

HEPATIC TRIACYLGLYCEROL SECRETION IN SHEEP : EFFECTS OF FASTING
AND ALLOXAN DIABETES

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Ruminant animals are highly susceptible to the development of a fatty liver under conditions of metabolic stress, including pregnancy, fasting and diabetes. The predominant lipid accumulated under these conditions is triacylglycerol. This suggests that there may be a defect in the hepatic synthesis and/or secretion of very low density lipoproteins (VLDL), which mediate the bulk of endogenous plasma triacylglycerol transport in most mammalian species. However, plasma triacylglycerols are also raised under conditions of hepatic accumulation and so we have examined their rates of secretion under conditions of metabolic stress. This was done in 3-year-old Merino wethers using the non-ionic detergent Triton WR-1339 to inhibit clearance by lipoprotein lipase (Otway and Robinson 1967).

In normal, fed sheep, triacylglycerol secretion averaged 24 ± 5 (8) $\mu\text{mol}/\text{min}/\text{kg}$. Secretion was increased to 40 ± 11 (7) and 58 ± 14 (6) $\mu\text{mol}/\text{min}/\text{kg}$ by fasting and diabetes, respectively. These changes generally paralleled those in plasma free fatty acid concentration which averaged 0.28 ± 0.12 (5), 2.58 ± 0.19 (5) and 2.13 ± 0.17 (5) mol/mL for fed, fasting and diabetic animals, respectively. These changes were extremely surprising in view of the report by Schultz and Esdale (1971) that, in goats (as in non-ruminant species), metabolic stress led to inhibition of triacylglycerol secretion. However, we believe that the increase in secretion that we have observed may not reflect enhanced VLDL synthesis but is rather the result of a basement membrane which surrounds the hepatic sinusoid. This would inhibit the secretion of these very large (300-1000 \AA) particles (Henderson et al. 1982), but accumulation of triacylglycerols would result in greater secretion through a pressure effect. Such an idea would account for the very long plasma half-life of Triton in these species (28d), compared with non-ruminants. Triton is removed by the liver as a lipoprotein complex and so clearance would be limited by the membrane. Furthermore, phospholipids are predominantly transported as the smaller high density lipoproteins (75-120 \AA) and so their secretion might not be affected to the same degree. This is supported by the higher plasma phospholipids we have found in stress states. Preliminary data indicate that in fasting there were increases in particles resembling human VLDL and high density lipoprotein.

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