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KARDEA NUTRITION

GOOD FAT OR LOW FAT - WHAT'S RIGHT?

Health & Diet Special Report

About Kardea Nutrition Reports 2
Introduction: Five Rules for Eating Healthy Oils 4
Powerful Fats 6
Fats as Stores of Energy 6
The Chemical Factory: Fat Cells 7
Fats and Your Optimal Health 8
Good Fats and Bad Fats: The Basics 10
Fats and Weight Management 11
Fats and Cholesterol 13
Fats and Blood Pressure 15
Fats and Inflammation 16
Fats and Blood Sugars 16
Fats and Your Brain 17
You Are What You Eat—and So Is Your Fat 18
Keeping Good Fats Healthful! 18
Six Rules for Keeping Good Fats Healthful 19
Hot Topics in Good Fats 23
Coconut Oil and Cocoa Butter: Are They Really Healthy Saturated Fats? 24
Olive Oil: More Than a Good Fat 27
Flaxseed and Flaxseed Oil 29
Summary 30
About Kardea Nutrition 32
Endnotes 33

About Kardea Nutrition Reports

Have your seen the diet program advertisements that highlight the before and after photos with the after photos always showing dramatic weight loss? The next time you are considering one of these diets, ask to see the after-after picture—the one that shows how the person looked a year later.

The data is clear: *dieting* fails to deliver sustained weight loss. Weight may come off, even a lot of weight, but the pounds typically return. If you have had this experience, you are not alone. Most of us know what happens: we return to our everyday eating habits and gain back the lost pounds.

At Kardea, we start with a different understanding. Dieting is something you start and stop. Delicious, healthful eating is something you can sustain each and every day. Healthier weight follows.

The Kardea approach, defined in our widely praised book *The Kardea Gourmet*, written with Dr. Richard Collins, The Cooking Cardiologist, defines *healthful* in terms of the effect on our cardiovascular system. Cholesterol, blood pressure, blood sugar, and inflammation are each factors affecting our arterial health and heart disease risks. The way we eat, independent of weight, profoundly and very measurably affects these health indicators.

The Kardea Nutrition reports provide easy-to-understand, science-based assessments of important and emerging topics in healthy eating and weight management. The reports look beyond the media hype and the fad diets. These come and go. Instead, the evidence, built on the extensive study by researchers across the globe and in labs, kitchens, clinics, and field studies, is examined and presented in these easy-to-read, comprehensive reports.

For decades, diet and nutrition researchers have focused on defining the right role for fats and oils. More recently, the research focuses on answering this question: how does an eating pattern rich in “good” oils compare to one with a restricted fat intake?

The heart healthy Mediterranean diet delivers 40 percent of calories in the form of healthier oils. Other healthy eating programs, like the one followed by former president and heart patient Bill Clinton, are very low—perhaps less than 10 percent of total calories—in all fats and oils, even the good fats of the Mediterranean diet. The nutritional recommendations of the leading medical organizations, like the American Heart Association, the American Diabetes Association, and the American Cancer Society, fall somewhere in between.

What's right? This report explores the latest research on this important question. As you read this report, you will learn straightforward guidelines like our **5 Rules for Eating Healthy Oils** and **6 Rules for Keeping Good Fats Healthy**. With these guidelines, you will be able to start today toward striking your healthy and delicious balance between good fat and low fat.

In this report, you also will learn something of the science and biology of how different fats and oils work in our bodies. Researchers continue to push forward, more carefully understanding how some fats harm and some oils help. What you thought was right a few years ago probably changed!

Finally, remember that the good fat versus low fat debate is secondary. It comes after the more fundamental understanding of healthful nutrition. It is more about what you eat, not what you do not eat. The simple golden rule: *eat a lot of a wide variety of high nutrient plants, as close to nature as possible; enjoy whatever others foods you like, just not too much (and if it is highly processed, eat even less).*

It is Kardea's mission to help you navigate your journey to healthful, delicious eating.

Take a Healthy Bite Out of Life,

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Good Fat or Low Fat
What's Right for Health *and* Weight Loss?

Introduction: Five Rules for Eating Healthy Oils

You first heard that you should avoid all fats. They make you fat.

You then heard that you should avoid only the bad fats, like those in butter and red meat. These raise your cholesterol and cause heart disease. You then started eating a lot of low-fat foods like pasta, bread, potatoes, and sugary low-fat treats.

You were next told that it was not the fat that made you fatter, but the low-fat white breads, white rice, and white potatoes. Moreover, researchers concluded that the low-fat approach was tied to the epidemic rise in diabetes. The low-carb diet fads hit and gave you permission to eat as much butter, bacon, and cheese as you like, so long as you avoided the carbs.

More recently, you may have heard that oils, like polyunsaturated Omega-3s from fish and flaxseed, saturated fats from coconut butter and cocoa butter, and monounsaturated-rich olive oil should be taken daily—perhaps in large quantities—to actively promote good health.

You might be confused about what is right, but one thing is clear: fats and oils can make foods more delicious.

Many delicious flavors, in fact, are more fully released when some oil is present. Oils also allow foods to be cooked at higher temperatures without burning, providing for other delicious tastes and textures. The wonder of chocolates and ice cream is not just about taste. Their fats deliver luxurious textures that delight the senses.

How does all this get sorted out? It really is fairly simple. It is a common sense understanding that has been confused by the modern media and diet fads. It starts with five simple rules:

1. Enjoy the healthier fats and oils when they are part of whole, plant-based foods like nuts, seeds, olives, and avocados and, to a lesser extent, fish and shellfish.

2. When these healthier fats are separated from the whole foods (as in olive, canola, or grape seed oil), use with care. Remember, the healthier oils alone will not make you healthier, but they can make you fatter.

3. Use the right storage and cooking techniques when using oils. Stored the wrong way or cooked without care, healthier oils will become harmful.

4. When enjoying fats and oils, combine with foods containing plenty of antioxidant and anti-inflammatory compounds, like herbs, spices, berries, green teas, and fruits and vegetables. They keep healthy oils from becoming toxic.

5. Enjoy! Food is part of the daily celebration of life!

Use these rules to help navigate your journey to your healthier and sustainable way of eating. This report explores the science upon which these guidelines are built.

Powerful Fats

Fats and oils represent a wide variety of chemicals, with one common feature: they do not readily mix with water. Oils are liquid at room temperature; fats are solid at this temperature. At temperatures in-between, these compounds are greasy, not quite liquid and not quite solid.

Fats as Stores of Energy

We need energy for life, and all life on earth needs a reliable flow of energy to survive. The primary source of energy on Earth, the sun, delivers its energy at uneven rates. The sun rises and sets. The length of each day changes with our orbit around this life-giving source. Clouds block the sun's rays.

To sustain itself, life has evolved to store the sun's energy during periods of plenty and to draw down those stores during periods of scarcity.

Plants start the process, locking the sun's energy into sugars, a simple carbohydrate. For longer storage, plants convert these sugars to starches, like those found in grains, beans, potatoes, cassava, and other root vegetables and tubers. These are somewhat more complex carbohydrates. These carbohydrates, in turn, can be transformed into fiber that plants use to provide structure and protection. Plants also convert these sugars into another store of energy – fats and oils. High concentrations of fats are found in the nuts and seeds of certain plants.

Unlike plants, animals have little ability to store sugars and starch. The human body and other animals store energy as fat.

Fat is stored in fat cells that come together to make up adipose tissue. And here is the advantage of fat over starchy carbohydrates and sugars as a store of energy. Gram-for-gram, ounce-for-ounce, fats more effectively store this energy. More than twice as much energy is stored in fats and oils as stored in the same weight of carbohydrates.

Think about the hibernating bear. It would need twice the weight to make it through the winter if it could not store fat. For the early nomadic humans

who had to travel long distance to secure their food supply, the efficiency of storing energy as fat was similarly a great advantage.

The Chemical Factory: Fat Cells

Fats and oils, however, have a far greater purpose in human health than just serving as a store of energy.

Fats are incorporated into every cell membrane in our body. These fats regulate what gets into the cell and what comes out. Oils on the skins and fats just below the surface of the skin play a similar role.

Fats and oils enhance our bodies' ability to absorb certain healthful nutrients found in foods. Vitamins A, D, E, and K are best transported from our gut into the blood stream when some fat is present.

Many antioxidants in foods are fat soluble and released only when oils are present.

Fat cells are more than just a place where fat can be stored. Within these cells, chemicals that help control many important biologic processes, including those that trigger and control appetite and those that turn on and off our inflammatory responses, are manufactured and regulated.

Fatty acids are the building blocks of fats. Hundreds of fatty acids have been identified. As discussed later in this report, our bodies react to different fats and fatty acids in different ways. Some types raise cholesterol. Others do not. Some contribute to the healthy functioning of the arteries and the healthy flow of blood. Other fats have been shown to do our arteries harm. Certain fats are inflammatory; others have been shown to be anti-inflammatory.

A substantial portion of the brain is composed of fats. Fatty acids also play an important role in the development of the brain - some are so important that certain fats are added to infant formulas. Other fats have been associated with slowing the decline in brain functions as we age; others have been linked to a more rapid decline.

If fats and oils are so important for the functioning of the human, can a low-fat diet be healthy?

Yes! Our bodies have the ability to manufacture all but two of the fatty acids needed to maintain life. Known as essential fatty acids (EFAs), these are the Omega-3 and Omega-6 polyunsaturated fatty acids. Deny the body these EFAs, and it will be malnourished.

Yet, each of us need not consume a lot of fats and oils to get adequate EFA levels. Some nuts, some seeds, and perhaps some fish each week will provide adequate levels to avoid malnourishment.

But it is more than just avoiding malnourishment that we are after. We are seeking optimal health and wellness.

Fats and Your Optimal Health

Is skinny—a very limited amount of stored fat—always healthier? Not necessarily.

Whales and seals need to be fat to survive in the icy artic waters. Hibernating animals need large stores of fat to survive the winter. On the hot plains of Africa, elephants, rhinos, and hippos maintain large fat stores throughout the year.

Some of these animals consume very little fat. They are herbivores, converting sugars and starch to fats. They manufacture the fats their bodies' need.

Other animals are much less able to manufacture fat. Cats, large and small, are unable to manufacture fats. To survive, they must obtain fats from their diets. To a lesser extent, this is true for dogs.

Are we more like the whale and the elephant, or the cat and the canine? It is an intriguing question. The Paleolithic diet, a modern-day version of what Stone Age men and women ate, has become a popular approach to answering this question.

The Paleo diet looks to the fact that pre-historic men and women were lean like the cat and the canine. Like the cat and the canine, pre-historic clans ate fats, including the fats from red meat.

The Paleo diet also highlights the benefits of whole, natural, and organic foods. It stresses grass-fed beef and free-range chicken over the meats produced on the industrial farms, noting a healthier fat profile of the former.

Like the low-carbohydrate diets, the Paleo diet stresses the very limited use of added sugars. It also allows for no grains. While the mainstay of the human diet following the development of agriculture about 9000 years ago, grains played a minor role in human diet in the vast span of time that defines human evolution.

The challenge is that modern life is very different from the conditions under which humanity evolved.

We carry much more weight and much more fat than our distant ancestors. Few people today, whether on the Paleo diet, Weight Watchers, or any other diet, will succeed in attaining the average weight of pre-historic women or men.

Physical activity was more constant and perhaps more intense for the Paleolithic man and woman; exercise was not something that was fit into a twenty-to-thirty minute slot in an otherwise sedentary day.

Humankind also evolved to assure the survival of the species in a hostile environment, but evolution never anticipated the longevity many of us are striving to attain.

The role of cholesterol over a life time is an example of how our evolutionary heritage is misaligned with modern day realities.

Cholesterol is a building block of both male and female reproductive hormones. It is essential for the survival of the species, but it is a threat to individual longevity. It is one of the villains in the plaque-building process that damages our entire cardiovascular system, and is linked to heart attacks, strokes, and the decline in our cognitive function.

The plaque-building process, although starting early in life, takes time to reach health-threatening levels. Cholesterol, in our younger years, supports the survival of the species; as we age, however, it challenges the longevity of the individual.

We eat today to enjoy life. We will remain heavier and less active and grow older than most cave men and women. Modern life has changed our body chemistry. It requires that we recalibrate what we should be eating. And in fact, that is what evolution is all about – evolving to better meet the challenges of a changing environment.

The countless animal laboratory studies, human clinical studies and epidemiologic field studies, must be our guide to healthy eating in our modern civilization. Some of these studies support aspects of the Paleo diet, but with regard to fats and oils, the broad body of research on nutrition and modern lifestyles offers some different recommendations.

Good Fats and Bad Fats: The Basics

Fats are broadly classified as saturated fats (SFAs), polyunsaturated fats (PUFAs), and monounsaturated fats (MUFAs). All fat-containing food delivers a mix of all three.

Starting in the 1950s, Americans were told to purge the SFAs found in red meat, butter, and other whole-milk dairy products from their diets. High intakes of these fats were found to be associated with heart disease. Margarine was advanced as an important tool in this effort. Margarine was made from heart healthier PUFAs. For the next two generations, individuals at risk for heart disease were told to use butter alternatives. Studies then revealed that the hydrogenation process used to make margarine created trans fatty acids, a type of fat more harmful than the saturated fat it replaced.

“No fat” and “low fat” became popular in the 1980s. Lower total fat levels, not just saturated fat levels, were found to lessen the incidence of cardiovascular disease. With each gram of fat delivering over two times the calories of proteins and carbohydrates, reduced fat intake also could offer the benefit of weight reduction.

Through the 1990s, the low-carbohydrate diet developed by Dr. Robert Atkins gained momentum. It offered a high-fat, high-protein approach. Healthy eating was a secondary consideration at best. Weight reduction was the primary focus. Enjoy as much steak, butter, eggs, and bacon as you like so long as you stayed away all carbohydrates including oats, brown rice, barley, and fruits. If you tried Atkins, you did your arteries harm.

Still Americans became heavier!

As we moved into the twenty-first century, researchers were developing a new and improved understanding of fats and carbohydrates. The heart-healthy benefits of a Mediterranean diet, rich in vegetables, fruits, seafood, and olive oil became more widely recognized.

Moreover, the inadequacy of focusing only on the broad categories of defining fats and oils - SFAs, PUFAs, and MUFAs - was becoming increasingly clear. Researchers were learning how chemical differences within these categories could help or harm our health.

Omega-3s, for instance, are a type of PUFA that have been found to be healthful, but some Omega-3s are now recognized as more healthful than others. Other PUFAs have been found to be toxic. A PUFA with trans fatty acid features have been found to be worse than any SFA.

Specific SFAs, like those found in meats and whole-fat dairy, have been found to raise cholesterol, while a saturated fat found in chocolate and cocoa butter have not.

Even good fats, like olive oil, can become unhealthy with the wrong storage or cooking method, or when overused.

What makes a good fat good and a bad fat bad? Let's explore in terms of specific health targets for weight, cholesterol, inflammation, blood pressure, and cognitive (brain) function.

Fats and Weight Management

Calories do count! Fats and oils are calorie rich. Eat lots of fats and oils and, over time, you will likely gain weight. But remember, it is total calories that you are trying to limit. A low-fat diet also high in simple carbohydrates, like

white breads and white rice, is not the best way to control your appetite. You likely will find yourself eating more with this combination of foods. You will gain weight.

For humans, digestion and absorption of fats and oils are relatively slow. Only complex carbohydrates, like much of the carbohydrates in fiber-rich vegetables and whole grains, are absorbed more slowly. The slow digestion and absorption will leave you feeling fuller. With the high-fiber, high–complex carbohydrate diets, you will feel hunger pangs less often.

With a slowed absorption of calories, you also are less likely to experience sugar spikes, the rapid increase in blood-sugar levels associated with consuming processed grains, standard table sugar, and corn syrup. Your body takes action to bring your sugar levels down. As a result of this response, your sugar levels may fall sharply, triggering the desire to eat again.

Where does the right balance lie?

A study published in *The New England Journal of Medicine* compared the effectiveness of low-fat, restricted-calorie; Mediterranean, restricted-calorie; and low-carbohydrate, non–restricted-calorie eating plans.

The Mediterranean-diet group consumed the largest amount of dietary fiber and had the highest ratio of monounsaturated to saturated fat. The low-carbohydrate group consumed the smallest amount of carbohydrates and the largest amounts of fat and protein.

The low-fat group lost about 6 pounds; the Mediterranean-diet group, and low-carbohydrate group each lost about 10 pounds. Low-fat, in short, delivered the least weight loss!

There is a fourth way to eat: a low-fat, low simple carbohydrate diet very rich in fiber and high nutrient vegetables. After years of struggling with his weight and heart disease, former president Bill Clinton tried this form of diet. He found himself back to his high school weight in only a few months.

Moreover, a Clinton approach to eating does not just reduce his weight; this style of eating has been shown to more significantly improve a range of health indicators than a standard low-carbohydrate diet.

The challenge, of course, is that many people find the low-fat, nutrient rich vegetable diet difficult to maintain. Healthy diets with some levels of good fats have been shown to be more sustainable for many.

Fats and Cholesterol[1]

If you isolated the cholesterol in your blood stream, what would it look like? It would look like a waxy, fatty substance. That is right. Cholesterol is composed of fatty acids. Not surprisingly, the types of fat you enjoy in your foods affect the composition of cholesterol in your body.

If you eat trans fatty acids, your body responds by increasing LDL (bad) cholesterol and lowering HDL (good) cholesterol. Most of the trans fats found in the modern diet are formed through the partial hydrogenation of polyunsaturated vegetable oils. Partial hydrogenation is a process that allows fats that are normally liquid at room temperature to solidify, enabling, for example, the creation of stick margarines. Partially hydrogenated oils offer other benefits for food manufacturers. They are relatively cheap, have longer shelf lives, and can improve the texture—the mouth feel—of many foods.

Trans fats are also found elsewhere. Naturally occurring trans fats also are founds in meats and dairy products of cows, sheep, goats, and bison. While the levels found in these food products are low, the amount of trans fat associated with the development of cardiovascular disease is also low.

If you eat certain SFAs, like those found in meat, egg yolks, and dairy fats, your body responds by increasing the levels of LDL cholesterol while potentially raising the HDL cholesterol. For most people, saturated fat increases LDLs far more than it increases HDL cholesterol.

[1] For more information on the types of cholesterol and the risks, read *The Kardea Gourmet: Smart & Delicious Eating for a Healthy Heart*.

Good Fat/Bad Fat for Natural Cholesterol Management

Dietary Fat/Cholesterol	Main Source	State at Room Temperature	Effect on Cholesterol Levels	% of Daily Calorie Intake (grams in a 2200 Calorie Diet)
Total Fat				25%-35% (60-85g)
Monounsaturated Fat – Better	Olive oil, canola oil, peanut oil; walnuts, almonds, peanuts, most other nuts; avocados, olives	Liquid	Lowers LDL; No Change in HDL	Up to 20% (49g)
Polyunsaturated Fat – Good	Corn, soybean, safflower, and cottonseed oils; fish	Liquid	Lowers LDL, Lowers HDL	Up to 10% (25g)
Saturated Fat – Bad	Whole milk, butter, cheese, and ice cream; red meat; chocolate; coconuts, coconut oil	Solid	Raises both LDL and HDL	Limit to No More Than 7% (16g)
Trans Fat – Worst	Most margarines; vegetable shortening; partially hydrogenated vegetable oil; many processed foods.	Solid or semi-solid	Raises LDL, Lowers HDL	0 Allowance Specified; Keep at Low Levels
Cholesterol – Bad but Not as Bad as Sat Fat & Trans Fat	Eggs, non-skim dairy, fatty red meat	N/A	Raises LDL, Raises HDL	Limit to No More Than 200mg

Good fats consist of the monounsaturated fatty acids and the less processed polyunsaturated fatty acids.

MUFAs reduce LDLs without raising or lowering good HDL levels.

PUFAs have been found to lower both LDLs and HDLs. In general, the medical community believes that the LDL-lowering effect outweighs the HDL-lowering effect, particularly if the PUFAs replace saturated and trans fats.

The question, of course, is what happens when you enjoy a diet consisting mostly of vegetables, whole grains and fruits that uses very little of all kinds

of fat? LDL cholesterol has been found to fall more significantly than the good fat diet. At least in terms of cholesterol, a good-fat diet is healthier than a bad fat diet. A lower fat diet built upon a nutrient-rich, plant-based foundation, however, has been shown to be even more effective at lowering LDL cholesterol levels.

Fats and Blood Pressure

Cholesterol does damage to your arteries over many years, even decades, but fats can have an immediate effect on how your arteries function. The inner lining of the arteries is called the endothelium. It actively regulates the flow of blood though the arteries. The endothelium sends out messages that control when the arteries dilate and relax. Dietary fats and oils can interfere with the endothelium's ability to send out the right messages—and blood pressure can rise.

Researchers have found that a single high-fat meal, particularly those with high levels of SFAs, can hinder the endothelium from working most effectively. The effects continue for up to six hours after eating.[i, ii] Studies also have found that diets high in MUFAs, like a Mediterranean diet and Omega-3 PUFAs, support a healthier endothelium.[iii]

Here is where the challenge really lies: many people are enjoying a lot of saturated fat, one meal after another. For these folks, their endothelium never has time to recover! It is under constant attack. Blood pressure remains higher, causing constant damage to the arteries.

Like a high pressure flow of water quickly eroding the banks of river, the higher blood pressure accelerates wear and tear on the arterial wall.

Over time, even a small, but consistent, increase in blood pressure can cause significant damage. The consequences may not be immediately apparent, perhaps only small decline in the ability to remember names, words or faces. In time, though, your risks for strokes, heart attack, vascular dementia and other diseases rise.

Fats and Inflammation

Inflammation is a natural process that helps us heal our wounds and fight infection. Our healthy bodies, however, carefully control this process. When the process falls out of control, inflammation can do damage to most any part of our bodies.

Inflammation is recognized as the underlying cause of heart disease. In an inflammatory environment, cholesterol does its damage. Chronic inflammation also has been associated with accelerating the aging process. Certain fats have been shown to fuel inflammation. Others have been shown to cool the process.

Trans fats and SFAs have been associated with elevated levels of inflammation.

Women with the highest trans fat intake had a 73 percent higher level of C-reactive protein (CRP), a marker of inflammation measured through a routine blood, than women with low trans fat intake. Other studies have linked SFAs and inflammation.[iv]

Omega-3 PUFAs have been shown to significantly decrease CRP inflammatory markers.[v] So do diets high in monounsaturated fatty acid. At least in one study, high MUFA diets proved more effective in lowering inflammatory markers than a low-fat, high–complex carbohydrate diet.[vi]

Fats and Blood Sugars

Fats are slowly digested and absorbed into the blood, reducing the swings in blood sugar levels. If you are eating a lot of simple carbohydrates—like sugary drinks or white-flour breads, cakes, and cookies—switching to a higher healthy fat diet can help control blood-sugar levels. Fats are not the only answer. You also could replace these simple carbohydrates with proteins or high-fiber complex carbohydrates.

The type of fats, however, also has been found to affect our bodies' natural abilities to control blood sugar swings. MUFAs and PUFAs have been found to improve insulin's ability to control blood sugars, particularly when they replace dietary saturated fat.[vii]

Is the high good-fat, Mediterranean-style diet or a fat-and-simple carbohydrate diet better? They both are useful for regulating blood sugar. Start by asking yourself which one you can maintain each and every day.

Fats and Your Brain

Cognition has to do with abilities and skills to process information through the day with how we learn, remember, problem-solve, and pay attention. It is the decline in these functions that we associate with aging. Severe decline in cognitive function defines dementia.

If you are middle-aged, the fats you are eating today may affect your cognitive function later in life.

A twenty-one-year study tracking nearly 1,500 people found that abundant saturated fat intake from milk products and butter-like spreads at midlife was associated with a decline in daily brain functions including memory. High intake of polyunsaturated fatty acids was associated with better memory. Frequent fish consumption was associated with better cognitive function and word memory. The more PUFAs in relation to saturated fat, regardless of the total fat consumed, the better these individuals performed on intellectual activities.[viii]

As part of a large European study, known as the Rotterdam Study, high intakes of saturated fat and cholesterol and a low intake of polyunsaturated fatty acids were evaluated on the incidence of dementia on over 5,300 adults 55 or older. A higher incidence of dementia was strongly related to total fat and saturated fat intake. Fish consumption, an important source of Omega-3 polyunsaturated fatty acids, was found to reduce these risks.

The researchers concluded that a diet high in saturated fat and cholesterol increases the risk of dementia, whereas fish consumption may decrease this risk.[ix]

In a twenty-year study, cognitive function in 1,486 nurses was evaluated. Dietary fat intake was assessed from midlife forward. Higher intakes of saturated and trans fat and lower polyunsaturated to saturated fat ratio, were each highly associated with more significant cognitive decline in these women.[x]

Fruits and vegetables also have been shown to help maintain cognitive function as we age. Over a twenty-five-year period, over 13,300 women were tracked and tested. Total vegetable intake was significantly associated with fewer declines. Women consuming the most green-leafy vegetables experienced even a slower decline.[xi]

In another study, the intake of other plants, notably nuts, cabbage, and root vegetables, was associated with better cognitive function as we age.[xii]

Is plant-based low fat (e.g., a Bill Clinton diet) or plant-based high good fat (e.g., Mediterranean diet) better for preserving cognitive function?

A lot more research needs to be done before we really can say, and the differences may or may not be significant. Here is the good news: the Kardea golden rule of healthy eating works. For preserving your cognitive function as you age, *eat a lot of high nutrient plants, as close to nature as possible; enjoy whatever other foods you like, just not too much (and if it is highly processed, eat even less).*

You Are What You Eat—and So Is Your Fat

Both the amount of fat you eat and the types of fats you enjoy can profoundly affect your health. It is worth keeping in mind that you are what you have eaten. If you have eaten a lot of saturated and trans fats, your fat cells will have stored this type of fat. If you eat a lot of healthier fats, these will be stored in your fat cells. [xiii] The good news: with time, the fat stores in your body will change and mirror what you are eating.

Keeping Good Fats Healthful!

You may know that oils turn rancid. This is not the same thing as rotting, like a piece of fruit or meat. Rotting is caused by bacteria. Rancidity is caused by oxidation. Oxidized compounds can cause significant damage to the cells of the body.

Our bodies produce antioxidants to combat these oxidized compounds. Many of the foods we eat deliver antioxidants for further control.

Simple exposure to light, heat, and air can cause fats and oils to oxidize. Some oils, like Omega-3s polyunsaturated oils found in flaxseed oil, can oxidize fairly quickly—perhaps in a week or two. For this reason, flaxseed oil is stored cold and in dark containers. Other oils oxidize more slowly.

The higher the heat, the faster the oil will oxidize. Oils and fat all have smoke points, a temperature that causes the chemical composition to breakdown rapidly. You might have seen this occur while cooking. Until that point, the oil is simply heating up. When that point is reached, smoke starts coming up from the pan.

You may think that the oils is evaporating—like water going from liquid to steam that can become liquid again with no change in its chemical composition. Not so. When heated, the chemical composition of fats change, and even healthier fats can become highly oxidized and harmful.

Six Rules for Keeping Good Fats Healthful

Keeping Healthy Oils Healthy-Rule 1: Don't Let Them "Smoke."

Different oils will start to smoke, or oxidize, at different temperatures. Unrefined corn and soy oils have a smoke point of 320°. Extra-virgin olive oil (EVOO) has a smoke point of 325°, making it good for salads or light sauté. Refined oils can handle a higher heat (see chart).

Oil Type	Raw	275- 325°F (Sautéing Vegetables)	325- 375°F (Deep Fat Frying)	375- 425°F (Sautéing & Searing Meats, Poultry & Fish)	Description & Usage	Smoke Point
Almond, refined					Pure, clean flavor	495°F
Avocado, refined					Wonderful for dressings, pesto and stir-fries	450°F
Canola, refined					Neutral flavor, good for baking	425°F
Canola, unrefined					Mild and best used at lower heats	350°F
Coconut (virgin/extra virgin), unrefined					Ideal for cakes, crusts and sautéing vegetables	350°F
Hazelnut, unrefined					Rich flavor. Drizzle on food or use for dipping	275°F
Olive (extra virgin), unrefined					Ideal for salads, pesto and dipping, light sautéing	325°F
Olive (extra light), refined					Mild and tolerant of low to medium heats	400°F
Peanut, refined					Adds rich flavor to stir-fries and sautéed dishes	400°F
Peanut, unrefined					Adds rich flavor to stir-fries and sautéed dishes	390°F
Safflower, refined					Mild and good for high-heat cooking	450°F
Safflower, unrefined					Delicately flavored for salads and light sautéing	325°F
Sesame, refined					Adds distinct flavor to meats and stir-fries	445°F
Sesame, unrefined					Aromatic and nutty for dressings and sauces	300°F
Sunflower, refined					Neutral flavor, good for deep frying and searing	450°F
Sunflower, unrefined					Rich flavor, best in cold dishes	350°F
Walnut, refined					Use for salads, marinades and sautéing & searing	400°F

Keeping Healthy Oils Healthy-Rule 2: Don't Reuse Oil - Used Cooking Oil is Only Good for Diesel Engines

Okay, you may not be reusing oils when you cook, but how often do you eating out? In restaurants, the frying oil is used again and again. Heated, cooled, heated again—always open to the air. With each passing day, the

levels of oxidized compounds increase and pass into French fries, onion rings, fried fish and fried chicken.

Studies found that reused cooking oil negatively affects the arteries' ability to dilate and relax for four hours after a meal, while the same meal cooked in fresh oil did not.

The challenge of restaurant French fries, onion rings, and fried fish is not only the calories. You likely are consuming a lot of oxidized fats.

Keeping Healthy Oils Healthy-Rule 3: **High Temperature is Hell on Salmon and Grass-Fed Beef Fats**

You have started to eat more healthfully. You have been eating salmon eat week. The Omega-3s in properly prepared salmon are healthy, but so often the salmon is grilled or broiled over high heat. Much of the healthy fat drips out, but those that remain are likely to be oxidized. You have now turned a healthy fat into a harmful fat.

The same holds true for the grass-fed beef. Known to have lower levels of saturated fat and higher levels of polyunsaturated fats, grass-fed beef is preferred. Cook the grass-fed beef at high temperatures, however, and you have destroyed the benefits. In fact, the grass-fed beef may be less healthy. The saturated fats from the industrial stockyards are more stable at high temperatures. The polyunsaturated fats will oxidize more quickly.

Keeping Healthy Oils Healthy-Rule 4: Store Right, Buy Right

Oils are deemed rancid when oxidation reaches a level to cause a sharp decline in the taste. For centuries, food processors have sought ways to stop or slow oxidation.

Extra virgin olive oils, for example, are carefully processed to minimize exposure to light, air and heat. The oils are cold-pressed: no heat is used to extract the oils. The oils are carefully handled and quickly bottled.

Before sealing the containers of many oils, the bottle is capped with nitrogen to force out any air that might cause oxidation.

Once you bring the bottle home and break the seal, the oil is now exposed to the air. The oxidation process starts to speed up.

You may have heard that oils will keep for months, but remember that this defines the point at which oil is no longer suitable for good taste. Oxidized compounds have been developing the whole time.

The PUFAs, like the Omega-3s and Omega-6s, will oxidize more quickly than the MUFAs. This may be another benefit of olive oils that are high in these more slowly oxidizing fatty acids.

Storing the oils in the refrigerator slows the oxidation process, but some oils will solidify when cold, making them difficult to use. You have two options: buy a small oil carafe to keep just enough oil available for the next week of cooking, or buy the small containers of oil. This may be a bit more expensive, but it will likely be easier than refilling the oil carafe.

Keeping Healthy Oils Healthy-Rule 5: Be a Cool Cook with Hot Flashes

Anything cooked with a lot of water will maintain a relatively low heat. As the water reaches the 212° boiling point, it will steam, taking the heat with it. Steaming, stewing, poaching, and soup-making are great ways to cook any number of foods, often enhancing their nutritional value.

Temperatures between 212° and 325° are still considered low-heat cooking. Above 325°, the oxidation challenges can start to increase quickly.

Frying, grilling and broiling is high-temperature cooking. They tend to destroy the nutritional value of food. Yet, these cooking methods create delicious tastes and textures. Combination cooking is a technique that allows you to capture great taste while minimizing the oxidation of fats and oils. It emphasizes lower temperature cooking with a flash of high temperature.

Combination cooking uses oven roasting, stewing, or steaming to allow lower temperatures to do most of the cooking. You might start with a hotter flame to sear and impart a delicious flavor and finish with lower temperatures.

Alternatively, low temperatures can be used upfront and then the hotter flame or higher heat is used to finish.

When cooking that salmon fillet on barbeque, complete most of the cooking at a lower temperature on top of the stove, in the oven, or, if on the grill, to the side of the direct flames. Finish over the coals.[2]

Keeping Healthy Oils Healthy-Rule 6: Put Out the Flames with Antioxidants

Inevitably some oxidized compounds will find their way into your oils and meats, aggravating the oxidation levels that occur naturally in your bodies.

Healthy diets, like a Mediterranean diet or other plant-based diets, deliver high antioxidant levels. These neutralize oxidized compounds. Plants, in fact, produce these antioxidants to protect their own natural oils from becoming toxic.[xiv] These antioxidants can do the same for you.

High-antioxidant diets certainly start with a lot of fruits and vegetables. They also may include high-antioxidant beverages like red wine and green tea.

One thing is clear though: the most powerful source of antioxidants can be found in spices and herbs. The aromatics you smell in spices and the flavors you taste in herbs are antioxidants. And spice and herb *blends* deliver many types of antioxidant compounds that work in different and supporting ways in your body. Learn to bring more spices and herbs into your diet. A good place to start is checking out our online recipe database at www.kardeakitchen.com.

Hot Topics in Good Fats

The good fat versus low fat discussion is highlighted by the growing interest in particular types of fats and oils that have been shown to deliver health benefits. Most specifically,

[2] For more recipes using the principles of combination cooking, visit www.kardeakitchen.com and search our recipe database. Even more recipes and cooking techniques can be found in our bookstore (http://store.kardeanutrition.com)

- Coconut Oil and Cocoa Butter: Are They Really Healthy Saturated Fats?
- Olive Oil: More than Good Fat
- Flaxseed and Flaxseed Oil: Benefits Beyond Omega-3s

In this closing section, we review these higher fat foods.

Coconut Oil and Cocoa Butter: Are They Really Healthy Saturated Fats?

We now know that some fats are healthier and some are harmful—with SFAs generally falling into the harmful category. Two sources of SFAs—coconuts and cocoa butter—are receiving much attention for their potential health benefits.

Coconut Butter

Coconut oil is the more controversial of the two.

The saturated fat in coconut is different from that of most other fats and oils, not only saturated kinds, but also the MUFAs and PUFAs While most dietary fats are composed of long-chain fatty acids, coconut butter is composed largely of lauric acid, a medium-chain fatty acid.

Without going into the chemistry, the key point to understand is that lauric acid can be absorbed directly into the body and even into the cells, undigested. Other fats and oils must first be broken down. The lauric acid thus can serve as quick, no-sugar source of energy.

The Health Benefits

For some time, coconut oil has been known to be a useful source of energy for selected groups. Coconut butter has been shown beneficial for infants, individuals with difficulty digesting fats, and athletes requiring a quick burst of energy.

More recently, some health advocates have been recommending that all healthy adults add extra-virgin coconut oil to their daily diets.

The area of greatest interest has been associated with the potential use of coconut oil for weight management. Coconut butter is being recommended

for its possible effect on increasing metabolic activity and the rate of fat burn by the body. The virgin coconut oil also has been identified as a useful source of antioxidants.

The Health Concerns

With regard to cholesterol and blood-sugar regulations, studies are finding that while coconut oil may be less harmful than other SFAs, it still would not fall into the category of a healthful fat. In one study, adding 10 percent or 20 percent coconut oil in the diet for one to two weeks increased cholesterol levels, including LDL cholesterol levels, as well as total triglycerides in the blood.[xv]

In India, coconut butter has been used widely by much of the population. Heart disease in India is among the highest in the world. Indian researchers sought to determine the effects of blending a PUFA with the coconut butter. Cholesterol levels were reduced between 5 percent and 21 percent, when the amount of coconut oil was reduced by blending in PUFAs. The authors of the Indian study concluded that the atherogenic (the artery blocking build of plaque) potentials of a coconut oil can be significantly decreased by reducing this oils intake by blending it with the polyunsaturated vegetable oils.[xvi]

Another study also found that coconut oil compromised how the arteries functioned for three to six hours after a meal when compared with polyunsaturated fats.[xvii]

High-fat diets, particularly those rich in SFAs, also have been shown to reduce the body's ability to regulate blood sugars. These diets are associated with a decline in the body's ability to use insulin effectively. One study compared three types of diets: a diet high in medium-chain fats like the lauric acid found in coconut oil, a diet high in long-chain fats, and a low-fat diet.[xviii]

Both high-fat diets led to the less effective use of insulin compared to the low-fat diet. The effect, however, was less significant with the high medium-chain fats.[xix, xx]

In another study, however, only the long-chain SFAs affected insulin levels. The medium-chain fats did not.[xxi]

Extra-virgin coconut butter also has a low smoke point—about 280°. If you are using this butter for frying, use caution to assure that oxidized compounds are not created.

Using Coconut Butter: Summary

While the research continues, coconut butter may fall somewhere between a healthful and a harmful fat. For some specific groups, though, notably infants and adults with difficulty digesting fats, coconut butter may have a very useful nutritional role.

Looking beyond the health benefits though, coconut butter has some great culinary benefits. For the baker, coconut butter offers a somewhat better alternative to the standard dairy butter. For the vegan baker, coconut butter may be an essential ingredient for making delicious desserts.

For most of us, however, more research is needed before we take steps to add a lot more coconut butter to our diets. It may be healthier than other types of SFAs, but the evidence does not seem to suggest it would qualify as a healthy fat, and remember, even healthier fat should be used smartly.

Nonetheless, the level of research into coconut butter is rising. We will know more soon.

Cocoa Butter

Researchers are identifying significant health properties in cacao plant—the source of both cocoa butter and cocoa powder. Specifically, cacao has been found to be high in various micronutrients like antioxidants. These compounds have been shown to improve the functioning of the arteries.

From the bean of the cacao plant, both cocoa powder and cocoa butter are produced. To make chocolate, these two ingredients are brought back together with sugar, vanilla, and other ingredients. Different chocolates have different amounts of each of these ingredients. The antioxidant levels of a particular chocolate largely will be defined by the amount of cocoa used.

Cocoa butter is high in SFAs but contains a healthier type of saturated fat known as stearic acid.

Unlike other SFAs, stearic acid has been shown to be neutral with respect to cholesterol. It does not cause the body to increase or decrease its level of cholesterol. Like other SFAs, however, it has been shown to raise key measures of inflammation within the arteries.[xxii]

Using Cocoa and Cocoa Butter: Summary

Cocoa is a powerful antioxidant that should find a place in your eating routine. Come into the Kardea Kitchen (www.kardeakitchen.com) to find creative and unusual ways to bring cocoa into your diet.

When it comes to cocoa butter, remember that while it may be delicious and may not affect cholesterol levels negatively like other SFAs, it is still high caloric and inflammatory. Enjoy smaller quantities in chocolate, the darker the better. The cocoa powder nutrients can offset the inflammatory effects of the cocoa butter.

Olive Oil: More Than a Good Fat

Olive oil plays a central role in the heart healthy Mediterranean diet, and its specific benefits have been extensively studied.

The daily intake of this oil has been found to lower the levels of cholesterol, oxidation, and inflammation[xxiii] within the blood. It has been found to improve the day-to-day functioning of the arteries as well as reduce blood-pressure levels.[xxiv] It even has been associated with lower risks for cancer[xxv] and improved regulation blood sugars.[xxvi]

What makes olive oil healthy? To start, it contains high levels of MUFA and a low level of SFA.

Other oils, however, like canola oil, have been found to have healthy fat profiles, but have not been as widely associated with health benefits.

Olive oil, particularly extra-virgin grades, does in fact deliver other nutrients not found in most other dietary oils. It brings an assortment of micronutrients that serves as antioxidants and anti-inflammatory compounds.

These micronutrients are believed to work in two ways. They certainly deliver antioxidants that the body can use to battle oxidized particles. The

same antioxidants slow the rate at which olive oil oxidizes, either over time or while being heated in a pan.

Advocates of a low-fat, whole natural plant-based diet, however, maintain that these benefits of olive oil are unnecessary.[xxvii] Ample levels of antioxidant and anti-inflammatory compounds are consumed in vegetables and fruits without the calories.

Olive Oil Not Created Equal

Many vegetable oils, including corn, soy, and canola oils, are typically processed and refined in such a way to produce a fairly consistent product with much the same taste and nutritional benefits. Not so with olive oil.

EVOO comes from virgin oil production only. Virgin means the oil was produced by the use of physical means and no chemical treatment. Cold-pressed also uses no heat. Not all virgin oils qualify for EVOO, and it accounts for a small portion of the olive oil used worldwide. In the traditional Mediterranean diet countries, EVOO represents a majority of the olive oil consumed. It is used on salads and added at the table to soups and stews and for dipping.

Virgin olive oil comes from the same production process as EVOO, but it is not consider as delicious. It contains higher levels of acidity.

Pure olive oil is obtained by refining virgin olive oils that no longer meet the virgin standards. Refined olive oil lacks the flavors and the level of antioxidant compounds found in virgin olive oil, but the healthy fat acid profile is the same as virgin olive oil. Because it is more highly refined, it is more suitable for higher temperature cooking.

Using Olive Oil: Summary

A Mediterranean diet using olive oil has consistently been shown to be far healthier than what most people are eating today. Make olive oil your oil of choice to make healthier food more delicious, choosing EVOO for salads, dipping, and low-temperature cooking like stews and soups. Use pure olive oil for higher temperature cooking.

Flaxseed and Flaxseed Oil

Few people consume flaxseed for the love it. It has been available for human consumption for centuries. Until the health benefits of Omega-3s were widely recognized**,** flaxseed did not attract much interest as a food. Flaxseed oil, also known as linseed oil, was more popular for its industrial uses, particularly as a varnish**.**

Today, flaxseed is an ingredient in many whole-grain cereals, crackers, and breads. It offers a somewhat nutty flavor, and it allows for food companies to make claims like "good source of Omega-3s." Flaxseed oil has become a popular dietary supplement, available in health food stores throughout the United States.

Flaxseed does, in fact, deliver high levels of Omega-3s, but it is not the same Omega-3 as those found in fish oils.

The Omega-3s in flaxseed is known as alpha-linolenic acid (ALA). Omega-3s derived from the sea are the eicosapentaenoic acid and docosahexaenoic acid Omega-3s. The evidence linking the ALA form of Omega-3s to cardiovascular health is far less extensive but still may be significant. Specifically, ALA Omega-3s have been shown to provide anti-inflammatory benefits.

Flaxseeds, as opposed to most flaxseed oils, contain other nutrients associated with good health. It is nature's riches source of lignans. Found mostly in the flaxseed hull, lignans have been found to reduce cholesterol levels. Lignans are defined as a phytoestrogen, a class of nutrient whose benefits are now hotly debated in regard to a broad number of conditions including heart health and heart disease, osteoporosis, and cancer risks. Flaxseed is also a good source of dietary fiber.

Flaxseed oil contains the ALA Omega-3 but only trace levels of the lignans and no fiber.

Using Flaxseed and Flaxseed Oil: Summary

The flaxseed benefits lie not only with healthier fat but also with the other nutrients. Flaxseed delivers ALA Omega-3, fiber, and lignans. Flaxseed oil

delivers only the ALA Omega-3s. Overall, flaxseed makes for a great example for Kardea's first guideline on the healthy use of fats and oils: *enjoy the healthier fats and oils when they are part of whole, plant-based foods like nuts, seeds, olives, and avocados and, to a lesser extent, from fish and shellfish.*

In short, use the flaxseed but not the flaxseed oil. The flaxseed oil alone has fewer benefits and it is a very concentrated source of calories – and potentially oxidized compounds.

Summary

For decades, diet and nutrition researchers have focused on defining the right role for fats and oils. More recently, the research centers on answering this question: how does an eating pattern rich in good fats compare to one with a restricted fat intake?

The heart healthy Mediterranean diet delivers 40 percent of calories in the form of healthier oils. Other healthy eating programs, like the one followed by former president and heart patient, Bill Clinton, are very low—perhaps less than 10 percent of total calories—in all fats and oils, even the good fats of the Mediterranean diet. The nutritional recommendations of the leading medical organizations, like the American Heart Association, the American Diabetes Association, and the American Cancer Society, fall somewhere in between.

Which eating style is better? First, recognize that the question of good fat versus low fat is secondary. It comes after the more fundamental understanding of healthful nutrition. The Mediterranean diet, low-fat plant-based diet and the recommended diets of the American Heart Association are each micronutrient rich, high in fibers, low in saturated fat, and very low in trans fats. They also contain less protein than most Americans believe is important for good health. *The Kardea Gourmet: Smart & Delicious Eating for a Healthy Heart* explores this fundamental understanding of healthful nutrition in great depth.

Next, recognize that these three dietary approaches are substantially healthier than what most people in our modern, hectic lives are eating. The benefits extend beyond disease prevention. These same eating styles can help you feel better and more energetic. These diets may even slow the aging process. The best style of healthful eating is one you can enjoy, each meal, each day.

And from here, simply remember Kardea's five guidelines for enjoying fats and oils:

1. Enjoy the healthier fats and oils when they are part of whole, plant-based foods like nuts, seeds, olives, and avocados and, to a lesser extent, from fish and shellfish.

2. When these healthier fats are separated from the whole foods (as in olive, canola, or grape seed oil), use with care. Remember, the healthier oils alone will not make you healthier, but they can make you fatter.

3. Use the right storage and cooking techniques when using oils. Stored the wrong way or cooked without care, healthier oils will become harmful.

4. When enjoying good fats, combine with foods containing plenty of antioxidant and anti-inflammatory compounds, like herbs, spices, berries, green teas, and fruits and vegetables (and red wine in moderation!). This keeps healthy oils from becoming toxic.

5. Enjoy! Food is part of the daily celebration of life.

Use these guidelines to help navigate your journey to your healthier and sustainable way of eating. This report explores the science upon which these guidelines are built.

About Kardea Nutrition

Welcome to Kardea – a journey into a heart healthy lifestyle that finds its inspiration in a love of food, desire to keep things natural, belief in science, and passion for vital living.

Through the power of nutrition, Kardea aims at driving significant and measurable improvements in key health factors, like cholesterol, blood pressure, inflammation and blood sugar regulation. In The Kardea Gourmet: Smart & Delicious Eating for a Healthy Heart, written with cardiologist Dr. Richard Collins, I explore how nutrition can be more powerful than prescription medications or surgery.

Take a Healthy Bite Out of Life™,

Rob Leighton, the Kardea Gourmet

Nothing written in this report should be viewed as a substitute for competent medical care. Also, you should not undertake any changes in diet or exercise patterns without first consulting your physician, especially if you are currently being treated for any risk factors related to heart disease including high blood pressure, high cholesterol or diabetes.

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Endnotes

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[i] A. Vogel, Mary C. Corretti, et al. "Effect of a Single High-Fat Meal on Endothelial Function in Healthy Subjects," *The American Journal of Cardiology* 79, no. 3 (1997): 350–54.

[ii] Stephen J. Nicholls, Pia Lundman, et al. "Consumption of Saturated Fat Impairs the Anti-Inflammatory Properties of High-Density Lipoproteins and Endothelial Function," *American Journal of Clinical Nutrition* 67, no.67: 577–82.

[iii] Francisco Fuentes, José López-Miranda, et al. "Mediterranean and Low-Fat Diets Improve Endothelial Function in Hypercholesterolemic Men," *Annals of Internal Medicine* 134, no. 12 (2001): 1115–19.

[iv] Dana E. King, Brent M. Egan, et al. "Relation of Dietary Fat and Fiber to Elevation of C-reactive," *The American Journal of Cardiology* 93, no. 6 (2004): 812.

[v] Loukianos S. Rallidisa, Georgios Paschosb, et al. "Dietary α-linolenic Acid Decreases C-reactive Protein, Serum Amyloid A and Interleukin-6 in Dyslipidaemic Patients," *Atherosclerosis* 171, no. 1 (2003): 97–107.

[vi] Pablo Perez-Martinez, Jose M Garcia-Quintana, et al. "Postprandial Oxidative Stress Is Modified by Dietary Fat: Evidences from a Human Intervention Study," *Clinical Science* 119, 6 (2010) 251-261

[vii] B. Vessby, M. Uusitupa, et al. "Substituting Dietary Saturated for Monounsaturated Fat Impairs Insulin Sensitivity in Healthy Men and Women: The KANWU Study," *Diabetology* 44, no. 3 (2001): 312–19.

[viii] Marjo H. Eskelinen, Tiia Ngandu, et al. "Fat Intake at Midlife and Cognitive Impairment Later in Life: A Population-Based CAIDE Study," *International Journal of Geriatric Psychiatry* 23, no. 7 (2008): 741–47.

[ix] Sandra Kalmijn and Lenore J. Launer. "Dietary Fat Intake and the Risk of Incident Dementia in the Rotterdam Study," *Annals of Neurology Annals* 42, no. 5 (1997): 776–82.

[x] Elizabeth E. Devore, Meir J. Stampfer, et al. "Dietary Fat Intake and Cognitive Decline in Women With Type 2 Diabetes," *Diabetes Care* 32, no. 4 (2009): 635–40.

[xi] Jae H. Kang, Alberto Ascherio, et al. "Fruit and Vegetable Consumption and Cognitive Decline in Aging Women," *Annals of Neurology* 57, no. 5 (2005): 713–20.

[xii] Astrid C. J. Nooyensa1, H. Bas Bueno-de-Mesquita, et al. "Fruit and Vegetable Intake and Cognitive Decline in Middle-Aged Men and Women: The Doetinchem Cohort Study," *British Journal of Nutrition* 106 (2011): 752–61.

[xiii] C. Seymour Dayton, Sam Hashimoto, et al. "Composition of Lipids in Human Serum and Adipose Tissue During Prolonged Feeding of a Diet High in Unsaturated Fat," *Journal of Lipid Research* 7 (1965): 103–11.

[xiv] Caroline Pond, *The Fats of Life* (New York: Cambridge University Press, 2003).

[xv] M. Castillo, J. H. Hortal "García Coconut Oil Affects Lipoprotein Composition and Structure of Neonatal Chicks," *Biochemistry* 119, no. 4 (1996).

[xvi] Preeti Chandrashekar, B. R. Lokesh, et al. "Hypolipidemic Effect of Blends of Coconut Oil with Soybean Oil or Sunflower Oil in Experimental Rats," *Food Chemistry* Vol, 123, December 2010, pp. 728-733.

[xvii] Stephen J Nicholls, Pia Lundman, et al "Consumption of Saturated Fat Impairs the Anti-Inflammatory Properties of High Density Lipoproteins and Endothelial Function" *Journal of the American College of Cardiology* Vol 48, Issue 4, August 16, 2006, pp. 715-720.

[xviii] Johan De Vogel-van den Boscha, Sjoerd A. A. van den Berga, et al. "High-Fat Diets Rich in Medium- versus Long-Chain Fatty Acids Induce Distinct Patterns of Tissue-Specific Insulin Resistance," *The Journal of Nutritional Biochemistry* 22, no. 4 (2011): 366–71.

[xix] Ibid.

[xx] Joris Hoeks, Marco Mens ink, et al. "Long- and Medium-Chain Fatty Acids Induce Insulin Resistance to a Similar Extent in Humans Despite Marked Differences in Muscle Fat Accumulation," *The Journal of Clinical Endocrinology & Metabolism* Volume 7 No.2 January 2012: pp., 208-216.

[xxi]Silvia Wein, Siegfried Wolffram, et al. "Medium-Chain Fatty Acids Ameliorate Insulin Resistance Caused by High-Fat Diets in Rats," *Diabetes/Metabolism Research and Reviews* 25, no. 2 (2009): 185–94.

[xxii] Penny M. Kris-Etherton, Amy E. Griel, et al. "Dietary Stearic Acid and Risk of Cardiovascular Disease: Intake, Sources, Digestion, and Absorption," *Lipids* 40, no. 12 (2005): 1193–200

[xxiii] Lisa Lucas, Aaron Russell, et al. "Molecular Mechanisms of Inflammation: Anti-Inflammatory Benefits of Virgin Olive Oil and the Phenolic Compound Oleocanthal," *Current Pharmaceutical Design* 17, no. 8 (2011): 754–68.

[xxiv] Dolores Corella, José Ignacio González, et al. "Polymorphisms Cyclooxygenase-2 -765G>C and Interleukin-6 -174G>C Are Associated with Serum Inflammation Markers in a High Cardiovascular Risk Population and Do Not Modify the Response to a Mediterranean Diet Supplemented with Virgin Olive Oil or Nuts," *Journal of Nutrition* 139, no. 1 (2009): 128–34.

[xxv] Nicoletta Pellegrini, Francesco Visioli, et al. "Direct Analysis of Total Antioxidant Activity of Olive Oil and Studies on the Influence of Heating," *Journal of Agricultural and Food Chemistry* 49, no. 5 (2001): 2532–38.

[xxiv] L. Aldo Ferrara and A. Sonia Raimondi. "Olive Oil and Reduced Need for Antihypertensive Medications," *Archives of Internal Medicine* 160, no. 6 (2000): 837-842.

[xxv] Theodora Psaltopoulou1 and Rena I Kosti. "Olive Oil Intake Is Inversely Related to Cancer Prevalence: A Systematic Review and a Meta-analysis of 13800 Patients and 23340 Controls in 19 Observational Studies," *Lipids in Health & Disease* 10, no. 127 (2011).

[xxvi] B. Vessby, M. Uusitupa, et al. "Substituting Dietary Saturated for Monounsaturated Fat Impairs Insulin Sensitivity in Healthy Men and Women: The KANWU Study," *Diabetology* 44, no. 3 (2001): 312–19.

[xxvii] Caldwell B. Esselstyn Jr. *Prevent and Reverse Heart Disease: The Revolutionary, Scientifically Proven, Nutrition-Based Cure* (New York: Penguin Group, 2007).