Plant-based Eating and Cardiovascular Health Benefits

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The International nutrition community recently came together in Spain to attend the 20th International Congress of Nutrition.

With around seven thousand nutrition scientists, researchers and clinicians, this Congress was a hive of information exchange on all disciplines related to diet, nutrition and health. One particular hot topic was on food sustainability and the subsequent importance of plant-based eating. Expanding on this theme, and examining the health benefits of plant based eating, the Alpro Foundation hosted a satellite symposium focusing specifically on the benefits of plant foods in relation to cardiovascular health. This article provides an overview of the topics discussed.

Marine omega-3 fatty acids are often cited as being important for cardiovascular health, but what about plant sources?

This subject was debated by Professor Tom Sanders from King's College, London. He explained that the long chain omega-3 fatty acids, Eicosapentaenoic acid (20:5n-3; EPA) and Docosahexaenoic acid (22:6n-3; DHA), are provided mainly by fish. Studies have found that high intakes of long chain omega-3 fatty acids (typically in the range of 3 to 5g/ day) have favourable effects on several cardiovascular disease (CVD) risk factors including lowering blood pressure and triglycerides, and decreasing inflammation and thrombosis risk. However these doses are beyond those typically provided in the diet. Nevertheless epidemiological studies have found that lower doses (around 1g/ day) are associated with a reduced risk of sudden cardiac death. It's been postulated that there maybe other mechanisms involved. For example, EPA and DHA improving endothelial function - although recent studies have found no such benefit. Alternatively they may positively influence heart rate variability and cardiac rhythm, yet this isn't the case in people with pre-existing CVD. Professor Sanders went on to explain that despite a meta-analysis finding one portion of fish a week was associated with a 16% lower risk of death

from coronary heart disease, this maybedue to other nutrients present in fish. For example fish also contains Vitamin D, Selenium and Iodine. We need to be cautious linking the cardiovascular benefits of fish purely to long chain omega-3 fatty acids.

The shorter chain omega-3 fatty acid, Alpha-Linolenic Acid (18:3n-3; ALA), is found in soybean, flaxseed, walnuts and rapeseed oils. Although ALA can be converted in the human body to the longer chain omega-3 fatty acids, this conversion is inefficient due to competition with omega-6 fatty acids. However if the ratio of omega-6 to omega-3 is altered, with very little Linoleic Acid to ALA being present in the diet, more EPA and DHA will be produced, although the amount is small.

Despite long chain omega-3 fatty acids being recommended to support heart health, ALA has also been associated with a lower risk of CVD. A meta-analysis found a 14% reduction in risk in subjects reporting higher intakes of ALA. In fact prospective cohort studies have shown no difference between ALA and EPA + DHA and CVD risk.

Professor Sanders also suggested that an insufficient intake of ALA could explain the relationship between trans fats and increased risk of heart disease. He explained there's no biological mechanism to explain why low intakes of trans fats increase heart disease risk as the effect of low intakes on blood lipid profile is trivial. Trans fats are produced during partial hydrogenation of vegetable oil. Partial hydrogenation was specifically designed to selectively reduce ALA content in vegetable oils to improve the stability of oils for deep fat frying. As such, high intakes of trans fats may really be reflecting a lack of ALA. If this is the case, Professor Sanders is concerned with the new varieties of vegetable oils being designed to be low in ALA, especially as there are only a few good dietary sources of ALA.

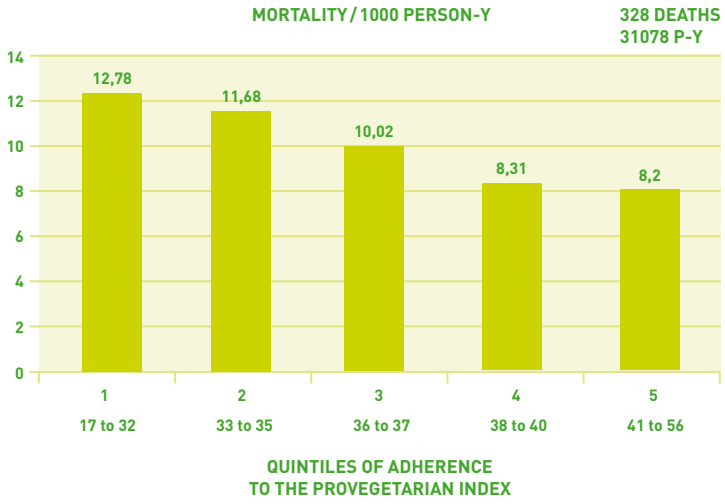
Vegetarians and vegans have lower plasma and tissue levels of DHA compared to omnivores, typically between one-third and two-thirds lower respectively. Yet they have a lower incidence of CVD. Recent data from the European Prospective Investigation into Cancer (EPIC) study found incidence rates of CVD to be around a third lower in vegetarians compared to omnivores. This can be explained by their more favourable cardiovascular profile. Lower LDL-cholesterol levels, Body Mass Index (BMI) and moderately lower blood pressure than omnivores. These factors also help to explain why vegans appear to have less arterial stiffness compared to omnivores despite having lower levels of long chain omega-3 fatty acids. Arterial stiffness, which is a measure of arterial ageing, is emerging as a strong predictor of future CVD events and is influenced by age, blood pressure, LDL-cholesterol and BMI.

Professor Sanders concluded by saying that despite vegetarians and vegans having lower intakes of EPA and DHA, current evidence does not suggest their diets need to be supplemented with these fatty acids to prevent heart disease. In fact there is potential harm. Studies supplementingvegetarian diets with DHA using algal sources have resulted in increases of LDL-cholesterol by 8 to 11% even at intakes as low as 0.8g of DHA/ day. Instead he believes that dietary requirements for omega-3 fatty acids are likely to be met by sufficient ALA, with intakes not less than 0.5% of energy.

Moving onto the cardiovascular benefits of a plant-based eating pattern, Professor Martinez-Gonzalez from the University of Navarra in Spain, explained what could happen if people gently moved towards a diet that was predominantly, but not exclusively, based on plant foods (a pro-vegetarian food pattern) using findings from the PREDIMED primary prevention trial. The PREDIMED study is the first large-scale randomized controlled clinical trial to show thebenefits of the Mediterranean diet for the primary prevention of heart disease. Over seven thousand men and women were included in the study. After 4.8 years those who consumed a Mediterranean diet (high in fruits, vegetables, legumes and nuts and low in red meat, dairy and refined grains) either supplemented with olive oil or nuts had a 30% reduction in the risk of heart attacks, strokes and CVD deaths, compared to those following a typical low fat diet based on American Heart Association guidelines.

Using the PREDIMED's 137-item semi-quantitative food frequency questionnaire, a pro-vegetarian food pattern was defined. Fruit, vegetables, nuts, cereals, legumes, olive oil and potatoes were all positively weighted. Addedanimal fats, eggs, fish, dairy products and meats or meat products were negatively weighted. Weightings ranged from be-

tween 12 to 60 points, with numbers approaching 60 characterising the higher pro-vegetarian food pattern. Energy adjusted quintiles based on these weightings were used to build the pro-vegetarian food pattern. Interestingly there were only three vegetarians in the whole of the study, yet subjects who had higher baseline conformity with the pro-vegetarian food pattern (↗ 40 versus ← 30 points) had a 39% lower risk of death from all causes (figure). Positive results were also observed with a higher pro-vegetarian index and reduced risk of Type II Diabetes, as well as incidence of CVD.



In conclusion Professor Martinez-Gonzalez explained that promoting a diet that is not purely vegetarian, but places the emphasis on plant based foods, is not only associated with better health outcomes in individuals who are at high risk of CVD, but it may be an easier message for consumers to understand.

The final speaker of the day was Dr Monique van Nielen from Wageningen University in the Netherlands who presented findings from an intervention study examining the role of soy protein in relation to the metabolic syndrome. She explained that protein may have a promising role to play in preventing the metabolic syndrome, a group of conditions associated with an increased risk of CVD, through its potential to improve body composition and glycaemic control. Soy protein may have further benefits because of its known lipid lowering effects. To investigate this, 15 postmenopausal women aged 45 to 70, who had a waist circumference larger than 80cm, were randomised in a cross-over design trial. Following a one week run in period they either consumed a mixed protein diet or a diet high in soy protein for four weeks. Both diets contained 21% of energy from protein, 26% of energy from fat and 51% of energy from carbohydrate and aimed to maintain energy balance. The soy protein diet contained 30g of soy protein per day where meat was exchanged for soy meat analogues and meat snacks were swapped for soy nuts. Compliance was ensured as 90% of the foods and drinks were provided to the participants and hot meals were consumed under supervision of the dieticians. The remaining 10% was free for the participants to choose from a list of limited products with a low amount of protein per portion. No protein supplements were used to mimic a real life situation. Adherence to the diet was further checked through food diaries. After the four weeks, they had a four week wash out period before swapping to the other diet for four weeks.

At the end of the study both high protein diets reduced fasting bloodglucose, insulin, triglycerides, total cholesterol, LDL and HDL cholesterol, C-reactive protein and percentage total body and abdominal fat. In addition, compared to the mixed protein diet, the soy protein diet significantly further lowered total and LDL cholesterol.

Dr Monique van Nielen concluded that protein has the potential to improve certain characteristics of the metabolic syndrome by improving body composition, inflammatory markers and metabolic control. Moreover soy protein has additional benefits by lowering total and LDL cholesterol further