

# Eat nuts everyday – protect your heart

Almonds  
Brazil nuts  
Cashews  
Chestnuts  
Hazelnuts  
Macadamias  
Pecans  
Pine nuts  
Pistachios  
Walnuts



Go Nuts for Life.  
Go Nuts for Health.



Know-how for Horticulture™



**There is a significant amount of research now which highlights the importance of eating nuts regularly for heart health. It is on the basis of this research that the US Food and Drug Administration has approved a qualified health claim for nuts suggesting that as part of a diet low in saturated fat and cholesterol, consumption of 1.5 ounces (45g) of most nuts per day, may reduce the risk of heart disease<sup>1</sup>.**

This document provides an overview of the scientific evidence examining the effects of nuts on heart health, results of which support these key messages.

- Eating a handful of nuts (30–50g) most days can lower blood cholesterol levels and reduce your risk of heart disease.
- Nuts are rich in healthy monounsaturated and polyunsaturated fats, protein and a wide range of cardio-protective nutrients.
- Heart healthy nutrients of nuts include healthy fats, fibre, arginine, plant sterols and antioxidants: Vitamin E, selenium, copper and zinc. It's likely that the combination of these nutrients working together is responsible for their significant lowering of heart disease risk.
- Nuts are nature's own vitamin pill since each nut has a unique combination of nutrients. Maximum benefits are likely to be obtained by enjoying a wide variety of nuts.
- Nuts are the perfect ready-to-eat snack food which can be incorporated into a heart-healthy diet in place of typical high saturated fat snacks such as chips, biscuits and cakes. Be adventurous with nuts and enjoy experimenting with them as ingredients when cooking.

Cardiovascular disease (CVD) is the leading cause of death in Australia, affecting more than 3.5 million Australians and accounting for 36 per cent of all deaths in 2004. CVD kills one Australian every ten minutes. According to the Heart Foundation<sup>2</sup>, 90% of Australian adults have at least one risk factor for cardiovascular disease and 25% have three or more risk factors. Of these risk factors, more than 50% have high cholesterol and almost one-third have high blood pressure. And despite the increased use of cholesterol-lowering medications, the prevalence of high blood cholesterol has not fallen in the past 20 years.

### Nutritional benefits of nuts

Nuts are a particularly nutrient dense food, comprising of a range of nutrients which can contribute to a reduced risk of coronary heart disease and maintaining heart health. These include healthy fats, dietary fibre, arginine, plant sterols and range of vitamins and minerals known to be important for heart health, including folate, magnesium, potassium, zinc, copper and vitamin E.

- Nuts are high in fat but are rich in the healthy fats – monounsaturated and polyunsaturated fats which are important for cholesterol lowering<sup>3,4</sup>. Walnuts are also a rich source of alpha-linolenic acid (ALA a plant-based omega-3 fat). Research has shown that ALA from walnuts can reduce inflammation, similar to omega-3 fats from fish<sup>5</sup>.
- Nuts are high in fibre, including soluble fibre which can assist with reducing blood cholesterol levels by lowering cholesterol reabsorption from the gut.
- Nuts are a good source of protein, and in particular a rich source of arginine – a building block of protein. This amino acid is converted to nitric oxide in the body which causes blood vessels to dilate and remain elastic and is involved in preventing blood

clotting. Hardening of the arteries and blood clotting can lead to heart disease.

- Nuts are rich in vitamin E, an important antioxidant vitamin which may protect LDL (bad) cholesterol from attaching to, and blocking blood vessel walls.<sup>3,4</sup>
- Nuts are a good source of folate, which can reduce blood homocysteine levels. High levels of homocysteine are associated with an increased CVD risk.
- Nuts contain plant sterols including beta-sitosterol, campesterol and stigmasterol.<sup>3</sup> Plant sterols can reduce total and LDL cholesterol levels<sup>6,7</sup> by lowering cholesterol reabsorption from the gut. This suggests that the plant sterol content of nuts may contribute to their cholesterol lowering effect.
- Nuts are a rich source of minerals including magnesium, copper, zinc, potassium and selenium, all of which may play a role in heart health. Magnesium intake is associated with a reduced risk diabetes, metabolic syndrome, high blood pressure and CVD<sup>8</sup>, potassium can assist with blood pressure control and copper, zinc and selenium are antioxidants.

Nuts are a unique whole food with a wide range of cardio-protective nutrients and should be included in any diet aimed at promoting heart health.

## Effects of nut consumption on heart health

### Epidemiological studies

**There is now extensive evidence from a number of large population studies that nut consumption is protective against CVD. Table 1 summarises the results of these studies.**

The Adventist Health Study<sup>9</sup>, published in 1992, was the first to generate interest in nut consumption and coronary heart disease (CHD), showing that eating 1 ounce (28g) of nuts 5 or more times per week could halve the risk of both Myocardial Infarction (heart attack) and death from CHD. While there was some question about whether these results could apply to other populations (due to the large number of vegetarians and frequent nut consumers in this study), other studies looking at nut consumption in a variety of groups have confirmed these findings.

Both the Nurses' Health Study<sup>10</sup> and the Physicians' Health Study<sup>11</sup> found a relationship between nut consumption and fatal CHD. The most frequent nut consumers in these studies had a 30–40% lower risk of dying from CHD. The Physicians' Health Study found the greatest benefit for the prevention of sudden cardiac death, which was almost halved in those who had the highest nut intake.

The Iowa Women's Health Study reported a 19% reduction in risk of death from CHD in those who consumed two or more servings (57g or more) of nuts per week compared to those who ate nuts less than once a month<sup>12</sup>. In a more recent follow-up of only postmenopausal women who were free of diabetes or heart disease 15 years earlier, they found strong and consistent reductions in death attributed to CVD and CHD with increasing intake of nuts & peanut butter. Those consuming nuts plus peanut butter (28.5g of nuts or 1 tablespoon of peanut butter) 5 or more times per week had almost a 30% reduction in risk of death from both CVD and CHD.<sup>13</sup>

**Table 1: Effect of nut consumption on risk of coronary heart disease**

Study	Number of Subjects (sex)	Endpoints	Nut consumption Frequency	Relative Risk*	p for trend	
Nurses' Health <sup>10</sup> Study	86 016 (F)	Total CHD	Almost never	1.00	0.0009	
			≥5 serves/week	0.65 (0.47-0.89)		
		Fatal CHD	Almost never	1.00		0.007
			≥5 serves/week	0.61 (0.35-1.05)		
		Non-fatal MI	Almost never	1.00		0.04
			≥5 serves/week	0.68 (0.47-1.00)		
Adventist Health Study <sup>9</sup>	26 473 (M/F)	Non-fatal MI	<1 serve/week	1.00	<0.005	
			≥5 serves/week	0.49 (0.28-0.85)		
		Fatal CHD	<1 serve/week	1.00		<0.001
			≥5 serves/week	0.52 (0.36-0.76)		
Physicians' Health Study <sup>11</sup>	21 454 (M)	Sudden CHD death	<1/month	1.00	0.01	
			≥2 serves/week	0.53 (0.30-0.92)		
		Fatal CHD	<1/month	1.00		0.06
			≥2 serves/week	0.70 (0.50-0.98)		
Iowa Women's Health Study <sup>12</sup> 12yr follow-up	34 111 (F)	Fatal CHD	<1 serve/month	1.00	0.24	
			≥2 serves/week	0.81 (0.60-1.11)		
Iowa Women's Health Study <sup>13</sup> 15yr follow-up	31 778 (F)	Fatal CHD	<1 serve/week	1.03 (0.84-1.26)	0.02	
			≥5 serves/week	0.71 (0.55-0.91)		
		Fatal CVD	<1 serve/week	1.00 (0.86-1.17)		0.0008
			≥5 serves/week	0.72 (0.60-0.88)		

\* multivariate-adjusted

## Clinical Studies

A large number of clinical studies have been conducted looking at the beneficial effects of nuts on cardiovascular risk factors, in particular blood fats. The results of a number of these studies are summarised in two recent reviews, showing that the regular inclusion of nuts in the diet can lower both total and LDL cholesterol<sup>14,15</sup>. Despite many different study designs, diverse population groups, variation in the length of the studies and the quantity of nuts consumed, the research has *consistently* shown that the inclusion of nuts in a diet low in saturated fat and cholesterol has benefits on blood fats when compared to a low fat or typical Western diet<sup>15</sup>. Studies have also looked at the effects of nut consumption on oxidative stress, a key factor in atherosclerosis, and endothelial function – the health of blood vessel walls.

### The effect of nut consumption on blood fat profiles

A raised blood LDL cholesterol level is a risk factor for heart disease. A recent review of 25 studies found that diets containing nuts reduce LDL cholesterol by 3–19% compared with Western and lower fat diets<sup>15</sup>. An earlier review found that the cholesterol reduction observed in clinical studies of nuts is about 25% greater than would be expected based on blood cholesterol predictive calculations so the effect of nuts is greater than expected<sup>16</sup>. A number of these studies have also demonstrated an increase in HDL (good) cholesterol. The quantity of nuts consumed ranged between 40 and 100g per day. Studies of almonds show evidence of a dose response across an intake range of 34 to 100g/day, suggesting a greater benefit may be obtained from a higher intake of nuts.<sup>17,18</sup>

While almonds and walnuts have had the most research to date, clinical studies have also shown benefits for other nuts including hazelnuts, macadamias, pecans and pistachios. The results of these studies suggest that all types of nuts are likely to benefit heart health.<sup>22,29,32,35,36,43,44</sup>

### The effect of nut consumption on oxidative stress

Oxidation of LDL cholesterol is a key step in atherosclerosis – the blocking and hardening of arteries. One study found a significant reduction in oxidised LDL following the consumption of almonds (providing 22.2% of total energy, average 73g almonds/day) for 1 month.<sup>17</sup> While a traditional Mediterranean diet including nuts (30g of almonds, hazelnuts and walnuts per day) was found to reduce oxidized LDL over 3 months, the findings did not reach significance.<sup>19</sup> Other studies however have failed to show such an effect suggesting that further research is needed.

Nuts contain a range of antioxidants including vitamin E, selenium, copper and zinc among others, with almond skins being found to contain about 30 different antioxidant compounds<sup>20</sup>. An experimental feeding study found a reduction in protein thiol concentration (a marker of oxidative stress) following a meal containing 60g of almonds.<sup>21</sup> Another study using macadamias found a reduction in markers of oxidative stress following the consumption of 40–90g/day of macadamias (15% of total energy) for 4 weeks.<sup>22</sup>

### The effect of nut consumption on endothelial function

Endothelial dysfunction or dysfunction of the normal biochemical processes carried out by the endothelium (cells lining the inner surface of blood vessels) is believed to be a key event in the development of atherosclerosis and is associated with an increased risk of stroke and heart attack. Nuts may influence endothelial function in a number of ways including nitric oxide production, endothelin-1 production and involvement in cell adhesion and inflammatory processes<sup>23</sup>. One study found that consumption of 40–65g of walnuts as part of a low fat, plant-based diet significantly improved endothelium-dependant vasodilation (relaxation of blood vessel walls) and reduced levels of vascular cell adhesion molecule-1, or VCAM-1 (a human gene which is thought to play a role in the development of atherosclerosis).<sup>24</sup> Another study observed improvements in flow-mediated dilation (a measure of endothelial function) with the addition of walnuts to a high fat meal.<sup>25</sup> Consumption of 40–90g/day of macadamia nuts for 4 weeks favourably improved markers of blood clotting and inflammation.<sup>22</sup> Nuts are a good source of arginine, the precursor of nitric oxide which causes relaxation of blood vessels walls, and may partly explain their benefits on endothelial function.

### The effect of nut consumption on postprandial glycemia

Postprandial glycemia (high blood glucose levels following a meal) are now recognized as an important risk factor for CVD and a meta-analysis of 38 studies found a positive relationship between postprandial glycemia and cardiovascular disease risk, even in the normal range (below the level at which diabetes is diagnosed).<sup>26</sup> One study has found that the addition of almonds to a meal can reduce blood glucose and insulin levels following the meal and that these changes were associated with less markers of oxidative damage. Unlike other nuts chestnuts contain low glycaemic index carbohydrates which also help control blood glucose levels. These provide other possible mechanisms by which nuts may reduce the risk of CHD.

### The effect of nut consumption within a cholesterol lowering diet

While diets containing nuts have been clearly shown to reduce blood cholesterol levels, maximum dietary cholesterol reductions are likely to be achieved as part of a whole diet approach. Jenkins and colleagues (2003, 2005) found that a vegetarian diet, very low in saturated fat and cholesterol and high in plant sterols, soy protein, soluble fibre and almonds (14g/1000kcal) reduced LDL cholesterol by about 30%, similar to that seen with low dose cholesterol lowering statin drugs (20mg/day).<sup>27,28</sup>





# Nuts and weight management

Despite a significant body of evidence showing the benefits of nuts for heart health, there remains concern among both the general population and health professionals regarding the role of nuts in weight management. Research in those with high cholesterol levels, however has shown that nuts do not cause weight gain when included as part of a cholesterol lowering diet.<sup>17,18,29-40</sup> And some studies have found that including nuts as part of a kilojoule-controlled eating plan can contribute to weight loss.<sup>41,42</sup> These findings are supported by epidemiological studies which suggest that those who eat nuts at least 5 times a week do not weigh more than those who consume nuts less than once per week. Three large studies show a trend towards lower BMIs in those who consume nuts more frequently.<sup>9,10,12</sup> For more details see *The Role of Nuts in Weight Management*.

## Nuts in a healthy diet

Nuts not only offer many health benefits, but also provide flavour, texture and variety to any healthy eating plan. Here are 10 ways to incorporate nuts into your healthy diet:

1. sprinkle chopped almonds and walnuts on breakfast cereals or muesli
2. use a pure nut spread (eg almond or brazil nut spread) on toast in place of butter or margarine
3. toss some macadamias or pine nuts into a salad
4. make pesto for pasta using pistachios or pine nuts ground up with fresh basil, garlic and olive oil
5. add cashew nuts to stir-fries
6. make a crust for fish by combining breadcrumbs with crushed macadamias or pistachios
7. mix chopped hazelnuts or pecans in muffins or cakes
8. add extra crunch to dips with macadamias or walnut pieces
9. use roasted chestnuts in place of potato at evening meals
10. snack on a handful of mixed nuts

For recipe ideas using nuts and more health information visit [www.nutsforlife.com.au](http://www.nutsforlife.com.au)



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### Glossary

**BMI** – Body Mass Index is a measure of a person's weight scaled according to height. Defined as weight (in kg) divided by the square of height (in metres). A BMI of 18.5 to 25 is considered a normal weight, 25–30 is overweight and over 30 is considered obese.  
**CVD** – Cardiovascular Disease refers to diseases involving the heart and blood vessels, including heart disease, stroke and other blood vessel disease.  
**CHD** – Coronary Heart Disease (also known as Coronary Artery Disease, CAD, and Ischemic Heart Disease, IHD) refers to disease resulting from blockage of the arteries to the heart.  
**MI** – Myocardial Infarction (also known as a Heart Attack) occurs when the blood supply to the heart is interrupted, resulting in damage and possible death of heart tissue.

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