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Taking the Pulse of Health in 2016—Does a Role Exist for Legume Ingredients in Supplements?

Peter Jones, PhD

This year, 2016, has been defined by the United Nations as Year of the Pulses. Pulses are the dry, edible seeds of podded plants in the legume family including chickpeas, dry beans, lentils, and yellow peas. Canadian pulse production represents about 35% of global pulse exports annually. Indeed, in 2015, Canada exported 6.2 million tons of pulses, valued at greater than $4.2 billion.[1] Pulses have a low carbon footprint, are a water-efficient source of protein, and improve soil health.[2, 3] In addition to their contribution to sustainable agriculture, consuming ½ cup/day pulses may improve diet quality by increasing intakes of fibre, protein, folate, zinc, iron, and magnesium, and reducing intakes of saturated fat and total fat.[4]

Pulse foods are low in fat, rich in carbohydrates, with high amounts of both soluble and insoluble fibre[5] as well as resistant and slowly digestible starch and oligosaccharides.[5, 6] Pulses also contain 2–3 times the amount of protein found in cereals and other plant crops including wheat, corn, quinoa, and rice.[7] With a somewhat unique nutritional composition, pulses have the potential to improve blood glucose and appetite control. Studies have shown that protein increases satiety to a greater extent than carbohydrate or fat,[8] while protein has minimal effects on blood glucose and only modestly if at all increases hepatic release and production of glucose.[9] Diets higher in protein have been shown to reduce blood glucose postprandially, improving glucose control compared to diets lower in protein.[10] A variety of health benefits have been associated with consuming fibre, either in form of diet or as natural health products. Such benefits include improved blood glucose and insulin sensitivity as well as enhanced weight loss.[11] Similar to dietary fibre, demonstrated health effects of resistant and slowly digestible starches found in pulse products are improved blood glucose and insulin responses, as well as increased satiety and reduced energy intake.[12, 13] The inherent nutritional composition of pulses makes them very suitable to be considered for use as value-added food ingredients and as supplements.

Whole pulses have been studied extensively for their beneficial effects on satiety in human trials. When consumed alone or within mixed meals, whole pulse products have the capacity to favourably affect postprandial glycemic and satiety responses.[14, 15, 16] A review

of whole pulses showed that pulses increase satiety by 31% when compared to a control.[17] However, whether pulse ingredients retain the health benefits of whole pulses when consumed as supplements is unclear. To date, a limited amount of research has examined the impact of processed food products and supplements incorporating pulse flours and pulse fractions on blood glucose and satiety.[18, 19, 20] Priorities for future research ought to be directed towards examination of whether the same ingredients that have been shown to be effective in whole foods can be effective as extracted and precisely formulated natural health products. Certainly, matrixing the positive elements of pulse foods into supplements would be advantageous from the standpoint of convenience and avoidance of the calories intrinsic in foods. Hopefully, the Year of the Pulses will result in both better foods as well as improved supplements for consumer use into the future.

References

1. Pulse Canada. 2016. http://www.pulsecanada.com/pulse-industry.
2. Gan Y., et al. *Agron Sustain Dev* 2011;31(4):643–656.
3. Mekonnen, M.M. and A.Y. Hoekstra. *Ecosystems* 2012;15(3):401–415.
4. Mitchell, D.C., et al. *J Am Diet Assoc* 2009;109(5):909–913.
5. Tosh, S.M. and S. Yada. *Food Res Int* 2010;43(2):450–460.
6. Hoover, R., et al. *Food Res Int* 2010;43(2):399–413.
7. Boye, J., F. Zare, and A. Pletch. *Food Res Int* 2010;43(2):414–431.
8. Anderson, G.H. and S.E. Moore. *J Nutr* 2004;134(4):974–979.
9. Nuttall, F.Q. and M.C. Gannon. *Diabetes* 2013;62(5):1371–1372.
10. Gannon, M.C., et al. *Am J Clin Nutr* 2003;78(4):734–741.
11. Anderson, J.W., et al. *Nutr Rev* 2009;67(4):188–205.
12. Nugent, A.P. *Nutr Bull* 2005;30(1):27–54.
13. Anderson, G.H., et al. *Am J Clin Nutr* 2010;91(4):932–939.
14. Mollard, R.C., et al. *Br J Nutr* 2012;108(03):509–517.
15. Thompson, S.V., D.M. Winham, and A.M. Hutchins. *Nutr J* 2012;11(1):23.
16. Mollard, R.C, et al. *Appl Physiol Nutr Metab* 2011;36(5):634–642.
17. Li, S.S., et al. *Obesity* 2014;22(8):1773–1780.
18. Mollard, R.C., et al. *Appl Physiol Nutr Metab* 2014;39(12):1360–1365.
19. Marinangeli, C.P.F., and P.J.H Jones. *Br J Nutr* 2012;108(S1):S46–S51.
20. Anderson, G.H., et al. *Br J Nutr* 2014;(12):1966–1973.

EPA/DHA Omega-3 Supplementation for the Complementary Management of Key Risk Factors for Cardiovascular Disease

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Introduction

The impact of consuming long-chain omega-3 fatty acids as EPA (eicosapentaenoic acid) plus DHA (docosahexaenoic acid) from fish / fish oils has been extensively studied

in clinical trials [1, 2] and shown to have beneficial effects on several risk factors for cardiovascular disease (CVD). These risk factors include those that can readily be determined via a regular medical check-up with a personal physician (and/or self home-monitoring for some) as well as others (e.g. blood platelet aggregation, vascular resistance, inflammatory factors) which are not routinely measured or readily available in the health-care system. The present summary will focus on the former category of risk factors and will include blood lipid / lipoprotein levels, blood pressures, and resting heart rate. Increased intakes of EPA/DHA can serve in the complementary management of these risk factors (i.e. added to other therapeutic treatments including pharmacological). Numerous human studies have indicated that EPA/DHA intakes can also exert their beneficial effects when used alone for some applications and in those individuals not yet on targeted pharmaceutical therapeutics, thereby offering an opportunity for protective cardio care.

Blood Lipid/Triglyceride Levels

Elevated serum lipid/lipoprotein concentrations have long been identified as major risk factors for CVD including high total cholesterol (C), high LDL-C, and low HDL-C. During the past many years, the circulating level of fasting serum / plasma triglyceride (TG) has become recognized as an independent risk factor for sectors of the population. It is rather unfortunate that Canadian guidelines have often considered elevated TG levels to be a "secondary optional target for high-risk" individuals with targeting of fasting TG level lowering for levels of 1.7 mmol/L or above, while not addressing those with lower levels. Population studies have indicated that circulating levels of fasting TG well below 1.7 mmol/L (150 mg/100 ml) in the range of 1.1–1.7 mmol/L (100–150 mg/100 ml) have been associated with an increased risk of myocardial infarction as compared to lower levels.[3] Such is of even greater concern in those with metabolic syndrome. The majority of adults in North America exhibit fasting serum (plasma) TG levels well above 1.1 mmol/L.

As reviewed (see www.dhaomega3.org), each gram (1000 mg) daily of supplemental EPA plus DHA can be expected to lower the fasting triglyceride level by approx. 7–9% within 4 weeks. Thus, 3–4 g daily, taken at or near meal time, can lower levels by approx. 25–30%. It is noted that a suppression in postprandial (postmeal) surges in blood TG levels can also be expected. A metaanalysis indicated that each 0.1 mmol/L decrease in fasting TG levels was associated with a 1.4% and 3.7% decrease in CVD

risk in males and females, respectively. Many clinicians are suggesting EPA/DHA supplementation as a therapeutic option to fibrate for TG-lowering. Numerous clinical trials have shown combination therapy with statins (for cholesterol-lowering) plus EPA/DHA supplementation [4] to be efficacious and safe for combined dyslipidemia (elevated cholesterol and TG levels).

Blood Triglyceride: HDL (Cholesterol) Ratio

While not regularly utilized in blood-lipid testing/reporting, a higher TG:HDL(C) ratio has been associated with an increased risk for a myocardial infarction as well as an index of heart disease morality and incidence of type 2 diabetes mellitus.[3, 5] Women with higher ratios were also more likely to have carotid plaques.[6] A published clinical trial from our group in postmenopausal women found a marked lowering (by 28%) of this ratio within one month with daily supplementation at 4 g/d of EPA/DHA.[7] It is noted that up to 5 g (5000 mg) daily is considered to be generally safe for most people by the European Food Safety Authority (EFSA) and Health Canada.

Blood Pressure

Based on several published trials, systematic reviews have indicated that fish-oil supplementation with EPA/DHA can play a role in the prevention and treatment of hypertension, while not being a substitute for prescribed pharmacological therapy. As reviewed,[8] a median intake of 3.7 g/d of EPA/DHA over a few weeks or more reduced blood pressure by 2.1 mmHg (systolic blood pressure) and 1.6 mmHg (diastolic blood pressure), with the greatest reduction in older subjects (lowering by 3.5 and 2.4 mmHg, respectively) and in hypertensive (equal to or greater than 140/90 mmHg) individuals (lowering by 4.0 and 2.5 mmHg, respectively). Population studies (e.g. MRFIT) have associated each 1 mmHg rise in systolic blood pressure (over the range of 120–159 mmHg) with a 3.6% increase in the risk of coronary heart disease (CHD).[9] The aforementioned reductions in systolic blood pressure with EPA/DHA can be expected to provide a reduced risk of CHD by 12.6% (older subjects) and 14.4% (in hypertensives). Very recently, a modest intake of supplemental EPA/DHA (only 700 mg/d) over a 6-week period in men plus women (average age of 45 years) with an average initial systolic blood pressure of 146 mmHg resulted in a statistically significant reduction in blood pressure of 5 mmHg.[10] Based on the aforementioned systolic blood pressure–outcome relationship, an estimated 18% reduction in the risk of CHD can be predicted.

Resting Heart Rate

General population studies [11] have

shown that increases in the resting heart rate also represent an independent risk factor for several cardiovascular events (incl. myocardial infarction and cardiovascular mortality). An average resting heart rate of 85 beats per minute (bpm) has been associated with a 47% greater risk for a myocardial infarction relative to 65 bpm. Relatively modest daily supplementation with EPA/DHA (810 mg/d) over a 4-month period significantly reduced the resting bpm by 7% overall.[12] Such might then be expected to reduce the risk of myocardial infarction by 14% for individuals with resting heart rates of 85 bpm, based on the above relationship.

Conclusion

There is considerable evidence-based information that increased intakes of EPA/DHA to levels which are well above current dietary intakes in North America (approx. 120–150 mg/person/day) can play a role in attenuating common risk factors for CVD, when used either as complementary treatment or independently as part of an overall preventive strategy. Several servings of appropriately selected fish per week or moderate supplementation can provide EPA/DHA intakes approaching 700–1000 mg/d. Higher intakes will require the use of supplemental EPA/DHA in the vast majority of individuals to reach the targets used in the aforementioned clinical trials, wherein beneficial impacts on risk factors for CVD have been reported.

Further information from evidence-based studies on the potential benefits of EPA/DHA in these and other conditions can be found at www.dhaomega3.org

References

1. Holub, B.J. *Can Medical Assoc J* 2002;166(3):608–615.
2. Mozaffarian, D. and J.H.Y. Wu. *J Am Coll Cardiol* 2011;58(20):2047–2067.
3. Gaziano, J.M., et al. *Circ* 1997;96(8):2520–2525.
4. Holub, B.J. *Can Med Assoc J* 2007;177(6):604.
5. Vega, V.L. et al. *J Investig Med* 2014;62(2):345–349.
6. Masson, W., et al. *Endocrinol Nutr* 2016 [Epub ahead of print].
7. Stark, K.D., et al. *Am J Clin Nutr* 2000;72(2):389–394.
8. Campbell, F., et al. *Eur J Prev Cardiol* 2013;20(1):107–120.
9. Kannel, W.B., R.S. Vasan, and D. Levy. *Hypertension* 2003;42(4):453-456.
10. Minihane, A.M., et al. *J Nutr* 2016;146(3):516–523.
11. Sharashhova, E., et al. *J Epidemiol Community Health* 2016 [Epub ahead of print].
12. O'Keefe, J.H., et al. *Am J Cardiol* 2006;97(8):1127–1130.

Stroke Recovery

Neil McKinney, ND

The brain generates and uses about 70% of our daily energy production as ATP. Given that our ten million billion mitochondria at any moment have about 4.25 watts of power, and we make 1,200 watts a day, they are turning over many

kilograms of ATP daily.[1]

When blood flow is compromised to brain tissue, the sudden drop in oxygen and nutrients creates a rapid loss of cellular energy. The pumps responsible for transport of ions across membranes fail. Electrical currents no longer flow, and neurological function ceases.

Metallic ions, such as iron and magnesium, drift out of the brain cells. When oxygen is restored, these free metals will literally burn and damage the vascular endothelium and the blood-brain barrier.

Hyperbaric oxygen therapy can be remarkable if started early, to restore perfusion to penumbral zones of injury. Neoangiogenesis revascularizes hypoxic zones.

Fundamental to brain recovery is restoration of the vasculature and barrier system.

Grape seed extract is critical, in doses of 400–500 mg daily or more. It is an iron chelator and it reduces lipid peroxidation. Grape seed extract reduces inflammation linked to LOX, COX-2, and histamine.[2] Grape-seed proanthocyanidins help repair structural glycosaminoglycans in capillary walls, reducing permeability and fragility. Grape seed extract also increases blood flow, via nitric oxide release and by inhibiting platelet aggregation.[3] Barrier repair is also enhanced by **coenzyme Q_{10}**, at ≥ 300 mg ubiquinone or ≥ 100 mg ubiquinol form.[4, 5] Avoid alcohol and statin drugs, which deplete CoQ_{10}.

***R*–*alpha*-Lipoic acid** helps spark up mitochondrial oxidative phosphorylation to maximize ATP production. B vitamins are critical to energy production and neurotransmitter production. Vitamin B_1 or **thiamine** supports the mitochondrial resuscitation.[6] Vitamin B_{12} as **methylcobalamin** is fat-soluble and most effective in healing the brain. Vitamin B_1 and methycobalamin B_{12} have a synergy in healing neuropathy from any cause—a clinical pearl from Dr. John Bastyr, ND.

Methyltetrahydrofolate is the preferred form of folate, and **pyridoxal-5′-phosphate** is the preferred form of vitamin B_6. **Niacinamide** drives energy production forward in the restored mitochondria.[7]

***N*-Acetyl-L-carnitine** is a potent activator of mitochondria, facilitating acetyl-CoA uptake, moving fatty acids within the mitochondrial membranes, and promoting gluconeogenesis.[8, 9] It is highly synergistic with *alpha*-lipoic acid.[8] Carnitine rapidly overcomes malaise and sleepiness, improving spatial and temporal memory and cognition significantly.[8] It is contraindicated in those with seizure disorders. In

those cases, consider CoQ_{10} synergist **pyrroloquinoline quinone** (PQQ). Give at least 20 mg PQQ daily.

Magnesium is a cofactor in most enzymes of the Krebs cycle. Prescribe 300–600 mg daily of **magnesium bisglycinate**, or to bowel tolerance.

Omega-3 oils, such as fish oil, provide essential brain fats EPA and DHA.[10] Medical doses are 3,000–4,000 mg daily. These oils are anti-inflammatory, reducing edema and its compressive effects. They are also used to generate structural and functional fats necessary for repair of nerve tissue.[10]

Coconut oil **medium-chain triglycerides** provide fast fuel via the beta-oxidation pathway.

Acupuncture directly connects to and regulates brain and spinal control centres. Restore brain microcirculation with KI-6 and HT-7, LI-4, KI-1, GV-20 and 26, ST-45, HT-9, PC-6 and PC-9. Aphasia: GB-21, GV-12, BL-62. Hemiplegia: GB-21. Coma: PC-8, GB-15 and 16, SP-2, HT-9. Flaccid paralysis: CV-8.

Adjunctive mitochondrial remedies include glutathione, *N*-acetylcysteine, selenium, vitamin E mixed tocopherols, resveratrol, D-ribose, melatonin, *Ginkgo biloba* extract, and taurine.

References

1. Smith, R.A., et al. *Ann N Y Acad Sci* 2008;1147:105–111.
2. Bagchi, D., et al. *Toxicol* 2000;148(2–3):187–197.
3. Sano, T., et al. *Thromb Res* 2005;115(1–2):115–121.
4. Berbel-Garcia, A., et al. *Clin Neuropharmacol* 2004;27(4):187–191.
5. Ernster, L., P. Forsmark, and K. Nordenbrand. *J Nutr Sci & Vitamin* 1992;Spec No:548–551.
6. Liu, J. *Neurochem Res* 2008;33(1):194–203.
7. Mouchiroud, L., R.H. Houtkooper, and J.Auwerx. *Crit Rev Biochem Mol Biol* 2013;48(4):397–408.
8. Liu, J., et al. *Proc Natl Acad Sci USA* 2002;99(4):2356–2361.
9. [No authors listed]. *Alt Med Rev* 2010;15(1):76–83.
10. Blok, W.L., M.B. Katan, and J.W. van der Meer. *J Nutr* 1996;126(6):1515–1533.

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