CHANGES IN THE HEPATIC LIPID PROFILE AFTER FEEDING RATS WITH FISH OIL-RICH DIETS

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Research has shown an association between the consumption of fish oil and decreased risk of cardiovascular disease. The long chain polyunsaturated fatty acids of the n-3 series present in fish oil are believed to play an important role. The liver is the main site of de novo fatty acid synthesis and will influence the fatty acid composition of other tissues. The aim of this study was to investigate the change in hepatic fatty acid profiles when rats were fed fish oil supplements.

Rats were fed a 10% (wt/wt) fish oil rich diet. The effect was monitored at different times (0,2,4 and 6 wk). The animals were killed by C02 asphyxiation after ovemight fasting. The livers were excised and washed in chilled saline (15%) and lipid extracted by Folch's method (1957). The total lipid extract was then separated into neutral and phospholipid fractions by column chromatography and BHT added to prevent oxidation. The fatty acid methyl esters were prepared using the method of Lepage and Roy (1986) and analysed in duplicate by flame ionization gas chromatography with hydrogen as the carrier gas. The mean percentage fatty acid composition was calculated by reference to standard mixtures of known composition (see table).

Fatty acid	wk 0	wk 2	wk 4	wk 6
		Liver triglyceride		
18:2(n-6) LA	18.14±2.84	↓ 16.51±0.87[a]	19.78±2.68	18.00±1.45
20:4(n-6) AA	22.43±3.51	↓ 8.72±1.61[d]	8.65±2.78[d]	9.39±2.49[d]
20:5(n-3) EPA	0.68±0.24	↑ 7.63±1.09[d]	5.83±1.19[d]	5.35±1.63[d]
22:5(n-3) DPA	1.19±0.26	↑ 3.68±0.57[d]	2.73±0.59[b]	2.32±0.54[c]
22:6(n-3) DHA	6.93±0.39	↑ 14.19±1.25[d]	12.96±2.01[d]	12.75±1.90[d]
		Liver phospholipid		
18:2(n-6) LA	13.93±2.10	13.18±0.97	13.76±5.39	13.69±1.39
20:4(n-6) AA arachidonic acid	27.04±1.69	13.81±1.05[d]	14.94±4.57[d]	17.09±1.94[d]
20:5(n-3) EPA	0.39±0.12	6.81±0.94[d]	3.82±1.49[e,f]	4.24±1.14
22:5(n-3) DPA	0.99±0.16	1.77±0.24[a]	1.52±0.74	1.16±0.20
22:6(n-3) DHA	7.12±0.18	12.08±1.21[c]	13.60±2.52[d]	10.88±0.87[b]

a,b,c,d-the percentage is significantly different from the baseline level with P<0.05, P<0.01, P<0.001, P<0.0001respectively.
e,f-the percentage is significantly different from the values in week 2 with P<0.05, P<0.01 respectively.
g-the percentage is significantly different from the values in week 4 with P<0.01

Arachidonic acid (AA) showed a sharp fall after two weeks. There was a corresponding increase in eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA) and docosahexaenoic acid (DHA). Interestingly, linoleic acid (LA), the precursor of AA, remained constant during the dietary regime indicating a direct substitution of arachidonic acid by EPA, DPA and DHA. This occurred in both the triglyceride and the phospholipid fractions.

In conclusion, the present work provides evidence that feeding dietary fish oil containing long chain n-3 fatty acids changes the fatty acid profile of liver lipids with maximum changes occurring within the first two weeks.

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