

# FAT FOR FUEL

Audiobook  
Supplemental Material

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## **How to Handle Common Objections to MMT**

### **My doctor says diet doesn't matter.**

Many physicians have never received any substantive training on nutrition, which can result in them being skeptical about the value of making dietary changes to treat or prevent disease. Take this objection as merely an indication of a fatal flaw in our medical education system, and not as a personal prognosis of success or failure. If they believe that diet truly doesn't matter, then they should also believe that it won't hurt if you alter the way you eat.

There's no concrete evidence that a fat-burning diet has a therapeutic effect on disease.

At this time the only scientific proof that a high-fat, low-carb diet has a beneficial effect relates to children with drug-resistant seizures. However this does not mean that it doesn't work for other conditions, only that the trials needed to show an effect are still many years out and will require loads of funding that is not typically dedicated to diet studies. Please understand that there are no studies that show it does not work. Review Chapter 2 for a comprehensive list of recent and important studies on the effects of high-fat diets on disease.

### **My doctor doesn't want me eating this much fat.**

The current government dietary guidelines limit calories from fat to around 20 to 35 percent of your total. These guidelines are based on flawed science, yet they persist. Fortunately, in recent years some bright and dedicated researchers have started to unravel these myths. What they're learning is that excess carbohydrates, especially the easily digestible ones from grains, starches, and fruits, are the primary cause of many of the chronic diseases that degrade health from childhood on.

### **This eating plan is too restrictive and hard to implement. I don't want to weigh everything.**

It may seem tedious to weigh your food, record your food intake, and test your glucose levels—I'm not going to pretend it's not. But you don't have to start out keeping meticulous records. You can begin at whatever level of tracking and testing is doable for you, and gradually increase your record keeping over time, as other parts of the plan become easier.

Also, take a moment to consider how inconvenient, expensive, and unpleasant the conventional therapies can be: chemo, radiation, surgery, and dangerous—potentially life-threatening—medications are terribly inconvenient, as are frustration over not being able to lose weight and a sense of disempowerment regarding your own body and health. While MMT is not a cure, it is a powerful foundational metabolic intervention that will kick-start your body to begin the healing process. Of course this requires more effort on your part, and you need commitment to put your plan into action. But the upside far outweighs the minor inconvenience of weighing your portions and keeping good records of your progress.

### **I need a complete meal plan in order to do this.**

Miriam Kalamian, the nutritionist who specializes in helping clients who have cancer adopt a fat-burning diet and who has consulted extensively on this book, hears this a lot but knows that in reality, you can start very simply. That's why she and I collaborated on three different ways to embark on MMT, which we call "on-ramps" and which we cover in the next chapter. While you may believe you need each meal mapped out for you in advance, you actually only need to think of your new plan one meal at a time. If you are feeling overwhelmed just thinking about these changes, start with one high-fat meal per day and you'll find it easier to quickly work your way up to a full day of fat-burning meals.

There are plenty of websites, cookbooks, and even meal-planning services that you can use as resources to help you draw up a detailed and personalized meal plan. But you don't need a plan like this to get started. In fact, the more you personally engage in the research and decision making, the more able you'll be to make MMT work for you and your particular health situation.

If you still feel like there are too many obstacles to making these changes, consider working with a health coach or nutritionist who specializes in therapeutic high-fat diets (see page 192 for info on how to find one). Most likely, all you really need is a few hours of consultation to create your personal road map.

### **My doctor doesn't want me to lose weight.**

If you are at or above a healthy weight, losing a little weight can work to heal some of the underlying conditions of disease, such as insulin resistance. That said, I understand that your doctor

may not want you to lose weight, particularly if you have cancer (as unintended weight loss can be a sign that you are not tolerating the standard treatments well, or that your disease is progressing). If you are already underweight, you can set up your high-fat eating plan to provide more calories than are required to maintain your current weight so you gain weight on the plan.

**I can't afford organic/I can't find high-quality foods locally.**

That's okay. It's better to work within these limitations than to let them keep you from making any beneficial changes. Work to the best of your ability dependent on where you are right now in terms of health, cooking ability, budget, and food availability. The important element here is to make the commitment to start. Once you've experienced the benefits for yourself—for example, seen your blood sugar drop to a new and healthier level—you will be motivated to find ways to improve on the quality of the foods in your plan.

**I don't have the time for shopping and meal prep.**

This is another challenge that Miriam runs up against frequently. Her advice: Chances are you're already spending some time in the grocery store and the kitchen. Find some easy-to-prepare, high-fat, low-carbohydrate recipes online that you think you might enjoy and then check to see if you have all the ingredients. If not, add them to your shopping list. (Yes, you'll need a shopping list as you'll be visiting different areas of the supermarket.) Another option: ask your friends or family to help you out here. You may not get exactly what you want on the first try but it's a step in the right direction.

**I need to keep non-MMT foods on hand for my kids (or spouse).**

The reality is that these foods are no better for your family members than they are for you. While you can't force others to adopt MMT, you can set a good example by switching to a fat-burning diet; use this as an opportunity to improve your entire family's health. Plus, your kids and/or spouse will still have plenty of access to these foods outside the home—no need to keep your cupboards and fridge stocked with all manner of carb- and sugar-laden treats.

If there are some foods that are high in quality but aren't part of the fat-burning food plan, especially if they are appropriate

choices for the youngest members of your family, designate a clear “Non-MMT” area to store them in. Then accept as fact that these areas are off limits to you.

**My doctor/friend says I’ll get kidney stones.**

MMT changes the way your kidneys handle sodium, which can result in a loss of both sodium and water. The risk of kidney stones rises if you are not well hydrated because your urine will contain higher concentrations of substances—including calcium, oxalate, urate, cysteine, xanthine, and phosphate—that can precipitate out and form stones. Some foods on the fat-burning food plan are also high in oxalates, another possible contributor to the formation of some types of kidney stones. If you have a family or personal history of kidney stones, talk to your doctor about a prophylactic supplement—such as prescription potassium citrate. And everyone on MMT should stay well hydrated, drinking plenty of filtered tap water each day.

If you are working with a doctor who doesn’t acknowledge your right to share in the decision making about your health, or who doesn’t understand your perspective and concerns, start the search for a new doctor. Yes, you have incredible power over your health through your food choices, but you need a solid and supportive team, especially if you are facing a serious diagnosis. And every member of that team is important.

### **MMT-Friendly Foods**

Photocopy this list and take it with you to the grocery store on your first few shopping trips to help you restock your kitchen with foods that will ease your transition to fat burning.

Vegetables:

- Asparagus
- Avocados
- Broccoli
- Brussels sprouts
- Cabbage
- Cauliflower
- Celery
- Cucumbers
- Kale
- Mushrooms
- Salad greens

- Sauté greens
- Spinach
- Zucchini

After you are fat adapted, you can add back limited amounts of these foods:

- Eggplant
- Garlic
- Onions
- Parsnips
- Peppers
- Rutabaga
- Tomatoes
- Winter squash (very limited amounts)

Fruits:

- Berries (a small handful, in lieu of a serving of vegetables)
- Grapefruit (a few sections, replacing a serving of veggies)

Proteins:

- Grass-fed beef (ideally with the AGA American Grassfed certification)
- Lamb
- Pork (including limited amounts of bacon and sausage)
- Poultry (preferably pastured and organic)
- Seafood (wild-caught fish and shellfish)
- Sardines and anchovies
- Wild game meats
- Eggs (preferably pastured and organic)
- Organ meats

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### Dairy

- Cheese (hard cheeses such as cheddar or Parmesan or soft, high-fat cheese such as Brie)
- Heavy whipping cream
- Sour cream (cultured, without added starches or fillers)
- Full-fat “original” cream cheese

### Nuts and Seeds

- Macadamias (rich in healthy fats, yet low in carbs and protein)
- Pecans
- Brazil nuts (rich in selenium but limit yourself to two per day because they are high in protein)
- Coconut (including unsweetened meat, milk, cream, or flour)
- Hazelnuts
- Chia seeds
- Hemp hearts/seeds
- Pumpkin seeds
- Black sesame seeds
- Black cumin seeds
- Raw cacao nibs
- Flax seeds (rich in healthy omega-3s and fiber; grind just before eating)

### Snacks

- Avocados
- Olives
- Pickles (naturally fermented—look for salt on the ingredient list and no vinegar)



#### Fats and Oils

- Coconut oil
- MCT oil
- Cocoa butter
- Raw, organic butter or ghee, grass fed
- Lard or tallow from organically raised animals, best for sautéing
- Other saturated animal fats, such as duck fat
- Extra virgin olive oil (for dressings or homemade mayonnaise)
- Fermented vegetables, ideally made at home or bought (unpasteurized) and used as a condiment

#### Sweeteners

- Stevia (liquid drops, preferably organic)
- Lo han kuo or monk fruit
- Xylitol—although beware; it's toxic to dogs!
- Erythritol

## REMOVE TEMPTATION WITH A PANTRY SWEEP

It is so much easier to resist the urge to eat carbs if they aren't in your home. An essential part of your preparation for adopting MMT is going through your pantry and cupboards and removing anything that is not compatible with the plan. Give it away to friends, or take it to a food bank. You may even be able to return unopened packaged foods to your grocery store and use the money you get back to purchase foods that are MMT friendly. The more quickly you work through this step, the less likely it is that you'll run into temptation.

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Surprising Sources of Hidden Sugars			
Condiments	Beverages	Snacks	Meals
Salsa	Lattes	Fresh or dried fruit	Many Thai and Vietnamese dishes, such as pad Thai
Ketchup	Flavored coffees	Flavored yogurt	Frozen dinners
Packaged salad dressings	Iced tea beverages	Peanut butter with added sugars	
Barbecue sauce	Flavored kefir	Nut butters with added sugars	
Teriyaki sauce	Commercially prepared smoothies		
Bottled marinades	Most mixed drinks		
Pickles	Sweet white and sparkling wines		
Relish	Creamers, dairy or nondairy		
Honey mustard	Dairy-free milks (look for the word “unsweetened” on the box)		
Commercially prepared coleslaw	Juices that contain fruits and root vegetables		
Tomato sauce			

# RESOURCES

## BOOKS

*The Art and Science of Low Carbohydrate Living*, by Stephen D. Phinney and Jeff S. Volek

*The Art and Science of Low Carbohydrate Performance*, by Stephen D. Phinney and Jeff S. Volek

*The Big Fat Surprise: Why Butter, Meat and Cheese Belong in a Healthy Diet*, by Nina Teicholz

*Cancer as a Metabolic Disease: On the Origin, Management, and Prevention of Cancer*, by Dr. Thomas Seyfried, professor of biology at Boston College. You can learn more about the keto research conducted at Dr. Seyfried's lab on his website: <http://www.bc.edu/schools/cas/biology/facadmin/seyfried.html>.

*The Complete Guide to Fasting: Heal Your Body By Intermittent, Alternate-Day, and Extended Fasting*, by Jimmy Moore and Dr. Jason Fung

*Doctoring Data: How to Sort Out Medical Advice from Medical Nonsense*, by Dr. Malcolm Kendrick

*Dumping Iron: How to Ditch This Secret Killer and Reclaim Your Health*, by P. D. Mangan

*Good Calories, Bad Calories: Fats, Carbs, and the Controversial Science of Diet and Health*, by Gary Taubes

*Grain Brain: The Surprising Truth About Wheat, Carbs, and Sugar—Your Brain's Silent Killers*, by David Perlmutter, M.D., and Kristin Loberg

*Keto Clarity: Your Definitive Guide to the Benefits of a Low-Carb, High-Fat Diet*, by Jimmy Moore and Dr. Eric Westman

*Keto for Cancer: The Ketogenic Diet as a Targeted Nutritional Strategy, A Guide for Patients and Practitioners based on the Metabolic Theory of Cancer*, by Miriam Kalamian

*Power, Sex, Suicide: Mitochondria and the Meaning of Life*, by Nick Lane

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*The Obesity Code: Unlocking the Secrets of Weight Loss*, by Dr. Jason Fung and Timothy Noakes

*The Obesity Epidemic: What Caused It? How Can We Stop It?* by Zoë Harcombe

*Tripping over the Truth: How the Metabolic Theory of Cancer Is Overturning One of Medicine's Most Entrenched Paradigms*, by Travis Christofferson

## COOKBOOKS

*200 Low-Carb, High-Fat Recipes: Easy Recipes to Jumpstart Your Low-Carb Weight Loss* by Dana Carpender takes a very straightforward approach to incorporating more fat into your meals. Take note, though, that this author is not concerned about food quality. In other words, there's no mention of pasture raised versus CAFO or raw versus cooked. Still, the book is a practical resource, especially for those new to any kind of whole-food cooking.

*The Ketogenic Cookbook: Nutritious Low-Carb, High-Fat Paleo Meals to Heal Your Body* by Jimmy Moore and Maria Emmerich is an elegant take on high-fat gourmet, beautifully illustrated throughout. This is more special-occasion cooking than everyday, but is great for the foodies out there who fear monotony.

*The Ketogenic Kitchen: Low carb. High fat. Extraordinary Health* by Patricia Daly and Domini Kemp—both cancer survivors who have woven their story, as well as many cancer-fighting tips, into the book. Includes meal plans and recipes that may help those new to low-carb, high-fat cooking.

## ONLINE RESOURCES

**The Charlie Foundation for Ketogenic Therapies** was founded to provide information, advocacy, and support for families with children suffering from intractable epilepsy. Over the years, it has expanded its mission to include use of the diet for cancer, autism, ALS, Parkinson's disease and Alzheimer's disease, and traumatic brain injury. It is a clearinghouse of scientific research, recipes, and products related to the therapeutic benefits of a ketogenic diet. <http://www.charlifoundation.org/>.

**Cronometer**, a free online tool that you can use to customize your MMT plan. Track food intake, add biometrics, and record exercise, then see at a glance if you are meeting your targets for macronutrient distribution, nutrient intake, and other parameters you wish to track. Cronometer is also available as an app, making it convenient for you to log your foods on the go. I am thrilled to have been able to collaborate with the founders to create a custom "Mercola" version of the software that's designed to support your efforts. You can find it here: <http://www.cronometer.com/mercola>.

**Dietary Therapies**, the website of Miriam Kalamian, Ed.M., M.S., C.N.S., nutrition consultant and educator who specializes in the ketogenic diet for cancer. She offers a book on her website that you can use as a guide to implementation. <http://www.dietarytherapies.com/>.

**Ketogenic Diet Resource**, the website of Ellen Davis, M.S. This site is particularly helpful for its general and condition-specific info as well as high-fat, moderate-protein, and low-carb food plans and recipes (although you may need to modify them because they may be too high in protein for you, depending on your lean body mass, so please keep that in mind). <http://www.ketogenic-diet-resource.com>.

**KetoNutrition: Practical Information on Ketogenic Diets and Metabolic Therapies**, the blog of top keto researcher Dominic D'Agostino, associate professor in the Department of Molecular Pharmacology and Physiology in the Morsani College of Medicine at the University of South Florida: <http://ketonutrition.blogspot.com/> and <http://ketonutrition.org/>.

**“Insulin and Its Metabolic Effects,”** a talk by Dr. Ron Rosedale. To view the transcript, go to: <http://articles.mercola.com/sites/articles/archive/2001/07/14/insulin-part-one.aspx>.

**KetoDiet Blog**, the blog of Martina Slajerova, author of *The KetoDiet Cookbook* and *Sweet and Savory Fat Bombs*—a great source of free, high-fat, low-carb recipes: <http://www.ketodietapp.com/blog/>.

**Mercola.com**, my own website where I publish articles daily on the latest research findings and updates in my own thinking and recommendations: [www.mercola.com](http://www.mercola.com).

**“Reconsidering the Role of Mitochondria in Aging,”** a 2015 research paper published in the *Journals of Gerontology: Medical Sciences*, is the best article I reviewed for this book and is available for free download at PubMed.gov (the National Institutes of Health’s clearinghouse of scientific studies; you can find it by searching for “PMID: 25995290”). I did not dive deep into molecular pathways in this book, as it not written for professionals, but if you have extensive biochemical and mitochondrial education I would strongly encourage you to download this study. At the time of this writing, I have read it four times and learn something new with every read.

**Ruled.me**, a website with recipes and ketogenic high-fat food plans that also has an active forum: <http://www.ruled.me>.

## SUPPLIES

**Abbott Precision Xtra or Freestyle Optium Neo Blood Glucose and Ketone Monitoring Systems**, meters that use test strips (which are typically sold separately) to measure beta-hydroxybutyrate and glucose in the blood—they may be called by another name outside of the U.S.

**Bayer Contour Glucose Monitoring System**, the most economical way to test blood glucose levels.

**Bayer Ketostix**, urine test strips to detect acetoacetate ketone bodies in the urine—best used in the first few months of the diet.

**EatSmart Precision GetFit Digital Body Fat Scale**, a bathroom scale that uses bioimpedance to assess your body fat percentage.

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**Ketonix Breath Ketone Analyzer**, measures levels of acetone ketone bodies in the breath—particularly useful for athletes (<https://www.ketonix.com>).

**Pure Power Mitomix Bars**: These bars, which took 17 revisions to perfect, provide a high level of nutrients, great taste, and an MMT-friendly macronutrient ratio in a convenient grab-and-go package. They contain almond butter, psyllium, coconut, pumpkin seeds, macadamia nuts, cocoa powder, chia seeds, hemp seeds, coconut butter, cocoa powder, erythritol, and stevia in a chocolate coating (<http://shop.mercola.com>).

**Skulpt Aim or Skulpt Chisel**, electrical impedance myography (EIM) device to measure your body fat percentage.

# APPENDIX A

## From Pimples to Heart Disease: How Mitochondrial Metabolic Therapy Helps Many Diseases

Healing your mitochondria happens on the cellular level, but the benefits ripple throughout the body to include all aspects of your health—perhaps most dramatically the chronic diseases or conditions that may be threatening your quality of life.

The science community has recognized that a high-fat, ketogenic diet is beneficial for epilepsy since the 1920s. But it has been a slower road for research to assess the possible benefits of such a diet on a whole host of other conditions. Here is a roundup of the latest research on the long list of ailments that a fat-burning diet can help treat, if not outright reverse.

### ACNE

Nearly 85 percent of people have acne at some point in their lives, making acne the most common skin disorder in the U.S.<sup>1</sup> While acne typically begins during puberty, it's not limited to

adolescents and may impact any age group, even those in their 50s and beyond.

While not physically dangerous, acne can take a considerable psychological toll on its sufferers. Some of those afflicted become so self-conscious and embarrassed that their professional and personal lives suffer, leading to alienation, depression, and social withdrawal.

Many mistakenly believe acne is mostly an aesthetic problem, but it is actually a sign of a deeper imbalance in your system, often originating in your gut. Most physicians miss this connection entirely, instead prescribing acne drugs and other topical treatments.

Americans spend more than \$2.2 billion every year on acne treatments, including prescription and over-the-counter products,<sup>2</sup> but many of these products will prove to be useless if you ignore the foundational cause of most acne: improper diet.

Diets high in sugar and refined carbohydrates are one of the primary causes of acne. In fact, acne is much less of a problem in non-Westernized societies, where refined carbohydrates and sugar are consumed in much lower amounts.<sup>3</sup>

The link between carbs and acne exists because grains, high-net-carb vegetables, fruits, and sugar/fructose all cause a surge of insulin and insulin-like growth factor 1 (IGF-1) in your body. Excess protein will also increase IGF-1. This can lead to an excess of male hormones, like testosterone, which cause your pores to secrete sebum, a greasy substance that attracts acne-promoting bacteria. IGF-1 also causes skin cells known as keratinocytes to multiply, a process that is also associated with acne.

Additionally, these very same foods—refined carbs—also increase inflammation in your body, which may trigger or exacerbate acne.

There is plenty of good evidence that changing your diet can result in improvements in acne. Most of the research does not look at high-fat diets but instead points to the benefits of eating a low-glycemic diet. Glycemic index refers to a food's ability to increase levels of blood sugars, so foods that are higher in carbs than in fiber (which helps stabilize blood sugar) also have a higher



glycemic index. So although these studies aren't a total indicator of a high-fat diet's effect on acne, the MMT diet is also low glycemic, so there are strong parallels.

A 2007 study published in the *American Journal of Clinical Nutrition* found that young men (ages 15 to 25) with acne problems who were placed on low-glycemic diets for 12 weeks—in other words, diets low in the type of carbs that raise glucose and insulin—showed significant improvements in acne and insulin sensitivity.<sup>4</sup> A 2012 controlled randomized study by Korean researchers found that acne patients who followed a low-glycemic diet for 10 weeks experienced a significant reduction in inflammation and number of lesions.<sup>5</sup> And a 2014 review published by researchers at the State University of New York Downstate Medical Center examined evidence of a link between refined carbohydrate consumption and acne, concluding that dermatologists should counsel their acne patients to avoid high-glycemic (i.e., high-carb) foods,<sup>6</sup> which following the high-fat diet helps you do naturally, and without feelings of deprivation.

## ALZHEIMER'S DISEASE

As of 2015, 5.3 million Americans had been diagnosed with Alzheimer's disease,<sup>7</sup> and that number has only steadily risen since then; Alzheimer's diagnoses are projected to triple by 2050.<sup>8</sup> Over half a million Americans die from the disease each year, making it the third leading cause of death in the U.S., right behind heart disease and cancer.<sup>9</sup>

Mounting research suggests that our modern diet is playing a significant role in the skyrocketing prevalence of Alzheimer's. Processed foods tend to be nearly devoid of healthy fat while loaded with refined sugars: a pernicious combination for mitochondrial function. As I discussed in the "mental clarity" section of Chapter 2, Alzheimer's has been considered "type 3 diabetes" since 2005, when researchers found that diabetics have a doubled risk of developing Alzheimer's disease.

Since then, researchers have begun to discover how insulin resistance and Alzheimer's are intricately linked. Insulin receptors are present throughout your brain, and play a role in learning and memory as well as the regulation of food intake and body weight.

When insulin signaling goes awry, it paves the way for cognitive decline and the development of Alzheimer's in two ways: First, it enhances key signaling molecules that, when stimulated, lead to the development of proteins that contribute to the plaques and tangles that occur in the brain and are hallmarks of the disease.<sup>10</sup> The other way doesn't initiate in the brain, but rather in the liver, which in the presence of insulin resistance produces toxic fats known as ceramides that then cross the blood-brain barrier and go on to cause insulin resistance, oxidative stress, inflammation, and cell death in the brain.<sup>11</sup>

Tying diet specifically to Alzheimer's is research from the Mayo Clinic published in 2012, which revealed that diets rich in carbohydrates are associated with an 89 percent increased risk for dementia, while high-fat diets are associated with a 44 percent reduced risk.<sup>12</sup>

MMT has great potential to support healthy brain function because it improves insulin receptor sensitivity that in turn improves overall metabolic signaling. It also catalyzes your body to burn fat for fuel, thereby radically increasing the amount of clean-burning ketones your body produces for fuel. It also lessens chronic inflammation and moderates high blood glucose levels, both of which are associated with Alzheimer's.

There have been a handful of studies on the effects of a functional food called Axona, which is made up of medium-chain triglycerides (MCTs)—saturated fats similar to those found in coconuts. A 2009 randomized, double-blind, and controlled study (considered the gold standard in research) found that Axona made a significant improvement in the cognitive function of patients with Alzheimer's disease when compared to placebo.<sup>13</sup> It's important to note that even though exogenous ketones can be useful and likely are highly beneficial for Alzheimer's disease, the first step is to get your body to make its own ketones.

Another avenue by which a high-fat diet could mitigate risk factors for Alzheimer's disease is by improving mitochondrial health. Brain images of living Alzheimer's patients and postmortem analyses have shown that impaired mitochondria accompany the disease.<sup>14</sup> Because MMT protects mitochondria from oxidative damage, it likely has a protective effect against Alzheimer's.

Fasting, which I covered in Chapter 10, further promotes MMT's beneficial effect on Alzheimer's disease because it can accelerate the breakdown of the amyloid plaques, or protein fragments, that are one of the hallmark brain abnormalities of Alzheimer's. When you keep your protein and net-carb levels low, you increase your brain's ability to remove and recycle these damaging protein fragments.

While the science is still evolving regarding the direct correlation between a high-fat diet and Alzheimer's disease, because there is no known way to reverse the disease once it is detected, prevention is key, and MMT has all the hallmarks of being an effective defense. Better yet, it is one that is 100 percent within your personal control—a key factor that Alzheimer's disease rapidly erodes once it sets in.

## ARTHRITIS

More than 21 million Americans have trouble climbing stairs, getting dressed, and staying active due to arthritis, and that number is up from 19 million just a few years back. If you have osteoarthritis, the cartilage within your joints is undergoing progressive damage, and there is typically a reduction in the amount of synovial fluid that keeps your joints lubricated and cushioned. Osteoarthritis also has an inflammatory component.

By 2040, an estimated 78 million Americans over the age of 18 are expected to be diagnosed with osteoarthritis, with more than half of the new cases in people as young as 45 to 64 years.<sup>15</sup>

Why are so many young people suffering from this painful degenerative joint disease, which has historically been associated

with wear and tear and joint deterioration that occur over a lifetime?

Rising rates of overweight and obesity likely play a role. Arthritis rates are more than twice as high in obese people as those who are normal weight, because the extra weight puts more pressure on their joints and increases inflammation in their bodies.

If you are one of the millions struggling with osteoarthritis, or want to avoid becoming one of that number, changing your diet is one of the simplest and most powerful steps you can take.

There is plenty of research showing that improving your omega-6 to omega-3 ratio—an integral part of MMT—has exciting potential to prevent and treat arthritis. According to a 2011 animal study, a diet enriched with omega-3 fats reduced the majority of disease indicators<sup>16</sup> among guinea pigs engineered to develop osteoarthritis. This included both cartilage and subchondral bone changes, and the lead researcher noted that the evidence was strong that omega-3 fats may help prevent the disease and also slow its progression in those already diagnosed. A 2013 study published in the journal *Cartilage* also showed that omega-6 oils, when injected into cartilage cells, provoked an inflammatory response, where monounsaturated and saturated fats appeared to inhibit cartilage destruction.<sup>17</sup>

A high-fat, ketogenic diet in particular has also been shown to reduce pain and inflammation in animal studies.<sup>18, 19</sup> Meaning that adopting a healthy high-fat diet (which includes eating more omega-3 fats and fewer omega-6s) is a viable and very promising avenue to pursue in the relief of the pain and disability that can be brought on by osteoarthritis. As an added benefit, you stand to lose some of the excess weight that may be contributing to your discomfort and keeping you from being physically active.

## CARDIOVASCULAR DISEASE

Even though the death rate from cardiovascular diseases—which includes heart attacks and stroke—declined by 29 percent between 2001 and 2010, it's still the number one cause of death

in the U.S., despite advances in medical technology that should have radically reduced the rate. According to the U.S. Centers for Disease Control and Prevention (CDC), about 800,000 Americans die from cardiovascular disease annually.<sup>20</sup>

A quarter of these deaths—or about 200,000—could be prevented through simple lifestyle changes, and more than half (6 out of 10) of the preventable heart disease and stroke deaths occur in people under the age of 65.

If you want to understand the causes of heart disease, you have to look at how your arteries incur damage, and what factors contribute to blood clotting. Contrary to popular belief, there's no fat (cholesterol) "clogging the pipe" at all.

Total cholesterol will tell you virtually nothing about your disease risk (unless it's exceptionally elevated, above 330 or so, which would be suggestive of familial hypercholesterolemia—about the only circumstance in which a cholesterol-lowering drug would be appropriate, in my opinion). Two ratios that are far better indicators of heart disease risk are:

- **Your HDL-to-total-cholesterol ratio:** The higher this number the better as a low HDL ratio is a very potent heart disease risk factor. Just divide your HDL level by your total cholesterol. This percentage should ideally be above 24 percent. Below 10 percent, it's a significant indicator of risk for heart disease.
- **Your triglyceride-to-HDL ratios:** This ratio should ideally be below 2.

Additional risk factors for heart disease include:

- **Your fasting insulin level:** Any meal or snack high in carbohydrates like fructose and refined grains generates a rapid rise in blood glucose and then insulin to compensate for the rise in blood sugar. The insulin released from eating too many carbs promotes fat storage and makes it more difficult for your body to shed excess weight; and excess fat, particularly around your

belly, is one of the major contributors to heart disease. One typically requires a physician's lab order for this test but it is relatively inexpensive even if you have to pay for it yourself.

- **Your fasting blood sugar level:** Studies have shown that people with a fasting blood sugar level of 100 to 125 mg/dl had a nearly 300 percent higher risk of having coronary heart disease than people with a level below 79 mg/dl.<sup>21</sup> I personally believe that you should make the changes needed to get your fasting blood sugar below 80, and this is easily monitored at home using a blood glucose meter (see Chapter 6 for more information on how to do this).
- **Your iron level:** Iron can be a very potent driver of oxidative stress, so if you have excess iron levels you can damage your blood vessels and increase your risk of heart disease. Iron levels can be monitored by testing blood levels of ferritin; ideally, your level should be between 60 and 80 ng/nl. For information on this test and others that will help you monitor your iron levels, see Chapter 4.

In a nutshell, preventing cardiovascular disease involves *reducing chronic inflammation* in your body, and a proper diet is an absolute cornerstone here. Although saturated fat has taken the blame for causing heart disease for the last several decades, even mainstream medicine is coming to the realization that the primary culprit in heart disease is *sugar consumption*.

A 2015 study published in the *Journal of the American Medical Association* concluded that there's "a significant relationship between added sugar consumption and increased risk for cardiovascular disease mortality." The 15-year study, which included data for 31,000 Americans, found that those who consumed 25 percent or more of their daily calories as added sugars were more than twice as likely to die from heart disease as those who got less than 10 percent of their calories from sugar. On the whole, the

odds of dying from heart disease rose in tandem with the percentage of added sugar in the diet regardless of the age, sex, physical activity level, and body mass index.<sup>22</sup>

A 2014 study came to very similar conclusions. Here, those who consumed the most sugar—about 25 percent of their daily calories—were twice as likely to die from heart disease as those who limited their sugar intake to 7 percent of their total calories.<sup>23</sup>

A high-fat diet dramatically reduces the amount of sugar you consume, and it mitigates risk factors for cardiovascular disease in other important ways that are related to insulin. As Dr. Rosedale explains, insulin stores magnesium. If your cells become resistant to insulin, magnesium passes out of your body through your urine rather than getting stored in your cells.

Several meta-analyses have confirmed a high-fat diet's role in reducing multiple risk factors for cardiovascular disease. One study, published in the *Journal of the Academy of Nutrition and Dietetics* in 2013, looked at the differing effects of high-fat diets versus low-fat diets on blood lipid levels. It included 32 studies and found that high-fat diets resulted in significantly greater improvements in reductions of total cholesterol, LDL cholesterol, and triglycerides and beneficial increases in HDL cholesterol.<sup>24</sup>

In regard to stroke, a 2012 review of animal studies published in the *Journal of Neurochemistry*<sup>25</sup> found that both a ketogenic diet and the supplementation of ketone bodies were protective in ischemic stroke (due to a blocked artery) and had neuroprotective benefits after a stroke occurred. As the researchers stated, there was a “notable improvement in mitochondrial function, a decrease in inflammation, and an increase in expression of neurotrophins such as BDNF” in animals in a ketogenic state.

## SEIZURE DISORDER

In the U.S., seizure disorder affects an estimated 4.3 million adults and nearly 750,000 children below the age of 17.<sup>26</sup> It's a chronic neurological condition characterized by recurring

seizures, which can have a significant impact on a person's quality of life, given the heightened risk of accidents and injuries.

Standard treatment for epilepsy includes antiepileptic drugs, which tends to control the problem for 60 to 65 percent of patients—although antiseizure drugs increase the risk of suicidal thoughts and behaviors and are associated with memory loss and hair loss. For the remaining 35 to 40 percent of epilepsy patients, the drugs don't work—but oftentimes a ketogenic diet *will*.

The high-fat diet was first recognized in the 1920s<sup>27</sup> as the best option in the treatment of seizure disorder until the introduction of Dilantin, which, as is the case with other antiseizure medications, often fails to control seizures. There's even a ketogenic diet special interest group at the American Epilepsy Society. It was organized by Dr. Thomas Seyfried, who today is one of the leading academic researchers investigating the use of the ketogenic diet as a treatment for cancer.

Due to his and other research, as well as advocacy efforts of The Charlie Foundation for Ketogenic Therapies, the ketogenic diet is widely accepted as a dietary therapy for the management of refractory (drug-resistant) seizures, especially in children.

A 2016 Cochrane Review<sup>28</sup> that evaluated seven randomized controlled studies on children with seizures found that the high-fat classic ketogenic diet (with 90 percent of calories from fat) resulted in reported rates of freedom from seizures as high as 55 percent and of a reduction in seizure frequency as high as 85 percent after three months. For the Modified Atkins Diet, the studies reported seizure freedom rates of only 10 percent and seizure reduction rates at just 60 percent, suggesting that the higher-fat classic diet yielded significantly better results.

The researchers concluded, "For people who have medically intractable epilepsy or people who are not suitable for surgical intervention, a KD remains a valid option."



## FIBROMYALGIA, CHRONIC FATIGUE SYNDROME, AND CHRONIC PAIN

When I started my medical practice over three decades ago, fibromyalgia was so commonly missed that by the time the average person finally received a diagnosis, they'd been evaluated by various physicians for nine or ten years. Today, the pendulum seems to have swung the other way, and it's become a convenient catchall for a variety of complaints. However, there's no doubt that fibromyalgia is a very real, painful, and sometimes debilitating health condition.

It's estimated that 5 million people in the U.S. have fibromyalgia, and 9 out of 10 sufferers are women.<sup>29</sup> Unfortunately, there is still no specific diagnostic test for this condition. Rather, patients have to meet certain clinical criteria, the most common one being hypersensitivity to pain in very specific areas of the body, including:

- Inside of elbows
- Collarbones
- Inside of knees
- Hips

People also frequently report pain all over their bodies—including in their muscles, ligaments, and tendons—along with a feeling of exhaustion. For these reasons, I'm combining this discussion of fibromyalgia with references to chronic fatigue syndrome and chronic pain as well.

Conventional physicians typically offer some form of pain medication, and perhaps psychotropic drugs like antidepressants. I don't recommend either of these drugs because they do not address the root cause of the problem.

Recent data suggests that central sensitization, in which neurons in your spinal cord become sensitized by inflammation or cell damage, may be involved in the way fibromyalgia sufferers experience pain.<sup>30</sup>

The problem is that fibromyalgia involves a complex array of symptoms including widespread pain and fatigue, and it has multiple causative factors. No one treatment is effective for everyone.

If you have fibromyalgia, chronic fatigue syndrome, or chronic pain, you already know how frustrating it is to manage, and how much confusion you face sorting through all the conflicting nutritional advice about how to eat. The fact is, there's little scientific evidence to support any single eating plan that will work for all sufferers of these conditions.

I believe a high-fat diet will go a long way toward dramatically reducing your symptoms and improving quality of life. It does this by improving your body's ability to produce energy by improving the functioning of your mitochondria.

There is some evidence that people with fibromyalgia experience fewer symptoms if they eliminate one or more of the foods that frequently trigger food allergies or food sensitivities. The most common offenders are corn, wheat, soy, dairy (all of which are highly likely to be contaminated with glyphosate), citrus, and sugar. The top three are pasteurized milk, soy, and gluten (wheat and similar grains). In one study of 17 fibromyalgia patients, nearly half experienced a "significant reduction in pain" after eliminating corn, wheat, dairy, citrus, and sugar.<sup>31</sup>

Science is also beginning to recognize a link between oxidative stress and mitochondrial dysfunction and health issues such as chronic fatigue and fibromyalgia<sup>32</sup>—two conditions that the high-fat diet takes full aim at by bringing the body back into balance.

Although there have been very few studies that look specifically at the effect of a high-fat diet on chronic fatigue syndrome, fibromyalgia, and chronic pain, there was one promising study published in the December 2013 issue of the *Journal of Musculoskeletal Pain*.<sup>33</sup> The diet in this study was expressly nonketogenic (meaning it wasn't designed to promote the production of ketones, either through a high fat content or through regular fasting), but it was low carb. The 33 middle-aged women who followed the diet reported increased energy, less pain, and improved symptom scores on the Fibromyalgia Impact Questionnaire.

If you are dealing with one of these pervasive and difficult to treat conditions, I hope you are empowered by the knowledge that you have the potential to dramatically improve your health and quality of life by changing the nutritional makeup of what you eat, moving away from carbs and toward high-quality fat.

## GASTROESOPHAGEAL REFLUX DISEASE (GERD)

The American Gastroenterological Association estimates that 15 million Americans experience daily pain and discomfort from acid reflux, and 60 million suffer from it every month.<sup>34</sup> GERD is responsible for approximately 9 million doctor visits and 5 million hospitalizations a year. In 2014, \$5.9 billion was spent just on Nexium<sup>35</sup> (one of the most popular drugs to treat reflux symptoms).

The hallmark symptom of acid reflux is “heartburn”—a burning sensation behind your breastbone that sometimes travels up your throat. In some cases, this pain can be severe enough to be mistaken for a heart attack. Acid reflux occurs when the lower esophageal sphincter relaxes inappropriately, allowing acid from your stomach to flow (reflux) backward into your esophagus.

Mistakenly, acid reflux is thought to be caused by excessive amounts of acid in your stomach, which is why acid-blocking drugs such as Nexium are typically prescribed or recommended. This is a serious medical misconception, as the problem usually results from having *too little* acid in your stomach, and these prescriptions only further reduce acidity. In fact, there are over 16,000 articles in the medical literature showing that suppressing stomach acid does not address the problem. It only temporarily treats the symptoms. To make matters worse, these drugs have side effects, which include magnesium depletion, impaired vitamin B<sub>12</sub> absorption, and osteoporosis.

The most effective way to treat GERD is to restore balance to the digestive system through diet. The typical Western diet of processed foods and sugars is a surefire way to exacerbate acid reflux as it will upset the bacterial balance in your stomach and

intestine, which directly affects your gastric function. MMT is an ideal approach to remedy GERD because it includes plenty of vegetables and other high-quality, unprocessed foods that promote a healthy microbiome and reduce excess weight, which commonly accompanies reflux (37 percent of obese people also have GERD<sup>36</sup>).

Research has shown that adopting a high-fat, low-carb diet can be highly effective in reducing the amount of acid that moves up into the esophagus. A 2006 study published in the journal *Digestive Diseases and Sciences*<sup>37</sup> measured stomach acidity in eight people with GERD before and after they switched to a high-fat, low-carb diet. After just a few days of eating the intervention diet, they experienced significantly fewer symptoms and a reduction in acidity in the lower esophagus. The improvements happened very quickly, which is always motivating when making changes.

Since the high-fat diet has been shown to be an effective weight-loss treatment (see the section on page 282 for more info on this), it can also help treat GERD by removing or greatly reducing a primary contributing factor—obesity. A 2013 study showed that losing weight can significantly reduce GERD symptoms or even resolve them completely. In the study, which was published in the journal *Obesity*, 332 obese adults—both men and women—ate a calorie-restricted diet.<sup>38</sup> After six months, the participants had lost an average of 13 pounds; 65 percent had their GERD completely resolve and 15 percent saw their reflux symptoms partially resolve.

## **IRRITABLE BOWEL SYNDROME (IBS)**

Irritable bowel syndrome is characterized by digestive symptoms, including abdominal discomfort or pain, bloating, and gas. Some people with IBS experience constipation. Others develop diarrhea. Still others have both simultaneously, or vacillate between the two. IBS is often associated with anxiety and tends to cluster within families.

Since there is no specific test for IBS, it often goes undiagnosed, but experts estimate that up to 11 percent of the global population

has symptoms. Approximately twice as many women as men are affected.

Diet plays a major role in IBS, as grains and high-sugar foods feed disease-causing gut bacteria—which can cause gas and gastric upset—and can also trigger serious intestinal inflammation. In my experience, there is usually an underlying emotional stress or anxiety associated with IBS patients, which can go hand in hand with an imbalance in gut bacteria as there is a scientifically recognized connection between gut health and mental health.

Adopting a low-carb diet has been shown to reduce symptoms and improve quality of life in people with IBS. A 2009 study<sup>39</sup> put 13 people with diarrhea-predominant IBS on a four-week diet of less than 20 grams of carbohydrates per day. Participants reported significant reductions in abdominal pain and stool frequency and improvements in stool consistency, and they lost an average of 6.8 pounds. Better yet, 10 of the 13 reported these reductions in symptoms during all four weeks of the trial, meaning the dietary changes yielded fast relief.

More recently, a Japanese study published in the journal *PLoS One* in 2015 looked at the correlation between regular consumption of carbohydrate-rich foods and IBS. This cross-sectional study of 1,082 Japanese adults demonstrated that the consumption of diet staples such as rice, bread, pasta, and buckwheat noodles was associated with a higher prevalence of IBS.<sup>40</sup> A high-fat diet naturally results in consuming fewer carbs, replacing them with plenty of high-fiber vegetables, nuts, and seeds—which in turn feed the good bacteria in your gut. So it stands to reason that these changes will also be helpful in rectifying IBS.

## MIGRAINES

More than 37 million Americans suffer from migraines; nearly 5 million of them experience at least one migraine attack per month.<sup>41</sup> In all, an estimated 13 percent of the world's population suffers with migraines to a greater or lesser extent. The condition is more prevalent among women, with about 15 to 18 percent

of women worldwide experiencing them, compared to 6 to 7 percent of men.

Despite their prevalence, migraines are still one of the most poorly understood medical disorders out there. Part of the problem has been that the experiences of those suffering from migraines vary greatly. Aside from throbbing, searing pain, which may or may not be one-sided, some experience visual disturbances prior to onset, while others do not. There may also be nausea, vomiting, fever, chills, sweating, and/or sensitivity to light, sound, and smells. The symptoms are also commonly confused with a stroke, as one can lose vision and experience unusual nerve sensations.

Diet does appear to also play a role in migraines: searching the medical literature in PubMed.gov using the search terms “migraine” and “food allergies” will provide you with over 160 different studies.<sup>42</sup> One randomized, double-blind, crossover study published in 2010<sup>43</sup> found that a six-week-long diet that excluded known food allergens produced a statistically significant reduction in the number of migraine attacks and number of headache days.

More recent studies have noted an association between high-fat, low-carb diets and dramatic reductions in migraine attacks. A 2015 study published in the *European Journal of Neurology*<sup>44</sup> assigned 45 women who experienced regular migraines to a ketogenic diet for one month, and then switched them to a standard calorie-restricted diet for another five months. The control group in the study ate a standard calorie-restricted diet for the entire six months. The women eating the high-fat, low-carb diet experienced a significant reduction in the number of attacks, number of days with a headache, and medicine intake during their first month (where the standard, low-calorie dieters didn't). Once they switched to a standard low-calorie diet, their symptoms worsened—although they remained improved compared to baseline. The group who didn't start with the ketogenic diet did see a reduction in the number of days with a headache—but not until month three, and they did not see a reduction in attack frequency until month six. Which would you prefer—noticeable relief within one month, or waiting three to six months?

A fascinating 2013 Italian study published in *Functional Neurology*<sup>45</sup> reported a case where 47-year-old twin sisters adopted a low-carb, high-fat weight-loss diet. After three days on the diet, their frequent migraines also “unexpectedly vanished.” The sisters ate a ketogenic diet for four weeks and then transitioned to a low-calorie, non-ketogenic diet for two months before starting the ketogenic diet cycle again.

Before starting the diet, the sisters suffered from five to seven migraine attacks a month. They experienced no headaches while on the high-fat, four-week cycle. Their migraines did recur during the two-month, nonketogenic intervals, although with reduced frequency, duration, and intensity. The researchers theorized that the diet reduced inflammation and oxidative stress in the neurons of the patients and enhanced mitochondrial genetics, which in turn resulted in a dramatic reduction in migraine attacks.

## MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is a chronic, degenerative disease involving the brain and spinal column caused by demyelination of the nerves. Myelin is the insulating, waxy substance that surrounds the nerves in your central nervous system. When the myelin is damaged by self-destructive processes, the function of those nerves deteriorates over time, resulting in a number of symptoms, including:

- Muscle weakness
- Sensory disturbances
- Cognition and memory problems
- Imbalance, or loss of coordination
- Astigmatism and vision loss
- Tremors

MS may progress steadily or present as acute attacks followed by a temporary remission of symptoms. Previous studies have

shown that vitamin D can positively impact MS by altering chemicals called cytokines, which modulate your immune system. Therefore, one of the best strategies you can implement for your health in general is also one of the best preventive strategies against autoimmune diseases like MS: getting enough regular sun exposure so your body can produce optimal amounts of vitamin D.

Studies have found that higher blood levels of vitamin D help protect against the development of MS, so if you don't have access to regular sensible sun exposure, or a safe tanning bed, you may want to seriously consider oral supplementation with vitamin D<sub>3</sub>.

One such study, published in 2004, found that women who took vitamin D-containing multivitamin supplements were 40 percent less likely to develop MS than women who did not supplement.<sup>46</sup> Keep in mind that this study was based on *far* lower dosages of vitamin D than what we now know are needed, so if you optimize your levels, you're likely to reduce your risk by far more than 40 percent.

While research on high-fat diets and multiple sclerosis is still emerging, it is promising. One 2012 animal study looked at the effects of a ketogenic diet on memory impairment and neuroinflammation—two hallmarks of MS. The mice fed the high-fat diet had fewer markers of inflammation and lower levels of reactive oxygen species (which, as you have learned, damage cells through oxidation). They also improved their performance on tests of spatial learning, memory, and motor ability.<sup>47</sup>

There is a growing body of evidence suggesting that mitochondrial dysfunction is at the root of neurodegenerative diseases, including MS,<sup>48</sup> which suggests that a diet that improves mitochondrial health, as MMT does, will also help manage and treat MS symptoms.<sup>49</sup>

## NONALCOHOLIC FATTY LIVER DISEASE

Nonalcoholic fatty liver disease (NAFLD) is defined as an excessive accumulation of fats in your liver—more than 5 to 10 percent of the total weight of the liver—in the absence of



significant alcohol consumption. While it's normal for your liver to contain some fat, when levels get too high your liver can no longer regulate your blood sugar, which leads to a cascade of serious health problems. If left untreated, NAFLD can cause your liver to swell or even contribute to liver cancer or liver failure.

Interestingly, the fat that gets stored in your liver in the form of triglycerides does *not* come from eating fatty foods. It comes from eating a diet rich in carbohydrates. This is why ducks and geese are force-fed corn to make foie gras (French for “fatty liver”). The sugar-rich American diet is a likely contributor to the current epidemic of NAFLD—25 percent of adults<sup>50</sup> and 10 percent of children in America have this disease,<sup>51</sup> which was almost unheard of in not-so-distant past. Fructose, which is the sugar found in most processed foods (often in the form of high-fructose corn syrup) can *only* be metabolized by your liver.

Nearly all fructose gets shuttled to your liver. And if you eat a typical Western-style diet, you consume high amounts of it. The overload of fructose ends up taxing and damaging your liver in the same way alcohol and other toxins do. You don't even need to be wildly overdoing it on the fructose front to be putting your liver at risk: a 2015 study from Tufts University revealed that those who consumed at least one sugary drink daily had a higher risk of liver damage and NAFLD.<sup>52</sup>

The good news is that dramatically reducing the number of carbs you eat has been shown to have powerful benefits in NAFLD. A 2011 study published in the *American Journal of Clinical Nutrition*<sup>53</sup> assigned two groups of patients with NAFLD to either a low-calorie or a low-carbohydrate diet for two weeks. At the end of the intervention, both groups had lost weight and lowered their triglycerides, but the low-carb group had a significantly greater reduction in liver fat. *In only two weeks.*

A 2011 Spanish pilot study published in the *Journal of Medicinal Food* placed 14 men with NAFLD on a Spanish ketogenic Mediterranean diet for 12 weeks. After those three months, 100 percent of the men had normal triglyceride and HDL cholesterol levels, 21 percent had completely resolved their NAFLD, and 92 percent had an overall reduction in the fat stored in their liver.<sup>54</sup>

An earlier study from 2007<sup>55</sup> found similar results, when five men with NAFLD were placed on a low-carb, ketogenic diet and followed for six months. Of the four who stuck with the eating regimen, their follow-up biopsies revealed a significant reduction in the percentage of fat in their livers. They also had improvements in the scarring—known as fibrosis—that can accompany NAFLD, and they lost a mean of 28 pounds.

## OBESITY

Two out of three Americans are now either overweight or obese. As a 2014 article in the *New York Times* noted,<sup>56</sup> the weight of the average American increased by 24 pounds in the four decades between the 1960s and 2002.

But it's not just a problem of size: in the U.S., just eight obesity-related diseases—including type 2 diabetes, hypertension, heart disease, nonalcoholic fatty liver disease, dementia, and cancer—account for 75 percent of all health care costs!

Keep in mind, however, that while obesity is associated with these diseases, it is not their *cause*. Obesity is a *marker*. The underlying problem, linking obesity with all of these health issues, is *metabolic dysfunction*. And the primary driver of metabolic dysfunction is insulin resistance, which in turn is typically caused by excessive consumption of carbohydrates. This means that your weight gain could be a sign that your overall health may be in jeopardy. Contrary to popular belief, obesity is not simply the result of eating too many calories and not exercising enough.

As Dr. Malcolm Kendrick, author of *Doctoring Data: How to Sort Out Medical Advice from Medical Nonsense*, notes, much of the medical advice we take as gospel is simply *made up*. There's no support and no science for it, and the "calorie theory" appears to fall into this category.

While there's science to show the actual number of calories in a pound of fat, it's a major flaw in logic to say that all you have to do to *lose* that pound of fat is to create an equal caloric deficit. (Zoë Harcombe's book, *The Obesity Epidemic: What Caused It? How*

*Can We Stop It?* is the most comprehensive document on this topic that I've come across, and exposes this flaw in the science. If you'd like to dive deeper into this topic, her book and Dr. Kendrick's are great places to start.)

While I know it can be difficult to let go of the idea that what you need to do to lose weight is eat fewer calories and exercise more, the good news in all this is that you *can* shed excess pounds by choosing *different* sources for your calories. When you shift your diet away from a steady stream of nonfiber carbs, and integrate regular periods of feasting and fasting, you allow your body to recalibrate its sensitivity to insulin. And when you replace those nonfiber carbs with high-quality fats, you empower your body to start burning its fat stores for fuel, which helps the weight come off. Better yet, the fats help you feel full and satisfied, making adherence to this diet much easier to maintain than low-calorie or low-fat diets.

## TRAUMATIC BRAIN INJURY

According to the CDC, some 1.7 million traumatic brain injuries occur in the U.S. each year, many of them resulting from sports injuries or automobile accidents.

Once a person with a traumatic brain injury is stabilized, there is no standard treatment to help their brain recover; most physicians, instead, adopt a “wait and see” approach to determine if the person will regain neurological function.

Sixty percent of your brain is made up of fat. DHA alone makes up about 15 percent to 20 percent of your brain's cerebral cortex. It's found in high levels in your neurons—the cells of your central nervous system—where it provides structural support.

Because your brain is literally built from fats, it makes sense that high doses of the most beneficial ones following injury could support your brain's natural healing process. In particular, science has evaluated the effect of two specific fat-related substances:

- Omega-3 fats
- Ketones, which your body produces when you consume a high-fat, low-net-carb, moderate-protein diet

How might omega-3 fats help the brain heal from a traumatic injury? They are known to:

- Inhibit cell death<sup>57</sup>
- Help reconnect damaged neurons<sup>58</sup>
- Activate genes that help cope with brain damage while turning off those that promote brain inflammation<sup>59</sup>

There have been documented cases of patients making remarkable recoveries from brain injuries after supplementing with omega-3 fats.<sup>60, 61</sup> Unfortunately, this is still considered an “unorthodox” treatment for traumatic brain injury, and is not routinely ordered as a standard of care, primarily because large-scale human trials have yet to be conducted—and are not likely to be conducted since omega-3 fats are widely available over the counter and thus are not easily patentable by pharmaceutical companies. But despite the pharmaceutical industry’s indifference, here’s what we do know:

- Brain injuries impair glucose metabolism in the brain,<sup>62</sup> while eating a high-fat, low-net-carb diet produces ketones, which the brain can use as an alternate fuel to glucose.
- Brain injuries result in neuroinflammation (inflammation in your nervous system);<sup>63</sup> ketones and a high-fat diet are anti-inflammatory.
- Over time, brain injuries can result in epileptic seizures,<sup>64</sup> and ketogenic diets have been shown to dramatically reduce the frequency of seizures.
- Rats fed a ketogenic diet after brain injury experienced a reduction in contusion volume (injured area).<sup>65</sup>

- They also experienced decreased swelling and cell death.<sup>66</sup>

If restoring brain health is a challenge you or a loved one is facing after a traumatic injury, the high-fat diet can provide the vital building blocks the brain needs to repair itself.

## TYPE 2 DIABETES

In the U.S., 115 million people—or nearly one in three<sup>67</sup>—has some form of diabetes or pre-diabetes. Nearly 28 percent of people with diabetes do not know they have it,<sup>68</sup> which increases the odds of developing potentially deadly complications.

The most recent data, released in 2014, reveals that between 2001 and 2009, incidence of type 2 diabetes among children aged 10 to 19 rose by 30 percent!<sup>69</sup> I use an exclamation point because type 2 diabetes had always been considered an adult disease. Now the epidemic is even affecting our children.

Statistics such as these point to two very important facts. First, they tell us that diabetes cannot be primarily caused by genetics, and second, they scream that something we're doing, consistently and en masse, is horribly wrong and we need to address the problem head-on.

Conventional medicine has type 2 diabetes pegged as a problem with blood sugar control but this is a misperception. The reality is that diabetes is a disease rooted in *insulin resistance*, which is typically caused by a diet that is too high in sugars and carbs. When you have insulin resistance, you have plenty of insulin circulating in your blood, to the point that insulin receptors become desensitized to it.

Even science is starting to understand that insulin is not the way to treat type 2 diabetes:

A study published in the June 30, 2014, issue of *JAMA Internal Medicine*<sup>70</sup> concluded that insulin therapy in type 2 diabetic patients may indeed do more harm than good. And yet, conventional medicine continues to prescribe insulin to treat

high blood glucose levels. On top of that, conventionally trained doctors pass along this seriously flawed nutritional information to diabetic patients, allowing the disease to expand to epidemic proportions.

While much conventional advice centers on insulin, *leptin* is another hormone that plays an integral role in the development of type 2 diabetes. Leptin is produced primarily in your fat cells, and one of its primary roles is regulating your appetite and body weight. Leptin tells your brain when to eat, how much to eat, and most importantly, when to stop eating. Leptin also tells your brain what to do with the available energy.

When your blood sugar is elevated, *insulin* is released to direct the extra energy into storage, the majority of which is stored as *fat*, and *leptin* is produced in these fat cells. The more fat you have, the more leptin is produced. This is why I typically talk about insulin *and* leptin resistance, as they work in tandem. Moreover, *leptin is largely responsible for the accuracy of insulin signaling and whether or not you become insulin resistant*. If you're insulin resistant, most likely you're leptin resistant as well, especially if you're overweight or obese. Just as with insulin, the only known way to reestablish proper leptin signaling is through proper diet.

High consumption of carbohydrates, especially fructose, is the prime culprit in both insulin and leptin resistance, which means that changing your diet has enormous potential to correct both of these major triggers of type 2 diabetes.

A high-fat diet appears to be particularly promising for treating diabetes.

Dr. Charles Mobbs, an animal researcher at the Icahn School of Medicine at Mount Sinai in New York City, published a study in the journal *PLoS One* in 2011<sup>71</sup> reporting he found that mice with type 1 diabetes and type 2 diabetes with early-stage kidney disease experienced a complete reversal of their kidney disease after eight weeks on a high-fat, ketogenic diet (87 percent fat). A similar reversal in humans could mean avoiding dialysis.

A 2015 critical review of previous studies published in the journal *Nutrition*<sup>72</sup> amassed evidence of the ways a low-carb, high-fat diet improves diabetes. Of these, the most crucial were twofold:

First, limiting carbohydrates is a proven way of significantly lowering blood sugar, even more effective than simply limiting calories. And second, following a high-fat diet has been shown multiple times to result in less need for medication in type 2 diabetics. Of course, a high-fat diet is also known to be highly effective in reducing excess weight, which is a known trigger for type 2 diabetes.

Despite the flawed advice from the American Diabetes Association, which is still recommending that diabetics eat  $\frac{3}{4}$  to 1 cup of high net carbs *at every meal*,<sup>73</sup> your best bet in managing—or even reversing—your type 2 diabetes is to adopt a low-carb, high-fat diet.

# APPENDIX B

## A Guide to Nuts and Seeds

### CACAO POWDER, NIBS, AND BUTTER

Most of us love chocolate but few know that it is derived from the fruit of an odd-sounding tree called cacao.

Cacao can be purchased as nibs, powder, or butter. Raw cacao powder has nearly four times the antioxidants of regular dark chocolate, making it one of the most concentrated sources of antioxidants available. In addition, it contains protein, calcium, carotene, thiamine, riboflavin, magnesium, sulfur, and more than 380 phytochemicals.

One of the best ways to consume cacao powder is to buy raw cacao nibs and then grind them into powder in a small coffee grinder just before using. Or you can purchase raw cacao butter, which is far less bitter and easier to tolerate, although it has fewer antioxidants than nibs or powder. Ideally both should be organic and Fair Trade.

**How to eat it:** Cacao powder and butter both taste great added to a smoothie with a small amount of a natural sweetener—you can use either or both. I find that stevia works best to convert the cacao powder into a delicious treat, and I have three small smoothies a day with it. It contains no polyunsaturated fat at all,



so you don't have to worry about cacao powder nudging your omega-6 fat intake too high, as you do with most all other nuts and seeds on this list. Cacao butter can also be used wherever you would use butter.

### BLACK SESAME

You may have eaten sesame seeds on a bagel, but black sesame seeds are a totally different food. Unlike white sesame seeds, black sesame seeds are unhulled, giving them a more complex flavor and delivering a wallop of additional nutritional benefits.

The Traditional Chinese Medicine classic text the *Compendium of Materia Medica*, written during the Ming Dynasty, says, "Taking black sesame seeds can heal all the chronic illness after 100 days, improve skin tone on body and face after 1 year, reverse gray hair after 2 years, and regrow teeth after 3 years."

Black sesame seeds have more calcium per gram than any other food and are excellent sources of magnesium, copper, and zinc, making them one of nature's multivitamins. They are also rich in lignans, a type of plant compound rich in polyphenols and insoluble fiber. Once ingested, lignans are converted into weak forms of estrogen that help regulate hormone balance in the body, and can potentially help reduce the risk of hormone-associated cancers (breast, uterine, ovarian, and prostate). There is research suggesting that postmenopausal women who have a high intake of dietary lignans have a 17 percent lower risk of breast cancer compared to those with a low intake.<sup>1</sup>

**How to eat:** Toss one ounce of seeds in a stir-fry of low-carb vegetables, sprinkle a small handful over a salad, or even eat them straight, making sure to chew them well and not just swallow them. Or you can add a tablespoon to a smoothie along with some of the other seeds on the list.

## FLAX SEEDS

Humans have long grown flax and used it to make linen fabric, but its usefulness is just as applicable to the inside of the body as it is to the outside. Flax seeds' beneficial properties fall into three major categories:

- Flax seeds are a rich source of omega-3 fats, in the form of the anti-inflammatory alpha-linolenic acid.
- Lignans, as discussed in the black sesame seed entry, are insoluble fibers and polyphenols that your body converts into weak forms of phytoestrogens. Flax seeds provide substantially more lignans than black sesame seeds—approximately 10 times the amount.
- Flax seeds are an excellent source of fiber, both soluble and insoluble.

**How to eat flax seeds:** Whole flax seeds can be freshly ground (in an inexpensive coffee or spice grinder) just prior to eating. Even better would be to soak them overnight and add them to the blender when you make your smoothie. You can use about a tablespoon in your smoothie, or sprinkle freshly ground flax meal into smoothies, vegetable juices, or soup; add them to eggs or guacamole (their subtle, nutty flavor won't overpower); and use them in place of bread crumbs in meatballs or crab cakes.

An important caution here is to avoid using pre-ground flax seeds or even worse, flax seed oil (which is advocated on the Budwig Cancer Protocol). Please understand that nearly all flax seed oil is seriously oxidized and should be discarded. It is easily replaced with the equivalent amount of soaked flax seeds.

Remember: one of the most important principles of MMT is to use the highest-quality and freshest ingredients possible, which will maximize the health benefits of using this approach.

## CHIA SEEDS

Chia seeds were a prized food to the ancient Aztecs and Mayans. *Chia* is the ancient Mayan word for strength, and the tiny seeds were valued for their energy-boosting properties.

Chia seeds are a quick and easy-to-use source of protein, healthy omega-3 fats, dietary fiber, minerals, vitamins, and antioxidants, all rolled into one tiny package. Although they have similar health benefits to flax seeds, chia seeds don't have to be ground prior to consumption, and they don't go rancid as quickly either. In fact, chia seeds are said to last up to two years with no refrigeration, courtesy of the high levels of antioxidants they contain.

Perhaps their greatest benefit is their high amount of fiber: just one tablespoon of chia seeds contains about 5 grams of fiber.

**How to eat:** When chia seeds are soaked in water or coconut milk overnight, they take on a tapioca-like texture; add some cinnamon and/or raw cacao powder and a bit of stevia for a pudding-like treat that can be eaten any time. You can also sprinkle chia seeds over smoothies or soups, but they do absorb water and become gelatinous, so if it's crunch you're after, sprinkle them on just before eating. Or sprout your chia seeds (yes, just like with a Chia Pet) and eat these nutritional superstars in salads or on their own.

**Caution:** If you have a history of difficulty swallowing, or are giving chia seeds to children, take care not to eat a handful of them and then immediately drink water, as they can quickly form a gel-like ball that can partially block the esophagus, requiring medical treatment to remove.

## BLACK CUMIN

Black cumin, also known as black seed, black caraway, onion seed, and Roman coriander, has a long history of use in traditional systems of medicine, including Ayurveda. The prophet Mohammed even described this humble black seed as a cure for every disease but death itself. It is important to understand that

black cumin seeds are not the same as the cumin spice. They are not as easy to find in grocery stores as some of the other seeds but can easily be found online.

More than 650 peer-reviewed studies have looked into the potential health benefits of “black seed” and have found it to have antimicrobial, liver-protective, immune-supporting, analgesic, antispasmodic, and antioxidant properties.<sup>2</sup>

Black cumin may also have anti-obesity effects, including reductions in body weight and waist and hip circumference.<sup>3</sup>

**How to eat it:** With a warm, slightly bitter flavor that tastes something like a blend of thyme, oregano, and nutmeg, black cumin is a palatable addition to your diet. You can add the seeds to casseroles, stir-fries, and salad dressings (try them mixed with lemon, cilantro, and tahini); sprinkle them on salads; or even add them to your coffee or tea. You can also make black cumin tea by pouring hot water over the seeds (about one tablespoon) and letting it steep for 10 minutes. I add about one tablespoon (or 11 grams) of black cumin seeds to my breakfast smoothie every morning.

## SUNFLOWER SEEDS

Though made famous in paintings by Van Gogh, and for populating entire fields in the south of France, sunflowers are actually North America natives. They were cultivated by Native Americans as early as 3000 B.C. and used as food and as a source of oil, and even ground into flour.

Sunflower seeds are rich in vitamin E, copper, B vitamins, manganese, selenium, phosphorus, and magnesium. Vitamin E is a potent antioxidant that protects cell membranes and cholesterol from free radical damage, giving it powerful anti-inflammatory properties.

**How to eat them:** I firmly believe that the best way to consume sunflower seeds is to sprout them. Spouts in general are a powerful delivery system of raw, living nutrients, and sunflower sprouts are the most nutrient dense of all sprouts—about 30 times

more nutrient dense than most vegetables. Seek to include a few ounces regularly in your salads. They are expensive to purchase (about \$30 per pound) but cost well under \$1 per pound if you grow them yourself. (Go to [mercola.com](http://mercola.com) and search for “sprouting seeds” for more information on how to do this.)

Sunflower seeds are also great on their own as a snack. Mix them into high-fat, grass-fed burgers, add them to a grain-free granola, sprinkle them over a salad for a refreshing texture addition, or use a high-powered blender to grind them into sunflower butter. As sunflower seeds have a high omega-6 oil content, they spoil easily; keep them in the refrigerator or freezer if possible, and definitely away from light.

### **PUMPKIN SEEDS**

If you're in the mood for a crunchy snack that doubles as a phenomenal health food, look no further than pumpkin seeds. With a wide variety of nutrients ranging from magnesium and manganese to copper, protein, and zinc, pumpkin seeds are nutritional powerhouses wrapped up in a very small package.

Magnesium participates in the creation of ATP, the synthesis of RNA and DNA, the pumping of your heart, proper bone and tooth formation, relaxation of your blood vessels, and proper bowel function. Magnesium has been shown to benefit your blood pressure and help prevent sudden cardiac arrest, heart attack, and stroke. Yet an estimated 80 percent of Americans are deficient in this important mineral.

Like sunflower seeds, pumpkin seeds also contain high levels of phytosterols and free radical-scavenging antioxidants. They are also high in fiber.

Pumpkin seeds are a rich source of zinc (one ounce contains more than 2 mg of this beneficial mineral). Zinc is important to your body in many ways, including immunity, cell growth and division, sleep, and mood. Zinc is also important for prostate health (where it is found in the highest concentrations in the body).<sup>4</sup>

**How to eat them:** Raw pumpkin seeds are great on their own. They are also a good addition to grain-free granola, salads, and soups, or freshly ground and added to your smoothie.

## PSYLLIUM SEED HUSKS

If you're looking for a healthy way to supplement your fiber intake—which is an important part of Mitochondrial Metabolic Therapy—organic, whole-husk psyllium is a simple, cost-effective way to do it. Psyllium is a high-fiber food source that is actually the ground husks of the seeds of the *Plantago ovata* plant. It contains both soluble and insoluble fiber, which have a long list of important attributes that contribute to physical health, as I covered in Chapter 5.

Taking psyllium three times a day could add as much as 18 grams of dietary fiber (soluble and insoluble) to your diet, which brings you quite close to the recommended minimum of 50 grams per 1,000 calories consumed—although please understand that using psyllium is not a replacement for eating plenty of fiber in the form of vegetables. This level of psyllium would have to be worked up to gradually and may not be necessary for everyone.

**Caution:** If you suspect that you have a bowel obstruction or have a history of bowel adhesions, only take psyllium under appropriate medical supervision.

**How to eat it:** Psyllium is perfect for adding to smoothies, as it blends well and changes their texture, making them thicker. You can also mix one heaping tablespoon in a glass of water three times a day, and follow it with another glass of water to help the fiber pass through your system. Please keep in mind that psyllium is a heavily sprayed crop, which means many common sources are contaminated with pesticides, herbicides, and fertilizers. For this reason, be sure to *only* use organic psyllium husk, and make sure it's 100 percent pure: many supplement brands use synthetic or semi-synthetic active ingredients that do *not* contain psyllium, such as methylcellulose and calcium polycarbophil. I also

recommend choosing a psyllium powder that does not contain additives or sweeteners, as these tend to have a detrimental effect on your microbiome. Sugar in particular feeds potentially pathogenic microorganisms, which is the opposite of what you're trying to achieve. It also adds to your overall carb count, and this is counterproductive to the aims of MMT. Also be wary of artificial sweeteners. Research is slowly building the case that these foreign foods can lower the number of beneficial bacteria, resulting in a negative impact on your microbiome.

### MACADAMIA NUTS

When you think of macadamia nuts, Hawaii might come to mind, but this nut is actually native to the continent Down Under, which explains why the fruit is also known as the Australian or Queensland nut. These are some of the most sought-after nuts in the world, so expect to pay more.

Macadamia nuts have the highest fat and lowest protein and carb content of any nut, and they also happen to be one of my favorites. Raw macadamia nuts also contain high amounts of vitamin B<sub>1</sub>, magnesium, and manganese. Just one serving of macadamia nuts nets 58 percent of what you need in manganese, and 23 percent of the recommended daily value of thiamine.

About 80 percent of the fats in macadamia nuts are monounsaturated, and most of those fats are the omega-9 fat, oleic acid. This is the same fat that is also present in olive oil, so they provide many of the same benefits as olive oil. They are typically less oxidized than olive oil because the fat is intact, not extracted (if you consume them, as recommended, as a fresh, raw nut).

If you have pets, it's important to note that macadamia nuts are toxic to dogs and can cause weakness, vomiting, loss of coordination, tremors, and hyperthermia.

**How to eat:** These tasty nuts are a perfect snack eaten on their own. You can grind them into nut butter, chop them finely and use them to "bread" meat or fish, chop them more coarsely and

add them to a salad, or mix them into soups for a little crunch. Keep your consumption to 60 grams or less a day.

## PECANS

The pecan tree traces its origins to North America. Throughout millennia, pecans were an important staple in the Native American food supply. And Native Americans were instrumental in teaching the early colonists how to harvest, utilize, and store pecans as an essential source of nourishment to tap into during harsh winters.

Pecans contain more than 19 vitamins and minerals, and research has suggested that they lower LDL cholesterol and promote healthy arterial function.<sup>5</sup> Pecans are a close second to macadamia nuts on the fat and protein scale, and they also contain anti-inflammatory magnesium, heart-healthy oleic acid, phenolic antioxidants, and immune-boosting manganese.

Pecans are in the top 15 foods identified by the USDA as high in antioxidant activity. Pecans are also chock-full of minerals including manganese, which is not easily obtained from your diet.

**How to eat them:** Raw pecans are delicious eaten on their own, or chopped and combined with coconut oil, ground cacao nibs, cinnamon, and a little bit of stevia for a sweet treat. For a truly delicious savory snack, toss raw pecans in butter and sprinkle them with sea salt and then roast them using low heat.

## BRAZIL NUTS

Brazil nuts are a nutrient-dense and delicious type of nut that comes from a tree in South America that bears the same name.

Brazil nuts are most notable as an excellent source of selenium, an essential mineral that may be beneficial in preventing cancer and other chronic diseases and as an antagonist to mercury. They also have a high-fat and low-protein content, following closely behind macadamias and pecans. And they are rich in zinc; this



## FAT FOR FUEL

is important given that so many Americans are deficient in this mineral.

There is a long and impressive list of health benefits associated with Brazil nuts, including their ability to help stimulate growth and repair, improve the digestive process, boost heart health, balance hormone function, improve the immune system, lower risk of cancer, boost male fertility, help with weight loss, aid in skin health, and reduce the signs of aging.

Brazil nuts also contain the amino acid l-arginine, which offers multiple vascular benefits to people with heart disease or to those who have increased risk for heart disease due to multiple cardiac risk factors.

Despite their many health benefits, eating more than a few per day has downsides. For one, you can easily exceed your ideal intake of selenium and that can have a negative impact on your health. Also, due to their extensive root systems, Brazil nuts contain small amounts of radium.<sup>6</sup>

**How to eat them:** Brazil nuts are great eaten whole. It is important to eat shelled Brazil nuts quickly, as the high fat content makes these nut varieties go bad quite quickly. Like the other nuts listed in this section, they can also be chopped and sprinkled over other foods included in the MMT protocol.

## ALMONDS

Almonds are technically not a nut; they're a seed. The almond tree is in the same family as peach, apricot, and cherry trees, and like those cousins, almond trees bear fruit that have a stony seed, or pit. The almond is that pit.

Almonds contain l-arginine and are also good sources of potassium, a mineral that helps normalize blood pressure.

Do be careful not to overeat almonds, however, as they are high in protein: four almonds contain nearly 1 gram. They are also relatively high in omega-6 fats, about 30 percent, so too many will distort your healthy omega-6-to-omega-3 ratio. They have about 60 percent saturated fats and only 10 percent monounsaturated fat.

It can be difficult to find truly raw almonds in the U.S. because almonds sold in North America can still be labeled “raw” even though they’ve been subjected to one of the following pasteurization methods:

- Oil roasting, dry roasting, or blanching
- Steam processing
- Propylene oxide (PPO) treatment (PPO is a highly toxic flammable chemical compound, once used as a racing fuel before it was prohibited for safety reasons)

It is possible to purchase raw almonds in the U.S., but it has to be done through vendors who sell small quantities of genuinely raw almonds and have obtained a waiver from the pasteurization requirement. The key is to find a company with this waiver.

If you do choose to consume almonds, you may want to soak them first. This will help rid them of the phytic acid and enzyme inhibitors they naturally contain. Enzyme inhibitors in nuts (and seeds) help protect the nut as it grows, decreasing enzyme activity and preventing premature sprouting. But in your body, these enzymes can interfere with the function of your own digestive and metabolic enzymes. To make soaked nuts more palatable, you can use a dehydrator to improve the texture.

**How to eat:** Of course, you can simply snack on almonds. You can also grind them into almond butter using a high-powered blender and spread it on celery, or mix it into smoothies with ground cacao nibs for a nutty, chocolatey treat. Store almonds in a dark cabinet, the refrigerator, or the freezer to preserve freshness and prevent rancidity.

I personally don’t eat any almonds because I want to keep my omega-6 content low, but they can be used in a limited amount. It’s probably best to limit them, like seeds, to about 15 grams per day.

FAT FOR FUEL

NUTRIENT LEVELS OF MMT-FRIENDLY NUTS AND SEEDS

Note: Values are based on volume measurement of one level tablespoon, which makes measuring easy. There is a wide range of weights, from 4 grams with psyllium to 11 grams with cacao nibs.

Seed/Nut	Fat	Protein	F/P	Carbs	Fiber	C/F
Cacao Nibs	4.7	1.6	2.9	3.9	3.5	1.1
Black Sesame	5.2	1.8	2.9	2.8	1.5	1.9
Flax	4.2	1.8	2.3	2.9	2.7	1.1
Chia	2.8	1.5	1.9	3.8	3.1	1.2
Hemp	2.1	1.5	1.4	1.7	1.7	1.0
Black Cumin	1.5	1.2	1.3	3.0	0.8	3.8
Sunflower	2.1	1.8	1.2	2.7	0.8	3.4
Pumpkin	1.7	1.7	1.0	4.8	1.7	2.8
Psyllium	0	0	0	4.0	4.0	1.0
Macadamia	7.6	0.8	9.5	1.4	0.9	1.6
Pecan	7.2	1.4	5.1	1.4	1.0	1.4
Brazil	6.6	1.4	4.7	1.2	0.8	1.5
Almond	4.0	1.7	2.4	1.7	1.9	0.9

## HEALTH PROFESSIONALS

### **Ron Rosedale, M.D.**

Dr. Rosedale is founder of the Rosedale Center, co-founder of the Colorado Center for Metabolic Medicine (Boulder, CO) and founder of the Carolina Center of Metabolic Medicine (Asheville, NC). Through these centers, he has helped thousands suffering from so-called incurable diseases regain their health. He also created The Rosedale Diet, detailing the first “fasting mimetic” diet and his proven methods for treating diabetes, cardiovascular disease, arthritis, osteoporosis, and other chronic diseases of aging. One of Dr. Rosedale’s life goals is to wipe out type 2 diabetes.

Dr. Rosedale was instrumental in helping me first understand the importance of insulin in 1995, and 20 years later the importance of limiting protein because of its impact on the mTOR signaling pathway.

### **Jason Fung, M.D.**

Dr. Fung is a Toronto-based nephrologist. He completed medical school and internal medicine at the University of Toronto before finishing his nephrology fellowship at the University of California, Los Angeles at the Cedars-Sinai hospital. He joined Scarborough General Hospital in 2001, where he continues to practice. *The Complete Guide to Fasting*, of which he is the coauthor, is in my view the finest book written on the use of fasting in clinical practice. This is important, as fasting is one of the most profound interventions to jump-start your metabolism into burning fat as your primary fuel.

### **Robert Lustig, M.D, M.S.L.**

Dr. Lustig is a professor of pediatrics in the division of endocrinology at the University of California, San Francisco, and former director of the Weight Assessment for Teen and Child Health (WATCH) Program at UCSF. He did a lecture in 2009 called

“Sugar: The Bitter Truth” that has been viewed 7 million times and brought great attention to the issue of excessive fructose as a metabolic toxin. He is also the author of *Fat Chance*, and his work on sugar has been covered on *60 Minutes*.

**David Perlmutter, M.D.**

Dr. Perlmutter is a board-certified neurologist and received his degree from the University of Miami School of Medicine. He is the recipient of the Linus Pauling award, and has authored four *New York Times* bestsellers including *Grain Brain: The Surprising Truth about Wheat, Carbs and Sugar*, with over 1 million copies in print. Others include *Brain Maker*, *The Grain Brain Cookbook*, and his most recent book, *The Grain Brain Whole Life Plan*.

**Malcolm Kendrick, M.D.**

Dr. Kendrick, like me, is a family physician. He currently lives in Macclesfield, England, and has written two excellent books, *The Great Cholesterol Con* and *Doctoring Data*. He also blogs at [drmalcolmkendrick.org](http://drmalcolmkendrick.org) where he explores a number of health issues, focusing primarily on cardiovascular disease.

**Thomas Seyfried, Ph.D.**

Dr. Seyfried is a professor of biology at Boston College and is a pioneer in the field of viewing cancer as a metabolic disease. He wrote the classic textbook on the topic, *Cancer as a Metabolic Disease*. It was a great privilege to have access to his expertise to untangle some of the complex science in this area.

**Jeanne A. Drisko, M.D.**

Dr. Drisko received her M.D. from the University of Kansas Medical Center, where she currently is the Rioridan Endowed Professor of Orthomolecular Medicine and Research and director of the KU Integrative Medicine Department since 1988.

**William LaValley, M.D.**

Dr. LaValley obtained his medical degree from Baylor College of Medicine in Houston, Texas, and is a licensed physician in Austin, Texas, and Nova Scotia, Canada, since 1988. He integrates evidence-based molecularly-targeted anti-cancer natural product supplements and repurposed anti-cancer pharmaceuticals for advanced molecular Integrative Oncology treatments in addition to (not instead of) conventional cancer care. Over the last 10 years Dr. LaValley has developed an extensive, state-of-the-art relational database that covers the molecular biology of cancer. He was instrumental in sending me the study that revealed the true mechanism of the action of insulin, which led to the development of the feast-famine cycle I described in Chapter 11.

**Stephanie Seneff, Ph.D.**

Dr. Seneff is a senior research scientist at the MIT Computer Science and Artificial Intelligence Laboratory and is an incredibly bright, innovative thinker who, among many other things, has done much work in describing how glyphosate, the active ingredient in the herbicide Roundup, causes harm in humans.

**Miriam Kalamian, Ed.M., M.S., C.N.S.**

Miriam is one of the leading nutritionists in the world in the practical application of nutritional ketosis for cancer. She has consulted with many hundreds of patients referred to her by Dr. Thomas Seyfried and Dr. Dominic D'Agostino, as well as a number of other prominent figures in the keto world, including low-carber Jimmy Moore. She is also creating a course to certify health professionals in nutritional ketosis through Certified Nutrition Specialists. I worked very closely with Miriam on most of the book to confirm its accuracy, and she was invaluable in the editing process.

**Dan Pompa, D.C.**

Dr. Pompa received his degree at Life University outside of Atlanta. He was an elite cyclist but developed chronic fatigue syndrome, which catalyzed his becoming an expert in cellular detoxification. He does not see patients but teaches hundreds of professionals how to implement this process that he integrates with nutritional ketosis. Because so many clinicians follow his protocols, he has one of the most extensive collections of information on the use of nutritional ketosis. While attending a conference in Orlando in September 2016, Dr. Pompa and I took a long walk and developed the feast-famine cycle component of the program I outline in this book. This portion of the program is largely based on his extensive clinical experience and is a key component of adopting the metabolic therapy over the long term.

**Patricia Daly, m.B.A.N.T., r.C.H.N.C.**

Patricia Daly is a cancer survivor and an experienced nutritional therapist specializing in the support of cancer patients and the ketogenic diet in particular. She has worked with hundreds of cancer patients in Ireland and abroad, lectures at the Irish Institute of Nutrition and Health, and is a well-regarded speaker at conferences and in cancer centers. *The Ketogenic Kitchen*, co-written with Domini Kemp, is her excellent book on practical suggestions for incorporating nutritional ketosis. Like Miriam, she has extensive experience in practical applications of nutritional ketosis.

**Andrew Saul, Ph.D.**

Dr. Saul has 40 years of experience in natural health education. He is the author of the popular books *Doctor Yourself* and *Fire Your Doctor* and coauthor of a dozen other books. His website, [doctoryourself.com](http://doctoryourself.com), is a comprehensive source of peer-reviewed natural health information. Dr. Saul is on the editorial board of the *Journal of Orthomolecular Medicine*, is editor-in-chief of the

peer-reviewed Orthomolecular Medical News Service, and was elected in to the Orthomolecular Medicine Hall of Fame in 2013.

**Michael Stroka, J.D., M.B.A., M.S., C.N.S., L.D.N.**

Michael is an attorney, and is the only expert on this list who is a former patient of mine. After I helped him recover from a chronic debilitating illness, he shifted careers and is now the executive director of the Board for Certification of Nutrition Specialists, the organization that is providing the framework for the certification of professionals in the clinical use of nutritional ketosis.

**Steve Haltiwanger, M.D., C.C.N.**

Dr. Steven Haltiwanger is a physician and certified clinical nutritionist with over 25 years of practice. He is well known for his research on electrotherapy and is the health and science director of LifeWave. Dr. Haltiwanger has also extensively studied the effects of light therapy, magnetic field therapy and nutrient therapy on cell regeneration of biological tissue.

**William Wilson, M.D.**

Dr. Wilson is a family physician and graduate of the University of Minnesota medical school. He developed a disease model connecting food and brain function that he coins Carbohydrate Associated Reversible Brain syndrome, or CARB Syndrome. He is an active participant on my website and is passionate about the benefits of low-carb diets, so I invited him to review the manuscript.

**OTHER PROFESSIONALS**

**Kate Hanley**

Kate is an experienced health journalist and book collaborator, and was the primary editor of this book. I was most fortunate to have the opportunity to work with her, as she is beyond talented at converting complex medical topics into easy-to-understand text.



### **Barbara Loe Fisher**

Barb is a treasured friend and champion of vaccine safety and the informed consent ethic. She is president of the National Vaccine Information Center (NVIC), a nonprofit charity she cofounded with parents of DPT vaccine injured children in 1982. She is one of the best editors I know, and her suggestions helped make the complex topics easier to digest.

### **Charlie Brown, J.D.**

Charlie is another cherished friend who is the former attorney general of West Virginia and currently a tireless advocate for mercury-free dentistry. His organization, Consumers for Dental Choice, leads the campaign to abolish dental amalgam, a filling material that is 50 percent mercury. As president of the World Alliance for Mercury-Free Dentistry, he was instrumental in making sure the Minamata Convention on Mercury addressed amalgam. Like Barb, he is an excellent communicator and helped greatly with making the book easier to read.

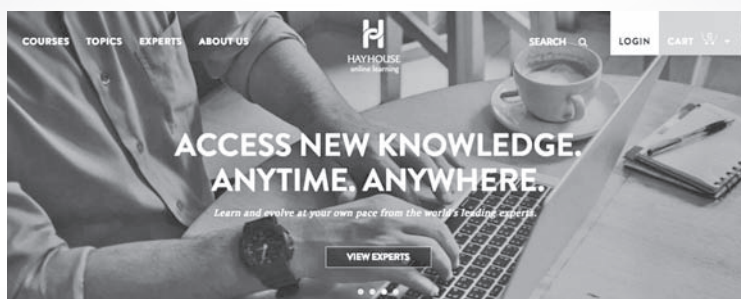
### **Travis Christofferson**

Travis is a gifted writer who wrote the book *Tripping over the Truth*, which played an important role in motivating me to write this book. I was familiar with most of the information he covered, but it never formed a cohesive narrative in my mind until I read his book. *Tripping over the Truth* is an important book to read for anyone who has cancer and is considering implementing metabolic therapy, as he provides the background information and framing perspective to help you understand the futility of the current cancer model, as well as the hope that metabolic therapy offers.

### **Aaron Davidson**

Aaron is the programmer who created the Cronometer software that I feel is an essential tool for implementing the metabolic program that is outlined in the pages of this book. This free resource also helps collect data that will help me and other researchers further improve the approach.

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