Changes in the extensibility of the cervix of the rat in late pregnancy produced by prostaglandin $F_{2\alpha}$, ovariectomy and steroid replacement

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The extensibility of the rat cervix was measured by a modification (Figure 1) of the method of Harkness & Harkness (1959). The removable stainless steel pins (P_1 and P_2; diameter 1.5 mm) were placed through the lumina of the cervix (c). The cervix and stirrup (s) were mounted in a tissue bath containing Krebs-Henseleit solution at 37°C bubbled with 95% oxygen and 5% carbon dioxide. Non-extensible linen thread (t) connected the stirrup to the empty balance pan (b) which exerted a small net load (5 g) to the system. The thread was held so that the stirrup touched the pin P_1. The arm (a), on a freely moving ball race, was held horizontal. The scale (sc) was moved until the arm was at the zero position and fixed using the knurled knob (kn). The dimensions of the recording scale, marked in mm, compared to the movement of the stirrup are proportional to the relative radii of the arm and the grooved perspex wheel (w). The balance pan was released and the net load (l) of 60 g added. Readings were taken every min for 5 min and then every 5 minutes. The scale can be rezeroed as required. The inner circumference of the cervix increased linearly with time after an initial curve. Cervical extensibility was measured as the slope of this straight line (mm/min) multiplied by 10^3.

Cervical extensibility increased considerably from day 17 (62.6 ± 21.9 mm/min, $n=4$) to day 22

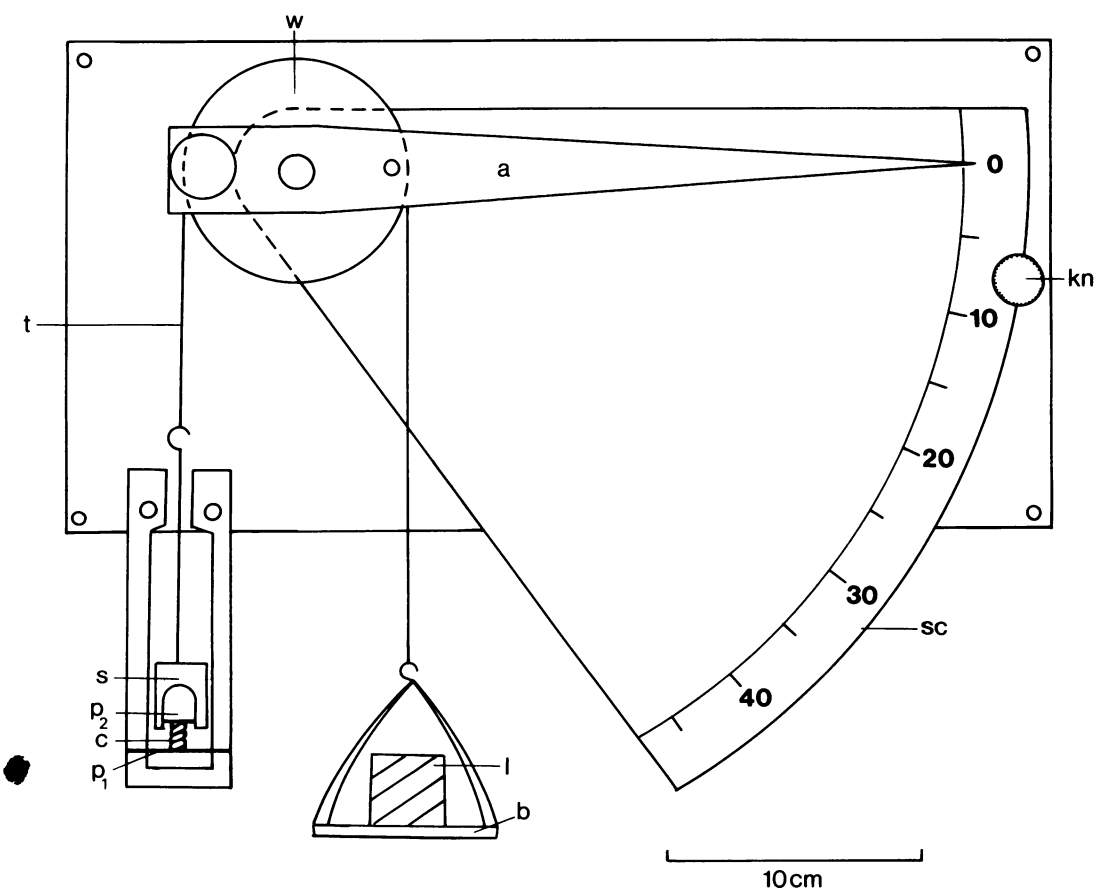

Figure 1 Apparatus to measure the extensibility of the cervix.

(321 ± 104 mm/min, $n=7$) and had fallen markedly by day one post-partum (8.6 ± 1.8 mm/min, $n=4$). Prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$; 2×1 mg/kg, s.c.) given on day 18 produced a doubling of cervical extensibility compared to controls on day 19. Following bilateral ovariectomy on day 16, cervical extensibility had not increased on days 18 and 20. Most fetuses had resorbed by day 20. 17β-oestradiol benzoate (0.5 µg/kg) plus progesterone (10 mg/kg) s.c. twice daily to ovariectomized rats allowed fetal survival and growth but cervical extensibility was not altered. An ovarian hormone may be necessary for the terminal increase in cervical extensibility in the pregnant rat. Using this method, the mechanism of the cervical action of $PGF_{2\alpha}$ can be investigated both *in vivo* and *in vitro*.

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The *in vitro* and *in vivo* effects of oxotremorine on the phosphatidylcholine content of washes of neonatal rabbit lungs

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By using a modification of methods of perfusing isolated and ventilated lungs (Delaunois, 1964; Leary & Ledingham, 1969), the effects of drugs on the secretion of phosphatidylcholine, the major chemical component of lung surfactant, from the parenchyma into the alveoli can be studied.

The lungs of neonatal rabbits (1–3 days old) were tracheotomized under sodium pentobarbitone (45 mg/kg) anaesthesia and removed into a well-sealed, water-heated (38°C) perspex box. They were perfused with Krebs-Henseleit solution (37°C) bubbled with 95% oxygen and 5% carbon dioxide at 2.9 ml/min via the pulmonary artery. Successful perfusion was assessed by removal of blood from the lung. The perfusate collected in the lung chamber and maintained the humidity. It was removed at 5 min intervals. The box was evacuated 140 times a min to a negative pressure of about 37 mmHg (1 mmHg $\approx$ 133 Pa). At 5 min intervals ventilation was stopped, 1.5 ml of saline injected slowly into the lungs via the tracheal cannula and after 1 min as much saline as possible withdrawn.

The phosphatidylcholine content of the lung washes was determined by a slight modification of the methods of Chen, Toribara & Warner (1956) and Hodge (1973).

Oxotremorine (0.2 mg/kg) was injected i.p. into neonatal rabbits. It produced salivation, tremor and hypothermia. 30 min later the lungs were removed and the total phosphatidylcholine content of 6 washes (50.4 ± 6.9 mg/g dry lung weight, mean $\pm$ s.e. mean; $n=7$) was significantly greater ($2\ P<0.01$) than those of saline controls (25.7 ± 6.0 mg/g; $n=5$) or non-injected controls (20.6 ± 4.6 mg/g; $n=8$). The phosphatidylcholine content of the residual lung tissue was similar in all groups.

Infusion of oxotremorine (0.01, 0.1 and 1 µg/ml) *in vitro* for 1 min immediately before the 6^{th}, 9^{th} and 11^{th} washes respectively did not increase the lung wash content of phosphatidylcholine.

The *in vivo* experiments suggest that oxotremorine caused secretion of phosphatidylcholine into alveoli rather than affecting production. A direct muscarinic action on cells within the parenchyma of the lung is unlikely.

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