

from 10706 cc. (6187 cc. per sq. m.) to 6447 cc. (3581 cc. per sq. m.). Since this is a function of the hematocrit the values would remain elevated until the hematocrit becomes normal.

The total circulating hemoglobin of 2194.73 gm. has been reduced to 1224.96 gm. This visualizes more clearly the effect of total thyroidectomy on erythropoiesis and hemoglobin formation than do hemoglobin concentration studies. It is probable that the patient's relief from symptoms is attributable to this reduction.

Conclusions. (1) All the alterations in the blood following a total thyroidectomy in a case of polycythemia vera are in the direction of normal. Normal values for total blood plasma, mean corpuscular hemoglobin (γ , γ) and mean corpuscular hemoglobin concentration have been attained. Although the concentration of hemoglobin per 100 cc. has remained unchanged the total circulating hemoglobin has been reduced to 56%. The other changes (hematocrit, total blood volume) are so striking as to be significant.

(2) The patient has been relieved of her former symptoms. Her present complaints are due solely to the myxoedema. No attempt has been made to control these as this would defeat the experimental objective.*

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Studies Relating to Time of Human Ovulation. II. During Lactation.

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It is a well known clinical fact that in the absence of any contraceptive measures, some women will become pregnant during their period of lactation while others will not. This has led to the conclusion that ovulation occurs in the former group but not in the latter. The frequency of ovulation in lactating women who are having catamenia at regular intervals is at present unknown. The following study was undertaken in order to shed some light on the subject.

A group of patients reporting to the postpartum clinic of the

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Sloane Hospital was chosen. Each patient was nursing regularly. Endometrial biopsies were taken at 4-week intervals by means of a modified Klingler and Burch¹ suction curette (Kurzkrok²). On the basis of this biopsy a diagnosis was made of the phase of the menstrual cycle. The presence of a premenstrual endometrium implies that ovulation has taken place and that we are dealing with an ovulatory cycle. On the contrary, the demonstration of a proliferative endometrium within 10 days of the succeeding flow implies an absence of ovulation or an anovulatory cycle. One of us (R. K.) has previously shown³ that the limits of ovulation during a regular 28-day cycle lie between the 9th and the 21st day of the cycle, with the greatest probability that ovulation will occur between the 12th and 14th day. The first day of bleeding records the first day of the cycle.

Thirty cases were chosen and more than 125 biopsies have been obtained. Of these one case had 9 consecutive monthly biopsies, one case had 8, 2 had 7, 2 had 6, 5 had 5, while 3 cases had 4, 9 had had 3, and the 7 remaining cases have had at least 2 biopsies taken. The spotting that occasionally resulted from a biopsy never lasted more than a few hours. (We have taken to date more than 1500 biopsies with only one slight accident.)

In Table I the diagnosis of the menstrual phase was made for each biopsy; the figure to the left gives the number of days since the previous flow (to the time the biopsy is taken), and the figure to the right the number of days before the next period. Thus, 27) P (1, means a biopsy was taken 27 days after the last flow and one day before the next flow. A proliferative endometrium 1 to 10 days before the flow implies an absence of a corpus luteum, hence an absence of ovulation, therefore an anovulatory cycle. Two patients (6 and 28) stopped having periods while they were under observation. Thus 86) P means that a proliferative endometrium was found on the 86th day since the last period of bleeding, no catamenia having occurred during this time.

Conclusions. Thirty lactating women studied during their postpartum period had 106 fairly regular cycles. Thirty-nine cycles were ovulatory in character, hence fertile. Forty-five cycles were anovulatory or sterile, hence the bleeding at the end of each cycle was not true menstruation for it did not come from a premenstrual

¹ Klingler, H. J., and Burch, J. C., *J. A. M. A.*, 1932, **99**, 559.

² Wilson, L., and Kurzkrok, R., *Am. J. Obs. and Gyn.*, 1936, **31**, 911.

³ Kurzkrok, R., Kirkman, I., and Creelman, M., *Am. J. Obs. and Gyn.*, 1934, **28**, 319.

TABLE I.

Case No.	Age	Days between delivery and first post-partum period	Biopsy								
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
1	24	29	27) P (1	28) P (59	84) P (3	27) P (1	28) P (2	25) P (7	20) S (8	20) P *	
2	27	76	21) P (2	27) F (1	28) P (2	27) F (8	18) P (7	20) P (11			
3	26	60	33) P (10	80) P (16	11) P (17	12) P (14	39) P (4				
4	35	91	21) P (1	28) S (26	23) S (2 *	26) P (3	24) S (7				
5	23	63	25) P (15	20) S (1 *	29) S (2 *						
6	32	53	19) P (45	49) P (11	16) P (6	28) P (7					
7	26	44	21) P (102	82) C.G.H. (13	24) P (13						
8	25	47	25) S (4	17) C.G.H. (13	26) S (3						
9	37	57	27) S (4	24) S (4							
10	20	102	30) S (1	27) S (1	28) S (1 *						
11	25	51	25) P (3	46) P (2							
12	28	50	9) P (1	28) S (1 *							
13	22	47	33) P (8	34) S (1							
14	24	42	30) P (58	26) P (6	35) S (1	29) S (1	28) S (2				
15	23	40	24) P (58	28) P (1	28) P (31	35) P (3	30) S				
16	25	42	7) P (15	20) F (1	27) P (1	14) S (1	28) P (1				
17	18	127	24) P (3	26) P (5	22) P (10						
18	15	34	23) P (1	51) P (1 *	23) P (1	17) P (1					
19	28	130	29) P (8	33) P (1 *	18) P						
20	28	69	22) P (6	22) S (7 *	32) Early S(4						
21	22	100	51) P (22	20) S (7	21) P (12	23) P (11	28) P (1				
22	27	101	27) P (1	29) P (11	21) P (12						
23	27	120	20) P (8	33) S (2	26) S						
24	27	74	24) P (13	36) S *	87) Decidua	115) Decidua					
25	27	20	21) Atypical S(1	27) S (1							
26	22	84	29) Early S(2	12) P (16							
27	22	80	26) S (3	23) S (7	49) S (1	27) S					
28	27	42	5) P *	51) P	79) P (7	107) P					
29	25	42	22) P (30	26) Early S(8	20) S (7						
30	26	66	28) P (14	15) P (10							

P = Proliferative or Postmenstrual Endometrium.

S = Secretory or Premenstrual Endometrium.

C.G.H. = Cystic Glandular Hyperplasia of the Endometrium.

* = Weaning.

Note: Neither the parity of the patient, nor the nursing schedule are in any way correlated with the result.

endometrium. There were 22 cycles of doubtful interpretation, by which we mean that 10 or more days elapsed between the date of the biopsy and the onset of the next period of bleeding. Ovulation could, therefore, potentially occur between the date of biopsy and the onset of the flow. Forty-two to 63% of the lactating women who bleed at fairly regular intervals have anovulatory or sterile cycles.

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Crystallization of Liver Fraction Protecting Against Necrosis from Carbon Tetrachloride or Chloroform Administration.

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We have reported^{1, 2} on the use of a liver preparation in the prevention of liver necrosis from carbon tetrachloride or chloroform administration. At this time we wish to report a method for the preparation of this active principle in a crystalline form.

A concentrated aqueous extract of hog liver representing approximately 10 gm. per cc., from which the heat coagulable materials have been removed, is warmed in a water bath to a temperature of approximately 60°C. To each 1000 cc. of this solution 2400 cc. of ethyl alcohol of about the same temperature is added with stirring. The precipitate which forms is filtered off after cooling and 2000 cc. of a saturated aqueous solution of ammonium sulfate added to the filtrate. The solution is then thoroughly shaken. On standing it separates into 2 layers: above, an alcoholic layer and below, a watery layer containing a great deal of precipitated ammonium sulfate. The upper layer is syphoned off and 1500 cc. of alcohol added to it to precipitate excess ammonium sulfate. The solution is filtered after being cooled in a refrigerator for several hours. The filtrate is then evaporated under reduced pressure to approximately 170 cc. It is then placed in a refrigerator and cooled over night. The precipitate is separated by centrifuging and washed in the centrifuge tubes, first with about 60 cc. of ice cold water and then

¹ Forbes, J. C., and Neale, R. C., *Proc. Soc. Exp. Biol. and Med.*, 1936, **34**, 319.

² Forbes, J. C., Neale, R. C., and Scherer, J. H., *J. Pharm. and Exp. Therap.*, 1936, **58**, 402.