fibrinolytically active compounds carrying a hydrophilic substituent with double or triple bonds are more active than their counterparts with a saturated hydrophilic substituent(2).

Summary. Naphthalene-disulfonic acids, acidic dyes, and numerous surfactants dissolve fibrin "s" at low concentrations. Human plasma inhibits some surfactants, does not affect others, and enhances markedly the activity of a third group. Of the amphoteric surfactants, Deriphat 160-C dissolved fibrin "s" and, in contrast to other surfactants, induced enzymatic fibrinolytic activity in human plasma.

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Maintenance of Pregnancy in Protein-Deficient Rats with Short-Term Injections of Ovarian Hormones.* (28612)

WARREN G. KINZEY§ AND HERBERT H. SREBNIK
(Introduced by C. W. Asling)
Department of Anatomy, University of California, Berkeley

In absence of dietary protein most pregnant rats resorb their litters by mid-gestation (1). Pregnancy can be maintained, however, by daily injections of estrone and progesterone from day 3 to 20 of gestation(2), an observation suggesting that reproductive failure may be due to reduced levels of pituitary and/or placental gonadotropins. This study examines the functional capacity of placenta to maintain pregnancy in protein-deficient rats when ovarian hormone administration is terminated by mid-gestation. Since hypophysectomy also interrupts pregnancy when performed before establishment of placenta (3), pregnant hypophysectomized rats were injected concurrently with protein-deficient rats.

Materials and methods. Virgin Long-Evans rats, 75-85 days old and weighing 175-220 g, were bred with normal males and fed protein-free diet† *ad lib.* beginning the day of finding sperm in vaginal smear (day zero). Animals were kept in individual cages, on screens, until autopsy on day 21 of pregnancy. Injections of 1 μg esterone and 4 mg progesterone‡ in 0.3 ml sesame oil were given once daily for varying periods. Control rats received sesame oil only or were uninjected. Three additional groups of rats of comparable age and weight were fed purified complete diet containing 24% casein. Two groups were hypophysectomized by parapharyngeal route on day 5 of pregnancy and injected as above; a third group was intact and uninjected. Vaginal smears were examined daily during gestation for the presence of erythrocytes (the placental sign). At autopsy uteri were removed, examined for implantation

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§ Present address: Dept. of Zoology, Univ. of Calif., Davis.

† Composition of purified diets and of fat-soluble vitamin supplement was reported previously(4).

‡ Estrone was obtained from Parke, Davis and Co., progesterone from Nutritional Biochemicals Co.

TABLE I. Maintenance of Pregnancy with Estrone and Progesterone in Protein-Deficient and in Hypophysectomized Rats.

Period of inj, days	No. rats bred	Wt change during gestation, g	Onset vaginal RBC, day	Living litters,* %	No. implantation sites/rat Total	No. implantation sites/rat Living	Avg fetus, wt, g
Animals receiving protein-free diet							
Uninjected	16	− 49	10.3 ± .15†	0	9.2 ± .66	0	—
1-5	10	− 42	9.8 ± .25	0	9.3 ± .65	0	—
3-7	10	− 40	11.1 ± .43	30	9.6 ±1.03	2.8	3.2 ± .18
3-8	10	− 26	12.2 ± .57	80	10.9 ± .50	5.9	3.4 ± .19
6-10	18	− 29	13.1 ± .16	89	9.5 ± .64	7.2	3.2 ± .07
5-9	25	− 16	12.9 ± .25	100	10.6 ± .31	9.2	3.2 ± .08
Sesame oil 5-9	14	− 42	9.9 ± .30	14	9.1 ± .40	1.2	—
Hypophysectomized animals receiving complete diet							
5-9	12	+ 53	11.8 ± .24	33	10.6 ± .81	3.1	5.2 ± .15
5-11	10	+ 53	12.4 ± .40	100	9.9 ± .41	6.3	4.6 ± .20
Intact animals receiving complete diet							
Uninjected	15	+137	13.0 ± .10	100	11.0 ± .34	9.3	5.6 ± .13

* Percentage of rats with living embryos at autopsy, day 21 of pregnancy. Implantation sites were present in all rats. Avg fetus weights are given for groups in which 3 or more rats had litters at autopsy.

† Mean ± standard error.

sites, and living young, when present, were weighed. Completeness of hypophysectomy was confirmed by visual inspection of the sella turcica and by adreno-cortical atrophy.

Results. All uninjected rats deprived of dietary protein had early vaginal erythrocytes and resorbed their young, as did all animals given estrone and progesterone during the first 5 days of pregnancy (Table I). In contrast, injection of hormones from day 5 through day 9 maintained pregnancy in 100% of animals, but reproductive performance was less successful when treatment was terminated before day 9 or initiated after day 5 of gestation. Most rats injected with sesame oil during the critical day 5-9 period resorbed their litters. All hypophysectomized rats receiving hormones on days 5-11 had living young at term; however, only 33% of animals injected through day 9 had litters, indicating that by day 11, when hypophysectomy no longer interrupts pregnancy, little exogenous estrone and progesterone remained in circulation.

Injection of hormones on days 5-9 caused a significant increase in the average number of implantation sites compared to that found in the sesame oil-treated group ($p<0.01$) and raised the number of living young per litter to the normal level. Absence of dietary protein markedly reduced average fetus weight compared to that of intact or hypophysectomized groups fed complete diets ($p<0.01$).

In hypophysectomized groups number of living young was reduced compared to intact animals receiving complete diet ($p<0.01$).

Discussion. Despite complete absence of dietary protein pregnancy was maintained in all rats injected with ovarian hormones on days 5-9. Percentage of litters, average numbers of implantation sites and living young were comparable to those of protein-deficient rats injected days 3-20(2). Approximately a week intervenes before protein deprivation interferes with reproductive function(1); hormones need not be administered, therefore, during early part of pregnancy.

Ovarian sensitivity to pituitary gonadotropic hormones is not significantly impaired in pregnant rats fed protein-free diet, for gonadotropin administration effectively maintained pregnancy in most protein-deficient animals(5). Placental function, similarly, is unaffected by the diet as judged by the presence of living young at term. Absence of dietary protein does interfere sufficiently with pituitary gonadotropic function, however, to require exogenous hormones until the placenta is fully established.

Results similar to those described for in-

jected protein-deficient mothers were obtained in pregnant hypophysectomized rats only when the injection period was extended 2 days. This difference in hormone requirement probably reflects continued low levels of circulating pituitary gonadotropins in protein-deficient animals. Number of living young of hypophysectomized mothers was reduced compared to that of rats hypophysectomized later in gestation(6), possibly because of decreased pituitary gonadotropins or operative trauma during first half of pregnancy. Fetal weights in both hypophysectomized groups, however, were subnormal.

Summary. Even in the complete absence of dietary protein the placenta can successfully carry fetuses to term provided estrone and progesterone are administered on days 5-9 of pregnancy. Pregnancy can be maintained also in rats hypophysectomized on day 5 of gestation when supported with hormones between days 5-11.

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Relative *in vitro* Activities of Intestinal Glucose Uptake and Monophosphate Esterases.* (28613)

A. S. NUNN, JR., M. SAYEED, J. MCNALLY, R. FALLOT
(Introduced by G. C. Ring)
Department of Physiology, University of Miami, Miami, Florida and Department of Physiology, St. Louis University, St. Louis, Missouri

In the albino rat the rate of glucose absorption decreases from a maximum in the upper half of the small intestine to the terminal ileum(1). It has been suggested that the rate limiting component for glucose absorption might be identified if this component were distributed throughout the small intestine in a pattern similar to the glucose absorption gradient.

This study was designed to determine if the monophosphate esterase activity along the small intestinal length would correlate in an obvious manner with the absorption gradient for glucose.

Methods. By use of a modification of the method of Crane and Wilson, glucose absorption was determined at eight consecutive levels of small intestine in twenty-seven fasted, male albino rats. This absorption technique has been described in detail(2). Monophosphoesterase activity at eight levels of small intestine was determined in ten animals. This technique involved the hydrolysis of paranitrophenylphosphate by mucosal homogenates obtained from areas adjacent to those used for glucose absorption.

Results. The statistical means for both glucose absorption and monophosphoesterase activity are shown in the figure. Segment 1 is the duodenum and segment 8 is the terminal ileum. The decline of absorptive activity found in the first five segments was of statistical importance only in the case of segment 1 *vs* segment 2. From the fifth segment to the terminal ileum each successive segment showed a linear and statistically significant decrease in glucose uptake. The mean monophosphate esterase activity at corresponding intestinal levels decreased precipitously throughout the first seven segments. Only the mean difference of segment 2 *vs* segment 3 was not statistically established.

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