

A COMPARATIVE STUDY OF THE FATTY ACID COMPOSITION OF FORTY MARGARINES AVAILABLE IN SOUTH AFRICA

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1. Executive Summary:

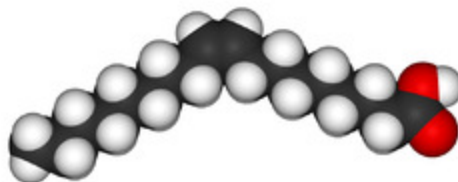
Forty margarines available in South Africa, were analysed by the CSIR for fatty acids and it was found that all had trans fats less than 2% and omega-6/omega-3 fatty acid ratios from 2.2 to 44.3. Peer-reviewed literature suggests that a low omega-6/omega-3 ratio of about 2.0 could help to counteract inflammation and have anti-cancer effects. Only two margarines out of forty had low ratios of about 2.0, i.e. Blossom Canola and Blossom Canola Light. Most margarines had much higher ratios probably due to the use of plant oils with little omega-3 fatty acid. Use of canola oil as the main constituent could explain the low ratio found in the Blossom margarines because this oil contains up to 11% omega-3 fatty acid. In the light of these results CANSA considers it to be reasonable and appropriate to recognise the Blossom Canola margarines as a *Smart Choice* in helping to lower the risk of cancer.

2. Introduction:

CANSA has become concerned with margarines since it was found over the past few years that they could contain trans fatty acids which were associated with cancer (1,2). Trans fats are a byproduct of the now historical hydrogenation process whereby solid margarine is synthesised out of liquid plant oils. During this process, at high temperatures, some of the carbon-carbon double bonds flip into a “trans” form causing unsaturated fatty acids to assume a linear shape rather than a “kinked” natural configuration. The saturated linear shape is very similar to that of saturated fats but is not identical. The slight structural difference is quite significant because it leads to a greater risk of cancer as well coronary artery disease than from saturated fats per se (3).



Trans fatty acid



Normal unsaturated fatty acid

It has been reported that margarines can contain up to 16% trans fatty acids (4). It was of interest to determine the trans fat contents of margarines available in South Africa. It was assumed that some margarines would contain less than 1% (w/w) because they were labelled as such, whereas other brands would have varying amounts ranging from 1-16% at least. To test this prediction all 40 brands available in commercial outlets in Cape Town during June 2008 were purchased and delivered directly to the CSIR who were requested to measure trans fats; saturated fats; monounsaturated fats; polyunsaturated fats and omega-6 as well as omega-3 fatty acids for each sample.

There is a reasonable body of evidence that shows that omega-3 fatty acids can counter systemic inflammatory processes while omega-6 fatty acids work in the opposite direction and stimulate inflammation (5). Consequently the ratio of omega-6 to omega-3 is of considerable importance. It has been postulated that this ratio was 1 in the Paleolithic diet (prehistoric) while in the modern diet it is 15 to 1. This means that there is too much omega-6 and too little omega-3 in our diets today and this is considered to be a serious health problem (6). There is evidence that this unbalanced ratio could impact negatively as far as cancer is concerned (7,8,9,10,11,12,13). If this is the case, it stands to reason that we should strive for low omega-6/omega-3 ratios in our food and drink.

These considerations were of great interest to CANSA and the final fatty acid composition of the 40 margarines was analysed in terms of the omega-6/omega-3 ratio. It was reasoned that the margarine(s) with the best (lowest) omega-6/omega-3 ratio could be identified as an extra bonus, over and above the trans fat component of this study.

3. Results - Discussion:

Table 1. Fatty acid composition of forty margarines available in South Africa.

Legend:

1. Lab No. = Laboratory number of CSIR (Testing Laboratory No. T0012, Rosebank, Cape Town) Ref. No. CASCA00/20083786 (Report 1). Signed off on 25-11-2008.
2. TRANS = Trans fatty acids g/100g margarine
3. SAT = Saturated fatty acids g/100g margarine
4. MUFA = Monounsaturated fatty acids g/100g margarine.
5. Polyunsaturated fatty acids g/100g margarine
6. O-6 = Omega-6 fatty acids

7. O-3 = Omega-3 fatty acids
8. O-6/O-3 fatty acid ratio.

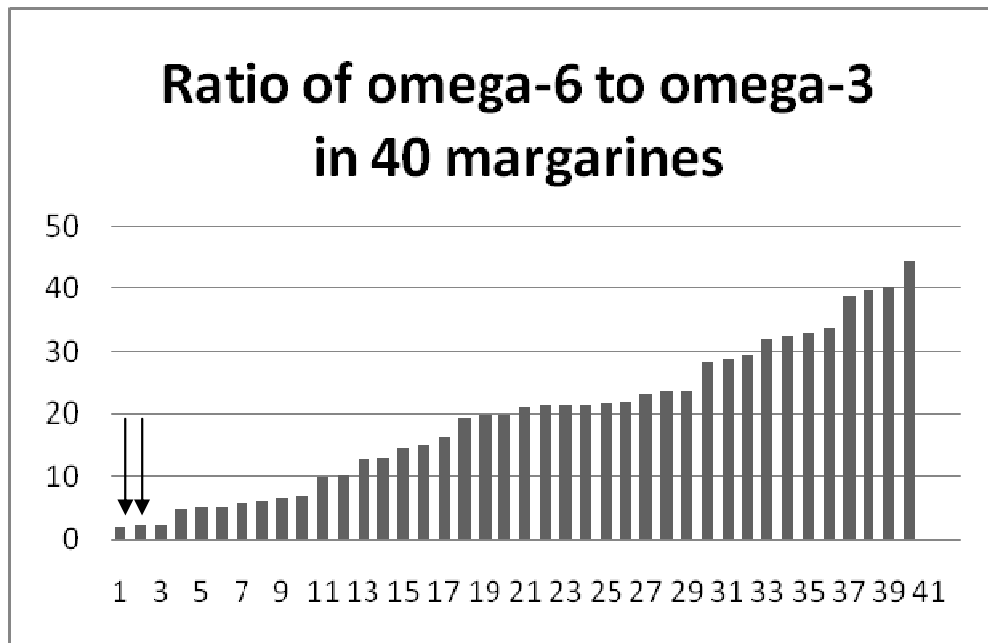
(Values measured represent gram/100 gram margarine)

	MARGARINE	Lab.No.	TRANS	SAT	MUFA	PUFA	O-6	O-3	O-6/ O-3
1	Blossom Canola Margarine	3797	0.46	9.43	29.71	13.78	9.50	4.29	2.21
2	Blossom Canola Light	3798	0.72	4.15	21.49	9.54	6.66	2.88	2.31
3	Cardin Tub	3793	0.17	8.58	30.77	15.08	10.75	4.33	2.48
4	Nuvo Canola	3823	1.35	10.60	22.43	11.28	9.29	1.99	4.67
5	Rama Idea	3805	0.05	8.37	6.17	12.44	10.35	2.10	4.93
6	Flora Olive Light	3806	0.10	6.11	11.37	13.71	11.41	2.30	4.96
7	Flora Proactive	3802	0.05	7.65	8.12	16.00	13.65	2.35	5.80
8	Flora Extra Light	3801	0.02	3.57	5.37	8.36	7.16	1.20	6.00
9	Flora Light	3800	0.04	5.44	6.36	11.74	10.18	1.55	6.57
10	Flora regular	3799	0.05	10.57	8.93	23.82	20.74	3.08	6.73
11	Rama Light	3804	0.07	12.50	12.58	18.78	17.06	1.72	9.91
12	Rama	3803	0.06	13.93	12.92	19.34	17.61	1.73	10.18
13	Sunshine D Original brick	3794	0.15	40.09	31.29	10.75	9.97	0.78	12.78
14	Sunshine D Medium fat	3792	0.56	24.80	19.35	6.67	6.18	0.48	12.88
15	Ole low fat brick spread	3813	0.44	15.57	12.77	4.34	4.06	0.28	14.50
16	Wooden Spoon White	3821	0.57	20.85	14.52	4.31	4.04	0.27	14.96
17	Rondo brick	3810	0.12	18.02	12.45	6.92	6.52	0.40	16.30
18	Pick & Pay no name brick	3814	0.88	29.36	25.13	8.30	7.88	0.41	19.21
19	Nuvo Original	3822	1.41	11.82	16.94	16.52	15.71	0.80	19.63
20	Rite Brand medium brick	3791	0.10	21.98	16.60	7.66	7.28	0.37	19.68
21	Checkers Medium spread	3787	0.21	26.99	22.87	7.95	7.59	0.36	21.08
22	Corden Bleu	3811	0.21	22.85	15.90	4.90	4.67	0.22	21.23
23	Blossom lite brick	3818	0.40	16.28	13.58	4.26	4.07	0.19	21.42
24	Stork to bake brick	3808	0.11	23.66	21.46	9.20	8.80	0.41	21.46
25	Rama Brick	3807	0.27	23.34	14.86	7.11	6.79	0.32	21.22
26	Checkers medium fat spread	3786	0.44	18.02	17.44	5.47	5.23	0.24	21.79
27	Spar house brand	3788	0.14	27.31	21.83	7.68	7.36	0.32	23.00
28	Blossom regular brick	3812	0.54	37.11	30.80	10.09	9.69	0.41	23.63
29	Nuvo olive oil	3825	1.28	16.16	26.64	15.26	14.65	0.62	23.63
30	Spar soft margarine	3789	0.00	13.70	21.73	20.59	19.82	0.70	28.31
31	Blossom light tub	3819	0.28	10.65	10.79	16.69	16.14	0.56	28.82
32	Sunshine D lite tub	3796	0.77	8.45	12.61	12.78	12.36	0.42	29.43
33	Stork country spread	3809	0.04	18.25	16.05	7.26	7.04	0.22	32.00
34	Pick & Pay medium spread	3816	1.30	12.66	16.41	17.38	16.87	0.52	32.44
35	Rite medium tub	3790	0.09	11.87	14.97	15.24	14.79	0.45	32.87
36	Nuvo-lite	3824	1.22	8.85	14.35	15.31	14.87	0.44	33.80
37	Sunshine D original tub	3795	1.42	11.57	20.06	20.25	19.75	0.51	38.73
38	Ole low fat spread tub	3817	0.82	8.85	13.15	14.26	13.91	0.35	39.74
39	Pick & Pay tub	3815	1.72	16.47	25.18	27.30	26.63	0.66	40.34
40	Stork tub	3820	0.09	12.16	11.88	17.67	17.28	0.39	44.30

Notes:

- The different margarines are arranged from 1 to 40 in terms of increasing ratio of omega-6/omega-3. In other words Brand No. 1 “Blossom Canola margarine” has the best ratio because it is the lowest, i.e. 2.21 compared to the highest of 44.30 for “Stork Tub” at number 40.
- It can also be seen that those margarines with the lowest omega-6/omega-3 ratio have the highest concentration of omega-3 fatty acids, e.g. the first 10 brands have omega-3 concentrations of at least 1% and omega-6/omega-3 ratios less than 7.00. This means that a higher omega-3 concentration leads to a lower omega-6/omega-3 ratio. The most likely source of the omega-3 is Canola oil, which is obviously used to make Blossom Canola margarines.
- Analysis of the data showed that very few of the margarines investigated had an omega-6/omega-3 ratio of about 2 to 1. This is shown clearly in Figure 1 below.

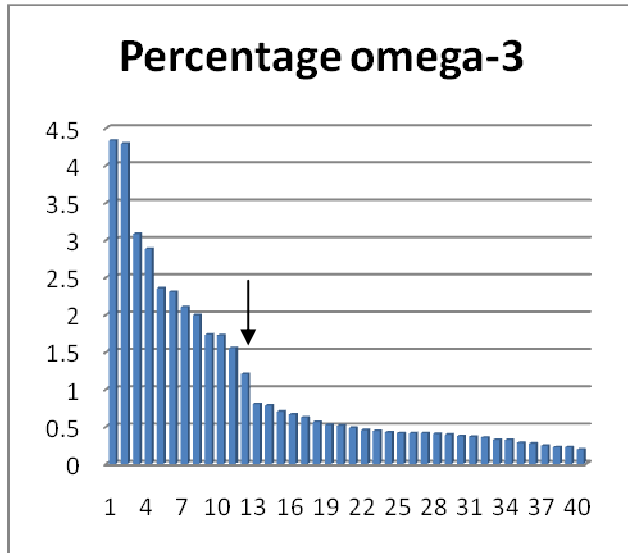
Figure 1:



The arrows indicate the two Blossom Canola Margarines

- It is also clear from Table 1 that 28 of the 40 margarines contain less than 1% omega-3 fatty acids. This is shown in Fig.2.

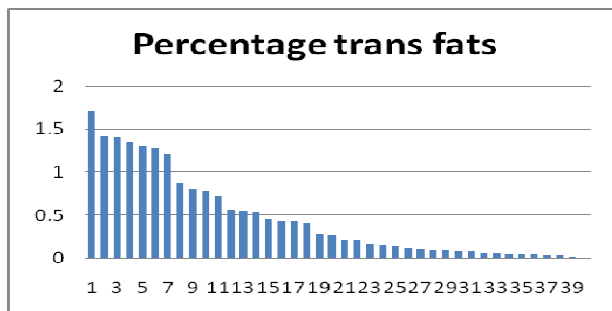
Figure 2:



All margarines to the right of the arrow contain less than 1% omega-3 fatty acids

- Analysis of Table 1 shows that every sample contained less than 2% trans fats as shown in Fig. 3. It is clear that about 30 of the 40 samples had low trans fat levels of 0.5% or less. It is not clear why about 10 out of the 40 samples had trans fat levels between 0.5 and 1.5%. This could be due to partial hydrogenation of some of the components in the margarines.

Figure 3:



4. Conclusions:

1. Chemical analyses of forty margarines available in South Africa showed considerable heterogeneity in terms of concentrations of various fats – especially omega-3 fatty acids which differed 11-fold in concentration and the omega-6/omega-3 ratio that differed 20-fold. These differences are probably due to different mixtures of plant oils and processes to constitute the margarines.
2. Surprisingly these data showed that each margarine investigated had trans fat levels lower than 2%.
3. In terms of the omega-6/omega-3 ratio the top brands were Blossom Canola margarine and Blossom Canola Light margarine. The ratio in these two margarines was about 20-fold lower compared to the brands with the highest ratio of omega-6 to omega-3.
4. The omega-3 levels suggest that by increasing the percentage of omega-3 fatty acid, the omega-6/omega-3 ratio is decreased.
5. It is concluded that the main determinant of a low omega-6 to omega-3 ratio is the use of Canola oil to make the margarine because this oil contains up to 11% omega-3 and is known to be used to make margarine.
6. It is concluded that most of the margarines mostly contain sunflower seed oil because this oil only contains 1% omega-3 fatty acid and 71% omega-6 fatty acid.
7. It is accepted that there is a reasonable case in the peer-reviewed literature that a low omega-6/omega-3 ratio has an inhibitory effect on inflammation, tumour cell growth and tumour development and growth in vivo.
8. In the light of these results CANSA considers it to be reasonable and appropriate to recognise the Blossom Canola margarines as a *Smart Choice* in helping to lower the risk of cancer.

5. References:

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