
Editorial

Dietary fat and stroke: a different story from coronary heart disease

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For several decades, clinicians and dietitians have made great efforts in the promotion of low fat diet to prevent and to combat heart disease and obesity. It is now increasingly recognized that not all fats are the same and the types of fat are more important than total fat intake in predicting risk of coronary heart disease (CHD)¹. Saturated fat and trans-unsaturated fatty acids are positively associated with CHD, whereas polyunsaturated and monounsaturated fat are inversely related to CHD²⁻⁵. However, these associations do not seem to apply to stroke. What is the link or whether there is a link between dietary fat and stroke has been puzzling researchers for many years.

Ecological studies suggested that saturated fat (mostly animal fat) was inversely associated with stroke⁶⁻⁸. Using data from 21 industrialized countries, Renaud⁸ summarized that dairy fat (rich in saturated fat) was positively related to CHD mortality. However, in the same countries, an inverse association between intake of dairy products and stroke was observed. Although ecological findings are helpful to generate hypotheses, it is prone to be biased by other lifestyle factors such as physical activity, smoking, and alcohol consumption.

Epidemiological studies on dietary fat and stroke are sparse. Gillman et al.⁹ reported an inverse association of dietary fat and ischemic stroke in men in the Framingham Heart Study. After following 832 middle-aged men for 20 years, the researchers found that total fat, saturated fat, and monounsaturated fat, but not polyunsaturated fat, were inversely associated with risk of ischemic stroke. An increment of 1% of energy from saturated fat was related to 9% of risk reduction in ischemic stroke.

In addition, Iso et al.¹⁰ conducted a study in the Nurses' Health Study on dietary fat and intraparenchymal hemorrhagic stroke, and found that women with lower saturated fat or trans-unsaturated fatty acid intake had higher risk of intraparenchymal hemorrhagic stroke. Compared with those who had higher intake of saturated fat, women in the lowest quintile of saturated fat intake had doubled risk of intraparenchymal hemorrhagic stroke. However, dietary cholesterol, monounsaturated and polyunsaturated fat were not related to risk of stroke in that study. Recently, our group examined the associations between dietary fat and stroke in the Health Professional Follow-up Study¹¹. During the 14 years of follow-up, we documented 725 incident strokes including 455 ischemic, 125 hemorrhagic and 145 unknown types of strokes among 43 732 healthcare professionals who were free from cardiovascular diseases and diabetes at baseline. After adjustment for potential confounders and major lifestyle variables, the association between the amount or the types of fat and risk of stroke in men was not found. For some selected foods rich in fat or cholesterol including red meats, high-fat dairy products, nuts and eggs, no significant association with stroke was observed.

Despite the fact that CHD and ischemic stroke share many of the same risk factors, previous studies depicted different pictures on dietary fat intake in relation to CHD and stroke. There are no convincing mechanisms yet to explain either inverse or no associations between dietary fat and stroke. One possible explanation is that blood cholesterol is not a surrogate marker for predicting stroke development. In contrast to

heart disease, for which the risk of cardiac events is directly associated with levels of blood cholesterol, there is no clear association between stroke and blood cholesterol. A meta-analysis including 45 prospective cohort studies found no association between blood cholesterol and stroke¹². However, most studies did not separate ischemic stroke from hemorrhagic stroke. In western countries, approximately 20% of all strokes are hemorrhagic strokes. Thus, any possible relation between blood cholesterol and ischemic stroke would be attenuated by inclusion of hemorrhagic cases. In addition, results from randomized trials are inconsistent with the association of blood cholesterol and stroke. An overview of trials of cholesterol lowering treatment involving more than 36 000 patients indicated no significant association between reduction in blood cholesterol and risk of stroke (relative risk 1.0; 95% confidence interval 0.8-1.2)¹³. However, recent trials suggested that the incidence of stroke was reduced by cholesterol lowering treatment (relative risk 0.75; 95% confidence interval 0.66-0.85)¹⁴. Nevertheless, we should consider that some of the effect of cholesterol lowering treatment may be through reduction of coronary events, which themselves predispose to stroke. It may be too early to make conclusions regarding the relation of blood cholesterol to stroke. Presumably, other factors such as nitric oxide and inflammation may play important roles in the pathogenesis of stroke in addition to atherosclerosis^{15,16}. Moreover, some specific fatty acids including long-chain omega-3 polyunsaturated fatty acids, α -linolenic acid and linoleic acid were demonstrated to be inversely associated with ischemic stroke. These indicated beneficial effects are probably due to the favorable effects of these fatty acids on platelet aggregation and endothelial function¹⁷⁻²¹.

Given the limited and inconsistent literature on dietary fat and stroke, future studies are clearly warranted. Randomized clinical endpoint trials are the most powerful for establishing diet-disease relations. However, it would be difficult to conduct a long-term, large scale, randomized trial on dietary fat and stroke because of practical considerations such as ethical issue and compliance problems. Large prospective cohort studies may be an alternative way to understand the effects of dietary fat on risk of stroke in different gender and ethnic groups. It is considerable to ascertain types of dietary fat intakes in relation to different subtypes of ischemic and hemorrhagic stroke because of the various pathogenesis of stroke subtypes.

Finally, a question may be raised as to how we can make recommendations on dietary fat intake based on the existing literature on dietary fat and stroke. Although we do not have evidence that dietary fat intake increases risk of stroke, it should not be misunderstood that a person does not need to care about his/her dietary fat intake. Instead, one needs to watch his/her dietary fat because increasing evidence supports that saturated fat and trans-unsaturated fatty acids are risk factors for

CHD, and monounsaturated and polyunsaturated fat may reduce the risk of heart disease. Therefore, a diet low in saturated fat and trans-unsaturated fatty acids, with adequate amounts of polyunsaturated and monounsaturated fat, especially long-chain omega-3 fatty acids derived from seafood, would be recommended. In addition, we should go beyond dietary fat in terms of stroke prevention. Other lifestyle factors such as regular exercise, no smoking, normal body weight and blood pressure, and moderate alcohol consumption are important in reducing the risk of stroke.

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