

The Scourge of Vegetable Oil—Destroyer of Nations

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If you think vegetable oil such as soybean, canola and sunflower is healthy, your brain and body will be harmed without you knowing it! If you take linoleic acid, an ω -6 fatty acid which is easily oxidized in delicatessen fried foods, fast foods and processed foods, it rusts your cells, so brain function declines, your mood becomes unstable, and thinking ability decreases. If electromagnetic waves rust these fatty acids further by entering the body from the circumstance, your brain will not be able to stand it at all. You should be scared of vegetable oil flooding the cities! If you take as little as you can of bad ω -6 oils and as much as you can of ω -3 oils, which are good for the brain, the brain will revive, but very few people know the underlying reason about this simple fact.

Here, I will review the scourge of vegetable oil for human health.

The Vegetable Oil-Derived Neurotoxin, Hydroxynonenal

Ethyl alcohol (ethanol) is detoxified by two liver enzymes: alcohol dehydrogenase and Aldehyde Dehydrogenase (ALDH). Alcohol dehydrogenase converts ethanol to acetaldehyde, while ALDH converts acetaldehyde to acetic acid, thereby detoxifying it. Acetaldehyde is highly toxic and causes hangovers such as headaches and nausea. Among the ALDH, it is the enzyme called ALDH2 which mainly decomposes acetaldehyde. Wild animals such as monkeys and chimpanzees also have ALDH2. Why do wild animals need alcohololytic enzymes? Because monkeys and chimpanzees feed on ripened tree nuts, sugar ferments spontaneously, and becomes an alcohol-containing food. So it is indispensable to nature, and essential for survival.

However, humans are divided into three categories: those who have “a lot (homo)” of this enzyme, those with “only half (hetero)”, and those with “none at all (null)”. About 40% of Japanese people have inactive ALDH2, which is equivalent to the latter two categories. Since it is difficult for them to decompose acetaldehyde, as soon as they drink alcohol, they turn red in the face, or even just by eating the lees of *sake* (Japanese rice wine), it makes their heart race.

There are statistics that show people with this inactive form of ALDH2 are 1.6 fold more likely to have Alzheimer's disease than those with the active enzyme. The risk of Alzheimer's disease is said to increase threefold also if they have APOE4 protein. Moreover, the incidence of Alzheimer's disease in people who have both of these genes, that is, people who are non-drinkers and have an APOE4 constitution, is a whopping 30 fold higher [1]. It's worrying if the risk is 1.6 fold, but 30 fold means that someone will inevitably get Alzheimer's disease when they are around 60 years old.

Why is this? Well, the inactive form of ALDH2 and APOE4 protein cannot detoxify hydroxynonenal, the causative agent in neuronal cell death. “-nal” is another term for “-aldehyde”. In other words, people with a constitution that can't decompose acetaldehyde, also can't decompose hydroxynonenal from vegetable oil.

Acetaldehyde from alcohol disappears from the body in 2 days. However, hydroxynonenal from the linoleic acid in vegetable oil accumulates in the body more and more as a neurotoxin (Figure 1), and it accumulates also in the brain although little by little. And by the age of 40, the curve of accumulation skyrockets. So, the hippocampus which is responsible for memories of words and shapes, and the nerve cells in

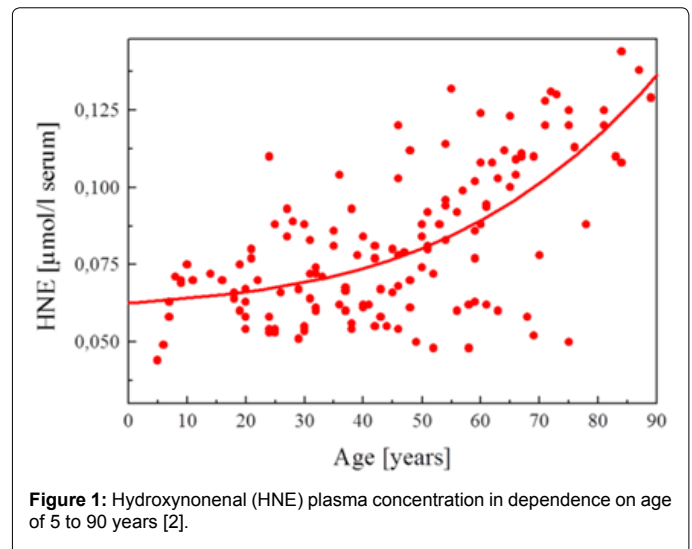


Figure 1: Hydroxynonenal (HNE) plasma concentration in dependence on age of 5 to 90 years [2].

the precuneus that integrate information, will die. As a result, memory and concentration decrease little by little, and Alzheimer's disease will eventually develop.

Exacerbation of Cerebrovascular Aging

It is said that over 95% of Alzheimer's disease is idiopathic, meaning that the cause is still unknown today. Researchers who believe in the “*amyloid β theory*” which was proposed half a century ago have decreased significantly in recent years. With the advent of PET scans which can directly look for amyloid β , it has now been found that some people with Alzheimer's disease do not have amyloid β accumulated in the brain, and conversely, there are many healthy elderly persons with a strong cognitive function who nevertheless do have a lot of amyloid β [2].

The cause of idiopathic Alzheimer's disease is clearly “aging” Getting old. Furthermore, people with lifestyle diseases such as type 2 diabetes, hyperlipidemia, hypertension and metabolic syndrome are also prone to Alzheimer's disease. What is common to “aging” and “lifestyle diseases”, and which is the main cause of oxidative stress? Undeniably, it is cerebral atherosclerosis which is associated with aging. Cholesterol and triglycerides accumulate in the blood vessels of the brain, the blood vessel walls thicken, and the inner lumen narrows - this is atherosclerosis. Then what happens? Blood flow is reduced to cause cerebral ischemia.

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This is the worst oxidative stress for the brain.

What will happen if this becomes chronic in decades to come? People who eat big meals or only meat burn a lot of carbohydrates and fat in the body. As a result, reactive oxygen species tend to be generated as exhaust gas in large quantities, and hydroxynonenal also easily accumulates in the body. Triglycerides and cholesterol deposit not only subcutaneously or around vital organs, but also on blood vessel walls. Smoking also inflicts permanent damage to blood vessel walls.

When blood flow decreases due to cerebral atherosclerosis, those places with poor blood circulation in the deepest part of the brain are affected. This is the precuneus and the hippocampus. When blood flow in the precuneus decreases, input of external information does not go smoothly, and attention and concentration are reduced. When blood flow in the hippocampus decreases, it appears as recent memory impairment so that new information cannot be memorized. Both are early symptoms of Alzheimer's disease.

The Mother of All Diseases-Despite its Healthy-Sounding Name!

The vegetable oil such as “rapeseed oil (canola oil)”, “soybean oil”, or “corn oil”, is extracted from the raw material by adding chemical solvents such as hexane, a petroleum solvent, and after processing at high heat, refining which includes “deacidification”, “decolorization”, “dewaxing” and “deodorization” is repeatedly performed to produce large amounts of edible oil. This is sold by the major oil manufacturers at a low price. The linoleic acid in vegetable oil produces hydroxynonenal due to high heat treatment at the factory, most of which will be removed during the refining process. However, the high heat when deep-fried food is cooked at home gives rise to hydroxynonenal again. This is taken into the body in cooked food, and accumulates for a long time in people with inactive ALDH2 and APOE4 protein.

Since hydroxynonenal is fat-soluble, it easily permeates blood vessels and cell membranes, and diffuses in the body just like poison

gas. My own research with Japanese monkeys showed that the toxic substance that kills neurons in a brain with Alzheimer's disease was not amyloid β which was suspected for more than half a century, but in fact was hydroxynonenal which is generated when vegetable oil is heated.

The results of injecting hydroxynonenal into monkeys once a week for half a year is shown in Figure 2. Although nothing happens in monkeys that were not injected, in the injected monkeys CA1 neurons in the hippocampus died (circled), and hepatocytes also underwent degeneration and necrosis. At autopsy, the liver showed a remarkable fibrotic change (rectangle). That's how scary hydroxynonenal, produced by subjecting vegetable oil to oxidative stress by high heat or electromagnetic waves.

Traditionally, linoleic acid, a polyunsaturated fatty acid of the ω -6 type which is the main ingredient of vegetable oil, was vaguely believed to be good for health. But it has recently been found that if too much linoleic acid is consumed, various inflammatory substances are made in the body, causing Non-alcoholic Steatohepatitis (NASH), type 2 diabetes, atherosclerosis, obesity and the like. The root cause of these diseases was previously suspected to be some toxic substance derived from linoleic acid which damaged the cells of our organs, but the details were hitherto unknown. Now, Kanazawa University monkey research group and myself have confirmed that the culprit is hydroxynonenal, and the situation has changed completely.

The lipid peroxide, hydroxynonenal derived from the linoleic acid, oxidizes heat shock protein 70 (human type: Hsp70.1) protecting the cell and ruptures the cellular organelle called the lysosome, a waste protein recycling plant, resulting in cell death. At the same time, when the concentration of calcium ions abnormally increases due to a decrease in cerebral blood flow due to aging or disease, calpain, which is a proteolytic enzyme, is activated. Amyloid β also facilitates this. When the activity of calpain abnormally increases, the oxidized Hsp70.1 is destroyed, the lysosomal membrane collapses, the proteolytic enzyme cathepsin leaks out, the cellular framework is gradually destroyed, and the cell dies. This is the “Calpain-Cathepsin Hypothesis” I proposed in 1998 [3].

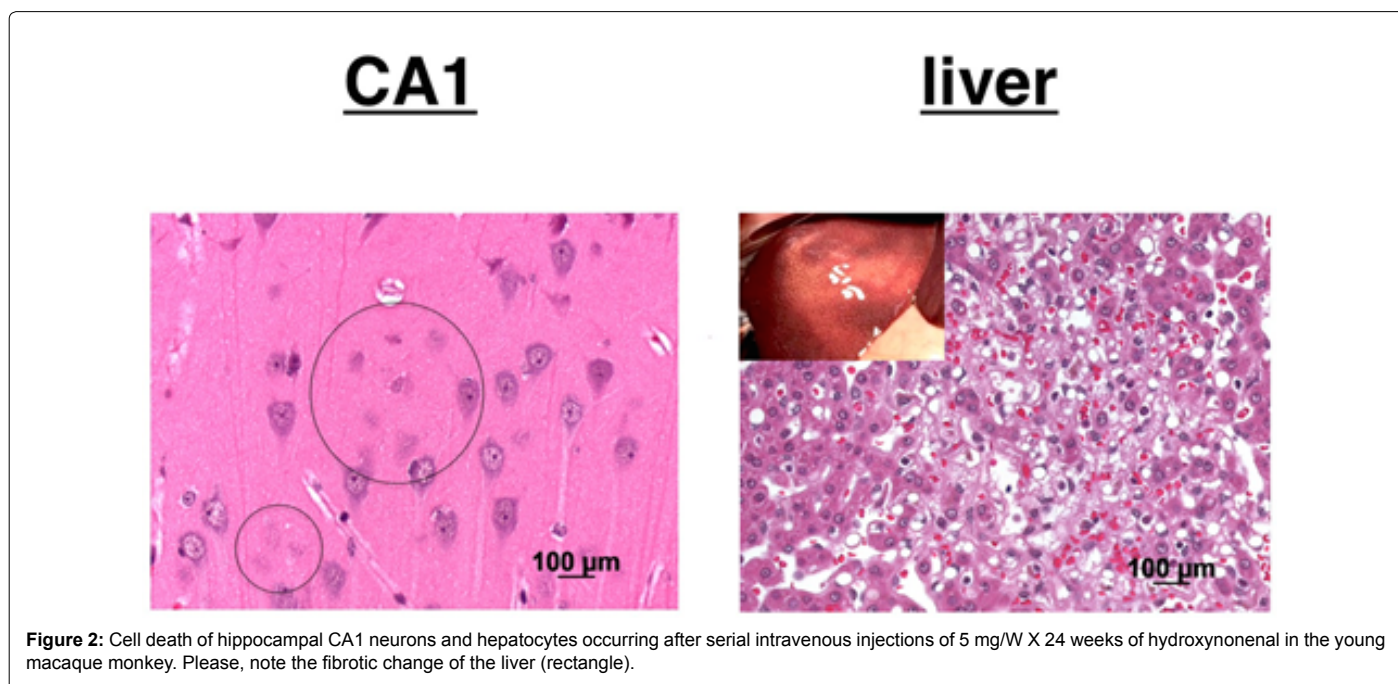


Figure 2: Cell death of hippocampal CA1 neurons and hepatocytes occurring after serial intravenous injections of 5 mg/W X 24 weeks of hydroxynonenal in the young macaque monkey. Please, note the fibrotic change of the liver (rectangle).

The calpain-cathepsin cascade can explain the mechanisms of not only ischemic neuronal death but also Alzheimer neuronal death [4-6]. I guess the similar cascade may work in hepatocytes, pancreatic β cells, adipocytes, vascular endothelial cells, etc. So, how can cell death be prevented? More than anything, the strength and quality of lysosomal membranes is paramount. If lysosomal membranes are protected with tough and rust-resistant lipids like fish oil ingredients, they are not easily broken when attacked by calpain. However, when you routinely eat vegetable oil, the lysosomal membrane is subjected to strong oxidative stress and it tears. As a result, strong digestive enzymes are dispersed intracellularly from the lysosome which was originally intended to recycle old or damaged proteins, killing the cell. This is similar to gastric ulcer which burns a hole, allowing strongly acidic gastric juices to spill into the abdominal cavity and cause peritonitis. In order to prevent such 'suicide bombings', it is important to stop eating vegetable oil and strengthen lysosomal membranes by eating high quality lipids (oils) on a daily basis.

The Risk of Frying Oil

Modern people love cutlets, fries, tempura, croquettes and other deep-fried foods. Since when did the Japanese like oily cuisine this much? Before the 2nd World War, Japanese food was mainly boiled and baked. This changed completely after the Tokyo Olympic Games and Osaka World Expo. Fast food entered the country, the consumption of instant noodles, frozen foods, snacks and other items increased, and the consumption of oil increased drastically. It seems that Japanese people consume about 13 liters of cooking oil per year.

At home, even without eating oily dishes, oil is used for various things such as sweets, bread and ice cream, etc. When you buy sweets and prepared dishes, lunch boxes, rice balls, sandwiches, bread and cakes at supermarkets and convenience stores, if you look at the ingredient label of the package, you will always see "edible vegetable oil", "vegetable oil", "margarine" or "shortening" there without exception.

"Edible vegetable oil" and "vegetable oil" refer to ω -6 oil. The reason for using these other names is because the manufacturer knows that vegetable oil is not good for health. Most of the "margarine" and "shortening" is soybean oil, rapeseed (canola) oil, sunflower oil, etc. Even though you may refrain from using these bad oils, you may be consuming them without knowing it.

In a paper recently published in the United States, as a result of a follow-up survey of American people eating fried potato (French fries) 3 times or more a week for 10 years, the average life expectancy was 8 years shorter than those who did not eat [7]. Also, according to the recent report by [8] when Alzheimer's disease model mice consumed canola oil for half a year, their ability to remember places decreased and their body weight also increased significantly. Regarding trans-fats, in the United States which has the most stringent regulations in the world, there is no doubt that regulation of vegetable oil will be strengthened in the near future.

In one paper published previously, when high fat meals were given to rats, the hypothalamic nerve cells (POMC neurons) involved in regulating appetite and body weight began to degenerate in the first week and died after half a year, so that the total number decreased [9]. The shocking thing is that neuronal cell death in the hypothalamus has also been confirmed in humans. In other words, the more you eat greasy food, the more you will lose the important nerve cells that control eating and obesity, so you can't adjust your appetite and you will not feel full. As a result, the body weight steadily increases, and lifestyle

diseases such as atherosclerosis, hyperlipidemia and type 2 diabetes are more likely to develop.

Oil components entering the body are broken down into fatty acids and taken into the cell membrane, and are therefore an important construction material. If you consume oxidized oil from the start, the function of the cell will naturally become worse, and if it is a nerve cell, it will cause brain dysfunction such as forgetting things, lack of concentration, lower resistance to depression, and anger. Fatty acids, which are easily oxidized, are further oxidized when exposed to electromagnetic waves such as from smartphones, and these brain symptoms are amplified.

Flaxseed Oil Peps up the Brain

Flaxseed and perilla oil have similar components and effects, but we will describe flaxseed oil here. Flax is an annual grass in the Linaceae family which grows to a height of about 1 m, preferring cold regions. After flowering, it produces many round pods the size of one's little finger, each of which contains up to 10 seeds slightly bigger than sesame seeds. Since flax takes up a lot of nutrients from the soil, it cannot be regrown, so once it is harvested, another crop is cultivated for 6 years, and then flax is planted 7 years later. For this reason, its commercial exploitation is difficult.

The seeds contain: (1) α (alpha) linolenic acid, which is an ω -3 polyunsaturated fatty acid, (2) dietary fiber which is insoluble in water, and (3) lignans, a type of polyphenols with strong antioxidant properties. Alpha-linolenic acid is taken up by the nerve cell membrane and freshens it, so it is good for the brain and eyes; insoluble dietary fiber smooths the passage of feces through the large intestine; and lignans lower blood cholesterol and triglycerides.

In Europe and the United States, flaxseeds are added to bread before it is baked, roasted flaxseed is made into cereals, and powdered flaxseed is added to salads and desserts, whereby about 1 Kl is consumed per year. This almost corresponds to the consumption of sesame seeds by the Japanese. If you put it in a frying pan and roast it for about 10 min, it tastes like rice crackers with a different taste to that of sesame.

The ingredients of 100 g of flaxseed are 41 g fatty acids, of which 23 g are α -linolenic acid, 28 g dietary fiber, of which 18 is insoluble, and 0.77 g of lignans, a plant polyphenol which has the same female hormone-like effect as soy isoflavones. Therefore, if you eat a curry spoonful of flax seeds (10 g) every day, since it contains 2.3 g of α -linolenic acid, it exceeds the intake guidelines recommended by the Ministry of Health, Labor and Welfare for maintaining health and preventing lifestyle diseases. For flaxseed oil, you can take one teaspoon (4 g), which contains the same amount of α -linolenic acid. The same goes for perilla oil.

A Super Container to Keep Oils Fresh

Let's remember that edible oil is the same fresh food as fish and vegetables. If it is fresh, it will deteriorate in a couple of months, so it's best to buy the minimum amount necessary and use it up within a month. A conscientious maker puts it in a dark green or brown glass bottle, closes it tightly, and keeps the air layer between the lid and the liquid level as small as possible. Regardless of oil type, such oils cost about 10 yen (cent) per mL. To be honest, it is expensive. In contrast, cheap oil is filled into a transparent PET bottle, and as the liquid surface is wide and comes in contact with air during the usage period, oxidation will progress, but since it is subjected to various treatments, it is supposed to be usable even for one year or two years.

For olive oil, there are extra virgin and pure virgin. In ancient Greek and Roman times, olives were picked by hand, and ground with a stone mill to extrude the fresh oil. This is the best oil (extra virgin). Today, it is usually extruded by a machine. Hexane, a component of kerosene, may be added to the residue as with salad oil, to make cheap, second-press (pure virgin) olive oil that it is forcibly extracted and refined. Do not imagine that this oil is healthy because it's called olive oil. I love extra virgin olive oil which is air-transported from Tuscany in Italy. It costs as much as 3,850 yen for 500 mL. So as soon as I buy it, I transfer it to a "*Hakuri Bottle*" by KYORAKU Company, Japan (<http://www.krk.co.jp/en/products/packing/packing01.html>). Recently, rice oil and soy sauce from top manufacturers are sold in special bottles which prevent contact with air after opening. That's the bottle!

With a double film structure of an outer wall and inner film, the flexible inner film protrudes into the inner space by the amount of oil that was used. The lid prevents backflow and outside air does not enter, so the contents hardly come into contact with oxygen even after opening, and do not easily degrade. After about one month, it still has the taste of fresh (unoxidized) olive oil as when you bought it. I am sure that *Hakuri Bottle* products, which were invented in Japan, will be sweeping the whole world in the near future.

Refresh Your Body by Investing 50 USD Per Month

If vegetable oil is bad for your health, what kind of oil should you use for fried food? Well unfortunately, although there is better frying oil, no oil in this world is 100% safe. Frying oil reaches a temperature of nearly 200°C. Then, the carbon double bonds which keep the melting point low are cleaved, the chemical structure is changed, and highly toxic hydroxynonenal and trans-fats are formed. In oils which are safer for preparing fried foods, the oil itself contains plenty of antioxidant ingredients which are difficult to oxidize.

Both cereals and fruits store antioxidants within their skins and shells to protect the contents from outside elements such as cold, frost, rain, pests, bacteria and the like, or a harsh environment. Colorful tomatoes and carrots, those with a strong odor like garlic and onions, and spicy ones like chili and *wasabi*, contain a lot of antioxidants. By heating or using chemical solvents, these antioxidant components cannot be extracted in their natural state. It is thus ideal to physically extract them such as by extrusion. Therefore, edible oils which, in addition to having many antioxidants, are extracted by low temperature extrusion, have the strongest antioxidant action and are really healthy. To the best of my knowledge, the only oils that meet these criteria are rice oil which is rich in the antioxidant γ (gamma) oryzanol, and sesame oil which also contains sesamin.

Although extra virgin olive oil with many antioxidant polyphenols would appear to be good, olive oil contains a certain amount of linoleic acid and is not recommended because it produces a considerable amount of hydroxynonenal when used to prepare deep-fried foods. It is best to use it for dressings, or put it on yoghurt or toast. At most, it can be used to stir-fry pasta and vegetables.

Is there no oil that will not hurt you even if you deep-fry? Actually there is: tallow, lard, and coconut oil. These oils contain saturated fatty acids such as palmitic acid and stearic acid, and because they don't have carbon double bonds, they are not oxidized at high temperatures. In other words, the oil will not be damaged, and no hydroxynonenal

will be produced. However, the price is high and you can't get enough to deep-fry except for commercial use. Also, since tallow and lard are animal fats, 1 g has 9 kcal. Although it is not toxic, eating too much will cause lifestyle diseases. This is a troubling fact.

I think that foods fried in lard should rather be eaten in a restaurant. Cutlets and fries, dumplings and croquettes are fried and baked in lard by stores. Generally, the trend is to use vegetable oil at low-priced stores, and lard at high-end stores. For example, when I go to a pub, I ask if the oil used for frying is vegetable oil (canola oil, soybean oil, sunflower oil, corn oil, etc.), or lard. If it's vegetable oil, I do not order fried food; if it's lard, I eat a small amount. Be careful not to eat too much animal fat, as it may lead to obesity.

Instant noodles, frozen fried rice and Chinese buns, etc., which list "vegetable oil", "edible vegetable oil", "margarine" or "shortening" which mean vegetable oil, on their ingredient label, should be avoided, while those which list lard are safe to purchase. Housewives inevitably run after "cheaper price", but since cheap things use vegetable oil, it's safer to avoid them.

Now, you can understand why vegetable oil is destroying Japan. Act now, before it's too late! Please, throw away all the vegetable oil in your kitchen, and replace it with more expensive rice oil, sesame oil, extra virgin olive oil, flaxseed oil and perilla oil. We can all protect the health of our families by an investment of several thousand yen every month. Good oil is also a health food, so you won't have to spend money on supplements any more.

Once you start taking in good oil, your body will be completely reset in just a couple of months. Not only will your brain become clearer, but also your skin will take on a glossy sheen. After that, try eating things fried with vegetable oil again, and your body will immediately complain. Then, you will realize the real menace of vegetable oil.

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