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Modulation of the response of rats to endotoxin by butter, olive oil and corn oil. By H. T. BESLER and R. F. GRIMBLE, *Department of Human Nutrition, University of Southampton, Southampton SO9 3TU*

Fats are able to modulate the responses to inflammatory agents. We have previously shown that the suppressive effects of butter on the response to TNFα in rats may be due to its oleic acid content (Mulrooney & Grimble, 1992). Olive oil, like butter, is rich in oleic acid (690 and 220 g/kg respectively). We therefore compared the effect of feeding weanling rats for 4 weeks on synthetic diets containing 50, 100 or 200 g fat/kg or chow (27 g fat/kg). Each synthetic diet contained 10 g corn oil/kg to prevent essential fatty acid deficiency, and the remaining fat was either butter, corn oil or olive oil. All diets contained 180 g casein/kg plus 3 g DL-methionine/kg. Diets contained adequate vitamin and mineral content and included 50 mg vitamin E/kg.

Animals received a subcutaneous injection of 0·8 mg *Escherichia coli* endotoxin/kg (Difco strain 055:B9; END) or 0·2 ml (9 g sodium chloride/l) sterile saline/kg (SAL). Rectal temperatures were monitored thereafter. Animals were killed 24 h after endotoxin injection. Liver was analysed for protein and reduced glutathione and plasma for caeruloplasmin (Schosinsky *et al.* 1974; Mulrooney & Grimble, 1991). Saline-injected rats were killed after pair-feeding for 24 h.

Olive oil and butter, at all levels of intake, had a similar suppressive effect on the loss of appetite and fall in rectal temperature in response to endotoxin. Olive oil, however, was more effective at attenuating the response of caeruloplasmin and liver protein.

Thus, oleic acid content may be an important anti-inflammatory characteristic of fats.

Dietary oil . . .	Corn oil			Butter			Olive oil			Chow	Pooled
Fat (g/kg) . . .	50	100	200	50	100	200	50	100	200	27	SEM
Change in rectal temperature 2 h post-injection (°)											
Injection: END	−1·88*	−1·92*	−1·93	−1·18	−1·30	−1·73	−0·43	−0·50	−0·75	−1·17	0·43
SAL	+0·10	+0·19	+0·05	+0·22	+0·03	+0·02	+0·60	+0·42	+0·05	+0·05	
Liver reduced glutathione (mg/g)											
Injection: END	21·1***	19·4*	18·8	24·2**	19·0**	16·6	27·6	21·9	17·1	26·1	0·7
SAL	8·7***	8·1***	6·7***	9·8***	12·0***	10·4	19·4	18·5	11·3	14·6	
Food intake after END injection (g/d)											
	1·8***	1·4***	1·1***	3·7	2·8	2·3	3·9	2·7	2·3	2·0***	0·17
Liver protein concentration (mg/g)											
Injection: END	260	271***	304***	206***	200**	244	259	236	249	209	2·9
SAL	242	237	252	197***	204**	199**	254	244	257	177	—
Plasma caeruloplasmin activity (U/L)											
Injection: END	77·4***	88·6***	103·4***	38·4	42·8	89·5***	33·3	31·8	32·4	55·0	1·7
SAL	23·5	25·6	26·4	37·8	43·2	33·5	32·8	31·8	32·1	34·3	—

Values significantly different from corresponding olive oil END or SAL group fed on similar fat concentrations (ANOVA): *$P<0·5$; **$P<0·01$; ***$P<0·001$.

Mulrooney, H. M. & Grimble, R. F. (1992). *Proceedings of the Nutrition Society* **51,** 89A.
Schosinsky, K. H., Lehmann, H. P. & Beeler, M. E. (1974). *Clinical Chemistry* **29,** 1556–1563.