Some investigations on lipolysis in the hereditary obese mouse. By I. S. ROSS, *Department of Chemical Pathology, University of Aberdeen*

Hereditary obese hyperglycaemic mice from a colony bred at the Medical School, Aberdeen, were separated, on weaning, into three groups. Each group consisted of three obese mice and their corresponding lean litter-mates (five lean per group) The obesity gene is recessive and litters contain both obese and apparently normal individuals.

Group 1 were fed for 3 months on the stock animal house mouse diet (FFG) giving a 2% fat intake on a dry-weight basis, with 46% fatty acids as linoleic acid, thus giving an approximate linoleate intake of 1% of total diet. Group 2 were fed for the same period on Old Guildford Mouse Chow, giving a 12% fat intake with 61% of this as linoleic acid. Group 3 were fed on Old Guildford Chow for 3 months, then changed to FFG for 1 month. All groups had similar weight gains. Total number of animals used was 24.

At the end of the feeding periods all animals were killed and the epididymal fat pads were extracted; the triglycerides methylated and the resulting fatty acid methyl esters were separated and determined on a Pye Argon Gas Chromatograph. Of the fatty acid percentages so obtained most interest was in the linoleic acid (18:2) as this cannot be synthesized by the animal and therefore must be wholly of dietary origin.

		Obese	Litter-mate
In group 1 (Aberdeen FFG)	18:2% was	9%	16%
In group 2 (Old Guildford)	18:2% was	24%	36%
In group 3 (changed diet)	18:2% was	22·2%	26%

Therefore in group 3 the linoleic acid content of the epididymal pads had fallen approximately 10% in litter-mates, but only 2·2% in obese mice, as a consequence of reduction in dietary intake of this fatty acid.

It is known that in seed oils (fats) and animal fats the more unsaturated fatty acids, e.g. 18:2, are preferentially attached to the β-position in the triglyceride molecule. This has been verified for both diet and animal fats in this series by pancreatic lipase digestion, which preferentially splits the α- and α_1-positions on the triglyceride molecule.

It is also known that there are at least two lipases active in triglyceride breakdown in body fat depots: (1) hormone sensitive lipase preferentially attacks the α-positions in the molecule; and (2) a monoglyceride lipase which cleaves the β-monoglyceride so produced. This monoglyceride lipase has an activity several times greater than the hormone-sensitive lipase, so normally it is never rate limiting.

It is suggested that these animals (obese mice) have deficient activity of monoglyceride lipase, thus causing a recirculation of β-monoglyceride to facilitate the resynthesis of triglyceride without the use of α-glycerophosphate. The present evidence supports this hypothesis, in that linoleic acid being a form of natural marker demonstrates this strain of animal's inability to mobilize the β-linked fatty acid molecules in their depot triglyceride during normal fatty acid turnover.