FOETAL AND MATERNAL PLASMA TRIGLYCERIDE AND CHOLESTEROL LEVELS IN THE RABBIT AFTER FOETAL HYPOPHYSECTOMY BY DECAPITATION IN UTERO

J. G. BEARN, A. ANTONIS* AND T. R. E. PILKINGTON
Department of Anatomy, The Middlesex Hospital Medical School, London, W. 1, and Department of Medicine, St George's Hospital Medical School, London, S.W. 1

(Received 12 December 1966)

Lipid and cholesterol synthesis is very active in the foetal rabbit liver and large amounts of lipid appear in the foetal liver at term and disappear in the first few days of life (Dawkins, 1966). The possibility that lipid metabolism at this stage may be regulated by the foetal pituitary is suggested by the observation that human anencephalic foetuses, which have a hypoplastic pituitary, have an abnormally thick pannus of subcutaneous fat (Angevine, 1938). This view is supported by the reports that foetal hypophysectomy by decapitation in the rabbit produces an increase in total body fat (Jost & Picon, 1958), in liver fat (Bearn, 1960) and in blood cholesterol (Bearn & Pilkington, 1963). This work has now been extended to include studies on blood triglyceride concentrations.

The foetuses were decapitated on the 22nd day of gestation by the intra-amniotic method (Bearn & Pilkington, 1963): The uterine wall is incised and the amniotic membrane is allowed to bulge out. The foetal head is manipulated into the balloon of amnion and severed with a ligature. Thus only the film of amniotic fluid round the head of the foetus is lost and the now headless foetus remains in the intact amniotic sac. The decapitated foetuses were recovered after a further week of growth and development in utero by Caesarian section under chloroform anaesthesia at 29 days. The decapitated foetuses were blotted with Kleenex tissue and weighed, and blood was taken from the axillary artery. Three intact litter-mates were taken at random and weighed, and a blood sample taken in the same way. They were then reweighed after decapitation to obtain the headless body weight for comparison with the experimental foetuses. A sample of maternal blood was taken by cardiac puncture at the same time. Triglyceride and total cholesterol concentrations in plasma were determined by the semi-automated procedure of Kessler & Lederer (1966) for triglycerides, and for cholesterol by the procedure of Block, Jarrett & Levine (1966) as modified by Antonis (1967).

Table 1 shows the triglyceride and cholesterol levels in the plasma of foetuses after hypophysectomy by decapitation: a significant rise in serum triglyceride and cholesterol in the hypophysectomized foetuses is evident. The maternal levels were lower than those in the litter-mate controls.

* External Staff, Medical Research Council.
These results suggest that the pituitary of the foetal rabbit plays a role in the regulation of blood triglyceride and cholesterol levels. Whether this effect is mediated by the foetal adrenals or the foetal thyroid is to be investigated.

Table 1. *Plasma triglyceride and cholesterol concentrations in the foetal rabbit after hypophysectomy by decapitation in utero. Means ± s.e.*

<table>
<thead>
<tr>
<th>Animals*</th>
<th>Age at operation (days of gestation)</th>
<th>Age when plasma analysed</th>
<th>Weight of headless body (g.)</th>
<th>Triglycerides (mg./100 ml. plasma)</th>
<th>Cholesterol (mg./100 ml. plasma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decapitated foetuses (25)</td>
<td>22</td>
<td>29</td>
<td>26.1 ± 1.0</td>
<td>157.8 ± 15.1</td>
<td>113.8 ± 8.8^4</td>
</tr>
<tr>
<td>Litter-mate control foetuses (73)</td>
<td>22</td>
<td>29</td>
<td>25.7 ± 0.5</td>
<td>81.7 ± 9.2^3</td>
<td>88.5 ± 4.1^3</td>
</tr>
<tr>
<td>Mothers† (16)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>81.7 ± 9.2^3</td>
<td>35.7 ± 5.6^3</td>
</tr>
</tbody>
</table>

* Number of animals in parentheses.
† Blood samples from the mother rabbits were obtained on the 29th day of gestation.

Difference between 1 and 2: P < 0·005. Difference between 4 and 5: P < 0·005. Difference between 2 and 3: P < 0·005. Difference between 5 and 6: P < 0·001.

These results further indicate that intra-amniotic decapitation of the 22-day foetuses did not lead to any retardation in body growth, as judged by weight. The results also confirm the observation that the plasma triglyceride and cholesterol of full-term rabbit foetuses is higher than that of the mother (Dawkins, 1966).

This work was supported by grants from the Medical Research Council and the Central Research Fund, London University, and the British Heart Foundation.

REFERENCES