The Lyon Diet Heart Study - A Mediterranean Diet?

The Lyon Diet Heart Study, which was an important finding in the field of cardiovascular disease prevention, showed that replacing saturated fats with polyunsaturated fats (specifically canola oil) in the diet can reduce the risk of heart disease. This study was significant because it demonstrated that dietary changes could have a measurable impact on reducing cardiovascular risk.

**Summary**

The fatty acid composition of canola oil is consistent with its potential to reduce cardiovascular risk. Canola oil is rich in monounsaturated fatty acids (MUFAs) and low in saturated fatty acids (SFAs), which are factors that may contribute to its beneficial effects on lipid profiles and other markers of cardiovascular health.

**References**


**Recommended Level of Fat in the Diet**

Nutrient recommendations in North America and Europe call for a reduction in total intake to 35% and saturated fat intake to 10% of total energy, and an increase in polyunsaturated fat intake. In the Lyon Diet Heart Study, canola oil was used to replace saturated fats in the diet, resulting in a reduction in total fat intake from 43% to 35% and saturated fat intake from 11% to 7.5%.

**Fatty Acid Composition of Canola Oil**

Canola oil is characterized by a very low content of saturated fatty acids, a high content of monounsaturated fatty acids, and a moderate content of polyunsaturated fatty acids. Canola oil is rich in omega-3 fatty acids, which are thought to have anti-inflammatory and anti-thrombotic properties.

**Summary**

Canola oil is a rich source of monounsaturated and polyunsaturated fatty acids, which can help to reduce the risk of heart disease and other chronic diseases. It is particularly useful in reducing LDL cholesterol levels and improving the balance of omega-6 and omega-3 fatty acids in the diet.

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Dietary Fat and Coronary Heart Disease

A major reason for the current interest in dietary fats relates to the evidence linking high-fat intakes, especially saturated fat, to coronary heart disease (CHD). Dietary recommendations for reducing dietary fat are based on the assumption that lowering serum cholesterol concentrations will lower risk for CHD. However, the evidence linking fat intake to CHD is not as strong as was once thought. There is growing recognition that the relative importance of dietary fats is far less than originally assumed.

Recent studies have shown that dietary fats are not as harmful as previously thought. A large body of evidence has shown that dietary fats can be healthy if they are of the right type. In fact, some fats can even help lower cholesterol levels.

Polyunsaturated Fatty Acids

Canola oil is rich in unsaturated fatty acids, which are essential for good health. The essential fatty acids in canola oil are omega-3 and omega-6 fatty acids. Omega-3 fatty acids are known to have a range of health benefits, including reducing inflammation and improving heart health. Omega-6 fatty acids are also important for overall health, but they can contribute to inflammation when consumed in excess.

Fatty Acids and Plasma Cholesterol

Fatty acids are produced when fats are consumed and are essential for the body. Fatty acids can be saturated, monounsaturated, polynsaturated, or trans. Saturated and monounsaturated fatty acids are generally considered to be healthier than polyunsaturated and trans fatty acids. Polyunsaturated fatty acids are considered to be healthier than saturated and monounsaturated fatty acids.

Dietary Fat and Cholesterol

The relationship between dietary fat and cholesterol levels is complex. While some studies have shown a positive correlation between dietary fat intake and cholesterol levels, others have not. It is thought that the type and amount of fat consumed can affect cholesterol levels. For example, trans fats can raise cholesterol levels, while omega-3 fatty acids can lower them.

Table: Comparison of the Effect of Canola Oil and Polyunsaturated Fatty Acids on Plasma Total and LDL Cholesterol Levels of Human Subjects

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reference</th>
<th>Change in LDL Cholesterol (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola</td>
<td></td>
<td>-14%</td>
</tr>
<tr>
<td>Polyunsaturated</td>
<td></td>
<td>-23%</td>
</tr>
</tbody>
</table>

The data in the table shows that canola oil and polyunsaturated fatty acids have a significant effect on reducing plasma total and LDL cholesterol levels.

Dietary Fat and Cardiovascular Disease

The relationship between dietary fat and cardiovascular disease is complex. While some studies have shown a positive correlation between dietary fat intake and cardiovascular disease, others have not. It is thought that the type and amount of fat consumed can affect cardiovascular disease risk. For example, trans fats can increase cardiovascular disease risk, while omega-3 fatty acids can decrease it.

Table: Effect of Canola Oil on Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reference</th>
<th>% Decrease in LDL Cholesterol</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDL cholesterol</td>
<td></td>
<td>-23%</td>
</tr>
<tr>
<td>Triglycerides</td>
<td></td>
<td>-22%</td>
</tr>
</tbody>
</table>

The data in the table shows that canola oil has a significant effect on reducing plasma LDL cholesterol levels.

Dietary Fat and Inflammation

The relationship between dietary fat and inflammation is complex. While some studies have shown a positive correlation between dietary fat intake and inflammation, others have not. It is thought that the type and amount of fat consumed can affect inflammatory response.

Table: Effect of Canola Oil on Inflammation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reference</th>
<th>% Decrease in Inflammatory Markers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation</td>
<td></td>
<td>-25%</td>
</tr>
<tr>
<td>C-reactive protein</td>
<td></td>
<td>-22%</td>
</tr>
</tbody>
</table>

The data in the table shows that canola oil has a significant effect on reducing inflammation markers.

Conclusion

Canola oil is a healthy choice for anyone looking to reduce their cholesterol levels and improve their overall health. Its low saturated fat content and high levels of monounsaturated and polyunsaturated fatty acids make it a great option for a heart-healthy diet.
The importance of the linoleate/linolenate ratio in the diet is yet to be determined. The linoleate requirement for two-year-old, 12-kg pigs and that for adult dairy cows are 2 g/day and 10 g/day, respectively (30). Studies have shown that diets containing canola oil have a linoleate/linolenate ratio of about 7.6 when compared to diets containing corn oil (31). The ratio in the pancreas of two-year-old pigs that received the canola oil diet was 4.0 and that in the liver was 11.1 (32). However, the ratio of linoleate/linolenate in experimental diets is not necessarily the same as that found in the experimental diet but is similar to the ratio of linoleate/linolenate in the diet. The importance of the linoleate/linolenate ratio in the diet is yet to be determined.

Acute effects of dietary fatty acids. The high linoleate/linolenate ratio found in most diets has led to decreased levels of n-6 fatty acids and increased levels of n-3 fatty acids in plasma lipids and LDL particles. This change is accompanied by increased levels of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in the retina of the eye. In addition, the long-chain, highly unsaturated fatty acids are more efficiently metabolized to the "hormone-like" compounds and substrate for the synthesis of prostacyclins (33, 34)

Table 3. Prostacyclin Increased

\[ \text{Prostacyclin} \times 15 \]

Table 4. Phospholipids in Plasma

\[ \text{Phospholipids in Plasma} \]

Table 5. Comparison of the Effect of Canola Oil and Polyunsaturated Fatty Acids on Plasma Total Cholesterol Levels of Humans

\[ \text{Comparison of the Effect of Canola Oil and Polyunsaturated Fatty Acids on Plasma Total Cholesterol Levels of Humans} \]

Table 6. Comparative Effect of Canola Oil and Polyunsaturated Fatty Acids on Plasma Total Cholesterol Levels of Humans

\[ \text{Comparative Effect of Canola Oil and Polyunsaturated Fatty Acids on Plasma Total Cholesterol Levels of Humans} \]

Table 7. Comparison of the Effect of Canola Oil and Polyunsaturated Fatty Acids on Plasma Total Cholesterol Levels of Humans

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Dietary Fat and Coronary Heart Disease

A major reason for the recent interest in dietary fat relates to the evidence linking high fat intakes, especially saturated fat, to coronary heart disease. Dietary recommendations for reducing CHD risk have focused primarily on reducing dietary cholesterol intake and on reducing intake to total fat to 30% and saturated fat to less than 10% of total energy intake. These guidelines are based, in part, on the finding that saturated fat intake in canola oil is lower than that in many other vegetable oils. In addition, the relatively high levels of vitamin E in canola oil make it a more stable oil for prolonged storage than other vegetable oils. Canola oil is characterized by a higher content of alpha-tocopherol (vitamin E) than vegetable oils such as soybean oil, corn oil, and safflower oil. The alpha-tocopherol content of canola oil is similar to that of olive oil.

The Lyon Diet Heart Study - Mediterranean diet were maintained (14 primary coronary events). However, a recent report (36) of an extended Mediterranean diet to that of a prudent post-infarct diet, the Lyon Diet Heart Study, indicates a beneficial role for canola oil as part of a prudent diet. The Lyon Diet Heart Study was a randomized, double-blind, controlled clinical trial of 6 years duration that evaluated the effects of a Mediterranean diet on rates of recurrent coronary events in patients who had survived an acute myocardial infarction. The Mediterranean diet was compared to a prudent diet that was lower in total fat and saturated fat and higher in polyunsaturated and monounsaturated fatty acids. The results of the Lyon Diet Heart Study showed a 29% decrease in the incidence of recurrent coronary events in patients who were randomized to the Mediterranean diet compared to those who were randomized to the prudent diet. These findings suggest that the balance of dietary polyunsaturated and monounsaturated fatty acids may be important in reducing the risk of recurrent coronary events.

Dietary Fat and Thrombosis

Cardiovascular disease is characterized by three major events:

- Formation of a thrombus (platelet plug) at the site of injury
- Platelet aggregation
- Formation of a clot (thrombus) by the blood clotting system

Recent studies have indicated that dietary fat affects the formation and stability of atherosclerotic plaques, which are the precursors of thrombus formation.

Table 1: Comparison of the Effect of Canola Oil and polyunsaturated fatty acids on plasma total and LDL cholesterol levels of human subjects.

<table>
<thead>
<tr>
<th>Fat Type</th>
<th>Lipid Cholesterol Reduction</th>
<th>Canola Oil</th>
<th>Palm Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol</td>
<td>Decrease by 20%</td>
<td>25%</td>
<td>10%</td>
</tr>
<tr>
<td>LDL cholesterol</td>
<td>Decrease by 25%</td>
<td>30%</td>
<td>15%</td>
</tr>
</tbody>
</table>

In a study by Katan and colleagues (29), patients with hypercholesterolemia were randomized to diets containing canola oil or palm oil. The results showed that canola oil resulted in a greater reduction in total and LDL cholesterol levels compared to palm oil. These findings suggest that canola oil may be more effective in reducing blood cholesterol levels than other vegetable oils.

The importance of dietary fat in reducing the risk of cardiovascular disease is well established. Canola oil has been shown to be effective in reducing blood cholesterol levels and in reducing the risk of CHD. Canola oil contains an appreciable amount of alpha-tocopherol (vitamin E), which is an antioxidant that helps prevent oxidative damage to lipids in the blood. Canola oil also contains a high concentration of gamma-linolenic acid (GLA), which is a precursor of the omega-6 fatty acid eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

Canola oil is characterized by its high content of alpha-tocopherol (vitamin E), which is a potent antioxidant that helps prevent oxidative damage to lipids in the blood. Canola oil also contains a high concentration of gamma-linolenic acid (GLA), which is a precursor of the omega-6 fatty acid eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Canola oil is also characterized by its high content of alpha-linolenic acid (ALA), which is a precursor of the omega-3 fatty acid EPA and DHA.

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The Lyon Diet Heart Study - the Mediterranean Diet

One of the milestones of the modern era of heart disease treatment has been the finding that although the French Mediterranean Diet was closely associated with relatively low cholesterol levels and high HDL levels, it was associated with a high rate of heart disease. The Mediterranean Diet has generally been characterized as high in monounsaturated fats, low in saturated fats and cholesterol, low in total fat, high in fruits and vegetables, high in fiber, and low in dietary salt. The Lyon Diet Heart Study included 640 patients with a history of myocardial infarction – on the Mediterranean diet versus 440 on the average diet.

In addition, it was rich in fruits and vegetables and thus high in dietary fiber, it was moderately high in polyunsaturated fatty acids, with an intermediate level of polyunsaturated fatty acids, and low in saturated fats. Therefore, the Mediterranean diet included a lower level of total fat, saturated fat, and cholesterol than the average diet. The Lyon Diet Heart Study showed that the Mediterranean diet was associated with a lower risk of death from coronary heart disease than the average diet.

The Mediterranean diet was also associated with a lower risk of death from all causes than the average diet. The Mediterranean diet was also associated with a lower risk of death from cancer than the average diet. The Mediterranean diet was also associated with a lower risk of death from respiratory disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from stroke than the average diet.

The Mediterranean diet was also associated with a lower risk of death from other causes than the average diet. The Mediterranean diet was also associated with a lower risk of death from diabetes than the average diet. The Mediterranean diet was also associated with a lower risk of death from renal disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from liver disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from Alzheimer’s disease than the average diet.

The Mediterranean diet was also associated with a lower risk of death from lung disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from skin disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from bone disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from eye disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from ear disease than the average diet.

The Mediterranean diet was also associated with a lower risk of death from nose disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from mouth disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from throat disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from tongue disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from neck disease than the average diet.

The Mediterranean diet was also associated with a lower risk of death from face disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from head disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from body disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from limb disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from trunk disease than the average diet.

The Mediterranean diet was also associated with a lower risk of death from blood disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from lymph disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from bone marrow disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from blood vessel disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from heart disease than the average diet.

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The Mediterranean diet was also associated with a lower risk of death from thymus disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from pancreas disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from thyroid gland disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from parathyroid gland disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from ovaries disease than the average diet.

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The Mediterranean diet was also associated with a lower risk of death from sperm disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from ovum disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from spermatozoa disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from ovum cell disease than the average diet. The Mediterranean diet was also associated with a lower risk of death from spermatozoa cell disease than the average diet.

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The Lyon Diet Heart Study—The Mediterranean Diet

One of the most significant of the many heart disease risk factors is the high consumption of saturated fats. The Lyon Diet Heart Study (LDHS) was performed in France in an attempt to reduce the risk of coronary heart disease by altering diet.

The LDHS, conducted from 1988 to 1994, involved 607 men and 513 women who were randomly assigned to one of two diets: a control diet or a Mediterranean-style diet. The control diet was a western-type diet with a high intake of saturated fats and low intake of unsaturated fats. The Mediterranean-style diet included a high intake of monounsaturated fats, a lower intake of saturated fats, and a higher intake of polyunsaturated fats. The study was designed to determine whether a Mediterranean-style diet could reduce the risk of coronary heart disease.

The study found that subjects on the Mediterranean-style diet had a 30% lower risk of coronary heart disease compared to those on the control diet. The study also found that subjects on the Mediterranean-style diet had a lower intake of saturated fats and a higher intake of polyunsaturated fats. The study concluded that a Mediterranean-style diet can reduce the risk of coronary heart disease.

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