

angiotonin by lymph and plasma involves the same mechanism, it is evident that the concentration of angiotonase in lymph is considerably lower than in plasma. It is not known whether the relatively much higher angiotonase content of the red blood cells³ is responsible for the higher concentration of this substance in plasma, as compared to lymph.

Summary. Cervical lymph and plasma

from normal dogs were compared as to their contents of renin substrate and angiotonase. It was observed that renin substrate occurs in similar concentrations in both lymph and plasma, but that the quantity of angiotonase present in lymph is considerably less than that in plasma.

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Action of Testosterone and Prolactin on the Corpora Lutea of the Rat.*

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In previous studies^{1,2} it was shown that under certain experimental conditions the continuous administration of testosterone propionate (total dose, 20 to 40 mg) to female rats led to the formation of hypertrophied corpora lutea such as normally occurs during pregnancy. These structures likewise were found to have an active function, since deciduomata could be produced in the uteri while they were present. At that time we felt that the hypertrophy and function of these corpora resulted from an excessive secretion of prolactin due to a direct effect of the testosterone on the anterior hypophysis.

The present report deals with a series of experiments designed to determine (1) whether large dosages of prolactin lead to hypertrophy of corpora lutea, and (2) whether this luteal hypertrophy is necessary for active function, as indicated by the production of deciduomata.

Fifty-nine adult female rats of the Stanford strain, averaging 110 days of age, were employed. Daily vaginal smears of each animal were studied for 28 days previous to injection, and the first injection was always given during late estrus. The injections were administered subcutaneously for a period of 10 days. The testosterone propionate[†] was dissolved in sesame oil in varying concentrations and given in single daily doses of from 0.1 cc to 0.05 cc, according to the total dosage indicated in Table I. The prolactin was made up in saline solutions of varying concentrations and from 2 to 4 injections were given daily, but each consisted of 0.2 cc. The control animals received equivalent amounts of sesame oil or saline solution.

On the 5th day the animals were anesthetized, the abdomen opened, and a silk thread introduced for a distance of about 1 cm through the lumen of one of the uterine horns. The rats were sacrificed on the 11th day and the ovaries, together with sections of the uteri taken at the level of the traumatization with

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¹ Fluhmann, C. F., and Laqueur, G. L., *Endocrinology*, 1942, **31**, 375.

² Laqueur, G. L., and Fluhmann, C. F., *Endocrinology*, 1942, **30**, 93.

[†] Our thanks are due to the Ciba Pharmaceutical Products, Inc., Summit, N.J., for the testosterone propionate (Perandren-Ciba) and to the Schering Corporation, Bloomfield, N.J., (Lactogenic Hormone-Schering) used in this study.

TABLE I.
Effect of Graded Dosages of Prolactin and Testosterone Propionate on the Size of Corpus Luteum Cells and Corpus Luteum Function.

Exp.	No. rats	Material injected	Total dosage	Size of corpora lutea		Deciduoma reaction	
				Normal	Hypertrophied	Negative	Positive
I	5	Testosterone	1.0 mg	5	0	5	0
II	5	"	2.5 "	5	0	3	2
III	6	"	5.0 "	4	1 (slight)	0	6
IV	5	"	10.0 "	5	0	0	5
V	4	"	20.0 "	0	4	0	4
VI	5	Prolactin	600.0 I.U.	5	0	1	4
VII	3	"	1200.0 "	3	0	0	3
VIII	2	"	2400.0 "	2	0	0	2
IX	3	Prolactin	400.0 "	0	3	0	3
X	4	Testosterone	5.0 mg	0	4	0	4
		Prolactin	600.0 I.U.				
		Testosterone	20.0 mg				
XI	6	Saline	1.0 cc	6	0	6	0
XII	11	Sesame Oil	0.5 "	11	0	11	0

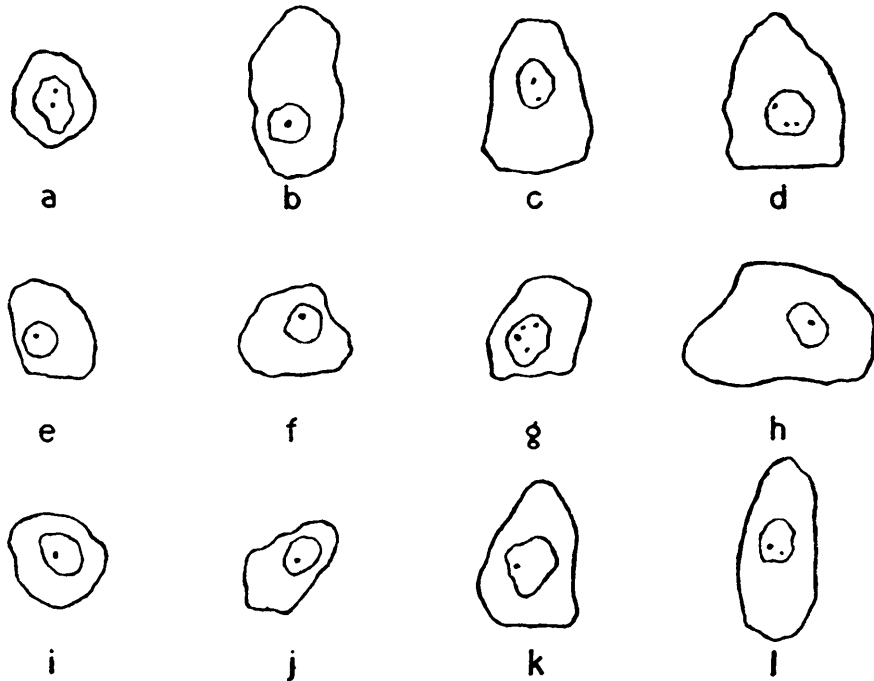


FIG. 1.
Camera Lucida Tracings of Corpora Lutea Cells.
(a) During diestrus
(b) Pregnancy, 16th day
(c) " " 18th "
(d) Day of littering
(e) After 600 I.U. of prolactin
(f) " 1200 " " "
(g) " 2400 " " "
(h) " 400 " prolactin and 5 mg testosterone
(i) " 5 mg of testosterone
(j) " 10 " " "
(k) " 20 " " "
(l) " 20 " " "

the thread, were fixed and stained for histologic study.

The results are indicated in Table I. It is seen that a total dosage of 1 mg of testosterone propionate given under these conditions failed to produce either hypertrophy of the corpora lutea or deciduomata. Deciduomata were formed in 2 of 5 animals given 2.5 mg and in all animals receiving 5 or 10 mg, but hypertrophy of the luteal cells was found only when 20 mg of the hormone were given. This enlargement is illustrated by the representative camera lucida drawings in Fig. 1, where it also can be compared with cells of various other types of corpora lutea.

Uniform results were obtained with prolactin. With 600, 1200, and 2400 I.U., the uteri reacted with deciduomata in 9 out of 10 rats but in no instance was there any enlargement of the corpora.

It is significant that the combined adminis-

tration of 5 mg of testosterone propionate and 400 I.U. of prolactin produced enlarged corpora, because at this dosage level neither hormone by itself produced this effect.

Summary. The administration of testosterone to rats, provided the initial injection is given during late estrus, leads to an enhanced and prolonged function of the corpora lutea, so that deciduomata can be produced by traumatization of the uterus. The minimal total dosage necessary to produce this effect is between 2.5 and 5.0 mg, given over a period of 10 days. If it is increased to 20 mg there is, in addition, a marked hypertrophy of the corpora lutea cells, similar to that of normal pregnancy.

A similar administration of prolactin in total dosages of from 600 to 2400 I.U. produces active corpora lutea, as shown by deciduoma formation, but there occurs no hypertrophy of the luteal cells.

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Inhibition of Experimental Liver Cancer in Rats by Addition of an Adsorbent to the Diet.

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The inhibiting influence of yeast, liver, rice bran and their extracts on the carcinogenicity of the azo dyes has been studied recently by Sugiura and Rhoads¹ who reported that only part of the protective factor in yeast could be extracted with ether. We have observed that the relatively indigestible fractions of the foods mentioned, when placed in an aqueous solution of the carcinogenic dye known as butter yellow (paradimethylaminoazobenzene), adsorb considerable amounts of the dye *in vitro*. It therefore occurred to us that part of the protective influence of these dietary constituents on butter yellow cancer might be due to reduced absorption of the carcinogen and that the incidence of this type of experimental tumor might be greatly reduced by

the inclusion in the diet of a good, non-toxic, indigestible adsorbent, such as the clay, montmorillonite.*

The present report deals with the adsorption capacity for butter yellow of several materials which might be suitable for inclusion in experimental diets containing this carcinogen, together with preliminary results on feeding one of these (montmorillonite) on the incidence and course of butter yellow induced tumors.

The adsorption capacity of the various materials for butter yellow, determined by the

¹ Sugiura, K., and Rhoads, C. P., *Cancer Research*, 1941, 1, 3.

* Montmorillonite ((Mg, Ca)O · Al₂O₃ · 5SiO₂ · nH₂O) is a natural white clay used by refiners for removing undesirable substances from foods and petroleum products. That used by us was mined in Gonzales County, Texas, and generously donated by the Milwhite Company of Houston, Texas.