YOU'D BE NUTS TO EAT THIS……

Phil Nuttridge offers some thoughts on the health impact of 'vegetable oils' in our diet. ***His writing draws extensively on evidence from published research papers. The reference points are shown in this article but the details of those references can be found at*** *http://www.cuttingcarbs.co.uk/pufa_refs/*

As a nutrition advisor I often get asked questions about what to do and what not to do when it comes to all matters food and diet related. Often the concepts are complex and all too often seemingly contradictory. Today food 'x' is good for us; tomorrow 'x' is bad for us. Wait a week and it will be good for us again.

Frustratingly, what often drives this apparent vacillation and confusion is corporate profit. Food is a big business and the more processed the food is, the more profit there is to be had. Of course, those fat-cat profits are not for the small farm shop, artisan delicatessen or family baker in your local area who endeavour to produce good quality locally sourced foods. No, the mega bucks are for large multinational corporations that produce our processed foods on an immense industrial scale and for which profit margin is everything.

These corporations have scientific and political clout. They fund research into our food and unsurprisingly, much of that research seems to come out in favour of the health benefits - or certainly the lack of harm - of the foods produced by the companies that fund such research (1). These corporations are also powerful political lobbyists. Every government or government-funded health service offers advice on what constitutes a healthy diet and much of that is sponsored by big food producers (2). Seeing the phrase 'heart healthy' on a box of cereal, for example, is more often a result of marketing and lobbying than robust evidence-based research on what will reduce your risk of cardiovascular disease.

There has been much analysis of the 'play-book' historically used by the tobacco industry to hide the true health impacts of smoking (3). There is significant evidence that the same principles are at play in the food industry (4).

There is no better example of how the power of corporative profit determines what finds its way into our food than that of 'vegetable oils'. And it was vegetable oils that

concerned the nutrition question I received last week. The specific question I was asked: “Which oil would you recommend for high temperature cooking?”. Actually the question was a little more nuanced and asked me to compare a number of seed and nut oils and their smoke points but for the purpose of this piece, my paraphrased version of the question will suffice.

The question was rather timely: I have the honour of being invited to contribute to the forthcoming third Gurus’ Guide to Reflexology which will focus on Cancer. My chapter is (of course) on ‘Cancer and Nutrition’ and over the last six months I have been deeply researching that topic. That research has taken me on a deep dive into the so called vegetable oils. Whilst I realise that I am going to steal some of my own thunder in this article, for the full analysis you will have to wait for the Gurus’ Guide to be published next year.

I reproduce below a somewhat embellished version of my response to that question on cooking with oils. In recognition of how my analysis will upend many facets of the prevailing dogma on nutrition and how robust therefore the analysis will have to be for the Gurus’ Guide, this piece is heavily referenced from peer-reviewed research papers. The reference points remain in this text but the full list of referenced articles can be found at http://www.cuttingcarbs.co.uk/pufa_refs/

QUESTION: “Which vegetable oil would you recommend for high temperature cooking?”
ANSWER: “None of them! Take all vegetable oils out of your diet.”

Let me take a step back first. We can classify the fats we eat into four categories:

1. Animal fats (butter, lard, dripping etc).
2. Fruit oils (olive oil, avocado oil, coconut oil. No ‘etc’ here - that is pretty much an exhaustive list).
3. Oils derived from nuts and seeds (all oils not in category 2). This is the category often referred to as the ‘vegetable oils’.
4. Margarines, ‘spreads' and shortenings solid at room temperature that are not in category 1. They contain ultra-processed forms of category 3 fats.

Categories 1 and 2 have been in the human diet for all of our evolution [5]. They are natural byproducts of eating animals and of eating those particular fruits.

Categories 3 and 4 fats are entirely novel to the human diet and heavily dependent on industrial chemistry for their extraction. The margarines and shortenings appeared at the start of the 20th century courtesy of Procter and Gamble [6]. The category 3 nut and seed oils appeared from the mid 20th century onwards as chemical processing developed. It is now a huge industry - last year, 30 kilograms of category 3 oil were produced for each of the seven billion of us on this planet [7]. These oils tend not to occur in isolated form in nature; they are mostly extracted with chemical solvents, de-coloured, de-odourised, stabilised and often fortified with nutrients to compensate for their nutrient deficiency [5][6][8].

A slight warning here. Whilst category 2 fruit fats can traditionally be pressed out of their fruits, cheaper industrially processed and adulterated versions of category 2 oils are now slipping into the market [9][49]. These are fruit fats (particularly olive oil) that have also been chemically processed so that more oil may be enticed out of the fruit than cold pressing would normally allow. To protect you against these, all your category 2 oils should be labelled “cold pressed” and “extra virgin” and you should avoid “refined” versions.

And there is a slight muddying of the waters with category 3 oils too. There are now “cold pressed” versions of some of these (for example, rapeseed oil). Whilst these oils have a lovely ‘artisan’ feel and will of course be without the hazards of the chemical extraction of the majority of category 3 oils, these seed based oils will still be high in linoleic acid, a biochemical villain I shall be introducing later in this piece [50].

For me there is no longer room for the term ‘vegetable oils’. The term suggests something healthy (broccoli, kale, spinach et al) but of course we do not get oil from such vegetables. I fear that with the rise of veganism and the ‘plant based’ movement, we will soon see the industrial nut and seed oils rebranded as ‘plant based’ to confer some idea they are saving us and the planet. As I will show, they are not.

The rise of category 3 and 4 fats in our diets has been inexorable [5][10]. For example, since 2012, consumption of soya bean oil - the most prevalent category 3 oil in the diet - has increased by 33 percent [7].

Several factors contribute here:

1. **They are cheap to produce.** With the advent of the 'TV dinner', the microwave meal, processed food and fast food, all food manufacturers will use category 3 and 4 oils in their products as they deliver higher profit margins. Animal fats and fruit fats are just too expensive. In the Nineties, McDonalds, for example, moved away from cooking its fries in animal fat turning to less expensive seed oils instead: An already unhealthy food became even more so to the benefit of profits [11] [12].

2. **They are polyunsaturated.** This is a huge topic in its own right but in brief, there was a strong movement in the 1960s and 70s in America to reduce saturated fats (category 1 and most of the category 2 fats) in our diet as their consumption seemed to be correlated with heart disease, leading to the "saturated fat is bad" hypothesis [13]. The evidence was weak even at the time [13] and very large scale interventional studies conducted since have shown the "saturated fat is bad" hypothesis needs rethinking. Those large studies show that diets high in saturated fat are correlated with *better* health outcomes and that diets higher in polyunsaturated fats are correlated with *poorer* health outcomes all of which is contrary to the 'saturated fat is bad' hypothesis [14][15][16][17][18][19][48].

   We now have a better biochemical understanding of why diets high in saturated fat are healthier. Consuming saturated fat increases your HDL (a.k.a. your 'good cholesterol') which is correlated with good health outcomes [20]. And although saturated fats may also increase your LDL (wrongly labelled as your 'bad cholesterol'), it is actually diets high in polyunsaturated fats that lead to increased levels of oxidised LDL and it is this oxidised LDL that is most correlated with heart disease [21][22]. The role of the polyunsaturated fats in the oxidation of LDL is discussed later in this piece.

   Despite this evidence to the contrary and on the coat-tails of 'saturated fat is bad', the likes of Procter and Gamble *et al* have been able to market their category 3 and 4 polyunsaturated fats as the healthy alternative to saturated animal fats. The marketing has been very successful as many people truly believe that polyunsaturated fats are healthy. They are not [23][24].

You are already beginning to see that saturated versus polyunsaturated is an important concept when it comes to fats. It is a distinction at the molecular level. Saturated fats are more stable and more likely to be solid at room temperature (think butter, dripping, coconut oil) whereas polyunsaturated fats are less stable and are liquid at room temperature (all category 3 oils).

Category 4 fats are only solid at room temperature because the category 3 fats from which they are formed have been further chemically processed to make them so. The process of 'hydrogenation' was developed to achieve this solidification, but we now know that hydrogenation leads to the creation of trans fats which are extremely toxic [6].

Once the hazards of trans fats became clear, demands to reduce their levels in category 4 fats have led to new chemical techniques being developed to solidify the nut and seed oils [25]. But I would express caution here: Just as we had several decades of hydrogenated category 4 fats in our diet before we knew of the trans fat issue we had introduced into our food, it is yet to be seen if the new chemical processing of these category 4 fats has added something else novel and potentially harmful to the human diet. As you have category 1 and 2 fats, there is no need to take this risk. Even if these new processes have not added anything else harmful to the diet, remember that all category 4 fats still contain nut and seed oils and therefore confer the risks associated with those polyunsaturated fats.

The relative instability of polyunsaturated fats means that heating all category 3 and 4 fats is ill advised as it oxidises the fats to create trans fats and myriad other unstable chemical reactive species [51][52]. Repeated heating is especially dangerous [22]. This oxidation happens naturally to these oils even if not heated, heating just accelerates the process. So, as soon as nut and seed oils are exposed to air even unheated category 3 fats will contain some trans fats and oxidative byproducts. The older the oil, the more it will contain [26].

The same oxidation that happens in your bottle of category 3 oil, also happens at a biochemical level in your cells if those polyunsaturated fats become incorporated into your cell membranes. The chemicals produced by that oxidation (with exotic names such as 4-hydroxynonenal) have toxic effects on the body and are associated with many pathological conditions [52].

There are many different polyunsaturated fatty acids found in nut and seed oils. There is one however that is of particular concern - linoleic acid. This is an 18-carbon omega-6 polyunsaturated fatty acid with the more formal name of “cis, cis-9,12-Octadecadienoic acid”. For a long time it has been known that this fatty acid has an inflammatory effect on human biochemistry when it is consumed but the perceived wisdom has been that we do need some omega-6 fatty acids in our diet, linoleic acid included. The last two decades of research are now questioning this assumption [27].

Allow me to list some of the ‘highlights’ from the research into the health consequences of linoleic acid. If talk of ‘mitochondria’, ‘adipocytes’ and ‘endothelial function’ is a little too much, just skip to the end of the following bullet list:

- When linoleic acid gets to the mitochondria of your cells (the structures that release energy) it causes disruption to the functioning of those mitochondria. There are a number of mechanisms here: When the linoleic acid becomes incorporated into the membranes of the mitochondria (as cardiolipin), its instability impairs structural integrity in turn affecting function [28]. When the linoleic acid is used an energy substrate by the mitochondria (as fatty acids can), the breakdown products of linoleic acid ‘clog-up’ the energy release pathways [18][28][29].

- Where the linoleic acid becomes incorporated in the mitochondria of the adipocytes (fat cells) in your skin, this can trigger obesity and type II diabetes [30]. The strong epidemiological correlation between the rise in consumption of category 3 oils and the rise in obesity in America is consistent with this [5][46].

- Levels of linoleic acid accumulated in adipose tissue are also strongly correlated with coronary artery disease, as too are levels of the breakdown products of linoleic acid [31] [47].

- Increasing linoleic acid in the diet increases the markers of compromised endothelial function, a necessary pre-cursor to cardiovascular disease [18][32].

- When linoleic acid becomes incorporated into liver cells it triggers NAFLD (non alcoholic fatty liver disease) [33] and also leads to the release of free fatty acids associated with metabolic syndrome and TOFI (thin on the outside fat on the inside) [30].

- Linoleic acid once incorporated into the wall of your LDL 'bad cholesterol' particles, makes these LDL much more prone to oxidative damage. The same instability that degrades category 3 oils in the bottle and under heat is at play here at the molecular level within the body. Levels of oxidised LDL are significantly correlated with cardiovascular disease [34].

- Linoleic acid even has its role in the severity of COVID19 outcomes too. High levels of the metabolic byproducts from the breakdown of linoleic acid are correlated with worsened outcomes of acute respiratory distress syndrome (ARDS) which is associated with severe cases of COVID19 [35].

- If the linoleic acid disrupts mitochondrial function in your somatic cells it can start a chain of events resulting in cancer through uncontrolled cell division and the switching off of the mechanisms that normally lead to disrupted cells being destroyed. Studies in rats show diets high in omega-6 polyunsaturated fats such as linoleic acid are correlated with certain forms of cancer [36].

A lot of biochemical details in those study findings but you hopefully get the message that raised levels of the polyunsaturated fatty acid linoleic acid in your diet or as a consequence, stored in your body are not good on very many levels.

And of course the seed and nut oils and the margarines made from them - the category 3 and 4 fats - are the principle sources of linoleic acid in our diets [37][38]. The prevailing dogmatic dietary advice to replace saturated fats with polyunsaturated linoleic acid-laden fats from categories 3 and 4, has almost certainly had adverse effects on our global health [24].

No diet can be devoid of linoleic acid. Linoleic acid is a fatty acid produced in nature and although animals do not make their own, a diet of natural whole plant foods will naturally contain some linoleic acid. It is primarily found in nuts and seeds (hence why oils derived from these contain it) and so any diet containing nuts and seeds will contain linoleic acid.

Any carnivore or omnivore diet that eats the products from animals that have eaten nuts and seeds will also contain some linoleic acid.

Ancestrally we probably consumed less than 2 percent of our calories as linoleic acid and then only for a short time in the Autumn when nuts and seeds were readily available [5].

It is now estimated that many people in developed countries consume up to 12 percent of their calories as linoleic acid [5]. In those countries, total consumption of nut and seed oils is estimated to be between a quarter and a third of all calories [5]. The figure is so high because of the category 3 and 4 fats are added to most supermarket, foods, processed foods and fast foods: In 1900, 99 percent of all fats added to our food came from animal fats (Category 1) but by 2000, 86 percent of added fats come instead from the nut and seed oils (Categories 3 and 4) [5]. Studies looking at the composition of our adipose fat tissue show that in 1959, around 9 percent of our adipose fat was linoleic acid; by 2008 this had become 21.5 percent [39].

As an aside here, studies looking at isolated populations of the world who have diets closer to our ancestral way of eating show that these populations have improved health outcomes compared to populations on the Westernised modern diets. The Masai tribes of Africa for example, have diets comprising 33-45% saturated fat and only 1.7% linoleic acid and have no incidence of heart disease [40]. The Tokelau islanders of the Pacific have a diet that is 48% saturated fat and only 2% polyunsaturated fat; they have no occurrence of cardiovascular disease and virtually no obesity or type II diabetes [41]. Ancestral diets low in linoleic acid correlate with better health outcomes.

If you choose to cook with category 3 and 4 fats, then you will of course have high levels of linoleic acid in your diet. But how prevalent might category 3 and 4 fats be in your diet even if you choose to use category 1 and 2 fats for cooking at home?

Here are some typical ‘hidden’ sources of linoleic acid that could be in your diet:

- The leading brand mayonnaise has it in significant quantities (rapeseed oil is the fat used).
- Most sliced breads from the supermarket shelf contain it (rapeseed oil, sunflower seed oil and soya bean oil being typical ingredients of packaged bread).

- Pretty much all mueslis contain these oils - dried fruit are coated in category 3 oils to make them 'shine'.
- Crisps are cooked in them.
- Pretty much every supermarket sourced microwave or ready meal that contains added fats, will have used category 3 and 4 fats.
- I have had to ban my Mum using the spreadable version of her favourite Danish butter as it contains rapeseed oil.
- Preprepared vegetables from your supermarket that you simply slip in the oven to roast are usually covered in category 3 oils - to cover them in category 1 fats would be too expensive for the manufacturer.
- 'Plant based' processed foods that are trying to emulate the texture and flavour of meat will inevitably contain category 3 and 4 oils. And usually in large quantities.
- Even restaurants can be complicit - the last time I visited a restaurant they wanted to cook my omelette in 'vegetable oil'.

Taking these foods out of your diet and all other foods that contain category 3 and 4 fats will reduce the amount of linoleic acid in your diet. And that will improve your health outcomes [42].

So, to summarise thus far: Polyunsaturated fats in the oils derived from seeds and nuts are harmful to health if consumed in anything other than small quantities. The harm comes from several sources:

- the chemical nature of how these polyunsaturated fats are extracted and in the case of category 4 fats, how they are processed to become solid at room temperature;
- the polyunsaturated fats they contain, particularly linoleic acid, are unstable being prone to oxidation and creation of harmful oxidative products even just sat in the bottle. This instability is accelerated if they are heated;
- once in your cells, the linoleic acid they contain readily breaks down and disrupts your biochemistry sufficiently to trigger obesity, NAFLD, Type II diabetes, TOFI, Cancer, cardiovascular disease and other chronic diseases associated with Metabolic Syndrome.

I truly believe that category 3 and 4 fats have no place in your diet.

It is not just the refined oils - consuming whole nuts and seeds will of course also add linoleic acid to your diet. But, whole nuts and seeds are not chemically processed and are relatively stable having a longer shelf life before oxidation compared to the extracted oils. And because of the other nutrients in whole nuts and seeds, you should be satiated well before you have consumed significant quantities of linoleic acid. However, I would say it is prudent not to over consume nuts and seeds.

You also need to be aware of another dietary source of linoleic acid: chicken and pork. Chicken and pigs reared on a commercial scale tend to be raised on manufactured feeds. Many of these feeds use nut and seed oils (for the same reason food manufacturers put them in human food - because they are cheap) and the linoleic acid from that feed gets concentrated in the fat reserves of the chicken and the pig. If you eat these animals, you then consume that linoleic acid [43]. This is a significant source of linoleic acid in our 21st century diets because of the mis-guided but successful campaigns to get us to eat less red meat: Chicken consumption is far higher than it was 60 years ago - since 1961, consumption of poultry has increased thirteen fold; by comparison consumption of beef and bison has increased only two and half fold [44].

If you can be sure that the chickens and pigs have been fed grass, worms and scraps rather than manufactured feeds, then you are probably okay on the linoleic acid front. My personal decision is that I now avoid chicken completely and only eat pork from pigs I have seen eating outside. Interestingly ruminants (cows, sheep, goats, deer) have enzymes that convert linoleic acid into forms that are not harmful to our health. The bacteria in the multiple chambered stomachs of the ruminants also assist in this conversion of linoleic acid into less harmful fatty acids [45]. So even if you eat beef or lamb that happens to have been raised on manufactured feeds, you are not getting much extra linoleic acid as a consequence of their diet. I would however always insist that the beef and lamb I eat is raised on its ancestrally appropriate diet of grass.

To conclude let me return to the specific question - which oil to use for high temperature cooking:

- NEVER use any of the seed and nut oils or solid butter substitutes (category 3 and 4 fats);

- if you use category 2 fats, always use the cold pressed, organic, extra virgin forms of the oils;
- always buy the smallest bottle possible of category 2 oils. They too can easily oxidise, so you do not want any of these oils hanging around too long;
- for cooking with category 2 fats, stick to avocado oil and coconut oil. Extra virgin olive oil is fine for drizzling but not for frying;
- category 1 animal sourced fats are fine (and indeed preferable) for all cooking purposes but always try and source fats from free range, ancestrally fed animals. Ghee and clarified butter have a higher cooking temperature point than butter. And beware that some 'lards' are a mixture of animal fat and hydrogenated seed oils.

Avoiding nut and seed oils in cooking is the easy part. To eliminate completely category 3 and 4 fats from your diet you then need to take out all of the processed foods that contain them as evidenced from my list of example hidden sources. And that will take a lot of time and patience looking at ingredient labels in supermarkets!

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