

completers following the Portfolio diet had reduced their LDL-cholesterol by 10.1% corresponding to a 20 to 25% reduction in CVD risk.

To determine the effects of a plant based diet on weight loss, Professor Jenkins investigated the effects of a high protein, plant based diet, he called Eco-Atkins. A criticism of high protein diets, based on animal protein, is that there maybe long term, negative effects on heart health. The current study was designed to demonstrate that a diet high in vegetable protein was **beneficial in losing weight as well as improving biomarkers for heart health**. Forty four overweight, hyperlipidaemic men and women were divided into two groups. Half followed the Eco-Atkins diet - low in carbohydrate (26% of total calories), high in vegetable protein (31% from gluten, soy, nuts, fruit, vegetables, and cereals), and vegetable oil (43%) and the other half followed a high-carbohy-

drate, lacto-ovo vegetarian diet (58% carbohydrate, 16% protein, and 25% fat). Both diets provided foods at 60% of calorie requirements. **After 4 weeks, both groups lost approximately 4kg in weight. However the high vegetable protein group had greater reductions in LDL-cholesterol and blood pressure compared to the high carbohydrate group.**

**In conclusion** Professor Jenkins believes that plant based diets, plant foods and plant components appear to reduce CHD risk. When used in a specific combination, under metabolically controlled conditions, these foods can have potent effects similar to early statins. Calorie restriction, exercise and moderation in all things remain the foundations for weight loss and health to which plant based diets may make a significant contribution.

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## NEW PUBLICATIONS

1. Barnard ND, Katcher HI, Jenkins DJ, Cohen J & Turner-McGrievy G (2009) Vegetarian and vegan diets in type 2 diabetes management. *Nutr Rev* 67[5], 255-263.
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3. Goodman MT, Shvetsov YB, Wilkens LR et al. Urinary Phytoestrogen Excretion and Postmenopausal Breast Cancer Risk: The Multiethnic Cohort Study. *Cancer Prev Res (Phila Pa)* 2009.
4. Jenkins DJA, Wong JMW, Kendall CWC et al. The Effect of a Plant-Based Low-Carbohydrate ("Eco-Atkins") Diet on Body Weight and Blood Lipid Concentrations in Hyperlipidemic Subjects. *Arch Intern Med* 2009;169:1046-54.
5. Key TJ, Appleby PN, Spencer EA et al. Cancer incidence in British vegetarians. *Br J Cancer* 2009;101:192-7.
6. Lee SA, Shu XO, Li H et al. Adolescent and adult soy food intake and breast cancer risk: results from the Shanghai Women's Health Study. *Am J Clin Nutr* 2009;89:1920-6.
7. Tempfer CB, Froese G, Heinze G, Bentz EK, Hefler LA, Huber JC. Side effects of phytoestrogens: a meta-analysis of randomized trials. *Am J Med* 2009;122:939-46.
8. Wong WW, Lewis RD, Steinberg FM et al. Soy isoflavone supplementation and bone mineral density in menopausal women: a 2-y multicenter clinical trial. *Am J Clin Nutr* 2009.

## FOR MORE INFORMATION

*The Alpro Foundation is an independent non-profit organisation, supporting and promoting scientific research in the field of health and nutrition.*

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## NEWS

### Award for Masters

The Award for MSc students was organised for the second time in five countries, namely Belgium, Germany, Italy, the Netherlands, United Kingdom & Ireland.

The Alpro Foundation Award for Masters is given in recognition of an outstanding thesis regarding the impact of bioactive compounds from the plant or plant-based nutrition on human health, the environment or the economy. Each national winner receives a generous award amounting to € 2,500 in recognition for their outstanding thesis.

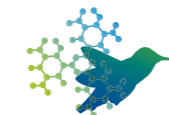
In addition, an European Alpro Foundation Award is presented to one of these five winners. The winner of the Europe an Award will receive a further € 2,500 on top of the first award.

More information on the announcements of the winners and of the third edition is available on [www.alprofoundation.org](http://www.alprofoundation.org)

### Symposium "Plant-based nutrition and bone health"

Alpro Foundation hosts a satellite symposium "Plant-based nutrition and bone health" (5/5/2010) at the WCO-ECCEO10 organised by the International Osteoporosis Foundation in Florence, Italy.

More details on symposia are given on the website [www.alprofoundation.org](http://www.alprofoundation.org)



## PLANT NUTRIENTS AND CARDIOVASCULAR HEALTH

At a time when Cardiovascular Disease (CVD) is the leading cause of death in Europe, accounting for 4.35 million deaths each year, the Alpro Foundation hosted its first ever student symposium at the University of Nottingham to examine the role of plant foods in reducing the risk of this chronic disease.



Professor Ian Rowland, from the University of Reading, Chaired and opened the event.

He explained that increasing our fruit and vegetable intake could reduce the risk of CVD by 20-50%, however in many countries, including the UK, the recommended amount is not being achieved.

### Cardiovascular Disease: The role of diet in the post-statin era



Professor Andrew Salter, from the University of Nottingham, then went onto explain how dietary advice to prevent CVD has changed over the last twenty years.

Since their peak in the 1970's, mortality rates from Coronary Heart Disease (CHD) in many Western countries have been declining. Reasons for this include changes in treatment as well as modifications in risk factors - mainly the drop in numbers of smokers. Unfortunately reductions in other risk factors, such as cholesterol and blood pressure, have been far less modest.

What about dietary factors? In the 1990's, public health guidelines focused on dietary changes to reduce cholesterol including reducing total fat and saturated fat, keeping trans-fats down and possibly increasing omega-6 polyunsaturated fats.

Around the mid 1990's another weapon became available to target cholesterol and reduce CVD. Two major studies discovered that statins could reduce the risk of having a heart attack. A meta-analysis published in 2005 provided conclusive evidence that statins decreased the risk of CVD deaths as a result of cholesterol reduction.

So what role does diet have to play in this post-statin era? During this time there has been a rise in the prevalence of obesity with an associated increase in Metabolic Syndrome and Type 2 Diabetes. While previous dietary advice focused on cholesterol reduction, other dietary interventions may now be an option. For example a **Mediterranean diet which is rich in whole grains, fruits, vegetables, nuts and olive oil maybe beneficial in reducing markers of inflammation.** Or the DASH (Dietary Approaches to Stop Hypertension) diet which may have beneficial effects on Metabolic Syndrome parameters, particularly blood pressure.

**Professor Salter concluded** by saying that previous dietary advice to reduce cholesterol hasn't been effective. Alternatively the use of a statin, if used properly, is a much more powerful tool. Since the publication of dietary guidelines in the 90's, there are now new complications to deal with, such as obesity, Metabolic Syndrome and Type 2 Diabetes. Although these threaten declining trend of CVD, dietary intervention still remains at the heart of treatment.

## Endothelial function and CVD risk. Can diet help?



**Dr Julie Lovegrove, from the University of Reading, described how various plant compounds can benefit vascular health.**

The vascular endothelium is now known to play an important role in vascular growth, vasoregulation and vasoprotection. It is essential for vasodilatation in response to increases in blood flow-associated shear stress. Several vasodilators are released by the endothelium in response to shear stress, including nitric oxide (NO), which diffuses into surrounding vascular smooth muscle causing vasodilatation.

Certain CVD risk factors including smoking, diabetes, dyslipidaemia and hypertension can damage the endothelium resulting in endothelial dysfunction. These cells are unable to produce NO to the same extent as healthy endothelial cells thereby reducing vasodilatation. **Endothelial dysfunction is thought to be a key event in the development of atherosclerosis and as such the endothelium can be considered a marker for CVD risk.** Being able to measure the health status of the endothelium could therefore predict the risk of CVD before physical symptoms arise.

Various methods are now available to determine endothelial function including Flow Mediated Dilatation (FMD) which is currently considered the gold standard technique. This test measures the vasodilatory response of a vessel caused by the production of NO, as stimulated by shear stress through increased blood flow.

Using techniques such as FMD, research is now being undertaken to investigate what dietary factors influence the function of the endothelium. **One interesting area is the role of flavonoids.** High intakes of flavonoids and the subsequent effect on the endothelium is being given as a possible reason for the low incidence of hypertension in island dwelling Kuna, despite eating a diet high in

salt and saturated fat. This population consumes cocoa that are rich in flavonoids which have been associated with improvements in FMD and lower blood pressure.

What about fruits and vegetables? It is well established that a low intake of fruit and vegetables is associated with an increased risk of disease - approximately 30% of CHD and 20% of stroke is due to eating less than 600g a day. As a result recommendations have been set to eat five portions of fruit and vegetables a day, although this does vary in other European countries. Plant foods contain vitamins, minerals, fibre as well as phytochemicals that may all have a role in cardiovascular health. **Although these phytochemicals, which include flavonoids, carotenoids, isoflavones and lignins, are metabolised and excreted very quickly, while they're in the body they maybe exerting some protective effect.** Sources of flavonoids include tea (catechins); red wine and grape juice (anthocyanins and flavonols); fruits and vegetables and it has been estimated that our daily intake of flavonoids is between 10 to 100mg a day.

Various fruits and vegetables have been investigated in relation to their effects on blood pressure or FMD. For example:

- **Beetroot** – A single 500ml drink of beetroot juice, given after breakfast, significantly reduced systolic blood pressure over a 24 hour period compared to 500ml of water. Associated with this was increasing levels of urinary nitrite, a surrogate marker for NO, indicating that something in beetroot juice maybe having a beneficial effect
- **Grape Juice** – In 24 subjects who drank 640ml/ day of purple grape juice for 56 days, FMD increased from 1.3±2.3% to 2.9±3.9%
- **Fruit and vegetable puree based drinks (FVPBD)** – subjects who drank FVPBD had an increase in plasma nitrate/nitrate and higher levels of vasodilatation compared to a control
- **Champagne** (produced by the red wine grape so has more polyphenols than standard white wine) - In a recent study, following the consumption of 2 glasses of champagne, there were im-

provements in vascular reactivity, as well as significantly higher levels of the polyphenol metabolites, protocatechuric and hippuric acid, compared to a control matched for sugar and alcohol.

Dr Lovegrove concluded by suggesting that while higher dietary intakes of nitrate and flavonoid rich foods is associated with improvements in vascular reactivity and haemostasis, the exact mechanisms by which they exert their beneficial effects are not fully understood. Possible actions include

- An effect on cell signalling pathways involved in the production of NO
- Antioxidant properties that protect LDL cholesterol from being oxidised, a prerequisite step in coronary atherosclerosis
- A role in platelet aggregation. Flavonoids may have an effect on cell signalling within the platelet, reducing platelet aggregation and associated thrombus development.

## Plant Nutrients and Cardiovascular Health



**Professor David Jenkins from the University of Toronto concluded the presentations with an overview of the role plant foods have in our diet.**

The US, along with many other Western countries, are getting fatter and with this comes chronic diseases such as Type 2 Diabetes, a major cause of blindness and renal transplants. In terms of our evolution this has happened during a relatively short time frame.

Over the course of twenty million years hominoids have evolved on a mainly plant based diet. The introduction of technologies have dictated what we eat. In this way our eating habits have diverged away from evolution.

Professor Jenkins went on to describe a series of experiments that investigated

the health effects of diets that might be reflective of ancient man. In one study, a **Simian diet**, typical of what was eaten four million years ago (sixty three servings of fruit, vegetables and nuts a day) **brought about a 30% reduction in LDL-cholesterol over the course of two weeks.** A **Neolithic style diet**, representative of a diet eaten ten thousand years ago (low fat yoghurt, whole grains, lentils and five servings of fruits and vegetables day) **resulted in a 25% reduction in LDL-cholesterol. Whereas the modern NCEP Step 2 diet** (low fat dairy, white rice, potatoes and five servings of fruits and vegetables a day) **reduced LDL-cholesterol by 5%.**

The Simian diet consisted of 5.5kg of food a day containing 143g of dietary fibre. This large volume of fibre rich foods resulted in the production of 1kg of faeces (compared to an average faecal output of 150-300g) and the loss of 1g of bile acids (compared to the normal loss of 0.25g). The large loss of bile acids places a big drain on the cholesterol pool. Furthermore Professor Jenkins has shown that 'nibbling' throughout the day, which would be required to get through 5.5kg of food, compared to eating 3 meals a day (representative of modern man) reduces mean, fasting total cholesterol and LDL-cholesterol by approximately 8.5% and 13.5% respectively over the course of two weeks. Insulin response also decreased by 28% on the 'nibbling' diet.

The composition of the Simian diet used in these experiments consisted of 93g of vegetable protein, 143g of dietary fibre, 1g of phytosterols and 70g of nuts a day. These are all foods and nutrients that are permitted on the current US Food and Drug Administration (FDA) health claims list for CHD reduction. The mechanisms by which they exert a reduction in cholesterol are different. For example:

- **Viscous fibres** increase bile acid loss. 10g of viscous fibre a day brings about a 4 to 8% reduction in LDL-cholesterol.
- **Soy protein** decreases cholesterol synthesis and increases LDL receptor uptake. In a meta-analysis published in 1995 soy protein was shown to reduce LDL-cholesterol by 12 to 13%. Since this time, subsequent studies have not shown such dramatic results with the

American Heart Association suggesting that 50g of soy brings about a 3% reduction in LDL-cholesterol. However Professor Jenkins believes this can be reduced further, especially if soy foods displace other foods from the diet. Furthermore studies have shown that fasting cholesterol is an indicator of soy's effectiveness. The higher the fasting LDL-cholesterol, the bigger the reduction after consuming soy foods.

- **Phytosterols** decrease cholesterol absorption. Two grams of plant sterols a day have been shown to reduce LDL-cholesterol by approximately 10%.
- **Almonds/ nuts** contain monounsaturated fat and have multiple mechanisms including many of the above. Epidemiological studies have concluded that consuming five portions of nuts a week reduces the risk of CHD by 18 to 51%.

What happens if you combine these cholesterol lowering components? Professor Jenkins then went onto describe studies that have included all of these into what he has named the Portfolio Diet. He believes that following this type of diet is more acceptable in modern times than the Simian diet with all of the foods being readily available in supermarkets. The Portfolio Diet consists of:

- Nuts – 30g a day of almonds
- Viscous fibre – 20g a day from oats, barley, psyllium, legumes, aubergines and okra
- Vegetable protein – 80g a day. 50% from soy and the other 50% from beans, chick peas and lentils
- Plant sterols – 2g a day from plant sterol margarine

In short term studies, subjects who have eaten this Portfolio diet for four weeks have reduced their LDL-cholesterol by approximately 30%, similar to those subjects who took 20mg of a statin drug. Furthermore C-reactive protein, an inflammatory biomarker, was also reduced by 30% on the Portfolio diet. In longer term studies, subjects who completed the study maintain a reduction in LDL-cholesterol and a rise in HDL-cholesterol compared to baseline. After three year,