incomplete removal of the gland. Hence, there were but 5 completely hypophysectomized and 10 hypophysectomized-ovariectomized mice that survived at least to the required age

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