

FATTY ACID COMPOSITION OF TISSUES FROM ω 3-DEFICIENT AND NORMAL KITTENS

T.L. FRANKEL* and J.P.W. RIVERS**

The domestic cat lacks a Δ 6-desaturase and requires a dietary source of derived-essential fatty acids (d-EFA). Cats fed diets containing high levels of linoleic acid but lacking d-EFA are infertile (Rivers and Frankel 1980).

Three d-EFA female cats were fed a diet containing evening primrose oil (EPO) as the only source of d-EFA; fatty acid levels (as percent of dietary energy) were 18:2 ω 6, 25-30%; 18:3 ω 6, 1.5%; 18:3 ω 3, 0.8%. After 10 months, the three cats were mated with a normal tom cat and three cats on a stock diet of of commercial tinned meat and fish (d- ω 6 fatty acids, 3%; d- ω 3 fatty acids, 1.5%) were also mated.

Two of the EPO-diet cats proceeded to full term pregnancies, one produced four still-born kittens the other, one still-born and one live kitten. The gross pathology of the kittens has been described (Rivers and Frankel 1980). The stock cats produced litters of 2-3 normal, live kittens that were killed with an overdose of barbiturate. Specific tissues (brain, liver, kidney, lung and carcass) were analysed (Rivers & Frankel 1980) for fatty acid composition.

Levels of 18:2 ω 6 in brain lipids were low despite the high dietary level. The lack of d- ω 3 fatty acids in tissues from kittens whose mothers were fed the EPO diet was accompanied by an increase in the levels of 20:5 ω 6, 22:4 ω 6 and 22:5 ω 6 and is consistent with findings in α -linolenic acid deficient rats (Tinoco et al. 1978).

	Tissue fatty acids (g/100 g fatty acids eluting after 16:0)							
	Brain CPG*		Brain EPG*		Liver		Kidney	
	Stock	EPO	Stock	EPO	Stock	EPO	Stock	EPO
<u>ω6 Fatty Acids</u>								
18:2 ω 6	0.3	1.9	0.2	1.0	5.8	21.9	4.4	17.5
"X"***	0	0.5	0	0.7	0	0.9	0	0.8
20:4 ω 6	4.3	5.7	17.3	22.1	11.3	7.6	8.8	8.5
22:4 ω 6	1.0	2.5	5.7	13.3	0.5	2.0	0.7	2.9
22:5 ω 6	0.3	2.5	1.0	10.2	0.3	0.8	0.9	1.8
Total ω 6	7.0	13.9	27.5	49.3	19.2	35.6	16.2	34.8
<u>ω3 Fatty Acids</u>								
20:5 ω 3	0.3	0	0.7	0	3.1	0	2.4	0
22:5 ω 3	0.6	0	2.3	0	2.8	0	1.8	0
22:6 ω 3	3.9	0	17.4	0	7.8	0	3.0	0
Total ω 3	4.5	0	20.4	0.6	13.9	0.1	7.3	0
Unsat. Index ⁺⁺	77	71	219	197	158	116	119	115

* choline- and ethanolamine phosphoglycerides

** eicosa- Δ 5, 11, 14-trienoic acid

++ sum of (the molar percentage of individual fatty acids multiplied by the number of double-bonds)

The results suggest that the ω 3 fatty acids are not essential for reproduction in the female cat, but their possible role in foetal development is still unclear.

RIVERS, J.P.W. and FRANKEL, T.L. (1980). In 'Nutrition of the Dog and Cat', p. 67, ed. R.S. Anderson. (Pergamon Press: Oxford).

TINOCO, J., BABCOCK, R., HINCENBERGS, I., MEDWADOWSKI, B. and MILJANICH, P. (1978). *Lipids* 13:6.

* School of Agriculture, La Trobe University, Bundoora, Victoria, 3083

** Department of Human Nutrition, LSHTM, Keppel St., London, WC1E 7HT, U.K.