

HOMEOSTASIS OF CARDIAC MEMBRANE LIPID COMPOSITION IN RATS
AND MARMOSETS DURING DIETARY LIPID SUPPLEMENTATION

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The lipid composition of biomembranes greatly influences membrane physical properties and the activities of many membrane-associated biochemical processes. Furthermore the nature of the dietary lipid intake can influence membrane lipid composition and potentially alter membrane-associated processes. The effect of dietary lipids on cardiac membrane fatty acid composition was determined in rats and marmosets by feeding diets supplemented with about 12% sunflower seed oil (SSO) or sheep kidney (perirenal) fat (SKF).

For both the rat and marmoset diets, the values of the indicated parameters, i.e. the Unsat. to Sat. fatty acid ratio, the w6 to w3 Unsat. fatty acid ratio, and the proportion of linoleic acid (18:2) were all high when compared as a ratio between their value in the SSO diet to their value in the SKF diet. However, when the same comparison was made for the cardiac membrane lipids from these animals, the values were significantly decreased.

The results shown in the Table below indicate that the composition of cardiac membrane lipids is markedly compensated against differences which exist in the nature of the dietary lipid intake. This suggests that an efficient homeostatic process is operative to buffer membranes from potential perturbations such as those arising from nutritional influences. This compensatory behaviour by cardiac membranes may reduce the tendency for dietary fatty acids to alter membrane physical properties.

Comparison of the values of the indicated parameters between those obtained for the dietary lipid supplement and those obtained for the cardiac membrane phospholipid fatty acid composition

PARAMETER	RATIO	RAT			MARMOSET	
		Diet	Heart Mito.	Heart SL	Diet	Heart Mito.
$\frac{\text{Unsat.}}{\text{Sat.}}$	$\frac{\text{SSO}}{\text{SKF}}$	7.1	0.9	1.0	3.7	0.8
$\frac{w6}{w3}$	$\frac{\text{SSO}}{\text{SKF}}$	10.2	1.5	1.9	13.6	2.6
18.2%	$\frac{\text{SSO}}{\text{SKF}}$	8.0	1.6	1.3	4.8	1.4

The values are the ratios obtained when comparing the values for the indicated parameters between those obtained in the SSO diet or animal groups, and the SKF diet or animal groups. The particular parameters indicated were calculated from the proportion of fatty acids present in the total dietary fatty acids or in the membrane phospholipid fatty acids as determined by GLC. Heart mitochondria were obtained from rats fed lipid supplements for 16 weeks and from marmosets fed for 22 weeks. Heart sarcolemmal (SL) membranes were from rats fed lipid supplements for 38 weeks.

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