

THE INFLUENCE OF OXYTOCIN ON THE PRODUCTION OF  
PROSTAGLANDINS IN VITRO AND IN VIVO

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In a recent study (2) we have been able to show, that not only the myometrium but also decidua contains Oxytocin (OT)-receptors and that the concentration of these receptors increases during gestation, reaching a maximum at the onset of labour. Since decidua has a high level of prostaglandin (PG) synthetase activity and a high concentration of arachidonic acid containing phospholipids we have speculated that the decidual OT-receptors might be concerned with prostaglandin production. We have therefore determined the effect of OT on PG production in vitro and in vivo.

Human decidua, myometrium and amnion were obtained by Cesarean section and immediately put on ice cold Krebs-Ringer solution containing a prostaglandin synthetase inhibitor. After 30 minutes the tissue pieces were transferred to fresh regular Krebs-Ringer solution, saturated with 95% O<sub>2</sub> and 5% CO<sub>2</sub> at 37°C. Each tissue was always divided in two halves, one being placed in plain Krebs-Ringer and the other in Krebs-Ringer solution containing 10 mU/ml of synthetic OT. The incubation medium was changed every 30 minutes and the concentration of PGE and PGF was determined by specific RIA after extraction.

The addition of OT to the incubation medium resulted in a significant increase in both PGE and PGF production by decidual tissue in comparison to tissue incubated without OT. In the amnion OT increased PGE synthesis significantly but had no effect on PGF production; in the myometrium OT had no significant effect on either PGE or PGF production (Table 1).

Table 1: Influence of OT on PG production in vitro

	<u>Decidua</u>		<u>Amnion</u>		<u>Myometrium</u>	
	Control	OT	Control	OT	Control	OT
PGE	140±22	263±52	1115±143	1390±210	135±35	122±27
	p < 0,01		p < 0,05		N.S.	
PGF	169±32	241±65	446±111	480±90	144±21	157±28
	p < 0,05		N.S.		N.S.	
	n = 14		n = 14		n = 11	

values in ng/g dry weight/90min., means ± SE

Student's T test was used for statistical analysis.

In 15 healthy women with live fetuses in whom labour was induced by intravenous OT the concentration of PGFM in the maternal peri-

pheral plasma was determined by specific RIA after extraction and silicic acid chromatography before treatment was instituted and at different time intervalls thereafter. All patients were monitored by external tocography and the degree of cervical dilatation was assessed by sterile vaginal exams after each blood sampling. Induction of labour was successful in 9 of the 15 women (group 1), in 6 women induction failed (group 2). The frequency of contractions rose similarly in both groups. During the sampling period cervical dilatation increased from 2,7 cm  $\pm$  0,5 cm to 7,7 cm  $\pm$  0,7 cm in women who went on to deliver while it increased from 1,8 cm  $\pm$  0,7 cm to only 2,3 cm  $\pm$  0,8 cm in women in whom induction failed. Plasma PGFM concentrations are shown in table 2.

Table 2: PGFM Plasma levels before and after induction of labour with intravenous OT

	<u>before</u>	<u>1</u>	<u>2</u>	<u>3</u>
Group I	400 $\pm$ 34	538 $\pm$ 77	757 $\pm$ 105	642 $\pm$ 95
Group II	362 $\pm$ 58	289 $\pm$ 48	233 $\pm$ 59	243 $\pm$ 88

all values in pg/ml, means  $\pm$  SE

During the OT-infusion plasma PGFM rose in all women whom induction was successful whereas in women in whom induction failed plasma PGFM did not change. Since all women had uterine contractions of similar frequency the increase of PGFM-concentration cannot be due merely to the release of PGF in consequence of these contractions, but on the contrary may constitute evidence that OT stimulates PG-synthesis in decidua also in vivo.

From the results of these studies we suggest that OT secreted from maternal and possibly fetal neurohypophysis (1) constitutes the stimulus for the increase biosynthesis of PG at the onset of labour.

1) Dawood, M.Y., Wang, C.F., Gupta, R., Fuchs, F.: Fetal contribution to Oxytocin in human labour, *Obstet.Gynecol.* 52 (1978) 205

2) Fuchs, A.R., Fuchs, F., Husslein, P., Soloff, M.S.: Oxytocin receptors in human parturition, *The 28th Annual Meeting of the Society for Gynecologic Investigation, St. Louis, Abstract No.231, p. 136, (1981).*

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