

A graphic of a barcode with vertical red bars of varying widths.

THE BLOOD CODE

Unlock the secrets of your metabolism

A 3D model of a DNA double helix structure, rendered in light gray, winding diagonally across the lower half of the cover.

Dr. Richard Maurer

FOLLOW YOUR BLOOD CODE TO:

- Reverse type 2 diabetes and insulin resistance
- Lower your risk of chronic debilitating disease
- Lose excess body fat
- Resolve hypothyroid symptoms



Whether overweight or lean, prediabetic or type 2, fatigued or fit—you are holding the key to unlock the secrets of your metabolic code and self-prescribe the unique dietary and fitness habits that reverse disease and lead you toward your truest health and vitality.

Dr. Richard Maurer offers a dynamic new health and fitness program in *The Blood Code*. Based on twenty years of private practice and proven results in thousands of patients, *The Blood Code* will provide you with everything you need to know to understand your metabolic code, by teaching you how to order, read, and act on your own blood tests and skin-fold caliper measurements. By following Dr. Maurer's six easy steps for ninety days, you will be well on your way toward cracking the unique metabolic blueprint you inherited from your ancestors.

"When people sincerely want to know how my health improved so dramatically, I refer them to Dr. Maurer, his work, and The Blood Code."

— Mark Smalley, Entrepreneur/Publisher

"The most empowering part for me is that as I change my habits I change my blood work, which changes my future"

— Dr. Derek Libby, Osteopathic Physician

The Blood Code

**Unlock the Secrets
of Your Metabolism**

Dr. Richard Maurer

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At the heart of *The Blood Code* is a simple blood test panel. Test results are not to be feared; instead they create a “GPS coordinate” that maps how your body is currently interacting with your diet and fitness habits. Once you know where you are, you can better choose the course that takes you toward disease recovery and real wellness. Here are some quotes from people, like you, after they acted upon *their* Blood Code.

After learning about my blood test results, I started doing the things that my body needed to stay healthy. As a result, I have seen better weight and remarkable energy from the changes I made in my diet and exercise routine.

-Tony Cohutt

I recently chose to follow my Blood Code rather than take medication, and I am glad I did. My HgbA1C went from 7.4 to now nondiabetic levels—I am lighter, healthier and feel great.

-Jim Gourhan

For years, I tried every thyroid prescription thinking that if I got the right one, I'd feel better. Finally, with no change in my prior thyroid dosage, I used the Blood Code to guide my diet and exercise. Within a few months, I was coming out of the hole I had been in for half a decade. I wish I had found Dr. Maurer's work sooner.

-Alisa Marquette

I know now that eating right, and that involves eating far more fats than I was used to, supports me in my quest for the energy to enjoy the challenges of the day. Today—I am back to enjoying life while making fun plans for the future, and the future is now.

-Sarah Goodwin

This approach was completely different and more on point. With the right guidance, I could easily change my food habits. Change is never easy, however when I know it is necessary, there is no other choice. Choosing to live a longer and healthier life is a no brainer. Thank you.

-Connie Koengeter

I saw my mother go down the road of dementia after a decade of diabetes and medications. So when my doctor said we should “watch” by blood sugars as they started to go up, I wanted to act. I saw Dr. Maurer and followed the Blood Code diet, the high blood sugars are gone. I feel better and know I will live a better life in my future.

-Jeanne Tarbox

After being diagnosed with sleep apnea and unable to lose the extra 10 pounds my blood work showed I was prediabetic. With this information I was able to target my diet and exercise and lose seventeen pounds, resolve apnea and have more energy.

-Patty Hagge

I was heading towards Diabetes Type 2 a few years ago, until I took charge. Dr. Maurer’s Blood Code was brilliant, I was able to turn it all around—my blood sugar levels are normal again.

-Christina Hall

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How to Use This Book

I have written a book that walks the line between an educational, science-based text and an accessible self-help guide. Some of you will read the book cover to cover, but most of you will jump to the sections that are important to you at the moment.

Let me explain.

After the introduction, you will get right into self-discovery work. Steps One and Two—blood test results and skin-fold caliper measurements, respectively—will help you to gather information about your current metabolism and health. You will probably reference these chapters when you have the results in front of you. Step One includes tests that have, up until now, been the domain of your intimidatingly confidential “medical chart.” New terms are explained herein as simply as possible, and I’ve also included a glossary at the end of the book. Step Three helps you interpret what these results mean *for you*, like learning what the gauges mean on the dashboard of your car.

Steps Four, Five, and Six are the action steps that will effectively guide you toward the personalized diet, fitness, and nutritional habits that your body needs. If your fitness habits are in place, you will probably spend more time on Step Four—dietary changes. If your diet is working well, you may need to put more effort into the fitness principles from Step Five.

The “Lifestyle Habits” chapter details how the choices you make when it comes to alcohol consumption, sleep patterns, and stress management will affect your metabolism. The chapter called “Digging Deeper” is written for those who want to know more about what is going on “under the hood.” I think this information is important, but not critical. (You can drive your car without knowing the details of internal combustion.)

Ultimately, this is a guidebook, but the landscape is not a fixed location—it is you. As your environment, habits, and age change, different parts of the book will be more important than others, so feel free to jump around. Further helpful resources and updates can be found at TheBloodCode.com.

Enjoy your journey toward improved and empowered health and well-being.

—Dr. Richard Maurer

Introduction: The Six Steps

Knowledge of the self is the mother of all knowledge. So it is incumbent on me to know my self, to know it completely, to know its minutiae, its characteristics, its subtleties, and its very atoms.
—Khalil Gibran

If you are like the patients I see in my office, you might be interested in reading *The Blood Code* because you have a history of heart disease in your family, and it’s beginning to worry you; or, your weight is inching up, or maybe you’ve learned that you have high blood sugar or type 2 diabetes. Perhaps you are proactively searching for ways to optimize your energy, health, and disease prevention. Regardless, by choosing to read this book, you have taken a major step in reclaiming power over your own health, metabolism, and weight. Congratulations!

Research over the past generation has conclusively linked the prevention of chronic diseases—like cancer, cardiovascular disease, and dementia—to good dietary and exercise habits. Weight gain and blood sugar problems like type 2 diabetes are even more causally linked to your diet and fitness. Five of the top seven causes of death in the United States are from conditions inarguably related to your diet and fitness activities, so clearly, lifestyle counts. Good diet and exercise is important. But what is “good,” and just what does that mean *for you*?

Authorities claim to have the answer for everyone: “Eat a low-fat diet, exercise three days a week, eat olive oil and more (but not too much) fish.” The more-commercialized celebrity health-care magicians offer to cure your weight problem with a magic pill, a superfood, or a 3-minute

workout. Medical advice as it pertains to your diet and fitness regimen has been excessively dumbed down to provide one blanket recommendation to the masses. Eminence-based medical advice, when the validity of a treatment relies upon the fame of the authority, has wrongly advised us on the daily decisions we make about our individual and families' food, fitness, and nutrition.

After twenty years of treating patients who have been confused, misled, and harmed by conflicting and often dead-wrong advice about how to treat a symptom, I hit a wall. I have helped patients to dramatically reduce their heart disease risk, resolve their type 2 diabetes, and recover their optimal weight and energy, all by recommending rational lifestyle changes based upon available medical tests. But patients remain perplexed as to why so many medical authorities, sometimes even their own health-care providers, push advice that clearly makes them less healthy. They ask me, "Why do I hear medical advice that contradicts what is working for me?" I have responded, in part, by writing this book, to teach and discuss a rational, self-driven program that relies on proven health metrics. My personal interest in health and metabolism helps drive my academic and professional vocation.

After my first college nutrition class thirty years ago, I pursued the answer to an ostensibly simple question: "What is a healthy diet?" In a generation of study, throughout premedical and naturopathic medical school, and two decades of practice, travel, and teaching, that question has changed. It is now "What does this individual need to stay healthy?" In other words, when faced with a new patient, I ask myself: "What diet or fitness change will help this person to move toward their perfect health and metabolism?" Headlines, popular diets, and one-size-fits-all medical wellness plans have only moved us further from this important question. How can you best assess which dietary, fitness, and nutritional habits will help you to recover your healthy weight, wellness, and longevity? The answer is not in a news headline or diet book; it is in *you*.

How your body responds to your environment, nutritional intake, and activity lies at the heart of whether you will be healthy for the long

haul. Popular dietary advice for a "good diet" is rife with myths: "Low-fat is healthy," "Red meat is bad for you," and "Whole grains are much better than refined grains." Studies have proven these myths to be false, but they survive because of the *idée fixe* that surrounds them. What if you knew enough about your own body and how it responds to your daily diet and exercise that you could effectively write your own cure and wellness story?

Countless books offer one-size-fits-all diet and fitness plans, while others use questionnaires. (Where else in your life do you make major personal decisions based upon the results of a self-guided questionnaire?) You need a reliable way to understand how your body is responding to your current dietary, nutritional, and fitness habits. The changes you make need to be guided by something more accurate and meaningful than simply the fame of a program's authority figure. And here's the dirty little secret that the weight-loss and supplement industry doesn't want you to know: It's not hard to find out what your body really needs. In fact, it's really easy.

Common blood test panels combined with measurements taken by skin-fold calipers are the two simple but invaluable tools that will crack your Blood Code. You just need to learn how to use them. Like a GPS device, these test results plot where you are right now. It is your job to understand how to plan a course that will best take you from your current location to where you want to go. Future tests will reveal your progress and whether or not the changes you've made are keeping you on the right path. It's my job to be your guide.

Throughout this book, I will show you how to decipher the meaning of your own test results. It will become clear to you why there is no "magic bullet," like a miracle pill, for your metabolism. I will guide you along the way to help you find your metabolic sweet spot. Once you do, it will be yours to keep; you will have the tools to truly understand your metabolism, from the inside. The only real magic bullets I know of are your curiosity, your will, and your ability to respond to what you learn, making the necessary corrections to stay on course along the way.

The Blood Code opens the door for you to become your own health and fitness expert. I wrote it for people who are sick of the smoke-and-mirrors atmosphere of the current medical establishment. Think of this book as a big fan that is going to clear the air and let you breathe freely. So, if you want to understand yourself from the inside out, and then make the necessary changes in your diet, nutrition, and fitness habits, read on. This book is for you. If you are willing, you're now ready to unlock what you need to heal yourself and create a long-term healthy future.

The most important thing to understand is this: Your lifestyle and diet interact with your genetic code. Your health, vitality, and disease symptoms occur where these factors intersect. Your genes express a certain trait when conditions are right; whether it is good or bad is irrelevant; it is what it is. How you respond is what counts. Today's research in epigenetics and genetic expression has liberated us from the former belief that genes are a fixed entity inside us. *Epigenetics* is the study of changes in gene expression, without changing the actual DNA. You can change your genetic expression, your "disease symptoms," if you properly adjust your diet and lifestyle to be in accordance with your unique genetic traits. When your daily habits are properly matched to your genetic code, the results will be expressed in your current health and your long-term wellness. And if you have children in the future, it will also be found in their genetic expression and health.

Your first step is to get some specific common blood tests. Blood test panels are like monitors on the dashboard of a car. You can see how hard the engine is working with the tachometer; the amount of fuel in the tank, with the gas gauge; and whether your car is overheating, with the temperature gauge. Your blood test panel results indicate how your body is responding to your diet, nutrition, and fitness *right now*. To drive a car, you don't need to know the details of internal combustion, but you *do* need to know what the gauges mean. Similarly, you don't need to know the detailed interaction of your metabolism, but test results, like the gauges on the dashboard, are an easy metric that will guide you

toward health recovery. The steps that follow are your driver's education classes that will help you to get the most out of the performance and longevity of your vehicle.

Conventional medical advice is too often based upon the result of one blood test—one number. When this is the case, *the number gets treated, not you*. Metabolic blood tests need to be understood as one part of a bigger picture: the result of how your genetic traits are interacting with your diet and lifestyle, right now. Together, your blood tests are a window into your metabolism—the chemical processes of your body. *Metabolism* is an abused word; weight-loss marketers usually precede it with words like *Speed up your* or *Boost your*. Your body has hundreds if not thousands of ways to adjust your metabolism depending on your health, diet, and activities on a daily basis. You can't fake out your metabolism; you need to learn how to live up to its demands. Your Blood Code will be your guide.

Countless patients over the years have come into my office with prior blood tests that indicate high triglycerides and an elevated blood sugar. Their medical advice was to "Keep an eye on it." This is similar to your auto mechanic saying, "Your brakes are ninety percent worn down and the engine is running a bit hot, but we'll just keep an eye on it for now. Call if you have a problem." Nobody wants to be stuck on the side of the highway because of a problem that could have been prevented. With neglected high blood sugars, it is not the mere dilemma of a broken-down car; it is elevated stroke risk, to name just one.

I could expand here on the innate problems of our health-care delivery system and insurance reimbursement policies in the United States; instead, I will simply conclude that true disease prevention and optimal health are not a vibrant part of the insurance and medical model. A profitable medical system relies upon the exploitation of the capital resource, and unfortunately, that's your disease—your "diagnosis"—not your health. "Medical wellness centers" have indeed sprung up within the past ten years, and arguably, that has been my practice for the past twenty years, but I think the term is more of an oxymoron. Your

long-term wellness and disease prevention is really up to you, because you are the one that benefits.

Ultimately, this book is about self-discovery. Your blood tests and skin-fold caliper measurements are metrics of what is happening, not a diagnosis of what you have. For example, if you measure higher skin fold on your hip as compared to your triceps, you are storing extra calories as fat, like someone who is carbo-loading. In fact, this is a wonderfully advantageous preparation for a long endurance event in cold weather, where caloric intake is limited. It is information about what is happening; it is not a label of what you are, and should be considered a telling piece of your Blood Code, not a judgment of your character.

This may sound like semantics, but words are important. Once you understand that your weight, your cholesterol, and your blood sugars are merely the expression of how your lifestyle is interacting with your DNA—not a personality defect—you can shed a lot of blame and self-doubt. This will free you up to take back control. You are not a lazy person or glutton if you have type 2 diabetes; in fact, you have excellent energy-storage capacity that has helped your genes to survive millennia of scarcity. So give yourself a break, and get on with adapting your lifestyle to suit your survivor tendencies.

In my practice, people of many different shapes and sizes and ages and stages arrive with all kinds of conditions: migraines, restless leg syndrome, cholesterol issues, hypothyroid, weight gain, type 2 diabetes, and prediabetes. The steps in *The Blood Code* offer you a way to see what is happening and a plan for what to do about it. Fortunately, I have taken a dose of my own advice over the years.

Insulin and Insulin Resistance

Insulin is the primary hormone that responds to what you eat. You release insulin when you eat carbohydrates, and, to a lesser degree, protein. Insulin signals for the storage of sugars, and the making and stockpiling of fats; it helps your cells uptake proteins and magnesium. Over many generations, your body has evolved to favor the ability to build and store a little extra, by leaving some extra glucose behind, and by storing extra fats for future energy. Over 40 percent of people in the United States—more than have blue eyes—store so much extra fat and sugar that it is causing high blood pressure, high blood sugar, weight gain, and abnormal blood lipids—a constellation of symptoms that gives rise to the term *metabolic syndrome*, and leads to many chronic diseases.

In Step One, you will discover whether you are in this camp with a simple calculation of your HOMA-IR. If you already trend toward insulin resistance, you have proven you are one of the 40 percent, and without correction, you can quickly tip the scales toward fat gain and/or type 2 diabetes.

Insulin resistance, prediabetes, and type 2 diabetes are not different diseases; they are just different points on a time line. Each condition marks the same trait: a remarkable expression of generations of survival and performance.

I was a classic story of insulin reactivity as a teenager and in my early twenties. At the four-year graduate school in Portland, Oregon, National College of Natural Medicine, I was one of forty medical students in a study that compared the blood glucose effects of different types of sweeteners: rice syrup, maple syrup, honey, cane sugar, and barley malt. Following ingestion, we measured our blood sugar every fifteen minutes for two hours. (By the way, the data displayed no significant differences between the sweeteners.)

I was kept afterward because my blood glucose was below 40 mg/dL (which is very low blood sugar) at the two-hour mark. I felt okay—albeit, a bit hyper, a condition that was not unusual for me. By three hours it had recovered, slightly above 60 mg/dL, due to my body’s release of stored glucose from my liver and muscles. I learned that this reactive hypoglycemia (excess drop in blood sugar) is not the opposite of type 2 diabetes; it is related. In hindsight, my vegetarian college diet, with five-grain hot cereal and vegetable juice each morning, was the wrong thing for my genetics and slightly anxious temperament.

Within the next ten years, my mother was diagnosed with type 2 diabetes, a strong family trait for her, and, of course, for me too. Identifying metabolic reactions so early in my medical career strengthened my interest in the nature of resistance and type 2 diabetes.

Throughout my thirties, I just needed to “watch my diet.” I gave up boxed cereals, concentrated grains like bagels and granola, and any drinkable sugar including juice. By my early forties, I displayed a high blood sugar level, through the HgbA1C test (defined on page [TK]). I needed to better manage my carbohydrates, so I set carb ranges for my meals, dropping the morning jam and toast and adding spinach and butter, and eating avocados instead of pears. I also needed to practice a smarter “metabolic circuit” fitness plan that helped to further improve my insulin sensitivity. This exercise allowed my muscles to use more of the sugar/glucose that had begun to stay in my bloodstream too long. The end result today: I feel better, fitter, and healthier than at any other time in my life, and my blood

sugar has dropped back into my metabolic “sweet spot.” My Blood Code panel is better than it was ten years ago.

I am pretty lean; therefore, people are surprised to learn that I was “prediabetic” according to blood tests in my early forties. The truth—that over one-third of type 2 diabetics are normal to low body weight—is not a surprise to me.

I personally follow the “mild insulin resistance” guideline from Step Three (see page [TK]). For comparison, my mother follows the carbohydrate restriction for someone with severe insulin resistance, and she practices resistance exercises with a trainer two days per week, and walks the other days. It has been over fifteen years since she expressed type 2 diabetic numbers on blood tests. Rather than lament about what she has to do to maintain this kind of health, she says, “It’s really not hard, and I feel so much better.”

Insulin resistance is not a disease label. My own insulin resistance trait explains why, historically, I could “play through” without a meal and still concentrate and feel well. I can work out for one to two hours on an empty stomach and not “run out of gas.” There is always enough glucose (sugar) for my brain to function. This is kind of like a supernatural power; I just need to know how to use it. People with insulin resistance, like me, are designed really well for infrequent food intake and increased physical exertion. After long bouts of exercise, it isn’t carbs that I need—it’s protein and fats. Dietary protein triggers enough insulin and helps me to recover and maintain my healthy and insulin-sensitive muscle mass.

At TheBloodCode.com you can view the stories of people who have used their Blood Code, some with more effort than others, to radically improve their health. The case presentations in this book and videos on the website are not some sleek before-and-after marketing pitch; they are real people who are willing to share their stories in hopes that they can help others find non-drug, self-motivated ways toward reversing diabetes, improving weight, lowering heart disease risk, and just feeling better. All the patients share a common truth: They feel more confident about their bodies and health going forward.

I recognize that it might be easier to blame suffering on something, or someone, else. Not long ago, a well-known celebrity went public with having type 2 diabetes. It struck me as odd when she said, “Diabetes is not my fault.” Of course it’s not your fault that you have a certain trait, no more than your eye color is “your fault.” But, if your Blood Code reveals insulin resistance, and you continue to eat cereal and juice for breakfast, whose fault is that? Your blood test panel and skin-fold results do not require blind faith; they do not lie. The Blood Code allows you to discover the direction you need to take toward the health and vitality you deserve.

Ready?

The Six Steps

Step One: Get Your Blood Tests

You can get the tests done through your health-care provider or through a direct lab facility. If you use a local provider, confirm that all the required tests are included (the panels are listed in this book and on the website, TheBloodCode.com). Be sure that you will receive a copy of the actual results, not just a summary letter. The website also contains a link to our direct lab partner, [SaveOnLabs](http://SaveOnLabs.com). The Blood Code Discovery Panel, The Blood Code Progress Panel, and The Blood Code Thyroid Panel are remarkably affordable, and the confidential results are sent directly and securely to you. You can choose to share your results with whomever you wish once received. These results offer you a starting point of reference, or a progress check point on the map of your health journey. In the future, if we continue to take responsibility for our health and disease prevention, I expect more options will be available for affordable direct access to blood testing.

Step Two: Measure Yourself with Skin-Fold Calipers

This is optional but elegantly informative. Some trainers use skin-fold calipers; you can also buy a simple, inexpensive, yet accurate model through [TheBloodCode](http://TheBloodCode.com) website. Whether you are overweight or a lean athlete, skin-fold caliper measurements, done on four key parts of your body, offer an honest metric of your current fat storage, metabolic balance, and fitness. Caliper measurements can help to distinguish whether

diet or fitness is currently more important for your metabolic recovery. Your weight, measured on a scale, is an inferior and inaccurate marker of your health and metabolism. It is true that pinching and measuring a skin fold intimidates some people at first, but I know the honest result will be surprisingly helpful for your health and confidence. I hope your curiosity wins out.

Step Three: Putting It All Together—IR, High Insulin, and Hypothyroid

Now it's time to self-prescribe a program that will best fit your personalized dietary and fitness needs. Your blood tests and caliper measurements provide insight into the relationship between your genetic basis, your eating habits, your fitness, and your nutrition. In this section you will unlock *your* unique Blood Code, by asking questions like: “Do I have the storage trait?” “Do I have an insulin resistance trait?” “Do I burn calories slower than the average bear?” Your dietary and fitness needs will be spelled out based upon your blood test and skin-fold results.

Step Four: Adjust Your Blood Code Diet

It is true that most people will improve their metabolism by exchanging some dietary sugars and carbohydrates, like sweets, breads, potatoes, and fruits with leafy vegetables, traditional fats, and proteins. In Step Three, you found out how *much* you need to change—whether you require no, slight, moderate, or severe reduction in dietary carbohydrates. In this step, you will discover *why* dietary fats are a better food choice to correct insulin resistance. The Blood Code Diet helps you to personalize the carbohydrate, fat, and protein choices that are in line with what your body uniquely requires.

Step Five: Add The Blood Code Fitness Principles

Your Blood Code allows you to see whether your current activity and exercise habits are right for your healthiest and most sustainable metabolism.

It is true that the efficient and thrifty traits that were so beneficial to your ancestors do not carry the same survival value given that your lifestyle is so metabolically efficient. Even getting the mail requires a mere click of the keyboard. If you express insulin resistance or a slow thyroid function, you need to create a lifestyle that compensates for the efficiency your body is so good at. The Blood Code Fitness Principles, when put into action, help you to balance your inner metabolic tendency with your outer activity and demand.

Step Six: Ensure Your Nutritional Support

Nutritional supplements play a smaller and more supportive role in your health compared to your diet and fitness habits. After treating thousands of people over the years and working as a technical director and clinical consultant for numerous nutritional and herbal supplement companies in past decades, I have found that only a few key nutrients have withstood the test of time and research to remain invaluable parts of The Blood Code program. You might be surprised by the reasonable and non-hyped tone of Step Six; I will not kid you with fantastic claims about what a nutrient can do for you. You need to ensure that you are not deficient in key metabolic nutrients; fortunately, these deficiencies are easy to correct with a rational, research-based nutritional plan.

When you follow the steps in The Blood Code, you should feel, perform, and look better in ninety days. Whether your new dietary, nutrition, and fitness habits are working or not does not require blind faith. Measurable improvements in your blood test results and skin-fold measurements should coincide with your improved habits. Re-check The Blood Code Discovery or Progress Panel and check your skin-fold measurements. Thousands of people have done this before, whether through The Blood Code or through Dr. Maurer's office in Maine. Tell us what you think, visit the TheBloodCode.com, and join in the discussion. Thanks for choosing TheBloodCode community to be part of your self-directed and radical health discovery and recovery plan.

Step One: Get Your Blood Tests

I have been and still am a seeker, but I have ceased to question stars and books; I have begun to listen to the teaching my blood whispers to me.

—Hermann Hesse, from *Demian*

Your dietary and nutritional habits can make or break your health; you must first know about your past and present to guide you toward your healthier future. The storied Scrooge endured dreams and apparitions of the past and present to allow him to make a grand moral shift to better his own future and the future of those close to him. Your story is less grand and moral and more personal. Once you see your past and present, revealed through blood test results rather than specters, you have the potential to rewrite a part of your future, lowering the likelihood of a stroke, heart attack, Alzheimer's dementia, and many cancers. I realize that lowering the risk of a future disease is pretty abstract; fortunately, when you follow the Six Steps of The Blood Code, you will experience tangibly better energy and health in the moment.

You need to start somewhere, and Step One is a good place to begin. Essentially you need to be your own advocate: Request and get some important blood tests. Although the conventional medical establishment might find it odd and even reckless for me to give you the tools and responsibility to understand the diet and lifestyle changes that are important for you, rest assured that you are the right person for the job. Welcome to the first step.

A Panel Is Better than an Individual Test

Single blood tests rarely provide meaningful information on their own. There are very few places in science—or life, for that matter—where a single piece of data gives a meaningful and certain conclusion. “She wore glasses, so of course she was trustworthy.” This example sounds absolutely absurd, but an equally irrational statement is: “He had a cholesterol of 240, so I know he was at risk for a heart attack.” The single test of cholesterol loses its value when seen in the context of all the other values in your Blood Code Discovery Panel. You have permission to become your own expert, and act upon your knowledge. Step One of The Blood Code is a reference of sorts; review the parts that are important for you.

Nationally in the U.S., laboratories that perform blood tests have an obligation to get results to you, not to just the ordering practitioner. Yet, there are archaic laws in some states that restrict your access to this information about yourself, as though you can't be trusted. I can understand the concern if the blood test is a complex cancer panel that requires statistical interpretation, but a basic metabolic assessment? It's like rudimentary wiring. To pursue this example, my state law currently allows me to do basic plumbing and electrical work *in my own home* but I appropriately can't do this work in other peoples' houses for hire (I am neither a plumber nor an electrician). It follows that you can and should be trusted to view and act upon your own blood test results, but you probably should not interpret others' results for hire, unless you are a properly licensed professional.

Your doctor can be a partner in your quest to get these tests done and results in your hands. And at TheBloodCode.com, you can find a link to the most accessible and affordable direct laboratory facility within the U.S. I anticipate greater direct consumer access to self-ordered blood testing over the next several years, especially with the new technology of performing blood tests on ever-smaller samples.

Practical science relies on the famous Einstein adage, “*Make things as simple as possible, but not simpler.*” I know there will be medical colleagues who will think The Blood Code Panels are too much information for the average person, while others will claim that some specialized tests have been left out. The following Panels provide you with the maximum information about your health and metabolism while maintaining an affordable and understandable interpretation. Anything less would be “simpler.”

These tests are not proprietary. They are of equal quality at any legitimate laboratory facility. If you do the panel through your health-care provider, be sure that all tests are included—and get the results rather than a summary letter. The following test panels have been honed to include the essential tests that provide you with meaningful, actionable information.

Throughout this book, reference ranges will first list U.S. standard units, as of the end of 2013—then International S.I. units will be listed in parentheses. Lab results from clinical cases are reported in U.S. standard units. A conversion chart can be found on page (TK) and is available at TheBloodCode.com.

Ready? Let's get on with your results.

The Blood Code Discovery Panel

Everyone should start with The Blood Code Discovery Panel, which includes all of the tests necessary to assess which direction your metabolism is going, such as excess storage, insulin resistance, and subsequent inflammation. The Discovery Panel includes your vitamin D and ferritin. The reasons will be explained under each individual test. The

Blood Code Discovery Panel helps you to thoroughly evaluate how your current diet, fitness, and nutrition interact with your genetic traits and environment. The Discovery Panel is your first step.

Preparation: Fast for 10 to 16 hours, overnight. Drink enough water, and take your prescribed medications.

1. Complete Blood Count with Differential [CBCD]
2. Comprehensive Metabolic Panel
3. HgbA1C
4. Serum Insulin
5. Lipid Panel
6. 25 OH Vitamin D
7. Ferritin

The Blood Code Progress Panel

The Blood Code Progress Panel is an affordable follow-up panel that you can do on a quarterly basis each year to ensure that your progress is in-line with your true health potential. The diet, fitness, and nutritional steps that you implement should provide you with measurable improvements. If your vitamin D and ferritin were okay on your Discovery Panel, the Progress Panel is all you'll need going forward. The Progress Panel is an objective beacon that ensures you are on the road toward a longer and healthier life.

Preparation: Fast for 10 to 16 hours, overnight. Drink enough water and take your prescribed medications.

1. Complete Blood Count with Differential [CBCD]
2. Comprehensive Metabolic Panel
3. HgbA1C
4. Serum Insulin
5. Lipid Panel

Definitions of the Tests in The Blood Code Discovery and Progress Panels

1. **Complete Blood Count (aka, CBC or Hemogram) with Differential:** To ensure a normal and healthy blood count. Anemia can alter HgbA1C results.
2. **Comprehensive Metabolic Panel (CMP):** Contains several markers, most importantly:
 - Liver enzymes—May show benign fatty liver disease, a condition where high insulin causes sugar to get stored as fat in the liver.
 - Fasting glucose—Also referred to as *blood sugar*, this is your pre-food baseline of circulating blood glucose prior to eating.
3. **HgbA1C / HbA1c (Hemoglobin A1C):** Also known as *glycosylated hemoglobin*, this subset of the hemoglobin molecule is part of a calculation that reflects your eight- to twelve-week average blood glucose. A useful tool to assess the changes in your blood sugar from changes in dietary and exercise habits over a period of months.
4. **Serum Insulin:** Your sensitivity or resistance to this anabolic hormone tells an important story about your disease risk. Your fasting glucose and fasting insulin together create a calculation called HOMA-IR. The important part is the “IR,” which stands for *insulin resistance*. Your HOMA-IR calculation is an invaluable tool used to help identify your need and response to dietary and exercise habits, and their impact on your health.
5. **Lipid Panel:** Provides the Triglyceride:HDL-cholesterol (TG:HDL) ratio, a strong indicator of heart disease risk.
6. **25 OH Vitamin D:** While cause and effect is still up in the air, insulin resistance is strongly associated with low vitamin D status.

7. **Ferritin:** This is the storage form of iron; too low, and you have significant iron deficiency. But while it is necessary for muscle function and manufacture of blood cells, high levels indicate inflammation or a genetic iron storage condition.

The Blood Code Thyroid Discovery Panel

Thyroid hormones are part of what regulates your metabolic rate, especially when you are not physically active. It is understandable why doctors suspect the thyroid gland may be responsible when you have a “sluggish metabolism.” Far from acting on its own, your thyroid gland responds to dietary and environmental conditions, and if you are prone to insulin resistance, hypothyroid can be in the mix as well.

Insulin resistance and hypothyroid are intimately connected. Recent research has determined that insulin resistance raises the incidence of thyroid problems.^{1 2} As I have said already, historical lifestyle is a major player; if your ancestors burned the metabolic candle at both ends by combining a lot of physical demand with low caloric intake, they created the perfect environment for these two conditions to develop together, and you are the brilliant representation of that survival.

Not everyone needs his or her thyroid thoroughly tested. If you have no family or past history of thyroid problems, past screening tests have been normal, the Thyroid Discovery Panel is not necessary for you.

If a thyroid problem is suspect, due to your family history or past abnormal test, answers are better than hunches. The all too common symptoms of hypothyroid include fatigue, weight gain, constipation, coldness, and dry skin. The Blood Code Thyroid Discovery Panel provides information that is beyond typical thyroid screening. It offers you and your health-care provider a better sense of whether the thyroid is part of your metabolic imbalance.

Preparation: The thyroid panel does not require fasting, *but exercise can significantly alter levels of circulating thyroid hormones.* A morning,

pre-exercise, fasting blood draw is convenient. Drink enough water, and take all medication as prescribed by your healthcare practitioner.

1. TSH (Thyroid Stimulating Hormone)
2. Free T4 (Free Thyroxine)
3. Free T3 (Free Triiodothyronine)
4. TPO antibody (Thyroid Peroxidase)

Definitions of the Tests in The Blood Code Thyroid Discovery Panel

1. **Thyroid Stimulating Hormone (TSH):** This hormone comes from higher in your brain (the pituitary gland). TSH quantifies whether the pituitary is whispering or yelling at the thyroid to produce adequate T4 and T3. If it is yelling (i.e., your number is higher), it is a sign that the thyroid gland is producing inadequate hormone.
2. **Free Thyroxine (Free T4):** The primary hormone that your thyroid produces, T4 is actually a pre-hormone, since the activity only occurs when it is converted into T3 inside your cells.
3. **Free Triiodothyronine (Free T3):** The activated form of the thyroid hormone that helps to regulate the BMR in all your cells. Numerous enzymes adjust and control the amount of conversion from T4 to active T3 and the final deactivation of T3.
4. **Thyroid Peroxidase (TPO antibody):** This test quantifies the amount of antibody—a protein of your immune system—that can “knock out” some of your thyroid gland’s activity, usually causing it to produce less thyroid hormone over time. If people have hypothyroid findings *and* elevations in this antibody, prescription treatment will likely begin sooner rather than later.

You will notice that there is no *Progress Panel* for thyroid. If there are abnormalities in the Thyroid Discovery Panel, you will want to develop a strategy for follow-up testing with your healthcare provider. Follow-up thyroid tests are best done a la carte. I have clients for whom I only order TSH to assess progress; others need the TSH with free T4 and/or free T3. In my opinion, the TPO antibodies rarely need to be retested once they are checked once.

Evaluate Your Discovery and Progress Panel Results

All meanings, we know, depend on the key of interpretation.

—George Eliot (pen name of savvy English author, Mary Anne Evans)

This is as good a time as any to reiterate: This book is not intended to be a substitute for medical advice and intelligent diagnostics. There are other disease considerations that arise given abnormal blood test results. The information given here is designed to help you to better understand yourself and to make informed decisions about your diet, fitness, and nutritional habits. Insight you gain about yourself and improvements in your health should strengthen, not replace, the relationship you have with your health-care provider(s).

1. Complete Blood Count with Differential (CBCD, CBC, Hemogram)

The CBC has several different components related to your white blood cells (WBC) and red blood cells (RBC). The RBC values will check for the presence of anemia, which mimics so many metabolic conditions, like hypothyroid, and can complicate the blood tests used for blood sugar control.

White blood cells (WBC or leukocytes)

3–10 M/uL is normal (S.I. units are the same)

White blood cells are the collective of cells that form your immune response to infection and participate in inflammation and allergy reactions. The lower the number, the less total white blood cells cruising through your bloodstream at the time of the blood draw.

Low WBC: If you were not sick at the time, the number should be on the low side of normal. Slightly lower than 3 is normal for some, but less than 2.5 should be discussed with your health-care provider.

High WBC: If the number is on the high side of normal, your immune system is probably mobilized and active, doing what it should do—fighting an infection before it even gets a stronghold in your body. If it is above 10, you were either fighting an infection or had been exposed to something. The differential contains the “count” of WBCs, and gives an indication of whether they are mostly the cells that fight viruses (lymphocytes) or the kinds of cells that mostly fight bacteria (neutrophils). The eosinophil is usually elevated if you have allergies, primarily airborne-type allergies.

Studies have linked chronically high WBCs with inflammation and heart disease risk. In population studies, people with higher body fat and poor fitness habits are more likely to have higher WBC counts and associated heart disease. If this was an issue for you, despite that WBC levels vary a little from test to test, your value should improve and lower as you gain fitness condition and lose body fat. Again, a high WBC can also indicate other non-metabolic conditions, so abnormalities should be discussed with your health-care provider.

Red blood cells (RBC or erythrocytes)

4–6 M/uL is normal (S.I. units are the same)

Red blood cells make up 40 to 50 percent of your total blood volume, moving oxygen in and carbon dioxide out of your cells. There is an iron molecule at the center of each RBC. This test is a “count” of your red blood cells. Average is 5 million cells per uL volume. Men are usually higher (4.0–5.8) and women are usually lower (3.8–5.4). Athletes want to be on the higher sides of normal, since these cells fuel your aerobic activity.

Low RBC: This signifies anemia—too few red blood cells. Your ferritin test, the storage form of iron in your body, will show whether this is the cause.

High RBC: This is not common, and might be within normal limits for you. Ferritin should be checked to ensure it's not too high.

Hematocrit (HCT)

Normal Range:

For women: 35–47% (0.35–0.47)

For men: 40–52% (0.4–0.52)

HCT is the percentage of whole blood that is red blood cells. The nickname “Crit” has become infamous, as athletes illegally and unhealthily dope with drugs that stimulate bone marrow production of RBCs, thereby giving them a higher percentage of oxygen-carrying red blood cells.

Low and high levels offer the same screening as the RBC.

Hemoglobin (HGB)

Normal Range:

For women: 11–15 g/dL (110–150 g/L)

For men: 13–17 g/dL (130–170 g/L)

HGB is the inside part of a RBC. It is made from the mineral iron and is B12-dependent. If deficient, it can affect the accuracy of interpreting HgbA1C levels.^{3 4}

Low Hgb: Anemia with low HGB is usually iron deficiency, and could also be low vitamin B12. The ferritin level will confirm iron status.

High Hgb: This is rarely problematic, and should be addressed like high RBC.

Mean corpuscular volume (MCV)

80–100 fL is normal (S.I. units are the same)

MCV is a measurement of the average size of your red blood cells.

Low MCV: This signifies small red blood cells, and usually means iron deficiency.

High MCV: This results commonly from B12 deficiency. Some people have numbers that normally remain outside the reference ranges; in this case, the value remains unchanged despite nutritional improvement.

Mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin content (MCHC): These calculations give the mathematical average HGB per red blood cell. Both tests help to tease out the different types of anemia. These tests are not metabolically pertinent, and if abnormal, should be further evaluated by your health-care provider.

Platelets (PLT)

140–400 x1000 uL is normal (S.I. units are the same)

Platelets are the cells that allow for normal clot formation. Like MCH, this test is not relevant to your metabolism, but if the number is out of the reference range, it could indicate one of many serious conditions. This should be discussed with your health-care provider.

Summary of your CBC: Ensure that you are not anemic. Even mild anemia prevents normal exercise recovery, and causes symptoms that mimic a “sluggish metabolism.” Anemia is a common symptom for many non-metabolic diseases, so be sure that the results of your tests are part of an intelligent dialogue with your health-care provider.

2. Comprehensive Metabolic Panel (CMP)

The CMP contains screening tests for many different organ systems. For your Blood Code you will observe the ones listed below.

Fasting glucose (blood sugar)

75–95 mg/dL is optimal (4.2–5.3 mmol/L)

<75 mg/dL is too low (<4.2 mmol/L)

96–100 mg/dL is borderline (5.3–5.6 mmol/L)

101–125 mg/dL is high blood sugar, but not “yet” diabetic (5.7–7.0 mmol/L)

>125 mg/dL is diagnostic of diabetes (>7.0 mmol/L)

Low blood glucose, also known as *hypoglycemia*, means that your body can’t liberate the stored sugars very effectively. This was a fast-ing test, so it is not vulnerable to your most recent meal. Weight loss, very low-fat diets, and some drugs can result in low blood sugar. When hypoglycemic, your body will tend to break down more proteins, a state of catabolism.⁵

High blood glucose, also known as *hyperglycemia*, implies that you have some insulin resistance. The degree of insulin resistance is directly associated with how high the fasting blood sugar is over 100 mg/dL (>5.6 mmol/L). A fasting blood sugar >125 mg/dL (>7mmol/L) is diagnostic of type 2 diabetes, but the earlier you can catch the elevated blood sugar *before* it is type 2 diabetes, the better. Insulin resistance, even at the early stages, is associated with serious disease risks.⁶

Your body has this wonderful ability to release extra blood sugar in the first morning hours. Some people have a slightly high fasting blood glucose in the morning, but will discover a normal HgbA1C (blood sugar average over time); this can be explained by the “dawn

phenomenon,” which is caused by the release of adrenaline and metabolically stimulating compounds upon rising.

Non-Insulin-Resistant Reasons for High Fasting Blood Sugar:

- If you don’t get “enough” sleep, you will have an extra high dawn phenomenon due to the increase of adrenaline when you get insufficient sleep.
- If you tend toward anxiety or panic, you might release excess adrenaline and therefore have an extra high dawn phenomenon.
- If you had a strenuous workout before the blood draw, your body will have released extra blood sugar from your muscles.

Liver Enzymes AST and ALT

AST and ALT 0–40 U/L is normal (S.I. units are the same)

Some labs still use the very old names ALT = SGPT and AST = SGOT. These enzymes indicate the rate of turnover of liver cells.

High liver enzymes imply that there is inflammation or irritation in your liver. The AST is more vulnerable to short-term influences, like alcohol intake or medications such as ibuprofen and acetaminophen taken within a few days prior to the test. Whereas the ALT indicates the long-term processes over weeks or months, like when your liver gets bogged down with too much fat storage, aka, fatty liver disease, or the more medical-sounding benign hepatic steatosis.

Many medications cause harmful liver irritation. If you show an elevation in your liver enzymes, and are on a prescribed or over-the-counter medication, discuss the results with your prescribing practitioner.

Creatinine and Blood Urea Nitrogen (BUN)

Normal Ranges:

Creatinine: 0.5–1.3 mg/dL (44–115 $\mu\text{mol/dL}$)

BUN for women: 6–21 mg/dL (2.1–7.5 mmol/L)

BUN for men: 8–24 mg/dL (2.8–8.6 mmol/L)

Creatinine is a by-product of your muscle metabolism and is produced at a fairly constant rate; it is also eliminated at a comparable rate through the kidneys. If you have a more-advanced case of insulin resistance or history of high blood pressure, your practitioner may look at your creatinine and BUN levels to assess the kidney function. Generally, if creatinine is above normal, your kidney function should be evaluated further with a more-accurate test administered by a medical specialist. The most damaging compound to the kidney is excess sugar, so control of insulin resistance is critical when kidney function is compromised.

BUN is another compound that is a normal part of protein breakdown and protein digestion, and is regularly excreted through the kidney.

Low BUN is usually found in two very different populations: children, who have low BUN in part because of their relatively efficient kidney function; and malnourished adults, such as those on very low-protein diets.

High BUN may be due to dehydration first thing in the morning, so use this test as a reminder to stay hydrated. A protein-rich diet can also result in a slightly higher BUN level. Very high protein diets and people who use protein powders may have a BUN above 30 mg/dL (>10.7 mmol/L); this is not healthy, and dietary patterns should change.

There are other components of the CMP test panel that are not an integral part of your Blood Code. If overt abnormalities exist, discuss them with your health-care provider.

3. Hemoglobin A1C (Hgb A1C)

4.5–5.7% is normal (26–39 mmol/mol)

$< 5.6\%$ is optimal (< 38 mmol/mol)

5.8–6.4% indicates significant insulin resistance (40–46 mmol/mol)

$>6.4\%$ indicates diabetes (>46 mmol/mol)

Hemoglobin A1C (HgbA1C) is a calculation that measures a chemical reaction to hemoglobin (Hgb) in your bloodstream. Significant abnormalities in your Hgb levels, such as anemia, can disrupt the accuracy of the HgbA1C test. Fasting blood glucose measures your blood sugar only at the moment of the draw; HgbA1C measures the prior eight- to ten-week average blood sugar. In 1990, most labs reported anything below 6.5% as normal. Now, the top edge of acceptable normal is 5.7% (39 mmol/mol). This lower acceptable limit is due to mounting evidence over the years that *nondiabetic* individuals with HgbA1C between 5.5% and 6% (37–42 mmol/mol) had significantly greater stroke and cardiovascular disease than those who maintained numbers between 5% and 5.5% (31–37 mmol/mol). Furthermore, as HgbA1C numbers went above 6% (42 mmol/mol), heart disease risk correspondingly increased with each level of elevated average glucose.⁷

Low HgbA1C is very rare; I have seen it twice in clinical practice. It indicates frequent hypoglycemia and subsequent tendency toward loss of muscle tone.

High HgbA1C is directly related to blood sugar; the higher the value, the higher your average blood sugar, and subsequently, the higher your chronic disease risk. This is a very useful test to see the improvement and progress with diet and fitness changes over an eight- to ten-week period of time.

4. Serum Insulin

Fasting Insulin for adults: The ranges listed here are quite different than the wide range the lab provides on your report. The international S.I. unit conversion is based on the most scientifically validated conversion value to date: 1 uIU/mL = 6 pmol/L.⁸

Low is <3 uIU/mL (<18 pmol/L)
 Optimal 3–8 uIU/mL (18–48 pmol/L)
 High is >8 uIU/mL (>48 pmol/L)

First, look at your absolute insulin level; low, normal, or high. Then you can run the calculation HOMA-IR (see below) to discover the extent of your insulin resistance (chronic disease risk) or insulin sensitivity (vital and healthy metabolism).

Low insulin: Labs cannot currently detect insulin lower than 2 uIU/mL. The result is reported as “below detectable limits.” If there is no detectable fasting insulin, <2 uIU/mL (<12 pmol/L), and the blood sugar is significantly elevated, such as with a HgbA1C >6.2% (>44 mmol/L), this could be type 1 diabetes, and should be immediately reviewed by a doctor. There is an adult-onset type 1 diabetes called LADA, sometimes referred to as diabetes type 1.5; more-advanced blood tests, including antibody tests, can help to evaluate for the presence of this condition, and should be done through your health-care provider.

With low insulin, you can readily break down fats that you have stored. In my practice, I see low insulin with:

- people with inadequate absorption of calories;
- people who over-exercise/over-train without adequate time off to recover; and
- people who have chosen a very low-carbohydrate diet, despite having no evident insulin resistance.

High insulin: High insulin on a fasting blood test means you are in an anabolic state—effectively building fat and muscle. High fasting insulin is rare in a thin and frail person. Future risk of type 2 diabetes begins to go up in those with fasting insulin above 8 uIU/mL

(48 pmol/L). Uncorrected high insulin will usually, over time, result in insulin resistance; therefore, you need to assess your HOMA-IR for any insulin resistance.

Insulin levels during childhood and pregnancy: It is normal for growing children and pregnant women to have a slightly higher insulin level, up to 15uIU/mL (90 pmol/L). Gestational diabetes is not a condition that happens “out of the blue”; instead, it is the appropriate pregnancy-related elevation of insulin that puts some women over the top of their previously hidden insulin resistance.

HOMA-IR, The Insulin Resistance Calculation: $\text{Insulin} \times \text{Glucose} \div 405$

The HOMA-IR calculation requires U.S. standard units. To convert from international S.I. units:

Insulin: pmol/L to uIU/mL, divide by (\div) 6

Glucose: mmol/L to mg/dL, multiply by (\times) 18

Optimal Range: 1.0 (0.5–1.4)

Less than 1.0 means you are insulin-sensitive which is optimal.

Above 1.9 indicates early insulin resistance.

Above 2.9 indicates significant insulin resistance.

HOMA-IR = $\text{Insulin} \times \text{Glucose} \div 405$

For example:

fasting insulin = 10 uIU/mL

fasting glucose = 100 mg/dL

$10 \times 100 = 1000$, divided by 405 = about 2.5 = early insulin resistance

HOMA-IR stands for Homeostatic Model Assessment of Insulin Resistance. The meaningful part of the acronym is the “insulin resistance” part. This calculation marks for both the presence and extent of any insulin resistance that you might currently express. You can visit

TheBloodCode.com to plug in your values and get the calculation. It is a terrific way to reveal the dynamic between your baseline (fasting) blood sugar and the responsive hormone insulin.

Low HOMA-IR means that you are sensitive to insulin. A small amount of the hormone insulin is doing the trick to keep your blood sugars in good balance.

High HOMA-IR relates to your level of insulin resistance. The higher the number, the more resistant you are to the message of insulin. If you are above 2, your self-prescribed diet and fitness habits will bring your number down into the lower insulin-sensitive range. The upcoming steps direct you toward the changes that are right for you.¹⁰

5. Triglyceride (TG) and High-Density Lipoprotein (HDL) from the Lipid Panel

As individual tests:

Triglyceride (TG): Optimal is 40–100 mg/dL (0.45–1.1 mmol/L)

HDL: Optimal is men >44 mg/dL (>1.14 mmol/L), women >50 mg/dL (>1.3 mmol/L)

TG is the fat that is in circulation in your bloodstream; this represents a lot of caloric availability. Remember, this was a fasting test, so this does not represent your last meal. Instead, fasting TG displays the capacity for your body to make and store fats, usually at the insistence of the hormone insulin.

Low TG, <40 mg/dL (<0.45 mmol/L), shows that you are running lean; while this is good to an extent, it leaves little room for error. If times get tough, like a strenuous workout that lasts over an hour, you will start to break down. Like someone with a level of insulin that's too low, you may have trouble adding muscle mass and strength.

Post-workout meals are vital when in this category. A vegetarian exerciser with low TG is on a dangerous road toward tissue and immune breakdown (catabolism).

High TG, >100 mg/dL (>1.1 mmol/L), implies that you have done a fabulous job storing up for the big event . . . that never happened. No doubt you have plenty of fat stored in your liver, too, but the TG measured was merely the overflow. High insulin is usually behind the steering wheel of your metabolism when you have high TG. The upcoming steps will swiftly correct this excessive fat storage.

HDL on its own: The HDL represents how well your liver is producing the useful and healthful HDL-cholesterol. If you have high TG, your HDL is probably lower than it should be for your optimal health. Conversely, as you move toward a healthier metabolism, your TG will reduce and your HDL will go up. The ratio between the two is important.

TG:HDL Ratio: A More-Accurate Heart Disease Risk Assessment

This ratio, like HOMA-IR, requires U.S. standard measurements; therefore you must convert into U.S. standard units.

- HDL: mmol/L to mg/dL: multiply by (x) 39
- TG: mmol/L to mg/dL: multiply by (x) 89

Optimal range: 0.5–1.9

Some insulin resistance: 2.0–3.0

Significant insulin resistance and heart disease risk is found at ratios >3.0

TG:HDL ratio is calculated on a fasting lipid profile. Simply take the Triglyceride and divide by the HDL; the closer to one, the better. For

example: TG = 120 mg/dL and HDL=40 mg/dL. $120 / 40 = 3.0$, and indicates an elevated risk of heart attack and stroke.

Low TG:HDL is desirable. As long as the TG is not below 40, your ratio can be below 1:1, as it is in many well-trained and properly nourished athletes, for example a TG of 50 mg/dL and HDL of 80 mg/dL provides a low TG:HDL ratio of 0.6.

High TG:HDL, especially >3 , indicates significant risk of heart attack and stroke. I realize that high cholesterol, especially LDL, gets most of the press, and I am realistic in blaming the pharmaceutical industry for promoting this hype. The research and relevance about the TG:HDL ratio is detailed further in the “Digging Deeper” chapter.

6. Total Vitamin D (25-OH vitamin D) (Part of the Discovery Panel)

30–60 ng/mL is your optimal range. (75–150 nmol/L)

Vitamin D level in your blood can be associated with insulin resistance. There is both a synergistic effect and some cause and effect noted in the literature related to obesity, insulin resistance, and low serum vitamin D. If you show any level of insulin resistance, you want to ensure that your vitamin D is within optimal range. Some additional supplemental vitamin D can be a very important part of your metabolic recovery.

Low vitamin D: This is associated with insulin resistance, and some cause and effect is noted in the research. Therefore, if you are overweight *and* have low vitamin D, your prognosis is worse. The take-home message: Guarantee that you are not vitamin D-deficient when you begin your journey toward a healthier weight and metabolism.¹¹

High vitamin D: Too much of a good thing is too much. In clinical practice, the only times I saw vitamin D levels above 70 ng/mL (>175

nmol/L) were in people who supplement with a high dose nutritional supplement. Vitamin D has received a lot of hype in the past decade. Research has repeatedly linked low blood levels of vitamin D with many diseases. Nutritional advice by many experts fell victim to the common error in science, which is to see the tree and not the forest, or, in other words, to mistakenly see direct cause and effect where there is only an association. Low vitamin D can cause problems, clearly, but once the basic deficiency is resolved, high vitamin D can cause similar problems, like calcification and hardening of arteries. If your vitamin D is above the reference range, look for where you might be inadvertently getting excess, such as dairy products and other combination nutritional. A good, all-around daily supplemental dosage is between 600 and 1200 IU, and should be taken in an oil-soluble form, such as with fish oil. Over 2000 IU per day should only be pursued with proper medical advice.¹²

7. Ferritin (Part of the Discovery Panel)

Normal Ranges (S.I. units are equal numbers as ug/L):

For women: 30–150 ng/mL

For men: 50–300 ng/mL

Athletes, both men and women: Raise the lower level of your normal ranges by 20 ng/mL

Ferritin is an iron-containing protein and is the primary form of storage iron in your body. The iron molecule represents your iron reserves. Animals, including humans, concentrate iron in their blood cells. When iron is in short supply, the body will rob ferritin from muscles and bones to feed the production of blood.

Low ferritin occurs when the iron reserves have been drained and not replenished. Anemia does not occur until the late stages of low ferritin, so you can still have a low ferritin even if your RBC is normal. When low, your muscles do not recover well from exertion, and

you will start to experience fatigue, lack of stamina, and restless leg syndrome with insomnia. These conditions are remarkably easy to cure with iron-rich nourishment. Women are more vulnerable to this condition due to the loss of iron with decades of menstrual cycles. If you are under the age of thirty, you should add a supplemental chelated iron while looking for ways to get some iron-rich foods back into your diet (e.g., red/dark meats, bone broths, oysters, and liver).¹³

High ferritin is known to be associated with obesity and especially fatty liver with high triglycerides. Individuals with higher serum ferritin levels are more likely to have severe insulin resistance, and vice versa.¹⁴

“Genetic” high ferritin: Everyone should have a ferritin run at least once in his or her early to mid-adult life. A condition called hereditary hemochromatosis presents in about 2 to 4 percent of the population in the United States. This set of gene mutations triggers excess storage of iron, a trait that could have been a survival boon historically for women to survive blood loss from childbirth, but excess iron can cause a chronic inflammation and liver damage in men and postmenopausal women.

If you have levels of ferritin above 300, you need to rule out whether this is secondary to inflammation, liver problems, or hereditary hemochromatosis. Follow-up genetic tests and discussion with your health-care provider are important steps you must take to evaluate a more serious, inflammatory reason for the elevated ferritin. If ferritin is high due to insulin resistance and fatty liver, the number will improve as you implement the dietary and fitness changes from the coming steps.

The common “inflammation” test, called hs-CRP, is an optional test you can order or discuss with your health-care provider. Below I explain why this test is optional.

Optional Test: C-Reactive Protein (CRP or hs-CRP)

Optimal Range <1 mg/L

CRP is one of the proteins responsible for inflammatory processes, such as the cleanup of dead cells and bacteria. Thus, when you are sick with an infection, CRP levels appropriately go up quickly. Then, several days following infection, they should go back to very low, or below detectable, limits. It is when people carry around high baseline levels of CRP that heart disease risk goes up.

High CRP is associated with an increased risk of heart disease and stroke in those with baseline CRP levels above 2.4 mg/L compared to people who were below 1 mg/L.¹⁵

Compounds from fat cells regulate CRP production in the body; this may be why insulin resistance and weight gain tend to associate with high CRP. Thus, CRP does not raise the risk of developing diabetes; it's simply that the underlying insulin resistance triggers the elevated CRP.¹⁶ Baseline CRP >2 mg/L is just one more sign that you are on the road to insulin resistance and excessive fat storage. There are drugs and herbs that lower CRP, but if you lower CRP and do not correct your insulin resistance, you will have gained nothing.

Therefore, hs-CRP is really a “tagalong,” \$30 to \$35, lesser, ancillary test. An elevated CRP piggybacks insulin resistance. CRP is often done in other medical settings, so it is worth discussing here, but the other markers within The Blood Code Panels are superior at steering your self-discovery.

The Blood Code Test Panels are designed to be the most effective and cost-efficient way to evaluate your metabolic health and progress. Consider the Discovery and Progress Panel contents as the minimum to be done to provide useful insight; *extra* tests can be ordered at the discretion of you and your healthcare provider.

Evaluate Your Thyroid Panel Results

Again, this test panel is optional, and should be run only if you or your health-care provider suspects a current or past thyroid problem.

Your thyroid gland sits just below your Adam's apple and releases some of the hormones that manage your basal metabolic rate (BMR). This is the rate of cellular biological processes at your baseline, which means without any exercise or effort, or "at rest." The simple term used to describe an underactive thyroid gland is *hypothyroid*; this condition makes up over 80 percent of people "treating" a thyroid condition. If for some reason your thyroid gland produces excessive thyroid hormone, the condition is called *hyperthyroidism*. If you have a family history of thyroid problems, a direct family member who has or had hyper- or hypothyroidism, there is greater likelihood that this gland is affecting your metabolic recovery—you therefore should be appropriately evaluated. Hyperthyroidism is a medically complicated condition and needs to be evaluated with your health-care provider. Throughout *The Blood Code*, you will better understand and manage the symptoms of a slow/hypo/sluggish thyroid.

1. Thyroid-Stimulating Hormone (TSH)

Optimal Range 0.4–4.0 uIU/mL

S.I. units are equal numbers stated as mIU/mL

TSH is the hormone from the pituitary gland in the brain that tells your thyroid gland to produce more or less of the pre-hormone, T4, and active T3. The over-simplified mechanism goes like this: Elevated TSH occurs when the pituitary gland yells louder to get the thyroid gland to produce more hormone, like a parent speaking louder to an unresponsive child to get the desired response. Conversely, if TSH levels are normal or low,

the pituitary gland perceives plenty of thyroid activity in the body, and therefore has no need to use a loud voice. TSH is the most frequently used hormonal test in any conventional medical setting and is the common test to screen for thyroid function.

But TSH is controversial. Over the past twenty years, higher TSH has been linked to heart disease risk. People with slightly elevated TSH, *even within normal range*, appear to have more heart disease and higher weight than those in the lower range of normal. This has led to a dangerous trend toward overprescribing thyroid hormone to lower TSH. TSH elevation is *associated* with heart disease risk, but does not cause it. Researchers, within the past five years, have attributed the heart disease risk and weight problems of slightly high TSH to insulin resistance—not a thyroid condition at all.¹⁷ TSH levels vary up and down one unit as a result of short-term exercise, so subtle changes within normal range are expected.¹⁸ Furthermore, slightly high TSH, 3 to 6 uIU/mL, appears to be associated with longevity in those over the age of sixty-five.¹⁹ ²⁰ A rational evaluation of the thyroid panel, starting with TSH, follows here.

Your TSH ranges

<.02–0.4 uIU/mL: Talk to your health-care provider if your numbers are in this low range. This indicates an overactive thyroid, and occurs when your thyroid gland, or a part of your thyroid gland, starts producing too much thyroid hormone. It also occurs if you are taking too much prescription thyroid hormone.

0.4–4.0 uIU/mL: This is the "normal range." TSH fluctuates up or down 1.0 unit throughout the day; thus, the range is more important than to expect an exact number. The upper range of normal, 3 to 4 uIU/mL, can signify insulin resistance, and this number will come downward if you correct your metabolism with your prescribed dietary and fitness habits.²¹ Even short-term exercise can raise TSH levels, thus the need to avoid significant exercise in the hours prior to your blood draw.

4.0–6.0 uIU/mL: This elevated TSH *might* indicate mild hypothyroid, but could also be elevated due to the combined effect of insulin resistance. TSH levels can enter this borderline range in women near menopause. This is due to the combination of several effects. During menopause, the pituitary gland releases extra LH and FSH hormones, and as the adage goes, a rising tide lifts all ships—the TSH elevates as well. Furthermore, after menopause, women can tend toward greater insulin resistance and lower muscle tone, especially with inadequate fitness habits. Lastly, TSH in this slightly elevated range may truly indicate an early hypothyroid pattern, as your pituitary is yelling at your thyroid gland to produce a little more. This number may be more advantageous over the age of sixty-five, but at younger ages, this level of TSH is associated with minor symptoms. If you have mild insulin resistance (HOMA-IR > 2.0), your TSH may lower following the dietary and fitness steps that improve your insulin resistance numbers. Two other reasons to have a slightly high TSH include caloric restriction (<1800 cal) or vigorous exercise in the prior twelve hours from the blood draw.

>6.0 uIU/mL: Clinically, most practitioners agree that when you have a TSH above 6.0, you will experience enough hypothyroid symptoms to warrant a more-robust medical treatment. Your health-care practitioner should be well versed in the options for thyroid prescriptions and be willing to personalize a hormonal treatment for you.

2. Thyroxine, Free (Free T4)

Optimal Range: 0.9–1.7 ng/dL (11.6–21.9 pmol/L)

T4 is a pre-hormone; it has little metabolic activity in this form compared to T3. T4 represents the production capability of your thyroid gland as nearly all the T4 measured in the blood stream was made in and released from your thyroid. T4 is made from the protein tyrosine and four iodine molecules. Nutritionally, iodine is an essential nutrient in small doses; this and other thyroid-related nutrients will

be spelled out in more detail in Step Six. To activate the T4 molecule, one of the iodine molecules must be removed, thus making it the more active T3.

Your Free T4 ranges:

<0.9 ng/dL (<11.6 pmol/L): Assess your overall nutrition. Ensure adequate dietary protein because in the thyroid hormone, as the letter “T” signifies, is a protein called tyrosine. The number after the letter T stands for the number of attached iodine molecules so, as you would expect, you also need adequate nutritional iodine—at least 100 mcg of iodine daily. If the low FT4 is due to primary hypothyroid, you would expect to see an elevated TSH, as your pituitary gland works harder to stimulate your thyroid gland to make more T4. Early in the process of hypothyroid and low T4, your body compensates to convert more T4 to active T3, so Free T3 is often in the normal range despite low Free T4.

0.9–1.7 ng/dL (11.6–21.9 pmol/L): Normal range; your thyroid gland is adequately producing hormone in response to the TSH and feedback mechanisms.

>1.7 ng/dL (>21.9 pmol/L): This indicates excessive thyroid hormone because of an internal process or due to a medication dosage. Either way, discuss this with your health-care provider to properly evaluate for a hyperthyroid pattern, especially if you have a low TSH, a finding that confirms overactive, or hyperthyroid.

3. Triiodothyronine, Free (Free T3, FT3)

Optimal Range: 2.3–4.2 pg/mL (0.035–0.065 pmol/L)

Only a small amount of the circulating T3 was produced by your thyroid gland, and of that, only a small amount is in the unbound form, Free T3. Therefore, your Free T3 status is not regulated by your thyroid gland

production; it is the activity of “de-iodinase” enzymes inside your cells. This set of enzymes turns the T3 activation on and off on an hourly basis.

You may insufficiently convert T4 into T3, or it may be an excessive conversion of active T3 to a permanently inactive form called “reverse T3” (rT3). Conditions like stress and moderate to extreme exercise cause this phenomenon, where to conserve energy, your body will “deactivate” some of your thyroid hormone. This happens more in deconditioned individuals. Like TSH, improvements in your active T3 should be seen over time when you improve other parts of your metabolism through the coming steps in the Blood Code.

Your Free T3 Ranges

<2.3 pg/mL (<0.035 pmol/L): Low and borderline low T3 with a normal T4 indicates a diminished conversion in the cells of your body, not a problem with the thyroid gland. T3 activation goes down with insulin resistance; with strenuous exercise, especially in hot temperatures; with caloric restriction; with poor conditioning; with stress . . . this list could go on. Essentially, as you take the steps toward a more balanced dietary and fitness lifestyle, and improve your insulin sensitivity and fitness, your low T3 should improve over time.

2.3–4.2 pg/mL (0.035–0.065 pmol/L): This range indicates adequate T3 activation. Free T3 fluctuates throughout the day, so variations within this normal range are expected.

>4.2 pg/mL (>0.065 pmol/L): Like elevated FreeT4, discuss this with your health-care provider. Your body has evolved with a natural inclination to burn less and store more, so when the body is oddly burning more, the hyper state needs to be properly evaluated and understood.

This simple table shows the common interaction between TSH (uIU/mL), T4, and T3:

TSH	T4	T3	Interpretation
SI High (4–6)	Normal	Normal	Insulin resistance or early / mild hypothyroidism
High (>6)	Normal	Normal	Mild hypothyroidism
High (>6)	Low	Low/normal	Hypothyroidism
Low	Normal	Normal	Mild hyperthyroidism
Low	High/normal	High/normal	Hyperthyroidism

There are more-rare conditions with the pituitary and hypothalamic release of TSH and TRH; any significant abnormality should be discussed with your health-care provider.

4. Thyroid Antibodies: Thyroid Peroxidase Antibodies (Anti-TPO, TPO Ab)

Optimal Range <30 IU/mL

S.I. units are equal numbers stated as kIU/L

A thyroid antibody called anti-thyroid peroxidase, or anti-TPO, indicates whether you are a carrier for the hypothyroid trait. This immune antibody can sit in waiting for many decades and then, after some unforeseen trigger, it might “take out” a portion of your thyroid activity. This antibody is usually present in people with a strong family history of hypothyroidism.

30–100 IU/mL: This is a slight increase from the normal range. While elevated TPO antibodies does indicate you have a greater likelihood of developing hypothyroidism, they can uneventfully sit in waiting throughout your lifetime without ever causing a problem. A positive

TPO antibody means that you are more likely to need treatment, typically with a prescription hormone, if you head toward hypothyroid numbers with your TSH, even in the slightly high 4–6 uIU/mL range.

>100 IU/mL: At this high level of antibody, you are the most likely to develop hypothyroid problems if conditions are “just right.” The most common cause of primary hypothyroidism is a condition called Hashimoto’s thyroiditis. Big, intimidating name, I know, but it loses its threatening nature once you understand it more. The hallmark of the condition is the presence of antibodies that target the thyroid gland (the TPO antibody) and another called the thyroglobulin antibody. Many people have elevated antibodies but never develop a thyroid condition in their lives. Here lies the evolutionary theory: The TPO antibodies sit in waiting, and if “times get tough”—low caloric intake with a chronic stress response, or perhaps a threatening immune-system trigger—the antibodies will come to life and take out some of the function of the thyroid gland to help you preserve your capital.

Slight hypothyroid activity can result in body fat that is distributed around the arms and legs. So let’s hit Step Two for one more quick measurement: no blood draw, no lab—just you and your skin.

The Blood Code: Table of Units Conversion

Test Name	U.S. standard unit	Conversion Factor For U.S. to S.I. → multiply For S.I. to U.S. ← divide	Standard International (S.I.)
WBC	%	0.01	unit of 1
Hemoglobin (Hgb)	g/dL	10	g/L
Hematocrit (Hct)	%	0.01	unit of 1
BUN	mg/dL	0.357	mmol/L
Creatinine	mg/dL	88.4	umol/dL
Glucose	mg/dL	0.0556	mmol/L
Insulin	uIU/mL	6.0	pmol/L
HgbA1c	%	[%–2.15] * 10.9	mmol/mol
Triglyceride (TG)	mg/dL	0.011	mmol/L
HDL cholesterol	mg/dL	0.026	mmol/L
Total cholesterol	mg/dL	0.026	mmol/L
Ferritin	ng/mL	1	ug/L
Vitamin D	ng/mL	2.5	nmol/L
TSH	uIU/mL	1	mIU/L
Free T4	ng/dL	12.9	pmol/L
Free T3	pg/dL	0.015	pmol/L

Liver enzymes AST and ALT along with other components of the complete blood count (CBC) such as MCV, MCH and platelets are identical between systems.

HGB A1C Conversion Chart

U.S. Standard: %	S.I.: mmol/mol
4.5	26
5.0	31
5.5	36
5.7	39
5.9	41
6.1	43
6.3	45
6.5	47
7.0	53
7.5	58
8.0	64

Summarize your Blood Code results here for easy reference:

Test Date:						
Triglyceride, mg/dL						
HDL, mg/dL						
* TG:HDL ratio						
Glucose, mg/dL						
Insulin, uIU/mL						
* HOMA-IR (GxI÷405)						
HgbA1C, %						
ALT enzyme						
Vitamin D						
Ferritin						
TSH						
Free T4						
Free T3						
Other Tests:						

***For these calculations, use U.S. standard units**

Step Two: Measure Yourself with Skin-Fold Calipers

The measure of who we are is what we do with what we have.

—Vince Lombardi, NFL football coach

This is an optional but instrumental step that reveals the effect of your metabolism. It's right there; you're wearing it.

You must be saying to yourself by now, "All this talk about blood tests!" Fortunately, the information that will guide you is not all hidden inside your body; some of it is expressed *on* your body, and it is waiting to be measured. You will need to get past any reservations you have about grabbing your skin and measuring the fat that lies underneath. It is no more than pinching with one hand and measuring with an easy-to-read skin-fold caliper in the other hand. The back measurement requires a buddy, but buddies come in handy for motivation too. I have taken skin-fold measurements tens of thousands of times throughout my practice, and research proves that practice makes more perfect.

If you are new to taking skin-fold measurements, you will have a little more variability in your results, but since you will be consistently measuring yourself or someone around you, you will become more consistent over time with your newfound skill. There is great value in having an at-home test that accurately measures your progress as you make dietary and fitness changes.

In my experience, I do see some patterns that are worth describing.

- Ninety-five percent of women think they are carrying all their fat at their stomachs. This may be because when you look down, you hunch forward, thereby creating abdominal rolls. Maybe it is more cultural. Whatever the reason, the fat storage is only higher in a woman's hips/abdomen about 20 percent of the time. Excess fat on the body is usually on the back, where muscles are rarely engaged, or it's on the arms, perhaps due to a sluggish thyroid pattern or lack of strength and resistance exercise. The punch line: When a good answer is a simple measurement away, why guess?
- Most teenage and young men carry excess body fat on their backs. Again, I think this is the result of a hunched posture, and can be best corrected with a well-designed, good-form fitness routine that strengthens "the backside" of the core.
- When men hit their forties, they are most likely to store the extra body fat at their hips and back. I believe that the generalized lack of fitness in a man's lifestyle is the major player here, and male hormones are a mixed blessing. Testosterone, like insulin, signals the body to make more tissue, especially on the torso. Compared to women, the male hormone balance allows men to develop significantly more muscles on their chest and back with bodybuilding. But the hormones promote the growth of tissue, not necessarily muscle, so in the absence of adequate fitness habits, the growth of tissue will be body fat. By a man's mid-forties, they are often more sedentary in their workplace, and at the same time, a couple days of exercise per week is inadequate. The calipers don't lie. The gain in body fat measured at the hip compared to the triceps measurement is a beacon of heart disease risk.

Policy and research continues to fixate on the simplistic notion that weight gain causes illness, and weight loss reduces illness. The

inconvenient truth is that weight loss does not result in less disease and a healthier life. *Fat loss does. An active lifestyle does. Promoting more insulin sensitivity does.* But weight loss as an end point does not effectively predict health and longevity. Skin-fold calipers are an inexpensive, reliable and accurate tool to measure the *amount* of body fat and mark *where* your body is storing it.

If you set a goal of weight loss, you must use calipers.

While studies have clearly found that weight loss does not add meaningful years to your life, it is a \$60 billion industry in America, so I expect "weight loss" supplements and programs will continue to be marketed with abandon. People who experience weight loss with fad diets, stimulants, or during life stress, lose a significant amount of muscle and connective tissue. To add insult to injury here, when the weight is re-gained, even more fat and less muscle is put on than before the weight loss. So again, a weight scale is terribly misleading: A pound of fat is weighed equally with the stuff you don't want to lose, like muscle, connective tissue, and bone density. Calipers will show you what counts, and will help you to track your progress toward fat loss.

How to Measure

The Most Common Questions about Skin-Fold Calipers



What are skin-fold calipers, and where do I get them?

Skin-fold calipers are simple devices that measure the thickness of a fold of skin and the attached tissue and fats underneath. In my practice I have often taught people how to use them. I have a \$250 professional one, but prefer to use the \$20 one; it's accurate and easier to read. It is available at TheBloodCode.com. Other skin-fold calipers, as long as you practice with them, will work.

Are skin-fold calipers and the resultant body fat measurement like the body mass index (BMI)?

Skin-fold calipers are a far more accurate method to assess your health status than BMI. BMI is a simple calculation of total weight compared to your height.

BMI relies on the imperfect scale which measures one thing: gravitational force upon your body on the surface of the Earth. A scale does not discern the kind of tissue creating the pressure. Fat, muscle, bone, and brain: You might want to keep some and not others. The scale will not help you to do that.

Conditioned strength athletes are considered obese on a BMI chart due to their bone and muscle density. People with low muscle mass and osteoporosis are rewarded as “lean” on the same chart. I have seen weight lifters denied

their “preferred status” at a workplace wellness program due to a slightly elevated BMI despite low to normal body fat percentage. Jane Brody in the *New York Times* summarized a 2010 study on BMI accuracy, stating that BMI misclassified people 41 percent of the time. Sadly, despite being inaccurate and outdated, BMI remains a centerpiece of public health initiatives.

What about the electronic measurement of body fat?

Bioelectric impedance analyzers (BIA) are consumer-priced devices that either stand alone or are integrated into the mechanics of common bathroom scales. These devices measure skin resistance, and have substantial variability depending upon hydration, gender, race, etc. In addition to being inaccurate, these methods also do not compare and contrast different locations on your body. You will learn in this chapter that if you successfully lower your insulin, the body fat at your waist will go down. However, the body fat found on the back of your upper arm relates to your fitness habits, not diet. Electronic devices do not show you *where* the fat is.

There are laboratory-grade BIA devices used in some clinics that use four points of contact to create a more-complete measurement of electrical impedance. These high-cost devices can give you some level of accuracy provided the person is at the same hydration status from one test to the next. Unless you have several thousand dollars to spend on the high-grade devices, forget the bathroom-scale versions. Comparative studies have shown that simple skin-fold calipers in the hands of a practiced individual are as accurate as the most expensive BIA devices.¹

How do I use my skin-fold calipers?

Video instruction and case reports can be found at TheBloodCode.com.

A skin-fold caliper is a device that measures the thickness of a fold of skin in millimeters (mm), with its underlying layer of fat. Research has shown that the thickness of this fold, at certain key locations on your body, is representative of the total amount of fat on your body. Pinch

with the fingers as much of the skin fold as “tissue traction” allows; firmly hold the pinch with your finger and thumb, and place the calipers next to your pinched fingers. Some people do carry a little more edema under their skin. A firm pinch, which might be tender, will push the fluid away from the point where the calipers measure. The caliper points should contact the skin right next to where your fingers are pinching firmly. To address variations in measurements, you might want to pinch three times in a row and take the lower of the three. The caliper will point to the millimeter thickness of your skin fold.



Where to Measure Body Fat

Men and women get an accurate body fat measurement by measuring four total points. Points should always be done on the same side of the body (I always use the right side). You will find that one layer of thin clothing does not substantially alter your measurement, but try to be directly on the skin when learning; it's easier. The four points are:

- 1) **Triceps**—midway down the back of your upper arm
- 2) **Biceps**—midway down the front of your upper arm
- 3) **Back**—under your shoulder blade, at a 35- to 45-degree downward angle
- 4) **Hip**—slightly forward of the top of the “hip bone,” or iliac crest



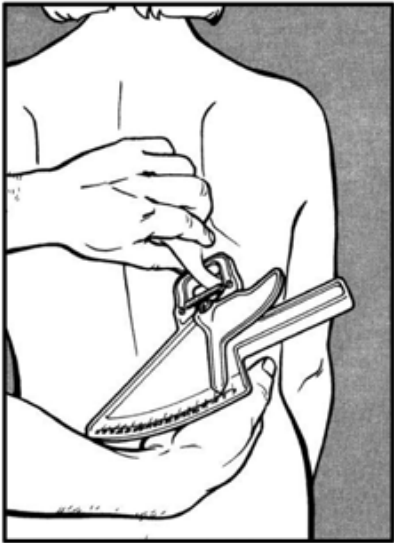
#1 Triceps location is halfway between the shoulder and elbow joints. The fold is taken in a vertical direction on the midline of the back of the upper arm.

FIGURE #1



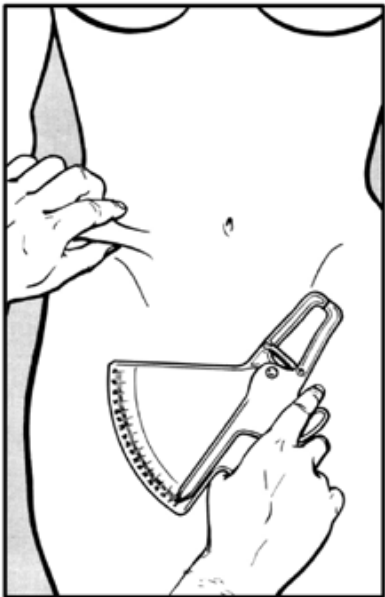
#2 Biceps measurement is taken the same way as the triceps, except it is on the midline of the front of the upper arm, midway between the elbow and the top of the shoulder.

FIGURE #2



#3 Subscapular on the back: This is located just below the shoulder blade, taken at a 30- to 45-degree angle. There is an obvious band of fat here, but it might take a slight lean backward to get a good pinch. It's like a love handle under the shoulder blade.

FIGURE #3



#4 Front of the hip: The measuring point on the side of the waist is taken a little toward the front, about 30 degrees from the side; this is called the "mid-axillary line." If you were to draw a line from the front crease of the armpit down to the waist, you would be at a right angle forward. It is on top of the iliac crest (hip bone), and should be approximately horizontal.

FIGURE #4

How to Interpret

Understanding Your Skin-Fold Measurements

Now that you have your skin-fold measurements for different parts of your body, you can identify your metabolic strengths and weaknesses, and unlock how to create dietary and fitness habits that will provide you with healthy progress. Each measurement is in millimeters. Together you can add them and look at the conversion chart on page [TK] to get your total percentage of body fat. But before you add the skin-fold measurements to get a total, *compare the locations*. This comparison will indicate whether you need to put greater effort into your diet or your exercise habits to achieve the results you want.

Your healthy, well-conditioned goal
Hip = Triceps = Back

In millimeters, your body should have about the same amount of fat under the skin at the triceps, back, and hip area.

This means that your body is not carrying excessive fat in one location. *Having an evenly distributed amount of body fat in these areas is a mark of a balanced metabolism.* When these measurements are not near equal, the fun begins. If you found you have high insulin, you probably have a higher skin-fold reading at your hip. Long-distance runners will typically have lower body fat at the hip due to the recurrent depletion of abdominal tissue fats from extended aerobic workouts. Postmenopausal women that avoid upper body exercise will have their highest number at their triceps.

Time to grab the calipers, take your measurements, and have some fun.

Your hip measurement reflects your dietary trends. If body fat goes up in the hip, a shape sweetly referred to as the apple, it is usually due to excess dietary carbohydrates in your diet; conversely, if body fat on the hip drops, this is due to a reduction in stored carbohydrates. Insulin resistance and high insulin create a disproportionate increase in body fat at the hip.

Body fat goes *through* your body; it isn't just under your skin. The body fat measured under the skin with the skin-fold calipers is reflective of the fat that is stored deeper within your body in that region. Body fat on the arms and legs indicates poor fitness status; while it may be unattractive to you, it doesn't, on its own, indicate high heart disease risk, whereas body fat at the hip and torso reflects fat that has also deposited around your liver and heart area. Heart disease risk is strongly associated with excessive fat on the torso/hip region.

If the hip:triceps ratio is 2:1, in women, I strongly suspect type 2 diabetes, or at least severe insulin resistance. The Blood Code Discovery and Progress Panels can confirm this clinical suspicion. The same type 2 diabetes suspicion arises when the hip:triceps ratio is 3:1 in men.

If your caliper measurement is higher at the hip, this is the location of body fat that rightly gets the bad rap, indicating an increased risk of heart attack, stroke, dementia, some cancers—and the list goes on. If this is your trouble spot, Step Four of The Blood Code will help you to set carbohydrate limits that will reverse this trend.

Your triceps reflect the tone of your extremities. Your legs mirror the same pattern as your arms, so do not need to be tested separately. If your triceps is the highest number, it may be because you are “out of

shape,” but people with hypothyroid can show the same imbalance. The fruit analogy describes this state as a pear. Fitness habits need to change to address this imbalance. Results are usually quick; if your body has already shown the ability to make fat, it has the hormonal ingredients to make muscle. Good fitness habits need to be put in place to effect this change.

Your back shows a combination of dietary carb balance and conditioning. In my clinical experience, your back is the most difficult body fat to reduce, due to the ubiquitous slumped posture and weak “core” that coincides with auto driving, computer keyboards, and small screens. Combine this sedentary, collapsed posture with excess dietary carbohydrates and you have a recipe for a fatty backside. In agriculture, to get a higher fat content on the back straps of livestock, you limit the animal's movement and feed it a high-carb diet with grains. This is an unhealthy environment for both livestock and humans.

Since I, for one, am not going to get rid of my technological advances, my fitness life is of primal importance. Prior to doing any exercise, make sure that you have been properly instructed to keep your core body posture upright and your shoulder blades engaged, back and down. More instruction is available at TheBloodCode.com, where we continually post instructional videos, and will have a referral list for trainers familiar with The Blood Code fitness principles.

Your bicep reflects conditioned muscle tone in the extremities. With a normal hormonal balance and muscle tone, the biceps should measure about half of the triceps. With leaner athletes, it will be even less than half the triceps. If the biceps are carrying higher proportional body fat, specific resistance and dynamic exercise of the extremities is needed.

Summary of your four possible findings:

- If skin-fold calipers measure equally in triceps, back, and hip, your diet and fitness habits are of equal importance.
- If your hip number is higher than your triceps, you are insulin-resistant, and you probably have high insulin. Carbohydrate limits will be especially important for you.
- If your triceps number is higher than your hip, your arms need more exercise and strength; if this imbalance remains persistent, your thyroid needs to be evaluated.
- If your back is highest, you are in the hunchback world of driving, texting, and typing. You need to move toward core fitness *and* lower carbs.

Take the Leap

If you discover that your body fat total is above normal, your excessive body fat is actually setting your metabolism to be *more* insulin-resistant. Here's the heartbreaker: *The more fat you have, the more fat your body will produce if nothing changes.* I know it may seem unfair, but it is the unvarnished truth. Fat begets more fat. To reverse this process, quickly and effectively, *a leap is better than baby steps.*

Why *not* baby steps? I know that other experts recommend making small, “bite-sized” changes, because, I'm afraid to say, they don't believe you can meaningfully change your habits. But I have seen thousands of similar people make the changes that free up their health and reverse disease, so I know you can do it. When you see and feel rapid improvement within a short period of time, you will more confidently stick with your new habits, and over time, there is justice. It becomes easier.

That's the good news: As your body becomes leaner over a greater surface area, insulin resistance reduces and the process reverses. A leaner, more-insulin-responsive body begets easier weight management, because the metabolic activity that promotes weight gain is no longer activated. Maintenance becomes the “easy” part of living up to your Blood Code. The steps in *The Blood Code* will help you take the leap, but it's important to realize from the outset that the dietary and fitness habits in your lifestyle are not an either-or decision; both need to be addressed in your daily life.

The location of the fat loss should steer your progress and help you decide whether to emphasize diet or exercise; measure every two to four weeks.

If your skin-fold caliper measurement gets smaller in your hip, it is due to an improvement in your diet. You are storing less abdominal body fat, probably due to your Blood Code Diet.

If your skin-fold caliper measurement gets smaller in the triceps, it is because of conditioning and better exercise. You are in better shape.

If your skin-fold calipers show proportional loss in all locations, you are doing a good job improving both your diet and exercise habits.

Chart your Body Fat Numbers

You can add the four numbers together and use a conversion chart to get to your *total body fat percentage*. In the world of fitness and body fat assessment, a great deal of energy is spent on studies that compare

the accuracy of a particular technique. The gold standard requires full body submersion into a tank that measures water displacement. Impractical, right? Calipers with well-established conversion charts are a pretty close second for accuracy, and obviously more practical. The Blood Code conversion chart is based upon the Durnin and Womersly data. Rather than having five different charts for different age groups, The Blood Code has only two charts: one for men and one for women, based upon a thirty- to fifty-year-old. If you are active and in your teens, your body fat percentage will be 1 to 2 percentage points lower than listed. If you are over sixty, your true body fat percentage might be 1 to 2 percentage points higher than listed on the conversion table. Data that tracks this trend have shown that people with the most active fitness lifestyles have total body fat percentages that reflect a much younger person; therefore, the thirty- to fifty-year-old conversion chart *is* accurate if you remain fit into your seventies and beyond.

The Blood Code Charts

Your skin-fold measurements are read off the caliper, in mm.

DATE →						
TRICEPS						
BICEPS						
BACK						
HIP						
Total mm						
Body fat %						

Don't get caught up on the total body fat percentage and apply the same angst that the scale has caused you over the years. Once again, the balance and distribution of body fat location is of greater importance.

The Blood Code Body Fat Evaluation Table					
For Women			For Men		
TOTAL MM		BODY FAT %	TOTAL MM		BODY FAT %
14–15	Too Low	12	12–13	Too Low	7
16–17		14	14–15		8
18–19		15	16–17		9
20–21	Below Normal	17	20–21	Below Normal	11
22–23		18	22–23		12
24–25		19	24–25		13
26–27	Normal	20	26–27	Normal	14
28–29		21	27–28		15
30–34		22	29–31		16
35–39		23	32–35		17
40–44		25	36–38		18
45–49		26	39–42		19
50–54		28	43–45		20
55–59		29	46–49		21
60–64		30	50–54		22
65–69		31	55–59	Too High	23
70–74	Too High	32	60–65		24
75–79		33	66–73		25
80–84	Obese	34	74–79	Obese	26
85–89		35	80–85		27
90–94		36	86–91		28
95–99		37	92–98		29
100–109		38	99–105		30
110–119		39	106–115		31
120–129		40	116–125		32
130–139		41	126–135		33
140–150		42	136–145		34
151–160		43	146–156		35

Body Fat Categories and Their Meaning

Too low: Some athletes perform at this level, but they should not remain here for long. Using boxing jargon, this is called “fighting weight”—not the body fat at which you should live or train, but where you might temporarily end up on fight/race day. This category is not healthy, nor is it associated with longevity. With such low body fat, any workout that lasts longer than one hour will cause muscle breakdown, or worse. There are few to no reserves; if you experience any additional stress, you have little ability to withstand it. For example, lack of sleep, an emotionally or physically stressful event, an injury, or an underlying medical condition—any of these will result in “breakdown” very quickly due to the lack of caloric reserves and fat-soluble nutrient storage. Therefore, this category should only be an end result of extreme athletic fitness training, not a general health goal. If you are at this level of body fat, daily nutrition is critical to prevent the breakdown of your ever-important proteins. Nutrient-dense proteins and fats need to be present at all meals, and if you also have low insulin, carbohydrates should not be overly restricted. Athletes in this lean state need to ensure adequate protein intake within one hour following any workout.

Below normal: As the name implies, this category marks someone who is running a lean ship. Like a lean-running operation, though, if inflow and outflow are not properly managed, the system can break down relatively quickly. For example, if a manufacturing business runs lean, it means they have very little inventory in storage. This may be efficient, but if one part of the process is interrupted—say, a bolt (or a meal) fails to arrive on time—the whole production is compromised, because there is not sufficient inventory available to maintain good performance. To really enjoy this efficient metabolism, you will need to ensure that you maintain an optimal and balanced nutritional intake, regular meals, good sleep habits, and proper exercise. This category is what I term *conditionally normal*, and should not necessarily be a goal for you. If you are in this range, further weight loss is not your goal. Your triceps and hip measurements should be balanced.

Normal: You will see that this category has the largest range in the body fat conversion charts. Fad weight-loss programs frequently try to sell people on the “lower-is-better” theory. This is, in fact, untrue. Suffice to say that normal range, is, well . . . normal. Within this range, there is no increased risk of illness if you are in one half versus another. If your goal is to be in better shape, or you need to improve some insulin-resistance numbers from your Blood Code Panel, the changes you make in your fitness habits and diet will likely result in a lower total body fat percentage, even if you started in the normal range. But remember: Your intention should not be a trite, “lower-is-better” attitude. Family genetics play a role in your body composition; you may be at your genetic optimum at the lower half of normal, while others will reach their goal at the upper half of normal. Balance between the skin-fold locations, optimal blood test results, and great fitness are all attainable within this category. Most people will live at their healthiest within this range.

Above normal: This category shows that you have plenty of reserves. To use the manufacturing analogy, your body is cluttered with parts, and excess inventory is lying around in boxes. This burdensome inventory is part of an inefficient system, and corporations are taxed on this excess at year end. In your body, the inventory is the excess fat deposits, and your taxes are a future illness or injury. Above normal may not be much actual weight on a scale, but chronic disease risks start to show up here: elevated blood pressure, high triglyceride:HDL ratio, and elevated fasting blood sugar are all markers of increased heart disease, cancer, and dementia risk. Above normal is your time to act before the trend continues. The steps that follow will help you to better utilize the pantry of calories that you are wearing on your body.

Obese: This is the category that is conclusively linked to compromised health and long-term illness. Across the board, people don’t feel good in this category, whether it’s physically or emotionally. The reality of this category shows little pity. As body fat percentage increases, greater insulin resistance occurs and lower basal metabolic rates are measured, resulting in a continual progression. Everyone in this category will need to exercise to compensate for the slow resting metabolic rate that results from higher

body fat stores. As a rule, once in the obese category, you have to be more active than someone with lower body fat in order to burn the same amount of energy. In addition, body fat is more insulin-resistant than muscle, so once you're in this category, carbohydrates cause even more fat storage and blood sugar problems than when you become leaner. Strong emphasis on the Blood Code Diet with carbohydrate restriction is imperative to change this insulin-resistant trend. A leap is a good start; make some big changes in your daily habits. The following steps offer you the ability to apply self-directed changes that will move you in the right direction.

Skin-fold calipers measure the end result of your daily metabolism—the calories that you wear on your body in the form of tissue fat. It is time to put this together with your Blood Code Panel results and find the right steps for you to unlock your personal Blood Code.

Review the Basics:

The absolute number measured by calipers, in millimeters, should be similar between the triceps, back, and hip.

Triceps = Back = Hip

If triceps measure higher than the hip, it implies a relative lack of muscle tone or slower metabolism. In this case, it's important to perform a thorough thyroid panel and address your fitness habits to provide strenuous exercise (see Step Four).

If your back measures higher than hip or triceps, it implies poor core muscle tone or excess carbohydrates in your diet. It is imperative to exercise in a posture that engages your back and core, and your carbohydrate intake likely needs to be reduced.

If your hip measures higher than your back or triceps, correct your carbohydrate intake, first and foremost. Not only do you have some insulin resistance, but you are also producing a lot of extra insulin. You will likely respond quickest to dietary carbohydrate control.

Step Three: Putting It All Together—IR, High Insulin, Hypothyroid

“Are these the shadows of things that will be, or are they the shadows of things that may be only?”

[Scrooge insists urgently] “These events can be changed. A life can be made right.”

—Charles Dickens, *A Christmas Carol* (Scrooge's monologue with the Ghost of Christmas Future)

You have been introduced to the measurements that plot your current metabolism. Before I describe the steps that will unlock your personalized diet, nutrition, and fitness program, I'd like to help you see how your blood test results and skin-fold measurements fit together, and how your lifestyle habits are likely to impact your success. A metaphor might be useful to help understand your metabolic strength and efficiency: Enter the automobile.

Car Models and Your Metabolic Code

I will say it again: Insulin resistance and mild hypothyroid are not, by nature, bad, and should not be considered diseases. In fact, these traits have certain strengths; for example, a large, heavy vehicle with a huge gas tank is perfect for the job of hauling heavy material long distances. It just doesn't make a good driving-around-town car. Let's use this metaphor to describe the different metabolic efficiencies and inefficiencies that describe your metabolism.

Two Types of Insulin Resistance

Insulin resistance comes in two different models: *high insulin* and *normal insulin*. In the real world, there are variations that mix elements of the two models, but the two archetypes provide a helpful comparison of the two expressions of insulin resistance.

High insulin (sport utility oversize XL): This car has an extra big gas tank, and it is full to the rim. There are also jugs of extra fuel in the trunk, a couple on the backseat, and maybe even one more in the front passenger seat. Now that I describe it, this car sounds downright dangerous, but perfect for a hauling a heavy load a long, long distance without having to stop for refueling.

The large gas tank is your oversize liver, and the fuel canisters represent the excessive glycogen and fat on and in your body. Triglycerides are usually high (TG>150) in your bloodstream, and your skin-fold calipers measure higher on your hip than on your triceps. All this extra fat is like having extra fuel tanks in the passenger seat. This is great if you need to go a couple thousand miles before the next fueling station, but realistically, your body's next fuel stop probably comes within hours, not weeks.

Normal (or low) insulin (fuel-efficient sedan with always-full tank): In this car, there is a normal-size gas tank, but it goes a remarkably long way before running out of fuel. The effect of insulin resistance is seen when driven. This car has a magical ability to use almost no fuel if driven efficiently. Driven without much stress to the engine, this car will always have enough fuel to start, and to get you around town without frequent stops for fuel. But if you reflexively fill the tank with gasoline every hundred miles, you will create a dangerous overflow of gasoline.

The glucose and carbohydrates in your diet are the fuel in the gas tank. Over the course of a day, the low-insulin model will have blood sugars above normal, unless there is some strenuous exertion. Eating extra carbs when the sugar is already high is like topping off the tank to the point where the gas overflows and runs down the side of the car,

and into the trunk. Dangerous, right? But instead of fuel spilling on the ground, the extra blood sugar problematically overflows into your bloodstream, body tissues, and brain. Unlike the big, high-insulin model vehicle, this normal-insulin, superefficient car model includes the 40 percent of people who develop type 2 diabetes that are *not* overweight.¹ A recent study in China galvanized this little truth. When 99,000 Chinese adults were tested, over half were prediabetic, and the vast majority of those with insulin resistance were of normal weight.²

Once the tank of glucose in your bloodstream is filled, you can prevent the overflow by reducing the carb intake. But what about the glucose that is already there? You can address this by exercising *inefficiently*, moving yourself as you would while driving in the city: lots of stop-and-go acceleration. This is called *interval training*, and the Fitness Principles in Step Five will spell out how to best incorporate this in your own life, according to your unique metabolism (see [TK]).

Allow me to extend the auto analogy to a mildly hypothyroid metabolism.

Hypothyroid and Your Car's Idle Speed

Years ago, I brought my old Volvo to an auto shop where the mechanic worked on a disproportionate number of high-mileage cars. I noticed that he adjusted the idle speed to a steady 800 rpm rather than the customary 1,000 rpm. (A note of apology to any auto mechanics who are reading this oversimplified analogy; I'm sure there's a great deal more to how a car is tuned and adjusted!)

This minor downward adjustment allows the car to work less while idling. Once the gas pedal is engaged, the acceleration of the engine is the same as it would be for a car with a higher idle speed. The lower and more-efficient idle speed, theoretically, helped allow my car to live a longer life (it's still running, in fact). Blood tests that show a TSH level >3 but <6 uIU/mL are associated with longevity. This mildly elevated TSH is loosely termed *mild hypothyroid*.

If you have been told that you have "mild hypothyroid" (TSH between 2.5 and 6), or if you medically treat hypothyroidism with hormone

medications, you need to actively get your body above idle speed. If you live your life at or near your slow idle speed, you will feel sluggish and will be out of shape; your triceps measurement on skin-fold calipers will be higher than your hip. You need to rev up your engine speed before functioning in your day.

If you tend toward a mild hypothyroid state, your day will go better with morning exercise to warm up your metabolism, and some strenuous fitness to get the muscles toned in your arms and legs. Idle speed is only when your body is at complete rest. Just like the low-idle car, once you are physically active, the gas pedal of fitness metabolically heats up your body, making your initial idle speed moot.

Nondiabetic conditions when you have, and are ignoring, insulin resistance:

Abdominal fat gain
Essential hypertension
Lipid abnormalities
Polycystic ovary syndrome
Nonalcoholic fatty liver disease

Clinical conditions that can be the first signs of insulin resistance:

Psoriasis
Gout
Restless leg syndrome / muscle cramps
Erectile dysfunction
Depression
Sleep apnea
Androgenic alopecia (baldness)
Dementia
Swollen joints that are not improved with typical treatment

Too much of a good thing can be too much, of course, so if your idle speed is too low (TSH >5–6 mIU/mL), your car will sputter and stall while at idle, especially in cold weather. This level of hypothyroidism should be medically corrected for most people. Again, even with a hormonal prescription, you need to drive your body with a bit more on the gas pedal of exercise, especially in the morning.

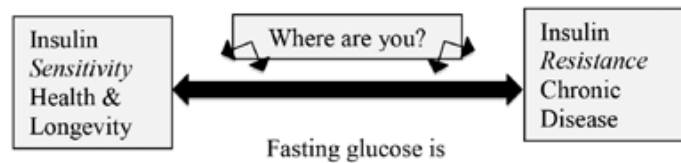
Your blood tests and skin-fold measurements provide a viewing window into the metabolic events that occur in your body. This is what you will see:

- Whether or not you currently express insulin resistance
- Whether you have high insulin
- Whether you tend toward mild hypothyroid, or high TSH

This discussion would be useless if there was no way to turn it around and move toward your metabolic recovery and insulin sensitivity. By the end of this chapter you will be able to gauge how insulin-resistant you are, and whether a slower thyroid is interfering with your metabolism. You will then be able to self-direct your dietary/carbohydrate, nutritional, and fitness habits that are specific for your body.

As presented in Step One, the test result ranges below will first list the U.S. standard unit followed by the S.I. international unit in parentheses. The conversion chart is found on page (TK).

Are You Insulin Resistant?



You show no insulin resistance if your Blood Code reveals:

- Fasting glucose is between 75–95 mg/dL (4.2–5.3 mmol/L).
- TG:HDL ratio is near 1.0, +/- 0.5.
- Fasting insulin is between 3–8 uIU/mL (18–48 pmol/L).
- HgbA1C level is less than 5.6% (<37 mmol/mol).
- Glucose/insulin as HOMA-IR is near 1 (.5–1.5).
- Your total body fat is <28% for men and <32% for women.

You show slight insulin resistance if you have two or more of the following:

- Fasting glucose is greater than 95 mg/dL (5.3 mmol/L).
- TG:HDL ratio is greater than 2.
- Fasting insulin is greater than 8 uIU/mL (>48 pmol/L).
- HgbA1C level is greater than 5.5% (>36 mmol/mol).
- HOMA-IR is greater than 1.5.
- The skin fold at your hip is greater than that at your triceps (by at least 5 mm).

You show moderate insulin resistance if you have three or more of the following:

- Fasting glucose is greater than 100 mg/dL (>5.6 mmol/L).
- TG:HDL ratio is 3 or greater.
- Fasting insulin is greater than 10 uIU/mL (>60 pmol/L).

- HgbA1C level is greater than 5.7% (>39 mmol/mol).
- HOMA-IR is greater than 2.5.
- The skin fold at your hip measures near twice that at your triceps.

You show severe insulin resistance if you have three or more of the following:

- Fasting glucose is greater than 110 mg/dL (>6.1 mmol/L). Greater than 125 mg/dL (>7.0 mmol/L) is diabetes.*
- TG:HDL ratio is greater than 4.
- Fasting insulin is greater than 12 uIU/mL (>72 pmol/L).
- HgbA1C level is greater than 6.0% (>42 mmol/mol). Greater than 6.4% (>46 mmol/mol) is diagnostic of diabetes.*
- HOMA-IR is greater than 3.
- The skin fold at your hip measures over twice that at your triceps.

** If you have a diagnosis of type 2 diabetes, it also means that you currently express severe insulin resistance.*

Insulin Resistance: What It Really Means for You

Over 40 percent of Americans are currently insulin-resistant, and the majority will develop type 2 diabetes in their lifetime given the current trends in diet and lifestyle. Insulin resistance is a practical human characteristic rather than a disease. Even natural medicine and functional medicine advocates wrongly blame insulin resistance for hypertension, elevated lipids, fatty liver, weight gain, and diabetes.

Genetics research confirms that insulin resistance is an advantage.

Your body is designed to survive periods with few calories and great physical effort. As of early 2013, at least 15 of your 23 genes are known to carry traits related to insulin resistance, and over 30 gene locations have been confirmed to raise susceptibility to insulin resistance and higher blood sugars. *This is no mistake!*

If you like this kind of genetic analysis, the human genome and associated illnesses are cataloged with Johns Hopkins University (<http://www.omim.org/entry/125853?search=t2dm&highlight=t2dm>).

Insulin resistance is the metabolic force behind the term *metabolic syndrome*. Metabolic syndrome is the gray area of symptoms that lie between normal blood sugar and type 2 diabetes. Nicknames include syndrome X, prediabetes, and Reaven's syndrome. If you have insulin resistance *without high insulin*, you won't have the tendency to get very fat, but you will see a consistent rise in blood sugars over time.

In truth, insulin resistance is your perfect expression of an efficient calorie economy; inappropriate lifestyle habits are the "disease," not you. Your life habits need to be in accordance with your genetic expression.

I appreciate how difficult it is to see a positive aspect of the traits behind type 2 diabetes, a condition that is clouded by the one-sided headlines that negatively fixate on the end-stage disease in overmedicated or uncontrolled type 2 diabetics. If I hadn't seen thousands of people

effectively turn their insulin resistance around—reversing weight problems, high blood pressure, lipid abnormalities, low energy, *and* type 2 diabetes—I, too, might lack the confidence and positive attitude that I maintain toward insulin resistance.

Insulin resistance is an efficiency, and is beautifully adapted to a world of outer inefficiency and effort. If you discover that you express this trait, you need to eat and exercise like the world is still a physically demanding place: no eating between meals, limited carbohydrate intake, and strenuous fitness activity.

Insulin resistance (IR) is simply when your body leaves extra glucose in the bloodstream at baseline and after meals. Hormonal, neurochemical, and anatomical processes drive IR; therefore, if you want to resolve it, you have to come at it from several different directions. I will say again: This condition does not lend itself to reductionist, pills-for-your-problems medical care. Diet, exercise, and nutrition must all be at the center of your program.

Insulin Resistance and the Action Steps Ahead of You

Step Four is dedicated to the dietary changes ahead of you; here's your chance to see what is coming. You have discovered your level of insulin resistance; now, find your carbohydrate tolerance. Let's call this your *carbohydrate code*.

Unlock your carbohydrate code per meal:

Without insulin resistance:

Breakfast: 30–40 grams

Lunch: 50–80 grams

Dinner: 50–80 grams

*TOTAL: 130–200 grams (about 550–800 calories)

Slight insulin resistance:

Breakfast: 15–25 grams

Lunch: 40–65 grams

Dinner: 40–65 grams

*TOTAL: 100–150 grams (about 400–600 calories)

Moderate insulin resistance:

Breakfast: 10–20 grams

Lunch: 20–40 grams

Dinner: 20–40 grams

*TOTAL: 50–90 grams (about 200–400 calories)

Severe insulin resistance:

Breakfast: 5–10 grams

Lunch: 10–15 grams

Dinner: 10–15 grams

*TOTAL: 25–40 grams (about 100–200 calories)

* *These gram ranges are based upon a diet of about 2,000 to 2,800 calories—a dietary intake that is an ideal average for most of us. If you are an athlete and exercise more than 60 to 90 minutes daily, your carbs, fat, and proteins all need to be appropriately adjusted upward.*

Step Five describes how to exercise so that you can tap into the storage tank of fats and sugars in your body. With insulin resistance, you do not just have high sugars in your bloodstream; you also have extra stored sugars in your liver, tissues, and muscles. If left to sit there, this extra sugar promotes inflammation and disease, so you need to actively clear it out. The encouraging word I can give you is that *any* exercise lowers your blood sugar; however, once your body has begun to express IR, gentle aerobic exercise will not help you turn this condition around.

Without insulin resistance: Incorporate the Four Fitness Principles at least two to three days per week. On the other days, any aerobic activity will do. Total: no less than 30 minutes.

Slight insulin resistance: Fitness Principle #2 becomes important at this stage; strenuous exercise sort of “wrings out” the muscles to utilize the stored sugar and glycogen that efficiently stores in your muscles. This should be at least every other day. On the other three days per week, general aerobic exercise is adequate, but should be a little more like the “interval training” that will be described later (see page [TK]).

Moderate and severe insulin resistance: Five to seven days per week, you need some strenuous exercise, even if it is for only 5 to 10 minutes; do something a few times daily. You need to use your body as if the world is the physically demanding place for which you are acclimated.

Step Six describes how nutrients such as vitamin D, when deficient, make insulin resistance worse. Furthermore, when you are insulin-resistant, you become more deficient in certain nutrients, such as magnesium. If you have insulin resistance, you are likely to have several

nutrient deficiencies that make your condition worse. To fully correct your metabolism to its sweet spot, you will need to ensure that you are not deficient in several core nutrients. The more severe your insulin resistance, the greater the need to actively prevent nutrient deficiency.

I had an inquisitive patient once ask me, “If I’m insulin resistant, why do I keep producing so much body fat?” The answer involves seeing insulin as the most skilled, primary—but not the only, worker in the business of building and storing fat. Your body works, at all costs, to avoid the damaging effect of chronically high blood sugar. Therefore, even with insulin resistance, other mechanisms will continue to turn sugar into fat and store it. Once you become more sensitive to insulin again, it’s like having the star player back on your team—you’ll perform better.

What does insulin resistance *feel* like? In my clinical practice I see cases of insulin resistance every day, and sometimes a person just has a good way of talking about it. Mark is just that kind of person. He was gaining fat around his waist, but came to the office for other reasons. Years later I shared before and after pictures that I had taken, and he was stunned. He hopes that his story can shed light on the health gains you can experience when you truly resolve insulin resistance.

A Case of Insulin Resistance / Metabolic Syndrome

Mark S., thirty-five years old

Mark came into my office not because of his weight, but because of a concern for his health. He knew something wasn’t right. He implemented his diet change starting in March, and the September test was at six months. Mark has generously agreed to share his story in his own words (see testimonial below, on page [TK]; additional cases can be found on TheBloodCode website).

Panel test date	1/4/08	9/18/08
Cholesterol, mg/dL	226	208
Triglyceride, mg/dL	176	64
HDL, mg/dL	49	44
TG:HDL ratio	3.5	1.4
Fasting glucose, mg/dL	112	98
Fasting insulin, uIU/mL	13.4	—
HOMA-IR	3.7	

Date →	1/8/08	4/29/08	7/17/08	9/23/08
Triceps, mm	24	21	16	13
Biceps, mm	12	10	12	10
Back, mm	26	20	15	16
Hip, mm	43	29	24	21
Total mm	106	80	67	60
Body fat %	29%	26%	23%	22%

Mark fell into Severe IR (but not type 2 diabetes); after six months, he was in the “slight IR” category, with room to keep improving.

Skin-fold caliper measurements: Mark waited a full nine months between blood tests, but his metabolic improvement was evident in his skinfold calipers.

June 26, 2013—Owls Head, Maine

I met Dr. Richard Maurer in 2008. I was ashamed to ask for help and counsel, but I was overweight, stressed out, and very concerned about my health. Dr. Maurer immediately set me at ease, treated me with great respect, and suggested a simple blood test before he made any recommendations.

After the blood test was complete, Dr. Maurer suggested a few simple modifications to my diet. I took his advice and counsel to heart, and committed the next eight weeks to his protocol. The results were beyond amazing; they were life-changing.

The color came back into my face and skin. The red in my eyes cleared up, and I was told they sparkled. The texture of my hair changed. I slept through the night without interruption.

The things in my life that cause stress did not change, but my ability to handle stress and let it slip away changed in a big way.

On top of that, I lost tons of useless body fat.

But more importantly, my health and wellness improved a hundredfold. I became inspired and excited about my life and health.

I don't like to give people advice on their health and wellness, nor am I qualified to do so. But when people sincerely want to know how my health improved so dramatically, I refer them to Dr. Maurer, his work, and The Blood Code.

—Mark S.

Hypoglycemia

Your body has dozens of ways to prevent low blood sugar, but for short periods of time, you can experience something called *reactive hypoglycemia*. This is when your body is hyperreactive to the message of insulin after imbalanced meals. A high-carb/low-fat meal results in a burst of insulin that causes a sudden drop in blood glucose in some people. The hypoglycemia that results will be quickly remedied by a release of adrenaline and other compensatory hormones, but this reactive process doesn't feel good. This process occurs early in someone's lifetime (before age twenty-five), before any insulin resistance has set in. If you experienced reactive hypoglycemia when young, you may tend more toward IR when older (>45 years old).

When teenagers or younger children experience migraine headaches, light-headedness, hyperactivity, or inability to concentrate, insulin-reactive hypoglycemia is suspected, and the triggers for insulin, like excess carbs in the diet, should be controlled.

High Insulin: >10 uIU/mL (>70 pmol/L) and the Action

Steps Ahead of You

High insulin is a variation on insulin resistance. It causes the high TG and excess fat deposits around your middle, measurable by skin-fold calipers. In the prior section I emphasized the benefits that come with insulin resistance. Let's define what is happening with high insulin. This discussion will allow you to more fully recognize *why* your body is performing the way it is, and help lead you toward *what* you can do about it.

Insulin is an anabolic (builds tissue) hormone made in the pancreas and secreted directly into the bloodstream, in response to several different stimuli, especially the carbohydrate and protein content of a meal. Insulin replaces the storage sugar/glycogen and fat into the fuel tanks of your body—the cells of your fat, muscles, liver, etc.

***Glucose is the cash in your hands.
Glycogen is the cash deep in your pocket.
Body fat and triglycerides are the funds stuck in
your bank account.***

Early-stage high insulin: As you begin to secrete extra insulin, your body will take sugars from your bloodstream and turn them into fats and proteins and put them away. At this early stage, your blood sugar will usually be normal, as the glucose is turned into a better storage form: triglycerides (TG). Your TG will start to rise on your blood tests (>100 mg/dL, or >1.1 mmol/L), and you will be able to measure that fat with skin-fold calipers—specifically, your body fat measurement will be higher on your hip and back compared to your triceps. At a very young

age, late teens to early twenties, you might benefit from insulin's night job: It helps your body to replenish glycogen, utilize proteins, and make muscle tissue. High insulin is actually useful for a strength-oriented athlete . . . to a point. High insulin, if let go for years, will cause your body to "numb out" and ignore the noise of insulin's message. This is the transition from insulin sensitivity to insulin resistance, and it will typically show up when you are in your forties, if not sooner.

Late-stage high insulin: As your insulin stays high for many years, you will accumulate the effects: Triglycerides are stored everywhere.

Your skin-fold caliper measurements will display excess fat storage on your hip and back; your torso is storing fat for the "big event." The organs inside the torso will also store extra fat. Your liver will have higher fat storage, causing fatty liver and elevated liver enzymes, especially the ALT enzyme. TG on the blood test will be high, above 150 mg/dL (1.7 mmol/L), and your liver will be so bogged down with fat that the "good cholesterol" can't be produced, so the HDL is low. This trend is best displayed through the TG:HDL ratio, which will be above 3.0 at this stage.

High insulin will cause a fatty torso—what we call the "apple-shaped" person. If you store significant weight around your middle, you probably have high insulin. The obesity is not your problem; the underlying insulin is the driving force. It helps to realize that insulin is insatiable: The more fat you store, the better your body will store fat. On the surface, the problem appears progressive. High insulin is remarkably

The industry-sponsored recommendation to consume sugar-laden chocolate milk following activity is fundamentally wrong if you have the innate ability to secrete high levels of insulin naturally. Instead of the carb-heavy 3:1 ratio in chocolate milk, plain whole yogurt has closer to the desirable 1:1 ratio of carb to protein.

misunderstood; medical headlines repeatedly “blame” obesity as the curse or underlying cause of “coronary heart disease, ischemic stroke, hypertension, dyslipidemia, type 2 diabetes, joint disease, cancer, sleep apnea, asthma, and other chronic conditions.”³ The obesity is not the horse pulling the cart; the high insulin is pulling the cart, and if left uncorrected, it will lead to subsequent insulin resistance / high blood sugar results.

Insulin Is a Gift, Not a Curse

Migratory ducks and fatty liver. Pardon me for comparing you to a duck, but the physiology is similar. Ducks in my home state of Maine spend September gorging on the late-summer wild rice in the freshwater marshes. This behavior creates a disproportionately big liver in these very small teal ducks. By early October, they launch into the air and fly for more than a thousand miles without another bite of food during their journey.

Temporary fatty liver is desirable for this lifestyle; a problem only arises if the duck decides to lie around in a climate-controlled house for the next twelve months. If you have high insulin, your inner duck must not gorge on carbs and remain sedentary in a climate-controlled house and workplace.

Good news! If you have high insulin, you are the most likely among your peers to experience a rapid and dramatic improvement in your weight and metabolism with The Blood Code. Stay within your prescribed carbohydrate restriction and follow the fitness guidelines that reinforce strenuous, full-body workouts on an empty stomach. You do not need to carbo-load . . . ever. You already store calories exceedingly well without the extra carbo load. Measure with your skin-fold calipers every three to four weeks; you will be impressed with how quickly you improve. Step Four will be your most important intervention. Here is a bit of a preview:

Primary Dietary Steps If You Have High Insulin

Several foods and food combinations do a tremendous job of triggering a release of insulin. If you know you tend toward high insulin normally, these foods and combinations need to be carefully limited.

- 1) **Unfavorable carbohydrates** cause a rapid increase to your blood sugar; both simple and complex sugars are implicated.
- 2) **Dietary protein** has a less-pronounced effect on insulin; any meal with greater than 20 grams of protein will trigger an insulin release. Your protein choices need to be eaten with plenty of fats, not extra carbs.
- 3) **Stretching the stomach:** Oversized meals and volume foods trigger a stomach-stretch response, part of a neat system whereby your digestive tract lining is an endocrine gland. Your gut releases two hormones, collectively known as *incretins*: GLP-1 and GIP. These hormones stimulate insulin to help lower glucose.
- 4) **Combinations add up:** “Two bads equal a worse.” Simple sugars when mixed with protein or complex carbs trigger a huge insulin release. While not many of you would put sugar on a steak, you probably don’t hesitate when it comes to putting ketchup on a hamburger with a bun. Foods with protein, sugar, and no fiber, like ice cream and chocolate milk, are disastrous. Sugar added to bread is another ubiquitous combination, such as toast and jam, cookies, muffins, etc.

More detailed information and research about the disease risks of a lifetime of excessive insulin can be found in the “Digging Deeper” chapter.

A Case of Early High Insulin

Kevin T., twenty-one years old

Kevin was in his final year of college, and had put on weight. He felt worse after eating and suspected a food allergy. Kevin had part of his problem right: He was reacting poorly to foods, but it wasn't an allergy; it was carbs. He improved in ninety days.

Panel test date	9/1/12	12/10/12
Cholesterol, mg/dL	194	190
Triglyceride, mg/dL	196	92
HDL, mg/dL	39	52
TG:HDL	5.0	1.7
Fasting glucose, mg/dL	85	82
Fasting insulin, uIU/mL	24	12
HOMA-IR	5.0	2.4

Skin-Fold Caliper Measurements

DATE →	9/1/12	12/10/12
Triceps	12*	12
Biceps	6	5
Back	20	18
Hip	24*	14
Total mm	62	49
Body fat %	24%	21%

* High hip:triceps ratio indicates high insulin. Wvth his youth, he wasn't yet unhealthy or obese.

Initial Plan: Carb limits: 20 grams at breakfast / 20–40 grams at lunch and dinner. Only minor exercise changes were made.

Great improvement occurred: TG:HDL and HOMA-IR are heading toward 1:1, with room to improve with a bit more strenuous and frequent exercise.

Hypothyroid, Slightly Elevated TSH, and Thyroid Antibodies

Your thyroid function represents one part of a brilliant orchestra of hormones with which your body regulates the amount of energy burned at rest. By lowering the cellular activity, you burn slightly less calories and produce a little less heat. At rest, this is referred to as a *slow or low basal metabolic rate*. You can see why this gland could become the scapegoat for all kinds of “sluggish” or weight-related symptoms.

Your thyroid panel can display several imbalances that require attention to your nutritional and fitness habits. This is not a replacement for medical advice about thyroid hormone prescriptions. The common blood test variants and subsequent action you require are listed here.

TSH is high-normal (2.5–4.0 uIU/mL), with normal T4 and T3

TSH is the most common hormone used clinically to detect early stages of a hypothyroid tendency. Research has consistently shown a link between TSH in the upper-normal range and heart disease risk.⁴ But researchers are guilty of mistakenly labeling people with high-normal TSH as *mild, or sub-clinical, hypothyroid*, and some members of the medical community have subsequently become overzealous when it comes to dispensing thyroid prescriptions. The high-normal TSH is a case of mistaken identity; slightly high/normal TSH may not be hypothyroid at all. More-recent research has clarified that the suspicious heart disease risk associated with TSH between 2 and 4 was due primarily to underlying insulin resistance.⁵ Furthermore, the insulin resistance appears to “cause” TSH to rise slightly.⁶

So, first things first: Check to see if you if you do have any other markers of insulin resistance.

Blood tests such as:

A1C >5.6% (>37mmol/mol)

HOMA-IR>2.5

TG:HDL>2.5

Total body fat percentage:

>31% in women

>25% men

If your TSH is slightly elevated *and* you display insulin resistance (IR), follow the steps to correct your IR. It might improve your next TSH test.

TSH is slightly high (4–6 uIU/mL), with normal to low T4 and T3

This pattern is on the continuum of hypothyroidism. As T4 and T3 go below normal and TSH goes higher, hypothyroidism is more evident. Ultimately, the use of a thyroid hormone prescription is up to you and your health-care provider, but here are some things you must consider in order to individualize your care.

Age and hypothyroid: Hormonal activity, thyroid included, tends to be lower in people over the age of sixty-five to seventy. While some think that this thyroid decline is a reason to consider prescription thyroid hormones to combat the effects of aging, convincing animal and human studies link this natural hormonal drop with longevity.⁷ TSH in large-scale studies was associated with longevity up to a level of about 8 uIU/mL; above that, and the hypothyroidism was too much of a problem.⁸ As you age, your body apparently has a little more reason to preserve capital; your resting metabolism will therefore slow down slightly. If you want a bit more pep as you age, you need to place an extra degree of importance on exercise in your daily life.

Exercise and hypothyroid: Stressful exercise in less-conditioned individuals lowers the T4 and T3 thyroid hormones compared to those who are in better shape.⁹ This doesn't mean you should avoid stressful exercise; on the contrary, it indicates that you should strive to be in better condition overall, so that stressful situations do not excessively reduce your thyroid activity. Extended periods of exercise—over 30 minutes, especially in a hot environment—replaces the need for some of

your thyroid activity, so it is natural to have reduced thyroid hormone activity after these circumstances.¹⁰

Dieting and hypothyroid: Long-term low caloric intake, 1,800 calories or less, results in less thyroid hormone activity and higher TSH levels.¹¹ A sudden drop in caloric intake can generate a compensatory short-term drop in thyroid activity a well.

Hypothyroid as Helpful?

Some hypothyroid tendency is likely a historically advantageous adaptation, which allowed people to use fewer calories at rest, thereby squandering less precious ingested calories. Sudden strenuous exercise and decreased caloric intake both lower thyroid activity. Historically, this helped people to survive during periods of excess physical exertion and minimal food, like having to walk a long distance to get to a displaced food supply. Got it? Vigorous exercise and low caloric intake both lower your thyroid activity. All those programs that tout calorie-restrictive diets with simultaneous boot camp-style exercise will contrarily *slow* your resting metabolism. This may blow the minds of those who are thinking that the only way to drop serious weight is to train hard and reduce calories, but if you tend toward any degree of hypothyroid, your success will only be short-term, if achieved at all. The slower resting metabolism that results will only make it harder for you to maintain whatever weight loss occurred.

If you have high TSH, mild hypothyroid, or are currently being treated for hypothyroid, you will need to build very consistent dietary, nutritional, and fitness habits. Yes, even if you are treated with a thyroid hormone, the pill is not the end of your metabolic imbalance. Your hypothyroid

tendency is still present at your tissues, so the lifestyle habits are critical, whether or not natural or synthetic hormonal treatment is in place.

Action Steps for Hypothyroid

Step Four dietary habits for hypothyroid must be consistent! The feast-or-famine approach will not work for your diet. You can't eat less before a vacation so that you can indulge while away. Each time you significantly reduce your caloric intake, your metabolism will quickly and efficiently compensate by slowing your resting caloric burn rate. Therefore, your total caloric intake should be relatively consistent over time. Of course, if you learn that you also express insulin resistance, you must find the carbohydrate range that is right for you and your Blood Code.

Cruciferous vegetables and hypothyroid: There are certain foods that have tremendous anti-cancer properties and are loaded with healthful nutrients, but contain a compound that can have a subtle effect on thyroid metabolism. They are given the name *goitrogens*, and include cruciferous vegetables such as broccoli, cauliflower, Brussels sprouts, bok choy, broccolini, Chinese cabbage, kale, kohlrabi, radish, collard greens, and turnips. Many online resources exaggerate the adverse thyroid effects from these foods. People with iodine deficiency or significant hypothyroidism appear to be the only ones affected by very high doses of these raw cruciferous vegetables. But even consuming a serving of these foods daily is not enough to have the said adverse effect. Furthermore, cooking effectively inactivates their goitrogenic activity—a reason to question the fad of “juicing” for general health. In my clinical practice, I have never recommended that anyone avoid these healthful vegetables in their diet. The vegetables should be properly cooked, and you should ensure that you are not overtly deficient in the mineral iodine.

There are goitrogenic compounds in soy products, peanuts, lima beans and millet that *do not* break down with cooking like the above vegetables. Therefore, if you have thyroid tests that are outside of healthy ranges, these foods are best limited or avoided.¹²

Step Five fitness rules for hypothyroid—daily in the morning!

You must exercise every day; that is first and foremost. One more time: *daily*. Your resting metabolism is a little slower with hypothyroid, but that does not carry over to your active metabolism. In fact, the metabolic effect of very strenuous exercise that lasts 45 minutes effectively replaces significant thyroid hormone activity for over 12 hours.¹³ Overnight, all people experience a drop in body temperature while sleeping; those with a hypothyroid tendency require physical activity to quickly generate heat and kick-start their metabolism to normal. This does not need to take much time; a workout of 10 to 15 minutes first thing in the morning is a critical step for you to feel better throughout your day. Once you feel like the activity is heating you up, you've done enough.

Step Six nutrition guidelines for hypothyroid: The T4 hormone requires the nutrient iodine—not much, 100-300 mcg is considered a healthy *minimum* range. The enzymes that convert inactive T4 to the active hormone T3 are made from the mineral selenium, and require zinc to function. Low vitamin D can make hypothyroid symptoms worse. Iodine, selenium, zinc, vitamin D; Step Six will further describe the nutrients that help you to rule out any deficiency that could aggravate hypothyroidism.

A Case of Hypothyroid with Insulin Resistance

Tony C., forty-seven years old

In 2011 Tony said succinctly, “I suspect there is some imbalance that’s causing very low energy, but when I regularly exercise, I feel better.”

Panel Test Date	4/27/11	3/30/12	9/7/12
Cholesterol, mg/dL	217	227	208
Triglyceride, mg/dL	175	143	84
HDL, mg/dL	43	49	50
TG:HDL	4.1	2.9*	1.7**
Glucose, fast. mg/dL	101	103*	82**
Insulin, fast. uIU/mL	7.1		5.5
TSH, uIU/mL	4.4	1.5	1.8
Vitamin D, ng/mL	15	19*	30

Skin-Fold Caliper Measurements

DATE →	4/19/11	12/10/12	9/2/12**
Triceps, mm	8	10	8
Biceps, mm	5	6	5
Back, mm	20	18	14
Hip, mm	20	16	12**
Total in mm	53	50	38
Body fat %	22%	22%	18%

* Like many people with hypothyroid, he had insulin resistance (IR), too. By 3/30/12, the thyroid prescription had corrected the TSH, but not his IR.

** Tony was able to pull his blood tests, body fat, and TG:HDL into his healthy range only after adopting a trainer-inspired fitness routine in conjunction with prescription thyroid.

High Thyroid Peroxidase (TPO>100 IU/mL)

As discussed in Step One, high TPO indicates that your immune system is at the ready, or has already “knocked out” some of the activity of the thyroid gland. This immune component might sit in waiting for your whole life, so on its own, it may not mean much. But if you have high TPO *and* you have a mild hypothyroid pattern, your health-care provider will likely consider medical treatment sooner than someone without any circulating TPO.

Dr. Maurer on Thyroid Prescriptions:

Finding the thyroid hormone prescription that works best for you must be a collaborative effort between you and your health-care provider. But don't look for a prescription to miraculously provide you with the healthy metabolism you want. There are divisive opinions held about the kind of thyroid hormone that is prescribed to treat hypothyroidism: T4 alone, T4 with T3, natural glandular thyroid, customized ratios of T4 and T3, etc. A prescriber must be familiar with the various options, as well as which one is more appropriate for a particular individual. The prescription, regardless of whether a theory claims it is better or worse, only offers an incomplete solution. Part of the problem is that people are looking for the thyroid prescription to solve all of their metabolic symptoms. Hypothyroidism affects all of your tissues; it is not defined as merely the reduction in circulating hormone. And as I have mentioned in other places in this book, it is common for people with a hypothyroid tendency to also have other metabolic thrifty behaviors like insulin resistance. The food, fitness, and nutritional steps of The Blood Code are your way to complement any prescription for a thyroid-related condition.