

Health Benefits of Salmon and Salmon-Related Products

There are seven major health issues in which salmon products have been shown to be of potential benefit:

- facilitating weight loss
- improving bone health and prevention of osteoporosis
- improving the functioning of the immune system and the body's ability to fight infection
- heart health
- improving overall nutrition
- promoting brain development and intelligence
- general health and prevention of major diseases such as cancer and diabetes

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WEIGHT LOSS

Background

More than half of all New Zealand adults and nearly a third of New Zealand children are overweight or obese.¹ Women's magazines are constantly publishing new, celebrity-endorsed, sure-fire, weight-loss diet. Despite all this dieting we are actually getting fatter. In theory it's all very easy: if we eat too much, we put on weight; if we eat less, we lose weight. In practice though, it is not that simple.

How does the body know when it has had enough food?

When we begin to eat, the body responds by releasing two small proteins. One is known as leptin and the other as amylin. These proteins travel in the blood to the brain. The amount of these proteins which reach the brain is one of the means by which we decide how "full" we are. Normally this mechanism ensures we eat just the right amount of food to meet the body's needs.

Why do we gain weight?

The problem is we don't always eat when we are hungry and we don't always stop eating when we are no longer hungry. This means we may end up eating more food than the body requires. Excess food or calories are stored as body fat.

Why is it so hard to lose weight?

In people who are very overweight, the brain becomes less sensitive to changes in the amount of leptin and amylin in the blood. This means the "full" feeling does not actually occur until an excess of food has been eaten. When overweight people try to reduce the amount of food they are eating, they feel hungry making it very difficult for them to stick to the weight-loss diet.

A role for salmon products in assisting weight loss

There are two proteins found in salmon which may be of benefit in assisting weight loss.

Calcitonin

Calcitonin is a hormone produced by salmon. Purified calcitonin from salmon acts in a similar way to amylin when given to animals. It results in the animal eating less food and therefore losing weight.²⁻⁶ Calcitonin has not been shown to have any effect on satiety in humans.

Chondroitin Sulphate

In order for the body to access the energy or calories in food, the food must be absorbed by the gut. Another means of achieving weight loss therefore is by preventing absorption of food in the gut. Of all the things we eat, dietary fat contains the most energy or calories. For this reason many weight-loss diets restrict the amount of fat that can be eaten. However, one of the reasons people fail to stick to a diet is because they feel they are missing out on all the foods they like to eat. These foods tend to be high in fat.

Chondroitin (pronounced kon-droy-tin) sulphate is a compound present in the nose cartilage of the salmon. In animals it has been shown to prevent dietary fat from actually being fattening. It appears to work in two ways. Firstly it reduces the amount of dietary fat which is absorbed by the gut and secondly it prevents fat that actually is absorbed from being stored within the body. Chondroitin sulphate has not been trialled in humans however it may be useful as a weight-loss supplement. Aside from weight loss, there are many other health benefits associated with a low-fat diet such as a reduction in blood cholesterol and risk of heart disease. Chondroitin sulphate may therefore have wide-ranging health effects.⁷

In Brief

More than 50% of NZ adults are overweight. These statistics are similar to those for most other Western countries. The diet industry is big business.

Salmon products have been shown to cause weight loss in animals by:

- making animals feel “full” therefore they eat less
- preventing the body from absorbing fat from the diet
- preventing the body from using dietary fat to make body fat

Note: these products have only been tested in animals not humans. The human body makes calcitonin as well. Salmon calcitonin is used as a drug for osteoporosis in humans, it is highly unlikely that eating salmon flesh would affect circulating levels of calcitonin in humans.

BONE HEALTH

Background

Osteoporosis affects more than half of all New Zealand women and almost a third of New Zealand men over the age of 60. More than 3000 New Zealanders suffer from hip fracture each year. Although not commonly thought of as a life-threatening condition, approximately one third of those who suffer a hip fracture die within the next year from related complications and another third remain hospitalized or institutionalized. Many of those who do return home have impaired mobility and as a result, a loss of independence.⁸ At the time of the 2001 census, approximately half a million New Zealanders were aged 65 years or over.⁹ As the population continues to age, the proportion of people in this age bracket will increase.

Salmon products and osteoporosis prevention

Omega 3 fatty acids, which are present in all fish oils, may also increase bone mass. Although the majority of the research in this area has been conducted in animals, two studies in elderly women have also demonstrated a reduction in bone loss (particularly at the hip) with fish oil supplementation (6g/day).^{10,11}

In Brief

Osteoporosis is a major health issue for New Zealand as well as other Western countries.

The omega 3 fatty acids may be of benefit in preventing bone loss and therefore reducing the incidence of osteoporosis.

IMMUNE HEALTH

Background

The body is constantly defending itself from attack by bacteria and viruses. Unfortunately, now and again something manages to slip past the body's defences and we become infected. Colds, the flu and food poisoning are some of the most common consequences of infection. Our lifestyle impacts on how well the immune system (body's defence system) functions. Stress and a poor diet weaken the immune system and make us more susceptible to infection.

Role of Salmon Products

There are certain nutrients which are very important for the functioning of the immune system. One of these is selenium, of which salmon is a very good source.¹² The omega-3 fatty acids found in salmon oil are anti-inflammatory and therefore are beneficial in alleviating some of the symptoms of arthritis – especially Rheumatoid Arthritis.¹³

In Brief

Salmon is a good source of some of the nutrients required for optimal functioning of the immune system.

HEART HEALTH

Background

One of the major risk factors for heart disease is having too much and/or the wrong balance of fats in the blood. Blood is the means by which nutrients, waste products and hormones are transported from one part of the body to another. Eating a high fat diet will therefore increase the amount of fat in the blood. Most people are aware that high cholesterol and high blood pressure are detrimental for heart health but high levels of certain types of fats known as triglycerides in the blood are just as dangerous. Blood triglyceride levels are raised, just as blood cholesterol levels are, by eating a diet rich in saturated fat.

Role of Salmon Products

The omega 3 essential fatty acids, of which salmon is a rich source, are widely known for their protective role in heart health. The main effect of these fats appears to be in improving blood lipid profile and reducing blood pressure.¹⁴⁻¹⁶ Salmon muscle also contains peptides that may lower blood pressure.¹⁷

Several trials focusing on the effects of increasing the amount of fish in the diet on heart health have been carried out in humans. In one trial, subjects ate a variety of fish-rich foods (including salmon pate) for two 3-week periods. At the end of the fish-eating period subjects had significantly lower blood pressure and serum triglycerides (“bad” fat in the blood) and significantly higher levels of long chain fatty acids in the blood (“good” fat).¹⁸ Another trial involving adults with high cholesterol levels found that eating 3g of salmon oil per day for 4 weeks significantly reduced the level of triglycerides in the blood and increased the level of HDL cholesterol (good cholesterol).¹⁹

In Brief

Including fish, particularly fish rich in omega 3 fats such as salmon, in the diet has been shown to lower blood pressure and cholesterol levels. Eating fish at least 3 times a week is recommended as a means of reducing the risk of heart disease.

OVERALL NUTRITION

Background

In most developed countries the majority of people have ample food to eat. However in certain population groups namely children, women (especially pregnant women) and the elderly, nutrient deficiencies are still common. Mineral deficiencies eg iron and calcium are particularly common. New Zealanders as a population are reported to have sub-optimal intakes of iodine and selenium. Women tend to have low intakes of calcium and iron and calcium is also an issue for children. A nutrient deficiency may result simply from not eating enough of the types of food in which that nutrient is found. Alternatively it may arise from eating foods which inhibit the absorption of the nutrient. Even though intake of the nutrient is adequate, very little of the nutrient is actually being absorbed by the gut. This is referred to as low bioavailability.

Role of Salmon

Salmon flesh is not only a rich source of many minerals but minerals in salmon are easily absorbed by the gut. In addition, by-products of the salmon industry such as blood, bone, fins, gills and guts are also an excellent source of many valuable dietary minerals including calcium, magnesium, iron, selenium, iodine, manganese, copper, phosphorus and zinc. These same by-products are also a source of the omega 3 fatty acids. It is possible to extract these nutrients from the by-products and this represents an under-exploited area for the salmon industry.²⁰

In addition to providing necessary dietary minerals, salmon appears to limit the health effects associated with certain mineral deficiencies. One of the consequences of zinc deficiency is a build-up of fat in the liver. Feeding salmon oil as opposed to coconut oil to zinc deficient animals resulted in substantially less build-up of fat in the liver.²¹ Salmon oil may therefore help to prevent the build-up of damaging fatty deposits in people who are nutrient deficient such as possibly some of the elderly.

Antioxidants have been widely promoted as being beneficial for a number of health issues including heart disease, cancer and even ageing. Salmon oil has been shown to increase antioxidant activity in the liver as well as in the heart muscle when fed to mice.^{22,23}

In Brief

Salmon is a good source of not only omega 3 fats but also many essential minerals which are required for good nutrition and optimal health.

BRAIN DEVELOPMENT

Background

The brain contains a large amount of fat. Certain types of fat are preferentially incorporated into the brain. In particular, omega-3 fatty acids especially docosahexaenoic acid (DHA) are present in very high quantities in brain tissue. In rats, a high DHA diet increased brain activity and cognitive function.²⁴ DHA is thought to be essential for the growth and functional development of the brain in infants. Inclusion of high levels of DHA in the diet improves learning ability. Eye function is also improved in infants if the formula includes DHA. It is therefore believed that DHA may be critical for optimising brain activity (and therefore intelligence) in humans as well.²⁵

Role of Salmon

Salmon is a rich source of omega-3 fatty acids including DHA. Piglets are often used as a model for human infants. Feeding salmon oil-supplemented infant formula to piglets has been shown to increase body levels of DHA. As little as 5% salmon oil added to the diet of rats significantly increased DHA levels in these animals.^{26,27}

In Brief

Omega 3 fatty acids, particularly DHA, appear to be essential for brain development during infancy. Salmon is a good source of omega 3 fats including DHA.

GENERAL HEALTH & PREVENTION OF MAJOR DISEASES

Background

Diabetes and cancer are two of the most common diseases afflicting people living in Western countries. At least in part these diseases are believed to be a result of the Western lifestyle which is characterised by a high saturated fat diet and physical inactivity.

Salmon and Diabetes

One large-scale study has been conducted on people living in the north-west Pacific. As a population, those living in this area have a high tendency to develop early-onset diabetes. This study found that incidence of high blood sugar (known as glucose intolerance) was much lower in those people consuming a traditional, salmon-rich diet compared to those who had adopted a Western-style diet.^{28,29, 31}

Salmon and Cancer

Ensuring the right amount of omega-3 fatty acids is eaten may be a means of reducing the risk of cancer as well as the spreading of cancer and the growth of tumours.^{29,30, 31} Omega 3 fats have also been shown to reduce cancer cell growth in the laboratory.

In Brief

Consumption of fish and fish oils has been associated with a reduced risk of diabetes. It may also aid in reducing the risk of cancer.

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