

Implantation Does Not Affect Luminal Content and Synthesis of Uteroglobin in the Rabbit (41400)

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Abstract. To evaluate the possibility that uterine decidual reaction to the implanting blastocyst may cause a decrease in the luminal content of uteroglobin during pregnancy, experiments were designed to have unilateral pregnancy in the rabbit. The unilateral pregnancy was obtained by ligating one of the oviducts with silk sutures, with the opposite horn remaining intact for pregnancy. Since the horn with sutures did not become pregnant, it was designated as a pseudopregnant horn. The uteroglobin content and ^3H -amino acid incorporation were determined in the pseudopregnant and pregnant horns on Days 5, 7, and 10 of pregnancy. Our results indicate that there was no significant difference in the concentration of uteroglobin and incorporation of ^3H -amino acid into the uteroglobin between the pregnant and pseudopregnant horns on different days of pregnancy. These studies suggest that the rapid decline of the luminal uteroglobin content in pregnant rabbits compared to pseudopregnant or progesterone-treated ovariectomized rabbits is not influenced by the process of decidualization due to implantation in the uterus but most likely is due to humoral factor(s) associated with pregnancy.

The protein uteroglobin is secreted into the rabbit uterine lumen in high amounts during a limited early phase of pregnancy, pseudopregnancy, and in the ovariectomized rabbit treated with progesterone (1, 2). The uteroglobin content of the uterine lumen was greater on Day 5 in ovariectomized, progesterone-treated, pseudopregnant and pregnant rabbits than on Day 10, and on Day 10, the uteroglobin content was higher in the progesterone-treated and pseudopregnant animals than on Day 10 of pregnant animals (1, 2). In all three groups, the synthesis of uteroglobin as indicated by the incorporation of ^3H -labeled amino acids into uteroglobin was much greater on Day 5 than on Day 10 (1). The reason(s) for the different rates of disappearance of uteroglobin from the uterus among the pregnant and pseudopregnant and progesterone-treated ovariectomized rabbits is not known. We have recently suggested that the luminal uteroglobin content in progesterone-treated, ovariectomized, pseudopregnant and pregnant animals may be influenced by the luminal turnover rate in addition to other biological control mechanisms, e.g., translation and transcription in the uterus (1).

The luminal content of uteroglobin is lower in the "traumatized" uterus of pseudopregnant rabbits compared to the nontraumatized uterus of pseudopregnant rabbits and it was suggested that in the pregnant female rabbit the uterine decidual response to implantation may play a role in causing uteroglobin diminution (2). Since in that report (2) the role of blastocyst-induced decidua in the decline of uteroglobin synthesis and secretion was not studied, the present studies were done to determine the influence of implantation on the content of uteroglobin in the lumen of the uterus.

Materials and Methods. Mature (3.5 kg), New Zealand virgin female rabbits were used. Animals were anesthetized, and a midline abdominal incision was made to expose the ovaries and uterus. Unilateral pregnancy was achieved by ligating one oviduct immediately adjacent to the ovary with silk suture 14 days prior to mating with fertile mates. The purpose of this design was to have unilateral pregnancy. After 14 days of postoperative recovery, females were mated with proven fertile males.

At 5, 7, and 10 days of pregnancy the rabbits were anesthetized and a mixture of L-[4,5- ^3H]lysine (40 μCi), L-[4,5- ^3H]leucine

(40 μ Ci), and L-[3- 3 H]glutamic acid (40 μ Ci) (New England Nuclear Corporation, Boston, Mass.) in 0.9 ml saline was injected into each uterine horn to measure the incorporation of 3 H-labeled amino acids into uteroglobin (1). At the end of 4 hr of *in vivo* incubation of 3 H-labeled amino acids, the uteri were removed, each horn was flushed with 1 ml of saline, and uterine flushings were collected for quantitative PAGE analysis of uteroglobin by the method of Davis (3). After gel electrophoresis, protein staining, and destaining the gel slices were scanned to quantitate uteroglobin (1) and the gels then dissolved by the method of Goodman and Matzua (4) to determine the radiolabeled content of gel slices as reported earlier (1).

Results and Discussion. The results of the present investigation indicate that there was no significant difference in the concentration of uteroglobin and incorporation of 3 H-amino acids into uteroglobin between

the pregnant and pseudopregnant horns on Days 5, 7, or 10 of pregnancy. Histological examination did show decidua formation in the Day 10 pregnant horns but not in the Day 10 pseudopregnant horns. The profile of uteroglobin levels and 3 H-amino acids incorporation into uteroglobin is in agreement with our earlier published findings for Day 5 and Day 10 pregnant rabbits. However, the uteroglobin content of Day 10 pseudopregnant rabbits was greater (1) than in the pseudopregnant horn of Day 10 pregnant animals reported here. Our results thus demonstrate that in the pregnant uterine horn, the implantation-induced decidua does not effect the uteroglobin synthesis and secretion (Table I). In addition to this, the synthesis and content of uteroglobin in pregnant horns were independent of the number of blastocysts present in pregnant horns (Table I). It is, therefore, concluded from the present studies that during the continued presence of circulating pro-

TABLE I. SYNTHESIS AND CONTENT OF UTEROGLOBIN IN THE PREGNANT RABBITS^a

No. of rabbits used	Days of pregnancy	No. of blastocysts in pregnant horn	Uteroglobin (μ g)		3 H]Uteroglobin (total cpm)	
			Pregnant horn	Pseudopregnant horn	Pregnant horn	Pseudopregnant horn
1	5	5	2500	2000	23,400	21,800
2		3	1200	1500	11,000	19,100
3		5	3000	2050	24,000	20,900
4		5	1500	2000	25,900	18,900
1	7	2	1800	2000	1,600	1,700
2		1	1900	1500	1,500	1,350
1	10	1	274	131	0 ^b	750
2		3	0 ^b	0	0	0
3		4	12	25	0	0
4		4	0	0	0	0
5		4	150	250	0	0
6		3	0	0	0	0

^a Mature (3.5 kg) virgin New Zealand rabbits were anesthetized and a midline abdominal incision was made to expose the ovaries and uterus. In each rabbit one of the oviducts was ligated adjacent to the ovary, with the opposite horn remaining intact for pregnancy. The ligated horn was designated as a pseudopregnant horn and served as a control for the pregnant horn in the same animals. In all three experimental groups, i.e., at Days 5, 7, and 10 of pregnancy the 3 H-labeled amino acids were injected into both horns to determine the synthesis of uteroglobin. At the end of the 4-hr *in vivo* incubations the uteri were removed and each horn was flushed with 1 ml saline and uterine flushings were collected for quantitative analysis of uteroglobin and incorporation of 3 H-labeled amino acids into uteroglobin (1).

^b Below the limit of the method of detection.

gesterone in the pregnant rabbits the implantation-induced decidua does not control the synthesis and secretion of uteroglobin in the uterus. The present and previous study suggest that the more rapid decline of luminal uteroglobin in the pregnant rabbit compared to progesterone-treated or pseudopregnant rabbit is not attributable to the blastocyst or decidualization but most likely is due to a humoral factor(s).

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