in these studies was found to average 23.06% a value significantly greater ($P < 0.01$) than that found for proinsulin (8.24%). The fractional excretion of the Al–B29 cross-linked insulin was 15.38%.

In summary, our data suggested that the isolated perfused rat kidney handled insulin, proinsulin and [N\(^\beta\)-Gly\(^\alpha\), N\(^\beta\)-Lys\(^\beta\)-dodecanediol insulin] in a similar manner, and even at the highest concentration of peptides employed, there was no evidence of saturation. The slower significantly greater Al-B29 cross-linked insulin was 15.38%.

proinsulin (8.24%). The fractional excretion of the fused rat kidney handled insulin, proinsulin and 

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Randle et al. (1963, 1966) first suggested that the oxidation of fat fuels in preference to glucose conserved endogenous carbohydrate in starvation, and that excess-fat oxidation, through its restraint of glucose utilization and stimulation of gluconeogenesis, was partly responsible for the hyperglycaemia associated with diabetes mellitus. This concept stimulated the development of compounds acting to restrict fat oxidation, with a view to their therapeutic use to lower blood [glucose] in diabetes. Among these, 2-tetradecylglycidate (TDG) was shown to be a specific and effective hypoglycaemic drug in fasted or diabetic animals (Tutwiler et al., 1978), and was killed 3 h later. Arterial blood samples were assayed for NEFA (plasma) and metabolites (KOH-neutralized HCIO,-supernatants) by spectrophotometric methods (Williamson et al., 1962, Stein, 1963).

Effects of TDG to increase plasma [NEFA] in starved rats have been attributed to inhibited NEFA utilization in the face of continued lipolysis (Tutwiler et al., 1978). In the present experiments (Table 1), TDG increased NEFA to a similar extent in all the starved groups. Assuming that long-chain fatty acid oxidation is completely inhibited by TDG, the increase in NEFA estimates the extent to which NEFA are utilized in the control (no TDG) situation. Since NEFA accumulation in TDG-treated rats was unaffected by liver resection, it is implied that either NEFA utilization by the remnant liver or extrahepatic tissues is increased, or there is stringent feedback control of the rate of lipolysis. TDG increased [NEFA] in fed PH rats at day 1 after surgery, suggesting significant utilization of long-chain fatty acids as substrates; NEFA accumulation over the 3 h period in the fed PH rats was approx. 40% of that observed if the rats were starved. TDG did not increase [NEFA] in any of the other fed groups.

Although 24 h starvation increased [NEFA] in both PH and SO groups, blood [ketone body] were not increased in starved PH rats at day 1 (Table 1). The rate of ketone body production by the liver remnant is < $\mu$g of ketone body utilization by extrahepatic tissues, possibly because of the decreased liver mass. The relatively increased plasma [NEFA] in fed PH rats at day 1 were also not associated with increased blood [ketone body], TDG administration for 3 h resulted in low blood [ketone body], consistent with the rapid turnover of these substrates. Blood [glucose] were consistently lower in the PH rats (fed or starved, at 1 or 4 days after surgery) than in the SO controls (Table 1). As expected, TDG decreased blood [glucose] in the starved groups. TDG also decreased [glucose] in fed PH rats at day 1, the first postoperative day, indicating that fat oxidation is required for the maintenance of blood [glucose] at this time. This may be related to a decrease in hepatic glycogen content (see


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The effects of two inhalational anaesthetic agents on carbohydrate metabolism in the isolated, perfused, rabbit lung

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It is well recognized that inhalational anaesthetic agents exert metabolic effects on many important organs such as the liver and brain. For example, halothane acts on mitochondrial (Cohen, 1973), microsomal (Hallen & Johansson, 1975) and glycogenolytic pathways (Biebuyck & Lund, 1974) within the liver. Although volatile anaesthetics are introduced through and so reach their highest concentrations in the respiratory system, there is no information available about the effects of these agents on lung metabolism. In the present study we have examined the effects of two commonly used anaesthetics, halothane and enflurane, on carbohydrate metabolism in the isolated perfused rabbit lung.

The preparation of the perfused, ventilated rabbit lungs was undertaken as described previously (Paterson et al., 1985). After an equilibration period of 1 h, perfusate samples were collected simultaneously every 15 min from the pulmonary artery and left atrium for the determination of glucose and lactate concentrations (Hall et al., 1980). Eight rabbit lungs were studied for 3 h while ventilated with a 93% O2/7% CO2 gas mixture and a further eight lungs were investigated with the addition of 2% enflurane from a calibrated vapourizer to the gas mixture. The exchange of metabolites across the lung was calculated from the product of the arteriovenous concentration difference and the flow rate and expressed as mmol/min. All results are given as mean values ± S.E.M.

There were only small increases in pulmonary artery pressure, airway pressure and lung weight in both the control and enflurane groups throughout the 3 h perfusion indicating that no significant oedema had occurred. The glucose concentration in the pulmonary artery samples ranged from 0.70 to 0.90 mmol/l in the control group but were slightly higher in the enflurane group, from 0.87 to 0.96 mmol/l.

Table 1. Effects of partial hepatectomy and 2-tetradecylglycidate on blood metabolite concentration in fed or 24 h-starved rats

<table>
<thead>
<tr>
<th>Metabolite</th>
<th>Time after surgery (days)</th>
<th>TDG</th>
<th>Partial hepatectomy Fed</th>
<th>24-starved</th>
<th>Sham operated Fed</th>
<th>24-h starved</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEFA</td>
<td>1</td>
<td>-</td>
<td>0.51 ± 0.03 (10)†††</td>
<td>0.96 ± 0.07 (14)††</td>
<td>0.21 ± 0.02 (12)†</td>
<td>0.56 ± 0.04 (23)††</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>+</td>
<td>0.78 ± 0.11 (4)†††</td>
<td>1.62 ± 0.05 (6)†††</td>
<td>0.13 ± 0.02 (5)†</td>
<td>1.38 ± 0.06 (6)†††</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-</td>
<td>0.17 ± 0.02 (6)††</td>
<td>0.42 ± 0.04 (8)†††</td>
<td>0.16 ± 0.02 (6)†</td>
<td>0.38 ± 0.03 (10)††</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>+</td>
<td>0.20 ± 0.05 (6)††</td>
<td>1.37 ± 0.09 (5)†††</td>
<td>0.12 ± 0.02 (4)†</td>
<td>0.56 ± 0.08 (5)††</td>
</tr>
<tr>
<td>3-Hydroxybutyrate</td>
<td>1</td>
<td>-</td>
<td>0.16 ± 0.04 (6)†</td>
<td>0.28 ± 0.04 (7)†</td>
<td>0.14 ± 0.01 (6)†</td>
<td>1.30 ± 0.21 (4)††</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>+</td>
<td>0.13 ± 0.01 (4)†</td>
<td>0.08 ± 0.01 (6)†††</td>
<td>0.13 ± 0.01 (5)†</td>
<td>0.09 ± 0.02 (6)††</td>
</tr>
<tr>
<td>Acetoacetate</td>
<td>4</td>
<td>-</td>
<td>0.15 ± 0.02 (7)†††</td>
<td>0.91 ± 0.07 (6)†††</td>
<td>0.14 ± 0.03 (6)†</td>
<td>0.86 ± 0.08 (5)††</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>+</td>
<td>0.11 ± 0.01 (5)†††</td>
<td>0.13 ± 0.03 (5)†††</td>
<td>0.16 ± 0.04 (4)†</td>
<td>0.19 ± 0.02 (5)††</td>
</tr>
<tr>
<td>Glucose</td>
<td>1</td>
<td>-</td>
<td>6.04 ± 0.22 (6)†††</td>
<td>4.86 ± 0.27 (7)††</td>
<td>7.78 ± 0.12 (6)†</td>
<td>5.99 ± 0.43 (4)†</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>+</td>
<td>4.85 ± 0.16 (4)†††</td>
<td>3.97 ± 0.27 (6)††</td>
<td>7.58 ± 0.27 (5)†</td>
<td>4.15 ± 0.17 (6)††</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>-</td>
<td>6.49 ± 0.12 (7)†††</td>
<td>5.18 ± 0.28 (6)†††</td>
<td>7.79 ± 0.15 (6)†</td>
<td>6.48 ± 0.26 (5)†</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>+</td>
<td>6.56 ± 0.14 (5)††</td>
<td>3.57 ± 0.20 (5)†††</td>
<td>7.37 ± 0.23 (4)†</td>
<td>3.84 ± 0.24 (5)††</td>
</tr>
</tbody>
</table>

For details see the text. Liver weights at time of sampling (mean ± S.E.M.) were as follows: (i) PH rats, day 1 fed, 1.51 ± 0.14; day 1 starved, 1.28 ± 0.05; day 4 fed, 2.61 ± 0.18; day 4 starved, 2.46 ± 0.07; (ii) SO rats — day 1 fed, 3.43 ± 0.09; day 1 starved, 2.92 ± 0.11; day 4 fed, 3.32 ± 0.22; day 4 starved, 3.24 ± 0.15 g/100 g rat. Significant effects of PH are shown by: § P < 0.05; §§ P < 0.01; §§§ P < 0.001. Significant effects of TDG are shown by: * P < 0.05; ** P < 0.01; *** P < 0.001. Significant effects of starvation are shown by: † P < 0.05; †† P < 0.01; ††† P < 0.001.

Gove & Hems, 1978) In the present experiments glucose concentration (mg/g wet wt.) and pool size (mg/100 g rat) were 4 ± 2 and 14 ± 7 respectively in fed PH rats (n = 4) and 33 ± 11 and 117 ± 18 respectively in fed SO rats (n = 4). These findings indicate the potential importance of the operation of the glucose-fatty acid cycle, when liver mass is decreased and/or liver glycogen depleted.

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