

THE ULTIMATE GRAIN-FREE  
HEALTH AND WEIGHT-LOSS LIFE PLAN

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WHEAT  
BELLY  
TOTAL  
HEALTH



WILLIAM DAVIS, MD

Author of the #1 *New York Times* Bestseller *Wheat Belly*,  
*Wheat Belly Cookbook*, and *Wheat Belly 30-Minute (or Less!) Cookbook*

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# WHEAT BELLY TOTAL HEALTH

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The Ultimate Grain-Free Health  
and Weight-Loss Life Plan

WILLIAM DAVIS, MD



*To all the readers who have the boldness, courage, and conviction to rebel against conventional  
dietary advice and discover what real nutrition can do for human health*

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# CONTENTS

ACKNOWLEDGMENTS

INTRODUCTION

## **PART I: NO GRAIN IS A GOOD GRAIN: Grazed, Grass-Fed, and Fattened**

CHAPTER 1 LIBERATE YOUR INNER COW: LIFE UNGRAINED

CHAPTER 2 LET THEM EAT GRASS

CHAPTER 3 THE REIGN OF GRAIN

CHAPTER 4 YOUR BOWELS HAVE BEEN FOULED: INTESTINAL INDIGNITIES FROM GRAINS

CHAPTER 5 GRAINS, BRAINS, AND CHEST PAINS

## **PART II: LIVING GRAINLESSLY: Restoring the Natural State of Human Life**

CHAPTER 6 GRAINLESS LIFE: BEGINNINGS

CHAPTER 7 GRAINLESS LIVING DAY-TO-DAY

## **PART III: BE A GRAINLESS OVERACHIEVER: The Next Steps to Reclaiming Grain-Free Total Health**

CHAPTER 8 CORRECT NUTRITIONAL DEFICIENCIES CAUSED BY GRAINS

CHAPTER 9 FULL RECOVERY FROM POST-TRAUMATIC GRAIN GUT SYNDROME

CHAPTER 10 GRAINLESS METABOLIC MASTERY: REGAIN CONTROL OVER BLOOD SUGAR, CHOLESTEROL, BONE HEALTH, AND INFLAMMATION

CHAPTER 11 THE ANNOYED THYROID: BOOBY TRAP FOR WEIGHT AND HEALTH

CHAPTER 12 ENDOCRINE DISRUPTION: TROUBLE IN THE GLAND SCHEME OF THINGS

CHAPTER 13 END THE SELF-DEFEAT: RECOVERING FROM AUTOIMMUNITY

CHAPTER 14 WHAT IF THE WEIGHT DOESN'T COME OFF?

CHAPTER 15 CLEARER, SMARTER, FASTER: GRAIN-FREE PERFORMANCE

EPILOGUE

APPENDIX A RECIPES FOR TOTAL HEALTH

APPENDIX B GRAIN PAIN: WATCH OUT FOR HIDDEN SOURCES OF GRAINS

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APPENDIX C A GRAIN-FREE SHOPPING LIST

APPENDIX D RESOURCES

ENDNOTES



## ACKNOWLEDGMENTS

**WHEN SOMETHING SPARKS** a phenomenon as large and revolutionary as the Wheat Belly movement, it becomes bigger than any one person. While it began as my personal effort to understand why, when patients in my office removed all things wheat from their diet, astounding transformations in health developed, it has ballooned into a collection of projects that are, I believe, changing the way we all look at food and nutrition.

As Team Wheat Belly has grown, a number of people have proven crucial players who have helped advance this cause, in particular this new book, *Wheat Belly Total Health*, the largest and most comprehensive book project in the *Wheat Belly* line to date, as well as all the projects that complement this book.

Among those whose input was crucial to this and related projects:

My agent, Rick Broadhead, who fights for this cause as if his own. A more mild-mannered but fiercer defender I could have never found.

My editors at Rodale, Jennifer Levesque and Anne Egan, helped craft this message to suit the needs of an audience eager to hear and understand more about why this counterintuitive approach works. Despite the changing landscape of book publishing, they have helped deliver the Wheat Belly message to a public barraged with competing, and often contrary, dietary messages. Vice President/Publisher of Rodale Books Mary Ann Naples and Vice President/Deputy Publisher Kristin Kiser have worked in the background to advance the Wheat Belly cause, proving instrumental projects such as the Wheat Belly special to air on public television. My publicist at Rodale, Emily Eagan Weber, dealt masterfully with the vagaries of media and managed to keep this message in the public eye, while Chris DeMarchis dealt tirelessly with many of the book's logistical details.

This *Total Health* project did not occur in isolation but developed as part of a broad front of projects that all cross-fertilize each other, everyone involved making a contribution, direct or indirect, to the final project. Among the members of Team Wheat Belly are my longtime friend Chris Kliesmet, who has helped hone these ideas from day one; Gary and Patti Miller, who champion the food and education projects; Paul and Anne MacInnis, who manage my speaking engagements, tours, and media projects; and Cindy Ratzlaff, social media consultant, who has helped make the Wheat Belly online experience a more engaging, stimulating, and entertaining interaction.

Of course, my wife and companion, Dawn, who had to endure my endless hours of distraction and the sort that goes with writing a book, deserves many, many thank-yous for her patience and support. Now that the preoccupation of the writing process is over, there will be no more befuddled looks: You are now back in my focus.



## INTRODUCTION

### YOU'VE BEEN GRAINED.

Beaten, demoralized, discouraged, your life and health have been bankrupted by “healthy whole grains.” The worst of the bunch is modern wheat: the Judas of dietary “wisdom,” despot of the breakfast bowl, tyrant of the bakery cabinet, the semidwarf darling of agribusiness. Your eyes were sprouting cataracts, your arteries were stiffening, your skin was wrinkling and plagued with rashes, your joints were sore and arthritic, your organs were inflamed, your belly fat was expanding, your blood sugar was climbing, and man breasts may even have been sprouting. Your mind was clouded by fog, your medication list was growing, and your schedule was fouled by mad scrambles for the nearest bathroom—all while you were being driven to consume more and more of the food that *all* official providers of nutritional advice advised you to consume . . . until you put an end to the whole mess as a result of the revelations made in *Wheat Belly*.

You boldly removed foods that enjoy the blessings of agencies in the business of dispensing dietary advice. You defied the USDA and its MyPlate and MyPyramid. You scoffed at the urgings of the Surgeon General’s office. You thumbed your nose at the advice of the American Heart Association, American Diabetes Association, and the Academy of Nutrition and Dietetics. You sniggered at the antics of the wheat lobby and wheat trade groups as they desperately launched waves of damage control. You removed grains like a festering abscess that refused to heal until lanced, and you discovered that health and vigor began to reappear.

I’ve experienced this personally. When I removed all “healthy whole grains” from my life, reversed my diabetes until I became confidently nondiabetic, I was freed from mind fog that persisted no matter how many cups of coffee I drank, and I found relief from the annoying symptoms of irritable bowel syndrome. My triglyceride level dropped from 350 to 42 mg/dl, my HDL increased from 27 to 97 mg/dl, and the dark thoughts and moods that I had struggled with for many years were simply erased. I did the *opposite* of widely accepted health advice and experienced a transformation to health.

Coming to the realization that conventional nutritional advice has as much value as old bubble gum stuck on the sidewalk can’t help but make you skeptical about whether most sources of health advice are objective, unbiased, and based on science in the first place. At best, dietary advice was driven by incomplete or misinterpreted data, an army of dietitians and “experts” unwittingly doing the dirty work of distributing the information. At worst, it was advice that served the ambitions of agribusiness and other powerful interests, all working to commoditize the human diet—you *commoditize*, or derive maximal financial gain by persuading us that the human diet should be dependent on foods that are inexpensive, indifferent to quality, blind to source, traded and arbitrage on a massive scale, and hungrily desired by the masses. Yes, you were grained.

When we peel back the veneer of marketing, trumped-up science, the appeal of convenience, and the yank of addiction, we find that, as a civilization, we made an enormous dietary blunder about 10,000 years ago: We mistook the seeds of grasses—first consumed in desperation—as food. We then allowed this mistake to balloon, not only perceiving this mistake as the discovery of a dietary staple

but as a food *ideal* for human consumption. Recognizing the ills of modern wheat in *Wheat Belly* was the first step, but now we can take another major step and eliminate *all* grains. Once that accomplished, we proceed even further along the path toward total health by identifying and undoing all the harmful effects we've accumulated during our grain-consuming years and that can persist even in the aftermath of grain removal. That's why I call this approach "Total Health."

In *Wheat Belly Total Health*, we are going to explore in greater detail why this dietary detour has caused more human disease and suffering than all the wars of the world combined. We'll discuss why and how experts joined in on this mass hysteria, even co-opting government agencies and policies into the delusion and creating an example of collective madness larger than the Salem witch trials or the fearmongering of the Red Scare, making absurd practices such as bleeding with leeches or frontal lobotomies seem quaint. We will then take this journey of discovery further, discussing how, after you undo this grain-induced mess, you can pick up the pieces and reconstruct diet and correct weight, hormonal status, and other facets of health you may have thought were out of reach.

There are aspects of life that are beyond your influence—genetics, family, and shoe size, for instance—but most of the factors that color your day-to-day existence are indeed under your control. Removing grains is the courageous first step, but there are plenty more steps to climb to fully undo the years of health abuse you've endured. In this book, there are wonderfully empowering strategies for you to consider to heal the wounds received during your grain-consuming days and unravel the tangle of health problems that developed. Once you're grain-free, you may be left with disruptions of bowel flora and digestive function, nutritional deficiencies, and chronic conditions like osteoporosis. These will all need to be addressed. You may find that medications previously prescribed to treat a long list of grain-related health conditions are no longer necessary. Some people take their diets on other unhealthy detours, such as by introducing gluten-free grains or unhealthy sweeteners, and discover that, while they may not be as bad off as when they consumed grains, they're striking compromises to health that *needn't* be struck. All these issues must be addressed to find your path back to total health ungrained.

Brace yourself for revelations about diet and health that you've probably never heard, even if you were an avid reader of the original *Wheat Belly*. In *Wheat Belly Total Health*, I follow a no-holds-barred, sacred-cows-be-damned, reach-for-the-skies attitude. My goal is not to titillate, nor to astound, but to inform without the influence of agribusiness interests or the bias of flawed epidemiology. I'm going to ask tough questions while discarding preconceived notions to get to the root of dietary wisdom. There we discover that, minus grains, not only does a long list of chronic health conditions dissolve, but you are also capable of achieving new heights of health and life performance that you had only previously imagined were possible.

We relieve this emperor of his new clothes while watching his huge wheat belly and man breasts shrink, his swollen joints flex, and his seborrheic skin clear. We observe his further health gains by dodging all other grains, then reclothe him in fabrics truly fit for a king. That king will be you, in a your noble, grain-free glory.

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## THE GRAIN-FREE EXPERIENCE: A CROWD PLEASER

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I could not have written *Wheat Belly Total Health* 3 years ago when the original *Wheat Belly* book came out. So many people have engaged in this lifestyle change, so many physicians and health-care professionals have come to embrace these concepts, so many new lessons have been learned as the worldwide rejection of the "healthy whole grain" message has grown that have crowd-sourced a steady stream of new and unexpected lessons. *Wheat Belly Total Health* distills the wisdom gained from the millions of people who have embraced grain-free living and rediscovered what it means to be full

healthy and alive. We are collectively undoing what humans have managed to botch for 30 generations, and we are doing it while dietitians, the USDA, and other defenders of the status quo harrumph, protest, and cast insults as they watch their last 40 years of work crumble beneath their feet.

The Information Age explodes with the empowered wisdom of crowds, shared at lightning speed and dispelling conventional “wisdom” as fast as sexting can take down a congressional career. We’ve learned, for instance, that wheat intolerance really means intolerance to *all* grains since, after all, they are all genetically related grasses. (Yes, *grasses*, just like the stuff in your backyard or what’s munched on by goats and horses. We will discuss the implications of this simple biological realization in some detail.) We learned that virtually everyone benefits from reestablishing healthy bowel flora after removing grains. We learned that iodine deficiency is making a comeback and can impair weight loss and health improvement efforts. Many removed wheat and enjoyed increased energy but didn’t experience the full return of youthful vigor because synthetic perchlorate fertilizer residues and brominated flour whiteners from bagels and pizza impaired thyroid function, leaving them with less-than-perfect ability to control weight, a head of prematurely thinning hair, and sluggish bowel function. As more and more people have said no to grains, we have recognized that, while grain elimination is powerful, there may be metabolic derangements that block weight loss and must therefore be addressed, no matter how meticulous the diet. We gained a better understanding that autoimmune, inflammatory, and neurological conditions require additional efforts to maximize their potential for a rebound to total health. We’ve come to appreciate that the entire package of benefits from grain elimination goes beyond, say, weight loss, and adds up to an astoundingly powerful collection of health-restoring, anti-aging, youth preserving, performance-enhancing, and life-prolonging practices.

Even if you’ve already enjoyed a major health success by eliminating wheat, understanding the strategies articulated in *Wheat Belly Total Health* and putting them to use can take your health effort several steps further. If you are among the many people who have shed 30, 50, 100, or even more pounds of wheat-induced visceral fat and reversed one or more health conditions, there are still many more steps you can take to further improve your health.

Or you may be among those who, minus wheat, failed to enjoy a full return to health. You may find yourself still struggling with 60 or more pounds of weight you want to shed, plus joint pains, skin rashes, and other health problems; you may be left wondering if there is something you can do, short of prescription medications and procedures, to restore your health. Or perhaps you now realize just how good you feel minus wheat and are motivated to achieve total health in as many ways as possible to ensure long-term ideal health. Or you may be brand new to the wheat-free message. If so, this is your ultimate guide to going grain-free. Regardless of which category you fall into, you have come to the right place for answers.

We are reminded that humans are truly adaptable, resilient, fit, and vigorous, and have a natural innate capacity to be healthy, slender, and happy—provided that no grains are permitted entry into our bodies and all health disruptions are corrected in their wake.

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## LIFE UNGRAINED: UNRESTRAINED HIGH PERFORMANCE

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Despotic governments oppress their people. Burdensome health-care costs weigh down our economy. One hundred extra pounds of body fat overtax hips, knees, and feet that are ill-equipped to bear such loads, and they groan, creak, and erode away under the burden. Likewise, the mix of components in grains undermines human functioning from head to toe. Unload such crushing burdens and people are freed, the economy is boosted, joints are relieved, and human functioning is liberated.

Minus the health- and life-impairing effects of grains, we venture into discussions about *performance*: How well you perform emotionally, mentally, professionally, and physically once the major impediments have been removed. This applies to accomplishments in school, at work, relationships, in sports—in virtually every setting we encounter in life. It means aiming to maximize how good you feel and look to get that extra boost of mojo that can make the difference between *getting through* your day or *blasting* through your day. Total health is outwardly evident; you see it in smoother skin, a flatter tummy, freedom from leg swelling, an easy gait, and ease and vigor of motion in all directions. It's also reflected internally through deeper sleep, less-turbulent menstrual cycles, freedom from headaches, and problem-free digestion.

In addition to less-disruptive menstrual cycles, women can enjoy improved fertility and reduction in perversely high estrogen levels, and they get reacquainted with the concept of feeling good most all of the time, rather than just once in a while or not at all. Male sexual performance improves as men enjoy lower levels of estrogen, higher levels of testosterone, and reductions of embarrassingly large breasts.

Total health can, in many instances, be measured. You can aim for perfect metabolic health as it is reflected in triglycerides and cholesterol panels, blood sugars, hemoglobin A1c (long-term blood sugar), thyroid tests, and screenings to determine levels of various nutrients. It can also be reflected in measures such as blood pressure and body fat percentage.

While you may be able to walk, run, or jump more easily, faster, farther, and higher minus the aches, pains, and energy impairment of grains, high-performance competitors enjoy similar benefits and a growing number of professional athletes are embracing the grain-free lifestyle. In this book, we discuss how to gain an even greater competitive edge with strategies that go beyond eliminating grains. Sometimes the additional steps are wonderfully simple, such as correcting iodine and iron deficiencies; other times the solutions are more elaborate, such as the strategies required to restore and maintain bowel health and undo the effects of endocrine disruption. But the goal is to unleash your individual potential and achieve the highest levels of performance in health and life in as many ways as reasonably possible. We aren't trying to create a race of superhuman grain-free men and women, but we can achieve levels of life performance that we previously enjoyed only fleetingly, if at all.

Many of these efforts may not have been necessary had we not been blindsided by these nutritional blunders in the first place. Had we grown up without exposure to Frankenrains with unique, health-disruptive effects, or without thyroid and sex hormone disruption from grains that are compounded by the ocean of endocrine gland-impairing industrial chemicals we swim in, things might be different. Had we also enjoyed the luxury of living outdoors in a semitropical climate and getting a full night of restorative sleep each and every night and had we not been exposed to the chronic, unrelenting stress of modern life, well, maybe we would have enjoyed peak functioning all along. But that is simply not the case for the majority of people. Thankfully, once we understand what went wrong, we can right the situation and, in most cases, fully restore your innate capacity for high levels of life performance.

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## **ACHIEVING UNGRAINED TOTAL HEALTH IN THREE STEPS: NO MORE, NO LESS**

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*Wheat Belly Total Health* is presented in three parts that are a logical and necessary sequence that *must* occur if your goal is total health. Like learning to crawl before you walk or studying algebra before cracking the code on calculus, total health unfolds in a natural progression.

You cannot, for instance, regain health as long as grains remain a part of your diet: Health *cann*

be perfect as long as multigrain buns, rye toast, or tacos made from genetically modified corn flour remain a part of your dietary experience. You might not even be aware that grains are exerting the harmful effects while you go about your business working, sleeping, sitting in the drive-thru, watching *Keeping Up with the Kardashians*. You might be unaware, for instance, that an abnormally increased degree of intestinal permeability is boiling away beneath the surface, waiting to eventually trigger an autoimmune condition in your body that will result, for instance, in the stumbling speech incoordination, and muscle weakness of multiple sclerosis. Or opacities may be accumulating in the lenses of your eyes, obscuring your vision with milky blurriness, waiting to be diagnosed as cataracts when you're 53, despite the "balanced diet" and exercise program you've been following for the last 30 years. Or a gradual impairment of mind function may develop beneath your awareness until one day you find that you can't remember where you parked your car, your way home, or who the unfamiliar stranger is that you share your bed with. Just because you fail to perceive it doesn't mean it isn't there. It's there regardless of how good you feel, and it needs to be corrected before you can even begin to hope for total health.

In Part I, I discuss why the elimination of *all* grains, wheat and otherwise, is essential if you are to begin your journey back to total health. It is essential because no amount of other healthy foods, nutritional supplements, exercise, or drugs can fully overcome the health-thwarting effects of grains should they remain in your diet. Grain elimination is evolutionarily appropriate for a member of the species *Homo sapiens*; it is consistent with your physiology and metabolism, and it begins—but does not complete—your journey back to total health.

In Part II, we deal with just how to accomplish this journey, including how you can survive the process of withdrawal from the opiates in grains—probably the most challenging hurdle to overcome in your journey back to health and the one that, if you are not properly coached and equipped, can backfire and set you back to your former grain-consuming ways. I teach you how to know when you've been reexposed to closely related proteins that force your body to revisit the havoc you thought you'd eliminated and threaten to undo everything you've accomplished. I also discuss how your body adapts to this new situation in life without grains and why and how adaptation may not be complete until you take the reins and *make* it complete.

In Part III, I discuss how to pursue health as far as possible once you have removed all the health destruction of grains: how to achieve new heights of energy, sleep, mental clarity, mood, bowel function, endocrine health, metabolic health, exercise, and physical functioning. We'll apply all of the lessons we've learned along the way as we discover that, minus grains, life and health are actually quite wonderful.

Too many of us, forced to accept this mantra of "healthy whole grains," have never been shown the path to easily and effortlessly accomplish total health. Once the health disruptions of grains are exorcised from your life and you recognize their purported health benefits for the fictional notion they are, everything gets so much better. Without grains, wondrous things begin to happen in just about every way. *That* is what "total health" means.



PART I

# NO GRAIN IS A GOOD GRAIN

Grazed, Grass-Fed, and Fattened

## LIBERATE YOUR INNER COW: LIFE UNGRAINED

*Goldfish do not eat sausages.*

—John Cleese, “How to Feed a Goldfish,” *Monty Python’s Flying Circus*

**SINCE YOU ARE** reading this book, I take it that you are a member of the species *Homo sapiens*. You are likely not a giraffe, toad, or woodpecker. Nor are you a ruminant, those taciturn creatures that graze on grass.

Ruminants, such as goats and cows, and their ancient, wild counterparts, ibex and aurochs, enjoy evolutionary adaptations that allow them to consume grasses. They have continuously growing teeth to compensate for the wear generated by coarse, sandlike phytolith particles in grass blades; produce in excess of 100 quarts of saliva per day; have four-compartment stomachs that host unique microorganisms to digest grass components, including a compartment that grinds and then regurgitates its contents up as a cud to rechew; and a long, spiral colon that’s also host to microorganisms that further digest grassy remains. In other words, ruminants have a gastrointestinal system uniquely specialized to consume grasses.

You don’t look, smell, or act like a ruminant. Then why would you eat like one?

Those of you who have already forgone wheat do not, of course. But if you remain of the “healthier whole grain”—consuming persuasion, you have fallen victim to believing that grasses should be your primary source of calories. Just as Kentucky bluegrass and ryegrass in your backyard are grasses from the biological family Poaceae, so are wheat, rye, barley, corn, rice, bulgur, sorghum, triticale, millet, teff, and oats. You grow teeth twice in your life, then stop, leaving you to make do for a lifetime with a prepubertal set that erupted around age 10; produce a meager quart of saliva per day; have three fewer stomach compartments unpopulated by foreign organisms and without grinding action; don’t chew a cud; and have a relatively uninteresting, linear, nonspiral colon. These adaptations allow you to be omnivorous—but *not* to consume grasses.

Early members of our species found nourishment through scavenging, and then hunting, animals such as gazelles, turtles, birds, and fish, and consuming the edible parts of plants, including fruit and roots, as well as mushrooms, nuts, and seeds. Hungry humans instinctively regarded all of these as food. About 10,000 years ago, during a period of increasing temperature and dryness in the Fertile Crescent, humans observed the ibex and aurochs grazing on einkorn, the ancient predecessor of modern wheat. Our hungry, omnivorous ancestors asked, “Can we eat that, too?” They did, and sure enough got sick: vomiting, cramps, and diarrhea. At the very least they simply passed wheat plants or undigested, since humans lack the ruminant digestive apparatus. Grass plants in their intact form are unquestionably unappetizing. We somehow figured out that for humans, the *only* edible part of the einkorn plant was the seed—not the roots, not the stem, not the leaves, not the entire seed head—just the seed, and even that was only edible after the outer husk was removed and the seed was chewed and crushed with rocks and then heated in crude pottery over fire. Only then could we consume the seed of this grass as porridge, a practice that served us well in times of desperation when ibex meat, bird eggs, and figs were in short supply.

Similar grass-consuming adventures occurred with teosinte and maize (the ancestors of modern corn) in the Americas; rice from the swamps of Asia; and sorghum and millet in sub-Saharan Africa, all requiring similar manipulations to allow the edible part—the seed—to be consumed by humans.

Some grasses, such as sorghum, posed other obstacles; its content of poisons (such as hydrocyanic acid, or cyanide) results in sudden death when the plant is consumed before maturity. Natural evolution of grasses led to wheat strains such as emmer, spelt, and kamut as wheat exchanged genes from other wild grasses, while humans selected strains of corn with larger seeds and seed heads (cobs).

What happened to those first humans, hungry and desperate, who figured out how to make this one component of grasses—the seed—edible? Incredibly, anthropologists have known this for years. The first humans to consume the grassy food of the ibex and aurochs experienced explosive tooth decay, shrinkage of the maxillary bone and mandible, resulting in tooth crowding; iron deficiency; and scurvy. They also experienced a reduction in bone diameter and length, resulting in a loss of as much as 5 inches in height for men and 3 inches for women.<sup>1</sup>

The deterioration of dental health is especially interesting, as dental decay was uncommon prior to the consumption of the seeds of grasses, affecting less than 1 percent of all teeth recovered, despite the lack of toothbrushes, toothpaste, fluoridated water, dental floss, and dentists. Even though they lacked any notion of dental hygiene (aside from possibly using a twig to pick the fibers of wild boar from between their teeth), dental decay was simply not a problem that beset many members of our species prior to the consumption of grains. The notion of toothless savages is all wrong; they enjoyed sturdy, intact teeth for their entire lives. It was only after humans began to resort to the seeds of grasses for calories that mouths of rotten and crooked teeth began to appear in children and adults. From that point on, decay was evident in 16 to 49 percent of all teeth recovered, along with tooth loss and abscesses, making tooth decay as commonplace as bad hair among humans of the agricultural Neolithic Age.<sup>2</sup>

In short, when we started consuming the seeds of grasses 10,000 years ago, this food source may have allowed us to survive another day, week, or month during times when foods we had instinctively consumed during the preceding 2.5 million years fell into short supply. But this expedient represents a dietary pattern that constitutes only 0.4 percent—less than one-half of 1 percent—of our time on earth. This change in dietary fortunes was accompanied by a substantial price. From the standpoint of oral health, humans remained in the Dental Dark Ages from their first taste of porridge all the way up until recent times. History is rich with descriptions of toothaches, oral abscesses, and stumbling and painful efforts to extract tainted teeth. Remember George Washington and his mouthful of wooden false teeth? It wasn't until the 20th century that modern dental hygiene was born and we finally managed to keep most of our teeth through adulthood.

Fast-forward to the 21st century: Modern wheat now accounts for 20 percent of all calories consumed by humans; the seeds of wheat, corn, and rice combined make up 50 percent.<sup>3</sup> Yes, the seeds of grasses provide half of all human calories. We have become a grass seed-consuming species—a development enthusiastically applauded by agencies such as the USDA, which advises us that increasing our consumption to 60 percent of calories or higher is a laudable dietary goal. It's also a situation celebrated by all of those people who trade grain on an international scale, since the seeds of grasses have a prolonged shelf life (months to years) that allows transoceanic shipment, they're easy to store, they don't require refrigeration, and they're in demand worldwide—all the traits desirable in a commoditized version of food. The transformation of foodstuff into that of a commodity that is tradeable on a global scale allows financial manipulations, such as buying and selling futures, hedges, and complex derivative instruments—the tools of mega-commerce—to emerge. You can't do this with organic blueberries or Atlantic salmon.

Examine the anatomy of a member of the species *Homo sapiens* and you cannot escape the conclusion that you are *not* a ruminant, have none of the adaptive digestive traits of such creature

and can only consume the seeds of grasses—the food of desperation—by accepting a decline in your health. But the seeds of grasses *can* be used to feed the masses cheaply, quickly, and on a massive scale, all while generating huge profits for those who control the flow of these commoditized foods.

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## MUTANT NINJA GRASSES

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The seeds of grasses, known to us more familiarly as “grains” or “cereals,” have always been a problem for us nonruminant creatures. But then busy geneticists and agribusiness got into the act. That’s when grains went from bad to worse.

Readers of the original *Wheat Belly* know that modern wheat is no longer the 4½-foot-tall traditional plant we all remember; it is now an 18-inch-tall plant with a short, thick stalk; long seed head; and larger seeds. It has a much greater yield per acre than its traditional predecessors. This high-yield strain of wheat, now the darling of agribusiness, was not created through genetic modification but through repetitive hybridizations, mating wheat with non-wheat grasses to introduce new genes (wheat is a grass, after all) and through *mutagenesis*, the use of high-dose x-rays, gamma rays, and chemicals to induce mutations. Yes: Modern wheat is, to a considerable degree, a grass that contains an array of mutations, some of which have been mapped and identified, many of which have not. Such uncertainties never faze agribusiness, however. Unique mutated proteins? No problem. The USDA and FDA say they’re okay, too—perfectly fine for public consumption.

Over the years, there have been many efforts to genetically modify wheat, such as by using gene-splicing technology to insert or delete a gene. However, public resistance has dampened efforts to bring genetically modified (GM) wheat to market, so no wheat currently sold is, in the terminology of genetics, “genetically modified.” (There have been recent industry rumblings, however, that make the prospect of true GM wheat a probable reality in the near future.) All of the changes introduced in modern wheat are the results of methods that predate the technology to create GM foods. This does not mean that the methods used to change wheat were benign; in fact, the crude and imprecise methods used to change wheat, such as chemical mutagenesis, have the potential to be *worse* than genetic modification, yielding a *greater* number of unanticipated changes in genetic code than the handful introduced through gene-splicing.<sup>4</sup>

Corn and rice, on the other hand, have been genetically modified, in addition to undergoing other changes. For instance, scientists introduced genes to make corn resistant to the herbicide glyphosate and to express *Bacillus thuringiensis* (Bt), a toxin that kills insects, while rice has been genetically modified to make it resistant to the herbicide glufosinate and to express beta-carotene (a variety called Golden Rice). Problem: While, in theory, the notion of just inserting one silly gene seems simple and straightforward, it is anything but. The methods of gene insertion remain crude. The site of insertion—which chromosome, within or alongside other genes, within or without various control elements—not to mention disruption of epigenetic effects that control gene expression, cannot be controlled with current technology. And it’s misleading to say that only one gene is inserted, as the methods used usually require *several* genes to be inserted. (We discuss the nature of specific changes in GM grains in [Chapter 2](#).)

The wheat, corn, and rice that make up 50 percent of the human diet in the 21st century are not the wheat, corn, and rice of the 20th century. They’re not the wheat, corn, and rice of the Middle Ages, nor of the Bible, nor of the Egyptian empire. And they are definitely not the same wheat, corn, and rice that was harvested by those early hungry humans. They are what I call “Frankengrains”: hybridized, mutated, genetically modified to suit the desires of agribusiness, and now available at a supermarket, convenience store, or school near you.

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# Wheat: What Changed . . . and Why Are the Changes So Bad?

All strains of wheat, including traditional strains like spelt and emmer, are problems for nonruminant humans who consume them. But modern wheat is the worst.

Modern wheat *looks* different: shorter, thicker shaft, larger seeds. The reduction in height is due to mutations in Rh (reduced height) genes that code for the protein gibberellin, which controls stalk length. This one mutant gene is accompanied by other mutations. Changes in Rh genes are thereby accompanied by *other* changes in the genetic code of the wheat plant.<sup>5</sup> There's more here than meets the eye.

## Gliadin

While gluten is often fingered as the source of wheat's problems, it's really gliadin, a protein within gluten, that is the culprit behind many destructive health effects of modern wheat. There are more than 200 forms of gliadin proteins, all incompletely digestible.<sup>6</sup> One important change that has emerged over the past 50 years, for example, is increased expression of a gene called Gli- $\alpha$ 9, which yields a gliadin protein that is the most potent trigger for celiac disease. While the Gli- $\alpha$ 9 gene was *absent* from most strains of wheat from the early 20th century, it is now present in nearly *all* modern varieties,<sup>7</sup> likely accounting for the 400 percent increase in celiac disease witnessed since 1948.<sup>8</sup>

New gliadin variants are partially digested into small peptides that enter the bloodstream and then bind to *opiate receptors* in the human brain—the same receptors activated by heroin and morphine.<sup>9</sup> Researchers call these peptides “exorphins,” or exogenous morphine-like compounds. Gliadin-derived peptides, however, generate no “high,” but they do trigger increased appetite and increased calorie consumption, with studies demonstrating consistent increases of 400 calories per day, mostly from carbohydrates.

## Gluten

Gluten (gliadin + glutenins) is the stuff that confers the stretchiness unique to wheat dough. Gluten is a popular additive in processed foods such as sauces, instant soups, and frozen foods, which means the average person ingests between 15 and 20 grams (g) per day.<sup>10</sup> Gluten has been genetically manipulated to improve the baking characteristics of its glutenin. Geneticists have therefore crossbred wheat strains repeatedly, bred wheat with non-wheat grasses to introduce new genes, and used chemicals and radiation to induce mutations. Breeding methods used to alter gluten quality do not result in predictable changes. Hybridizing two different wheat plants yields as many as 14 unique glutenin proteins never before encountered by humans.<sup>11</sup>

## Wheat Germ Agglutinin

The genetic changes inflicted on wheat have altered the structure of wheat germ agglutinin (WGA), a protein in wheat that provides protection against molds and insects. The structure of WGA in modern wheat, for instance, differs from that of ancient wheat strains.<sup>12</sup> WGA is indigestible and toxic, resistant to *any* breakdown in the human body, and unchanged by cooking, baking, and sourdough fermentation. Unlike gluten and gliadin, which require genetic susceptibility to exert some of their negative effects, WGA does its damage directly. WGA *alone* is sufficient to generate celiac disease–like intestinal damage by disrupting microvilli, the absorptive “hairs” of intestinal cells.<sup>13</sup>

## Phytates

Phytic acid (phytates) is a storage form of phosphorus in wheat and other grains. Because phytates also provide resistance to pests, grain-breeding efforts over the past 50 years have selected strains with increased phytate content. Modern wheat, maize, and millet, for instance, each contain 800 milligrams (mg) of phytates per 100 g (3½ ounces) of flour. Phytate content increases with fiber content, so advice to increase fiber in your diet by consuming more “healthy whole

grains” also increases the phytate content of your diet. As little as 50 mg of phytates can turn off absorption of minerals, especially iron and zinc.<sup>14</sup> Children who consume grains ingest 600 to 1,900 mg of phytates per day, while enthusiastic grain-consuming cultures, such as modern Mexicans, ingest 4,000 to 5,000 mg of phytates per day. These levels are associated with nutrient deficiencies.<sup>15</sup>

## Alpha-Amylase Inhibitors and Other Allergens

Wheat allergies are becoming more prevalent. Numerous allergens have been identified in modern wheat that are not present in ancient or traditional forms of the plant.<sup>16</sup> The most common are *alpha-amylase inhibitors*, which are responsible for causing hives, asthma, cramps, diarrhea, and eczema. Compared to older strains, the structure of modern alpha-amylase inhibitors differs by 10 percent, meaning it may have as many as several dozen amino acid differences. As any allergist will tell you, just a few amino acids can spell the difference between no allergic reaction and a severe allergic reaction, or even anaphylactic shock. People in the baking industry frequently develop a condition called *baker’s asthma*. There is also a peculiar condition called *wheat-derived exercise-induced anaphylaxis* (WDEIA), a severe and life-threatening allergy induced by exercising after eating wheat. Both conditions are caused by an allergy to gliadin proteins.<sup>17</sup> Many other proteins have undergone changes over the last 40 years: lipid transfer proteins, omega-gliadins, gamma-gliadins, trypsin inhibitors, serpins, and glutenins. All trigger allergic reactions.

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## LIFE OUTSIDE THE GRAIN MOOVEMENT

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The start of grain consumption for humans coincides with the dawn of the domestication of livestock. We learned that some herbivorous species, such as aurochs and ibex, when confined and allowed to reproduce in captivity, could be put into the service of the human diet. While we were domesticating these creatures into cows and goats, they showed us that their diet of grasses was also something we could try to mimic. They also contributed to human diseases by giving us smallpox, measles, tuberculosis, and rhinoviruses that cause the common cold.

While much of the world followed the lead of grazing ruminants and adopted a diet increasingly reliant on the seeds of grasses, not all cultures took this 10,000-year dietary detour. A number of hunter-gatherer societies throughout the world never embraced grains, relying instead on traditional omnivorous menus. The diets followed by such societies therefore largely reflect the diets of pre-Neolithic humans, i.e., diets that predate the development of agriculture. The modern world has, over the past few hundred years, encroached on these primitive societies, particularly if their land or other resources were prized. (Think Native Americans and Canadians of the Pacific Northwest or Aboriginal populations of Australia.) Each instance provides a virtual laboratory to observe what happens to health when there is a shift from a traditional grain-free to a modern grain-filled diet.

We have cultural anthropologists and field-working physicians to thank for such insights. Scientists have studied, for instance, the San of southern Africa, Kitavan Islanders of Papua New Guinea, and the Xingu peoples of the Brazilian rain forest, all of whom consume foods obtained from their unique habitats. None consume modern processed foods, of course, meaning no grains, no added sugars, no hydrogenated oils, no preservatives, and no artificial food coloring. People following the ancestral diets consistently demonstrate low body weight and body mass index (BMI); freedom from obesity; normal blood pressure; normal blood sugar and insulin responses; lower leptin levels (the hormone of satiety); and better bone health.<sup>18</sup> Body mass index, reflecting a ratio of weight to height, is typically 22 or less, compared to our growing ranks of people with BMIs of 30 or more, with 30 representing the widely accepted cutoff for obesity. The average blood pressure of a Xingu woman is 102/66 mmHg, compared to our typical blood pressures of 130/80 or higher. The Xingu experience less osteoporosis and fewer fractures.

The Hadza of northern Tanzania are a good example of a hunter-gatherer society that, despite

contact with Westerners, has clung to traditional methods of procuring food.<sup>19</sup> The women dig for roots and gather edible parts of plants, while the men hunt with bows and poison-tipped arrows and gather honey from bees. The average BMI of this population? Around 20, with vigor maintained in later life, as grandparents help rear grandchildren while mothers gather and prepare food. Despite a lifestyle that appears physically demanding on the surface, the total energy expenditure of the Hadza is *no different* than that of modern people—not greater or less than, say, an average accountant or schoolteacher.<sup>20</sup> Activity is parceled a bit differently, of course, with hunter-gatherers tending to experience bursts of intense activity, followed by prolonged rest, and modern cultures gradually playing out activity throughout the day, but detailed analyses of energy expenditure among primitive people show virtually *no difference*. This challenges the notion that modern excess weight gain can be blamed on increasingly sedentary lifestyles.<sup>21</sup> (Note that this is not true for all hunter-gatherer cultures; the Luo and Kamba of rural Kenya, for instance, exhibit high levels of energy expenditure.) The point is that differences in weight are not solely explained by differences in energy expenditure.)

Humans are adaptable creatures, as the wide variety of diets consumed worldwide attest. Some rely almost exclusively on the flesh, organs, and fat of animals, such as that of the traditional Inuits of the northernmost Pacific Northwest of North America. Some diets are high in starches from roots (such as yams, sweet potatoes, taro, and tapioca) and fruit, as with the Kitavans of Papua New Guinea or the Yanomami of the Brazilian rain forest.

The incorporation of foods from the mammary glands of bovines has provoked expression of a lactase-persistence gene that allows some adults to consume milk, cheese, and other products that contain the sugar lactose after the first few years of life—an advantage for survival. The seminomadic Maasai people of central Africa are a notable example. Largely herders of goats, sheep, and cattle, they traditionally consume plentiful raw meat and the blood of cows mixed with milk, and they've done so for thousands of years. This lifestyle allows them to enjoy freedom from cardiovascular disease, hypertension, diabetes, and excess weight.<sup>22</sup>

This is the recurring theme throughout primitive societies: A traditional diet, varied in composition and high in nutrient content but containing no grains or added sugars, allows people to enjoy freedom from all the chronic “diseases of affluence.” Even cancer is rare.<sup>23</sup> This is not to say that people following traditional lifestyles don't succumb to disease; of course they do. But the range of ailments is entirely different. They suffer infections such as malaria, dengue fever, and nematode infestations of the gastrointestinal tract, as well as traumatic injuries from falls, battles with humans and animals, and lacerations, reflecting the hazards of living without modern tools, convenience stores, central governments, or modern health care.

What happens when a culture that has avoided the adoption of agriculture and grain consumption is confronted with modern breads, cookies, and chips? This invasion by modern foods has played out countless times on a worldwide stage, with the same results each and every time: weight gain and obesity to an astounding degree, tooth decay, gingivitis and periodontitis, tooth loss, arthritis, hypertension, diabetes, and depression and other psychiatric conditions—all the modern diseases of affluence. Like a broken record, this same refrain has played over and over again in various populations, on every continent.

It has been observed in Pima Indians of the American Southwest, where 40 to 50 percent of adults are obese and diabetic, many toothless.<sup>24</sup> It has been observed in native tribes of Arizona, Oklahoma, and the Dakotas, resulting in 54 to 67 percent of the population being overweight or obese.<sup>25</sup> People inhabiting circumpolar regions of Canada and Greenland have all experienced dramatic increases in obesity and diabetes.<sup>26</sup> In Pacific Islanders, such as the Micronesian Nauru, 40 percent of adults are obese with diabetes.<sup>27</sup> Modernized diets have put Australian Aboriginal populations in especial

desperate health straits, with 22 times the risk of complications of diabetes, 8 times high cardiovascular mortality, and 6 times greater mortality from stroke compared to non-Aboriginal Australians.<sup>28</sup>

Until recently, the Maasai of central Africa, Samburu of Kenya, and Fulani of Nigeria showed virtually no overweight or obesity, no hypertension, and low total cholesterol values (125 mg/dl). When relocated to urban settings, hypertension and obesity explode, with 55 percent overweight and obese.<sup>29</sup> Former hunter-gatherers develop iron deficiency anemia and folate deficiency as they transition away from hunting game and gathering wild vegetation and rely on purchased food, especially corn.<sup>30</sup> Dr. Roberto Baruzzi, a Brazilian physician, studied hunter-gatherers of the Xingu region of Brazil in the 1960s and 1970s and found slender people with no discernible excess body fat, no diabetes, no cardiovascular disease, no ulcers, and no appendicitis. A repeat survey in 2000, following 30 years of contact with modern food, found 46 percent of the people overweight or obese, 25 percent of the men hypertensive, and most with abnormalities of cholesterol panels (such as low HDL cholesterol or high triglycerides), and rampant dental decay.<sup>31</sup> Another recent assessment of Aruák natives of the Xingu region documented 66.8 percent of men and women as overweight or obese, 52.1 percent of women with abdominal obesity, and 37.7 percent of men with hypertension.<sup>32</sup>

All of these groups represent humans who have not developed the *partial* tolerances agricultural societies evolved over 10,000 years that allow them to consume the seeds of grasses. Consequently, they, more so than us, show exaggerated responses to consumption of grains and sugars.

The diseases of modernization are unfortunately intertwined with the diseases of poverty, given the disrupted and marginalized lives indigenous people often endure at the heavy-handed ways of modern society. Typically, an overreliance on cheap grains and sugars characterizes the diets of these latecomers to the modern world, replacing gathered vegetation, for instance, with flours, convenient foods, and sweets. And if Western aid is required due to starvation and maldistribution (which is common when former hunter-gatherers are disconnected from their traditional lifestyles), do we fly in beef, salmon, coconuts, or cucumbers? Nope: We send in the grain—wheat, maize, rice—which feeds humans as well as their livestock.

Type 2 diabetes, in particular, is the defining disease acquired when hunter-gatherer populations join the modern world in dietary and health habits—so much so that anthropologists have labeled diabetes “the price of civilization.” And, of course, all of us modern humans, being hunter-gatherers at our genetic core, are experiencing diabetes at an unprecedented rate. This modern disease is expected to afflict a third of all adults in coming years, as well as a growing proportion of children and teenagers.<sup>33</sup> The world of humans now obtains 50 percent of its calories from the seeds of grasses and is increasing consumption of sucrose and fructose. Meanwhile, we’re being urged to further *increase* our reliance on “healthy whole grains” in the developed world while we resort to cheap, accessible grains of any sort in the less-developed world. Under these circumstances, we can expect no relief from this global man-made pandemic—unless we reject the notion of consuming the seeds of grass outright.



# Dr. Weston Price: Snapshots of Westernization

Dr. Weston Price was a dentist practicing in Cleveland, Ohio, during the early 20th century. He was troubled by the amount of tooth decay he witnessed in his patients, particularly children, and intrigued by reports that “savages” (people living in primitive settings) were virtually free of tooth problems. So Dr. Price did something extraordinary: He left his home and, along with his wife, Florence, began a 10-year worldwide journey to chronicle the dietary habits of primitive cultures, documenting his findings with careful examinations of teeth, facial structure, and more than 15,000 photographs. His efforts provide a remarkable visual record of what primitive cultures looked like and what happens to primitive humans when they begin to consume modern foods.

His travels took him to the Inuits of Alaska, the native Americans of the Pacific Northwest and central Canada, Melanesians and Polynesians, Aborigines of Australia, the Maori of New Zealand, descendants of the ancient Chimú culture in coastal Peru, and tribes of Africa, including Maasai, Kikuyu, Wakamba, Jalou, Muhima, Pygmies, Baitu, and Dinkas. In each locale, he examined and photographed teeth, faces, and other features he found interesting. In short, Dr. Price produced a fascinating record of people living their traditional lifestyles at a moment in time when it was all about to end.

In every culture of the dozens he studied—without exception—he found tooth decay, tooth loss, and dental abscesses or infections to be uncommon, typically affecting no more than 1 to 3 percent (and sometimes none) of the teeth he examined. He also noted the absence of gingivitis and periodontitis, and few to no crooked or crowded teeth. While a keeper of meticulous records, he also observed that facial structure was different, with primitive people enjoying what he called “fully formed facial and dental arches” and a lack of narrowed nasal passages.

Even more remarkably, Dr. Price specifically sought out members of these cultures who had recently transitioned to consuming “white man’s food”—people who were bartering for the breads, pastries, and candies of Westerners visiting or bordering their land. In every instance, he observed an astounding increase in tooth decay, affecting 25 to 50 percent of teeth examined, along with gingivitis, periodontitis, tooth loss, infectious abscesses, crooked and crowded teeth, and reductions in the size of the maxillary (midfacial) bone and mandible (jawbone). Nearly toothless mouths in teenagers and young adults were not uncommon.

The traditional diets of these societies were typically fish, shellfish, and kelp among coastal cultures and animal flesh and organs, raw dairy products, edible plants, nuts, mushrooms, and insects among inland cultures. With only two exceptions (the Lötschental Valley Swiss, isolated by the Alps, who consumed a coarse rye bread, and the Gaelic people of the islands of the Outer Hebrides, who consumed crude oats), grains, sugars, and processed foods were notably absent. (The Swiss had an intermediate number of dental caries, more than other cultures studied, while the Gaelic population did not.)

What is even more startling about Dr. Price’s observations of the rarity of tooth decay and deformity is that none of these cultures practiced any sort of dental hygiene: no toothbrushes, no toothpaste, no fluoridated water, no dental floss, and no dentists or orthodontists. While Dr. Price’s observations cannot be used to precisely pinpoint the nutritional distinctions between modern and traditional cultures, they nonetheless make a powerful point. Anyone wishing to read Dr. Price’s account can find it reproduced in a recent reprint.<sup>34</sup>

This social “experiment” has also occurred in the opposite direction: a *return* to traditional diet and lifestyle after a period of Westernization. In 1980, Kerin O’Dea, MD, while at the Royal Children’s Hospital in Melbourne, conducted an extraordinary experiment: She asked 10 diabetic and overweight Aboriginal individuals living Western lifestyles, all of whom retained memories of primitive lifestyles, to move back to their origins in the wilds of northwestern Australia and follow the previous hunter-gatherer diet of kangaroo, freshwater fish, and yams. They began their adventure with high blood glucose levels of (on average) 209 mg/dl, high triglycerides of 357 mg/dl, as well as abnormal insulin levels. After 7 weeks of living in the wild, killing animals, and eating family-gathered foods, the 10 lost an average of 17.6 pounds of body weight and dropped their blood glucose to 119 mg/dl and triglycerides to 106 mg/dl.<sup>35</sup> Of the original 10, five returned nondiabetic. In a 2000 lecture, Dr. O’Dea remarked: “I was struck by the change in people when they were back in their own country: They were confident and assertive, and proud of their local knowledge and skills. At the time we were not able to measure markers of psychosocial state, however observation suggested a ve

positive change.”<sup>36</sup>

Search the four corners of the earth today and you will find that the only surviving hunter-gatherer population that’s untouched by modern diet is the Sentinelese of the North Sentinel Island in the Indian Ocean. Because their language is strikingly different from all languages in neighboring lands, it is thought that the Sentinelese have been isolated since anatomically modern humans first migrated to this part of the world 60,000 years ago.<sup>37</sup> Attempts to visit their island have been met with volleys of arrows, spears, and rocks, so observations are limited. From what has been observed, however, they are lean and healthy, hunting, fishing, and gathering foods without the “benefit” of agriculture.

We have to be careful not to regard the life of the hunter-gatherer human as idyllic or problem-free: They had plenty of problems. While it is widely believed that stress is a modern phenomenon, this is absurd. Which is more stressful: struggling to pay your bills or having a marauding, bloodthirsty tribe of humans slaughter your friends, seize the women, and enslave the children? We need to observe some of the practices of primitive cultures, such as head shrinking by the Jivaro Indians of the Amazon or cannibalism by the Carib of the Lesser Antilles and Venezuela, to remind ourselves that the world of humans can be an inhospitable place. Violence inflicted by and upon humans has characterized our existence from the start. While violence is certainly still a part of modern life, legal and political constraints that became necessary as human populations developed, and greater reliance on the practice of agriculture make it far less a part of day-to-day life than it was, say, 50,000 years ago. Yes, there is a bright side to agriculture and civilization.

The development of civilization and the cultivation of the seeds of grasses: two processes that ran parallel over the past 10,000 years that led to concepts such as sedentary non-nomadic life, land ownership, centralized government, and many other phenomena we now accept as part of modern life. But when we observe what happens to cultures unexposed to the seeds of grasses who are then compelled to consume them, we observe an exaggerated microcosm of what the rest of the world is now experiencing.

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## EAT LIKE AN EGYPTIAN

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Tooth decay, dental infections, crooked teeth, iron and folate deficiencies, diabetes, degenerative joints, weight gain, obesity: I’ve just described the average modern person. Take a member of a primitive culture following their traditional diet and feed them the processed foods of modern man—complete with the enticing products of the seeds of grasses—and within a few years, we’ve given them all the same problems we have, or worse. Yes, without “modern civilization” they might succumb to the greedy ambitions of a violent neighboring clan, but with grain in their lives, they have to engage in battle while sporting a 44-inch waist, two bad knees, and a mouth that’s missing half its teeth.

While obesity and the diseases associated with it are virtually absent from hunter-gatherer cultures, neither are they entirely new. Diseases of affluence developed even before geneticists introduced changes into grains. Hippocrates, a Greek physician in the 3rd century BC, and Galen, a Roman physician of the 2nd century AD, both made detailed studies of obese people. William Waddell, an early-19th-century London physician and a lifelong observer of the “corpulent,” made the following observation after the autopsy of an obese man:

The heart itself was a mass of fat. The omentum [a component of the intestines] was a thick fat apron. The whole of the intestinal canal was imbedded in fat, as if melted tallow had been poured into the cavity of the abdomen; and the diaphragm and the parietes [walls of

organs] of the abdomen must have been strained to their very utmost extent, to have sustained ~~the extreme and constant pressure of such a weighty mass. So great was the mechanical obstruction to the functions of an organ essential to life, that the wonder is, not that he should die, but that he should live.~~<sup>38</sup>

What is new is that overweight and obesity have been transformed from that of *curiosity* to that of *epidemic*. The situation we confront in the 21st century is all the more astounding because modern epidemiologists and health officials declare that the causes of the epidemic of overweight, obesity and their accompanying diseases are either unclear or that the burden of blame should be placed on the gluttonous and sedentary shoulders of the public. But the answers can be discerned through observations of primitive societies plagued by *none* of the issues plaguing us.

More than the presence of grains distinguishes primitive from modern life, of course. Hunter-gatherers also drank no soft drinks; consumed no processed foods laced with hydrogenated fats, food preservatives, or food colorings; and consumed no high-fructose corn syrup or sucrose. They were not exposed to endocrine disruptive chemicals released by industry into our groundwater and soil, and which taint our food. Civilizations of ancient Greece and Rome and of 19th-century Europe also did not consume these components of the modern diet (except for increasing consumption of sucrose beginning in the 19th century). No Coca-Cola, Crisco, brightly colored candies lit up by FD&C Red No. 3, or polychlorinated biphenyl (PCB)-laced water graced their tables. But they did consume the seeds of grasses.

So just *how much* can we blame on the adoption of the seeds of grasses into the human diet? Let us consider that question next. Each variety of seeds of grasses poses its own unique set of challenges for nonruminants who consume them. Before we get under way in our discussion of regaining health in the absence of grains, let's talk about just how they ruin the health of every human who allows them to adorn his or her plate.

# LET THEM EAT GRASS

*I asked the waiter, "Is this milk fresh?" He said, "Lady, 3 hours ago it was grass."*

—Phyllis Diller

### GRASSES ARE EVERYWHERE.

They grow on mountains, along rivers and lakes, in valleys, vast steppes, savannahs, prairies, golf courses, even your backyard. And they now reign supreme in the human diet.

Grasses are wonderfully successful life forms. They are geographically diverse, inhabiting every continent, including Antarctica. They are a study of how life can adapt to extremes, from the tundra to the tropics. Grasses are prolific and hardy, and they evolve rapidly to survive. Even with the explosive growth of the human population, worldwide expansion of cities and suburbs, and asphalt spanning coast-to-coast, grasses still cover 20 percent of the earth's surface area. Just as insects are the most successful form of animal life on the planet, grasses are among the most successful of plants. Given their ubiquity, perhaps it's not unexpected that we would try to eat them. Humans have experimented with feasting on just about every plant and creature that ever inhabited the earth. After all, we are creatures who make food out of tarantulas and poisonous puffer fish.

While grasses have served as food for many creatures (they've even been recovered from fossilized dinosaur feces), they were not a food item on our dietary menu during our millions of years of adaptation to life on this planet. Pre-*Homo* hominids, chimpanzee-like australopithecines that date back more than 4 million years, did not consume grasses in any form or variety, nor has any species of *Homo* prior to *sapiens*. Grasses were simply not instinctively regarded as food. Much as you'd never spot an herbivorous giraffe eating the carcass of a hyena or a great white shark munching on sea kelp, humans did not consume any part of this group of plants, no matter how evolutionarily successful, until the relatively recent past.

The seeds of grasses are a form of "food" added just a moment ago in archaeological time. For the first 2,390,000 years of our existence on earth, or about 8,000 generations, we consumed things that hungry humans instinctively regarded as food. Then, 10,000 years or just over 300 generations ago, in times of desperation, we turned to those darned seeds of grasses. They were something we hoped could serve as food, since they were growing from every conceivable environmental nook and cranny.

So let us consider what this stuff is, the grasses that have populated our world, as common as ants and earthworms, and been subverted into the service of the human diet. Not *all* grasses, of course, have come to grace your dinner plate—you don't save and eat the clippings from cutting your lawn, do you?—so we'll confine our discussion to the grasses and seeds that humans have chosen to include on our dinner plates. I discuss this issue at some length, because it's important for you to understand that the consumption of the seeds of grasses underlies a substantial proportion of the chronic problems of human health. Accordingly, removing them yields unexpected and often astounding relief from these issues and is therefore an absolutely necessary first step toward regaining health, the ultimate goal of this book. We will spend a lot of time talking about how recovering full health as a non-grain-consuming *Homo sapiens* of the 21st century—that means you—also means having to compensate for all of the destruction that has occurred in your body during your unwitting grain-consuming years. You've consumed what amounts to a dietary poison for 20, 30, or 50 years, a habit that your non-

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