

## DIETITIANS' NEWS

### **Four Flax Oil Capsules Taken Daily Increase Omega-3 Fatty Acids in Red Blood Cells**

Four capsules or about 1 tsp of flax oil, containing a total of 2.4 g of alpha-linolenic acid (ALA) and taken daily for as little as 2 weeks, are sufficient to produce a significant increase in the ALA and eicosapentaenoic acid (EPA) content of red blood cell (RBC) phospholipids. These findings were published by Gwendolyn Barceló-Coblijn and her colleagues at the University of Manitoba in Winnipeg, Canada, and the University of North Dakota in Grand Forks.<sup>1</sup> The study was designed to determine the optimal daily dose of ALA needed for optimal elongation and desaturation to its long-chain metabolites EPA, docosapentaenoic acid (DPA) and docosahexaenoic acid (DHA).

The researchers worked with a cohort of firefighters and paramedics living in the Winnipeg area. Firefighters were studied because their high-stress jobs and typical high-fat diets place them at increased risk of cardiovascular disease (CVD). Sixty-two adults, nearly all men, were recruited and assigned randomly to one of six treatment groups: 1.2 g (2 capsules) of flax oil; 2.4 g (4 capsules) of flax oil; 3.6 g (6 capsules) of flax oil; 0.6 g (1 capsule) of fish oil; 1.2 g (2 capsules) of fish oil; or placebo (2 capsules of sunflower oil). Subjects were instructed to take the assigned number of capsules daily for 12 weeks. The doses selected were based on fatty acid intake recommendations of the International Society for the Study of Fatty Acids and Lipids (ISSFAL).<sup>2</sup> Red blood cells were studied because their fatty acid content is a good indicator of long-term dietary intakes.

In general, the ALA content of RBC phospholipids increased significantly in the 2.4 g and 3.6 g flax oil/day but not in the fish oil groups. The ALA content of RBC phospholipids increased 1.7-fold and 2-fold from baseline in the 2.4 g and 3.6 g flax oil groups, respectively (see Table 1). The EPA content of RBC phospholipids increased significantly in groups taking 2.4 g and 3.6 g of flax oil daily and in both fish oil groups. The DPA content increased in the 2.4 g flax oil group and in both fish oil groups but not in the 3.6 g flax oil group. The DHA content increased only in the fish oil groups.

Overall, the lowest dose of flax oil (1.2 g/day) did not change the fatty acid composition of RBC phospholipids, whereas the 2.4 g had a greater total omega-3 concentration, mainly due to elevated levels of ALA, EPA and DPA. Fish oil consumption increased the EPA, DPA and DHA concentrations of RBC phospholipids. The researchers concluded that an intake of 2.4 g or about 1 tsp of flax oil added to the daily diet is sufficient to achieve important changes in the fatty acid content of RBC phospholipids. The suggested amount is easily obtained by regularly consuming oil seeds like flax, nuts and green, leafy vegetables.

## References

<sup>1</sup> Barceló-Coblijn G, Murphy EJ, Othman R, et al. 2008. Flaxseed oil and fish-oil capsule consumption alters human red blood cell n-3 fatty acid composition: a multiple-dosing trial comparing 2 sources of n-3 fatty acid. *Am J Clin Nutr.* 88:801-809.

<sup>2</sup>International Society for the Study of Fatty Acids and Lipids. 2004. Recommendations for intake of polyunsaturated fatty acids in healthy adults. [cited 13 October 2003]. Available at: <http://www.issfal.org.uk/images/stories/pdfs/PUFAIntakeReccomdFinalReport.pdf>

**TABLE 1 – Changes in omega-3 fatty acid content of red blood cells**

Treatment Groups <sup>a</sup>	Change in the Fatty Acid Content of Red Blood Cell Phospholipids Compared with Baseline				
	ALA <sup>b</sup>	EPA	DPA	DHA	Total Omega-3 Fatty Acids
1.2 g of flax oil/day	no change	no change	no change	no change	no change
2.4 g of flax oil/day	↑ <sup>c</sup>	↑	↑ <sup>d</sup>	no change	↑
3.6 g of flax oil/day	↑	↑	no change	no change	no change
0.6 g of fish oil/day	no change	↑	↑	↑	↑
1.2 g of fish oil/day	no change	↑	↑	↑	↑
1 g of sunflower oil/day (placebo)	no change	no change	no change	no change	no change

<sup>a</sup>The treatment groups were as follows: 1.2 g of flax oil/day (2 capsules); 2.4 g of flax oil/day (4 capsules); 3.6 g of flax oil/day (6 capsules); 0.6 g of fish oil/day (1 capsule); 1.2 g of fish oil/day (2 capsules); and 1 g of sunflower oil/day (2 capsules).

<sup>b</sup>ALA = alpha-linolenic acid; DHA, docosahexaenoic acid; DPA, docosapentaenoic acid; EPA, eicosapentaenoic acid.

<sup>c</sup>Arrow represents a significant difference from baseline for at least one time point.

<sup>d</sup>Significantly different from baseline at 12 weeks only.