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Geoffrey Cannon on Fred Kummerow

The man who knew about *trans*-fats



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Geoffrey Cannon writes: The US biochemist Fred Kummerow knew about *trans*-fatty acids more than half a century ago. Above, he is at the beginning of his career; in mid-career at the University of Illinois, an advisor to the American Heart Association with many papers published; then recently in his laboratory (bigger picture, and right). By the late 1960s he was sure about lipids and heart disease, indicated by the title of his 2007 book. His conclusion is that naturally occurring saturated fats and cholesterol never were a cause of cardiovascular disease. Instead, the cause was – and is – industrially generated *trans*-fatty acids. The top pictures are of some people who affected him and who he has affected. These are from left, Ancel Keys, whose theory on saturated fats, cholesterol and cardiovascular disease dominated US policy and action for half a century; the Dutch scientist Martijn Katan, whose 1990 paper repeating what Fred Kummerow had published decades previously, turned the tide against *trans*-fats; and Walter Willett, the leading US antagonist of trans-fats, who pays tribute to Fred Kummerow, as does Gyorgy Scrinis in his 2013 book *Nutritionism*. To the right are current US Food and Drug commissioner Margaret Hamburg, and cabinet secretary of health Kathleen Sebelius (kissed into office by president Barack Obama). Fred Kummerow is right now sueing the US government and them by name, for failing to prohibit *trans*-fats.

Box 1

Kummerow on heart disease

I regard partial hydrogenation and its creation of *trans* fats in food supplies, as the biggest diet-related public health catastrophe in modern history. In 1910, when margarine using the hydrogenation process was introduced, nobody knew what effect this would have on the lives of Americans. We now know, 100 years later, that heart disease actually is not a disease, but a somatic response to a simple error involving the effect of 44 per cent industrially generated *trans* fat in partially hydrogenated vegetable oil on prostacyclin synthesis, and also to overheated fats converted into oxysterols in preparation of food.

From 1912 through 2011, consumption of polyunsaturated fat has increased from 11.3 pound per capita to 64.5 pounds, and saturated fat has decreased from 28 pounds per capita to 13.4 pounds. We have switched from the consumption of saturated fats to polyunsaturated fats, which now are in almost all food products. Death due to heart disease decreased from 1970 to 2010 by 19%. Smoking habits decreased by 43% in the same period. Since cigarette smoking also causes heart disease, the death decrease due to heart disease in the last 40 years may be because of the major decrease in smoking habits.

In 2010 the number of deaths from heart disease in the US was 600,000, half of which were sudden deaths. The death rate due to coronary heart disease and sudden death remains high. Vegetable oils, partially hydrogenated fats, and fried foods, are responsible for this persistently high rate. Partially hydrogenated oils should be banned from food supplies and thus diets. The most effective way to do this is to ban the partial hydrogenation process.

Extracted and edited from (1-4)

Fred Kummerow is sueing the US federal government, and in person Margaret Hamburg, commissioner of the US Food and Drug Administration, and her boss Kathleen Sebelius, the US Health and Human Services secretary. This is because the FDA has for two decades, obscured the public health crisis caused by *trans*-fatty acids. Asking food manufacturers please to reduce *trans*-fats in their products, and then requiring food labelling on *trans*-fats, does not address the true seriousness of the crisis, *as he outlines in Feedback this month.*

The latest move by the FDA, to remove the 'generally regarded as safe' green light from *trans*-fats, possibly a response to his lawsuit, is a step forward. But his case against the US government is that *trans*-fats are known to be toxic; that therefore they and the partial hydrogenation process must be banned by law; and that in not so doing the FDA is breaking the law. Fred Kummerow knows what he is saying. He is the original world authority on trans fats and human health. A distinguished US biochemist, he first knew about the toxicity of industrially generated *trans*-fats half a century and has been warning the science and medical profession, government and industry, ever since then.

Editor's note. In *Inspiration* our preference is to link to key documents that explain the reason to be inspired. For Fred Kummerow, these are his 2014 paper in *Clinical Lipidology* (3), *pdf available here*, and his lawsuit against the US FDA (5), *pdf available here.* The references at the end of this piece include pdf links to other documents.

Box 2

Fred Kummerow. The biochemist who walked alone



Fred Kummerow at work in his laboratory. His research, and his publications on trans fatty acids and human health, range from Nature in 1957 to Clinical Lipidology in 2014 (3).

Edited extract from a feature in the New York Times by Melanie Warner, 16 December 2013

In 1957, a fledgling nutrition scientist at the University of Illinois persuaded a hospital to give him samples of arteries from patients who had died of heart attacks. When he analysed them, he made a startling discovery. Not surprisingly, the diseased arteries were filled with fat — but it was a specific kind of fat. The artificial fatty acids called *trans* fats, which come from the partially hydrogenated oils used in processed products like margarine, had crowded out other types of fatty acids. The scientist, Fred Kummerow, became a pioneer of trans-fat research, one of the first scientists to assert a link between heart disease and processed food products. The long arc of his life and career illustrates how scientific conformity can hinder the search for answers. It would be more than three decades before those findings were widely accepted, and half a century before the Food and Drug Administration too decisive action by removing the reassuring appellation 'generally regarded as safe' from *trans* fats, as it did last month.

'Cholesterol has nothing to do with heart disease, except if it's oxidised,' Fred Kummerow says. He also says that the saturated fat in butter, cheese and meats does not contribute to the clogging of arteries — and in fact is beneficial in moderate amounts in the context of a healthy diet (lots of fruits, vegetables, whole grains and other fresh, unprocessed foods). His own diet attests to that. Along with fruits, vegetables and whole grains, he eats red meat several times a week and drinks whole milk daily. He cannot remember the last time he ate anything deep-fried. He has never used margarine, and instead scrambles eggs in butter every morning. 'Eggs have all of the nine amino acids you need to build cells, plus important vitamins and minerals' he says. 'It's crazy to just eat egg whites'.

Born in Germany just after World War I broke out, he moved to Milwaukee with his family when he was 9. His father did not have the money to send him to college, so he worked full time at a drug distribution company while attending the University of Wisconsin in the evenings. He then moved to the University of Illinois. At an age when life itself is an accomplishment, Fred Kummerow says he has no intention of stepping away from the work that has consumed him for six decades. He continues to work from home and talks daily to the two scientists who work in his laboratory. 'What I really want is to see *trans* fats gone finally,' he says, 'and for people to eat better and have a more accurate understanding of what really causes heart disease.'

The man who knew all too much

Fred Kummerow is one of the great heroes of public health in modern times. The story of how his research and vision remained obscured is a lesson to all who want to know how ideas about nutrition become translated into policies and actions that may be correct, or else turn out to be disastrous. He is a biochemist at the University of Illinois, Urbana-Champaign. His speciality since the 1940s has been lipids and cardiovascular health. He is a world authority on the biochemistry specifically of fatty acids and in particular industrially generated fatty acids. More important, his findings have turned out to be correct.

The story of lipids and cardiovascular disease is well-known. In the US and then globally, the 'lipid hypothesis' of Ancel Keys (see picture above), whose fame and power derived in part from formulation of the US army 'K rations' named after him, became dominant. This is that the main dietary causes of heart disease are saturated fat and cholesterol from any source, fresh food or processed products. Fred told me about having lunch with Ancel Keys in a fancy restaurant. They both ordered a main course of steak and eggs. Fred was surprised. Ancel Keys explained that his hypothesis was for the little people. Later, near the end of his long life, he said: 'There's no connection between the cholesterol in food and cholesterol in the blood. Cholesterol in the diet doesn't matter at all unless you happen to be a chicken or a rabbit'.

In the late 1960s Fred Kummerow was a member of the American Heart Association committee developing a new position paper. He told me that he recommended that trans fats should be banned from margarine, and the AHA printed a warning about trans-fats. But this was withdrawn, after representations from the trade association of margarine manufacturers. All 150,000 copies of the revised guidelines were pulped. A deal was done whereby industry agreed to reduce trans-fats from an average of 44 to 27 per cent on condition that the AHA said nothing. The deal was a secret. The age-adjusted rate of heart disease-related deaths coincidentally began to decrease in 1968.

As from 1990 the tide turned against trans-fats. A team of Dutch scientists including Martijn Katan (see above) in effect repeated Fred Kummerow's work, but did so in collaboration with the Durch-UK transnational margarine manufacturer Unilever, who got the message. So did Walter Willett of the Harvard School of public health (above) whose 1993 paper in the *Lancet* and many in the *New England Journal of Medicine a*nd elsewhere have led to trans-fats being generally seen as toxic and a public health disaster. Walter says that his decision to investigate trans-fats as part of the gigantic Harvard Nurses' Health Study was prompted by knowledge of Fred Kummerow's work. The 1993 paper was the turning point in scientific and medical thinking about trans fats. The stakes were very high and the implications have still not been thought and acted through. For a start, the discovery of the unique toxicity of trans fats undermined the Keys 'lipid hypothesis' which had driven US government and industry-backed policies and actions.

Box 3
Kummerow on eggs

The hypothesis that cholesterol is the major risk factor in heart disease was first based on a study in 1906 by Nikolai Anitschkov. He fed rabbits cholesterol or eggs and noticed atherosclerosis in the rabbits' coronary arteries that resembled the atherosclerosis in human coronary arteries of people who had died of heart disease. As a result, eggs became associated with high cholesterol levels. In 1975, the Federal Trade Commission held a hearing on the role of eggs and cholesterol in heart disease. All the cardiologists who testified agreed that cholesterol was the cause of heart disease and recommended that eggs should not be eaten. Only two spoke for eggs. They were Michael DeBakey, the pre-eminent heart surgeon, and I, a biochemist. Both of our testimonies were disregarded because we were not cardiologists. The Federal Trade Commission's ruling forbid the egg industry to mention the nutritional value of the egg unless it also stated that cardiologists considered eggs a source of heart disease (7). Even today, eggs are not given their proper role in good nutrition. The easiest way to consume all of the essential amino acids that are needed by the liver is to eat an egg every day.

Taken from the 2014 paper published by Clinical Lipidology (3)

Fred Kummerow continues to have a long, distinguished and influential career. You will have been wondering about his age, which yes, is part of his story. On 4 October this year, 2014, Fred Kummerow will be 100 years old. His email address is fkummero@illinois.edu, and his telephone number is (1) 217 344 6380. Greet him!

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Editor's note

Contributors are invited to choose and write about the document that has most impressed them in their life and work. The choice can be from this year, or ten or a hundred or thousands of years ago. It need not be explicitly about nutrition or public health, but it should be offered as inspiration to *WN* readers in their own thinking, vision and work. The document should be available in pdf form. Please send suggestions for *Inspiration* to wn.network@gmail.com.