Chapter 1

Metabolism 101: Understanding How It Works

In This Chapter

- Defining metabolism and calories and understanding their role in your health and life
- Balancing energy storage and use
- Recognizing the roles of nutrients and hormones
- Understanding how deprivation diets are bad for your metabolism and weight

You've probably heard the word *metabolism* being thrown around with the latest fad diet craze, in nutrition and fitness articles, on talk shows, and from gym rats. They all claim to know the best way to boost your metabolism so that you can lose a lot of weight in a little time. You may actually believe many misconceptions about metabolism and weight. By the end of this book, you'll know better.

If it weren't for your metabolism, you wouldn't be alive. Your metabolism isn't just a vehicle to blame for your weight-loss woes. It's a machine that impacts your energy and stress levels, your sleeping habits, and your long-term health. Every cell in your body is involved in a process associated with your metabolic rate.

Unfortunately, instead of health, *thinness* has become idealized in the United States, and extreme dieting and weight-loss methods are used to achieve that ideal. Because of our nation's obesity epidemic, this dichotomy causes nutrition messages to get all jumbled in the media and likely your social circle, and you may come to believe these mixed messages as truth. So, congratulations on taking the first step and picking up this book. Clearly you want the truth about what metabolism is and how it really affects your weight!

This chapter breaks down metabolism step by step so that, by the end of it, you'll understand why many of the "truths" you've believed are actually doing you more harm than good.

Introducing Metabolism

It's time for you to meet your metabolism and become friends. Because being enemies with your metabolism, blaming it for your weight struggles, and fighting it in an effort to reach your goals aren't going to get you anywhere. Instead, once you learn the basics about how your metabolism operates, you're able to work together with yours, to maximize your metabolic rate and get to where you want to be with your weight and health.

Metabolism is life

On the most basic level, *metabolism* is the process by which your body converts the food and water you consume into energy for immediate use or to be stored for later. This energy doesn't only power your jog — every action your body performs, including brushing your teeth and getting dressed in the morning, requires this energy.

Your muscles aren't the only organs that need to be fueled. Your lungs, heart, and brain all require the energy generated in your metabolism powerhouse. But when you eat *more* than your body needs for all its functions, your metabolism stores that energy as (drumroll, please) … fat.

Your metabolism is never sleeping or completely broken; its processes are going on every minute of every day. Of course, your metabolism may not be maximized to work the best it can — but that's what you're here to fix.

Everyone has to eat and drink, but your body could go for weeks without food. Your metabolism is programmed to conserve the energy for when you absolutely need it. In the absence of food, your metabolism actually slow down and releases less energy at a time so that you can survive longer.

But without water, you'd be dead within a few days. That's because:

- Your body is more than 60 percent water.
- The cells in your body that make up your skin, heart, lungs, and muscles (and everything else) require water to maintain their size and shape.
- Water helps regulate your body temperature. In the process of creating energy from the food you eat, your metabolism generates heat. You sweat when you're overheated to release that heat from your body, and you drink water to replenish the water loss.
- Compounds involved in metabolic reactions that help your body process and create energy require water to operate.

The Kreb's cycle

In high school biology, you learned about the Kreb's, or citric acid, cycle. This is the chemical reaction that's at the heart of generating energy, or heat, from breaking down *macronutrients* — carbohydrates, protein, and fats — into metabolites to create energy your body can use.

- All *aerobic* organisms (ones that breathe air) undergo these step-by-step reactions to break down food into energy.
- In the absence of oxygen, for example during anaerobic exercise, which is short-lived, high-intensity movement, the cycle still occurs, but less energy is created, requiring your body to "make up for it" afterwards (see Chapter 11).
- *Mitochondria* are the units in your cells where the reactions occur. They're also known as "cellular power plants."
- The Kreb's cycle requires two molecules of H_20 (water).
- Vitamins, particularly the B vitamins, and minerals such as calcium and magnesium play a big role in facilitating each step.
- *Enzymes* are proteins with an *–ase* at the end of their name (such as dehydrogenase) that are catalysts for the reactions.
- The cycle produces adenosine triphosphate, or ATP, which is released to do work wherever it's needed, for example, repairing muscle tissue after weight-bearing exercise. To function, your body burns ATP like a car burns gasoline, which would make the Kreb's cycle kind of like an oil refinery.

Metabolism is at the foundation of your basic functioning to live. It's what makes your body smart in times of crisis, but it's also what hurts you if you're not eating enough or aren't eating the right types of foods. Later in this chapter, I talk more about restrictive diets and how they're harmful to your health.

Comprehending calories

You're either thinking about how many calories you burned through exercise or how many you need to cut, right? You're not thinking about what calories *are*. Whenever I explain calories, I always think back to the day I learned what a calorie truly is.

So what is it? A *calorie* is a measure of heat that's released from food when digested. More exactly, a calorie is the amount of heat needed to raise the temperature of 1 gram of water by 1 degree Celsius. 1,000 calories = 1 *kilocalorie*, or one Calorie — which is actually what *1 calorie* on a food label means. It's

confusing, I know. What you have thought of as calories are actually kilocalories or Calories, but you can still call them calories because everyone else does, and I'll call them calories in this book from now on. Is that clear? Never mind. The more heat released, the more calories a food contains.

It wasn't until nutritional biochemistry lab in my junior year of college that all this really clicked for me, thanks to an experiment. We were each told to bring in a food item from a fast-food joint. I brought in a Big Mac from McDonald's. We ground it up and placed a portioned sample of the food in a *bomb calorimeter*, which has two chambers, one inside the other. The food is burned in the inside chamber, which is filled with oxygen, and in the outside chamber a certain amount of cold water is monitored for rises in temperature. The temperature increase correlated to about 500 calories for the whole Big Mac — which is what McDonald's had listed in the restaurant.

Of course, that lab example doesn't emulate exactly what's going on in your body when food is digested, but that's the gist of it.

You can also estimate how many calories are in a food if you know the protein, carbohydrate, and fat content.

- 1 gram of protein = 4 calories
- 1 gram of carbohydrate = 4 calories
- 1 gram of fat = 9 calories

For example, if you know that a certain amount of fat-free Greek yogurt contains 0 grams of fat, 7 grams of carbohydrate, and 18 grams of protein, you can expect that food to contain 100 calories.

There's also a discrepancy in calorie content among foods when they're cooked, raw, processed, or whole. A lot of that is due in part to the *thermic effect* of food (TEF), which accounts for the fact that some of the calories you eat are burned off during the digestion process itself. Therefore, the net amount of calories that make it into your body's energy system is actually less than what's initially present in the food. An interesting study published in *Food and Nutrition Research* studied two groups of people. One group ate multigrain bread with cheddar cheese, and another ate white bread with processed cheese — both containing the same proportion of calories from fat, carbohydrate, and protein. The study found the following:

- Whole foods have a larger thermic effect (use up more energy to break down) than processed foods do and therefore have fewer calories left over to potentially get stored as fat.
- There was no difference in satiation (feeling of fullness) reported, yet the average energy expended with the processed cheese sandwich was 50 percent less than the whole-foods sandwich!

- The moral of the story here is that, although technically you consume fewer calories from the whole-food sandwich, you feel as satisfied as you would from the processed sandwich.

Unfortunately, in the U.S., we eat about 30 percent more processed foods — such as frozen dinners and pre-made meals — than we do fresh, whole foods. These convenience foods, expanding portion sizes, and more sedentary lifestyles all contribute to the growing obesity epidemic that affects about a third of Americans.

Foods with a higher TEF help improve your metabolic rate. Fat is relatively easy to break down and therefore has a low TEF, whereas protein and complex carbohydrates are more difficult to digest and so have a higher TEF. And of course, fiber, the complex carbohydrate found in many whole grains, fruits, and vegetables, is mostly indigestible to begin with! The bottom line is that *whole foods that contain lean protein and fiber help keep you fuller, longer, and can help you lose weight*. (You'll find more on the thermic effect of food and how it impacts your metabolic rate in Chapter 3.)

Balancing using energy and storing it

Metabolism is a two-step process between catabolism and anabolism. The balance between the two is controlled by *hormones*, chemicals released by cells that have specific functions. Hormones are either classified as anabolic or catabolic depending on what they do:

- **Catabolism** breaks down macronutrients into their smaller units to release energy for physical activity or to use for anabolism. For example, the catabolic hormone cortisol is released in response to stress, causing your body to break down muscle protein to use for energy.
- **Anabolism** builds up larger molecules from smaller units requiring units of energy — for example, creating hormones, enzymes, and compounds for cell growth to build bone and muscles. The anabolic hormone insulin, for example, controls the amount of glucose in your blood by converting it into compounds that cells can use or store. The sex hormones testosterone and estrogen are also anabolic hormones that work to develop male and female sex characteristics.

Your body weight depends on your body's catabolism minus anabolism, or the amount of energy your body takes up to use. If your catabolism greatly exceeds anabolism, the excess energy generated is stored as glycogen (for later use by your muscles) or fat (which serves to increase body weight). Many factors impact which state your body favors, and everyone is different.

Here are some reasons your metabolism may be on the fritz:

- **Calorie intake:** If you're eating more calories than you can use, your body will store them for later. See Chapter 3 to calculate how many calories your body needs to function on a baseline level and with added activity.
- **Activity level:** If you're not active enough, aren't doing any weight-resistant exercise to work your muscles, or are too active that your body is stressed, you can be said to be in a more *catabolic state*.
- **Age:** One reason why losing weight becomes more difficult as you age is that levels of your anabolic hormones which use up that excess energy, like testosterone or estrogen, decrease, resulting in decreased muscle mass and increased fat storage.
- **Genetics and hormone-disrupting conditions:** Based on individual differences in genetics, you may be more or less prone to a sluggish metabolism. Also hormone-disrupting conditions like menopause and hypothyroid play a role (read more about this in Chapter 12).

For more on the factors that impact your metabolic rate, see Chapter 2.

Weighing benefits beyond weight loss

Although boosting your metabolism helps your body burn and use up more calories so you can lose weight, it also works to improve your health. (But your weight doesn't tell you everything about your health status. Some people are underweight with a sluggish metabolism, and some are overweight with a faster one.)

If you choose less processed foods and more wholesome nutrients, don't go too many hours between meals, and make a commitment to regular activity, you'll benefit from a range of positive side effects, in addition to weight loss, including the following:

- More energy
- Better sleep
- Improved mood and concentration
- Stronger immune system
- Stronger muscles and better mobility
- Improved blood glucose control with diabetes
- Improved blood pressure and heart health

Something to digest

Digestion actually begins with the enzymes in your saliva starting to break down nutrients in your mouth. Foods that take longer to digest typically help boost your metabolism because the more work your body does, the more heat or calories it requires your body to use.

- **Mouth:** Chewing breaks down the food, and the enzyme amylase, in your saliva, begins breaking down starch into simple sugars.
- **Stomach:** The enzyme pepsin in your stomach starts breaking down proteins, and other factors work on carbohydrates and fats as well.
- **Small intestine:** This is where most of the digestion and absorption takes place. The small intestine contains small fingerlike structures called villi that absorb nutrients into your bloodstream once they're broken into their simplest form. These nutrients first get processed by the liver to filter out anything harmful, like alcohol and toxins. Then the good parts get passed along to your cells for energy. What the small intestine can't absorb, like fiber, water, and bacteria, gets transferred to the large intestine.
- **Large intestine:** This is your body's last-ditch effort to absorb any nutrients, and the rest gets passed out of your body.

Meeting the Macronutrients

The nutrients you consume in the largest amounts — carbohydrates, protein, and fat — are known as macronutrients. You require all three to provide you with the energy you need and optimize your metabolic rate. A restrictive diet which focuses on cutting out one of them — fat or carbohydrates, for example — can cause fatigue, increased food cravings, and lead to other vitamin or mineral deficiencies.

You also need vitamins and minerals but in smaller amounts, so they're called *micronutrients*. Also, you do require water in large amounts, but it's not technically a food or nutrient.

This section reviews each of the three macronutrients, why you need 'em, and how they fit into the metabolism puzzle.

Facts about fat

Of all the macronutrients, the most confusion surrounds fat and cholesterol. You may automatically think, "If I eat fat, I'll get fat." It's true that the American diet is a rich source of fat, and too much fat can have negative health impacts such as increased cholesterol, heart disease, and weight gain. However, although fat is a concentrated source of calories, and too much can be bad for you, you still need to eat fat for essential functions:

- It's a readily available source of energy for use in metabolism (the highest concentration of energy at 9 calories per gram).
- It supplies fatty acids for use in developing hormones such as your sex and hunger hormones.
- It's required for the absorption of fat-soluble vitamins A, D, E, and K.
- It helps satisfy you by improving taste and variety in meals so that you aren't hungry again soon after.
- Even when fat is stored, it helps keep your body temperature regulated and protects organs from damage.

Anything you eat in excess of what your body can use for energy gets stored as fat, not just the fat you eat. To reduce your body fat, focus on a balanced diet in which you get about 20–35 percent of your calories from fat, to keep your metabolic rate up and so that you don't feel deprived. This doesn't mean that 30 percent of what you eat can come from fat. Each fat gram contains 9 calories so you need to consume about half the amount of fat grams that you would from carbohydrates or protein for the same calories. For example:

- 1 ounce of pistachios = 7 grams of fat, 80 calories
- 1 ounce (1 slice) of whole wheat bread = 15 grams of carbohydrate, 80 calories

Most fats in food, no matter the type, are in the form of triglycerides. *Triglycerides* are composed of three fatty acid molecules connected by a compound known as *glycerol*. When the body needs fat for energy, the triglyceride is broken down by the enzyme lipase through lipolysis into the free fatty acids, which can then enter the Kreb's cycle to generate energy and transport oxygen through the blood.

- During high-intensity exercise, although carbohydrates are the main source of fuel, fats are needed to access glycogen, which is the stored form of carbohydrates.
- Fat is the main fuel source for low-intensity exercise for longer periods of time.

For more on how your body uses fuel during exercise, see Chapter 11.

Not all fats are created equal when it comes to your health. Table 1-1 outlines each type of fat from good to bad and where to find them.

Table 1-1 Facts About Fat Types

Type	*Description*	*Sources*
Unsaturated	Lower risk of heart disease. Omega-3s have additional benefits and increase hormones to signal satiety (see Chapter 5 for more)	Olive oil, fish, nuts, avocado, soybeans
Saturated	Linked to heart disease and high cholesterol (see Chapter 4 for more)	Meat, butter, milk, cheese, egg yolks
Trans	Man-made fat which increases cholesterol and impacts glucose breakdown, slowing metabolism	Commercially packaged baked goods and breads, frozen foods, condiments

Although boosting your metabolism means getting rid of unwanted body fat, you still need *some* stored fat for essential functions such as providing energy and absorbing the fat-soluble vitamins A, D, E, K. See Chapter 3 for how much fat to eat and how to measure your progress through measuring body fat percentage.

Clarifying carbohydrates

Ever since Dr. Atkins came out with his carbohydrate-hating, protein-loving diet, you've seen more and more products hit the shelves with low-carb claims and more people banishing bagels and pasta from their diets. But carbohydrates truly are our main fuel source for metabolism and provide energy to our muscles and brain cells.

There was a shift in the types of carbs Americans consume as we went from a rural society to a more industrialized one: we're eating more processed sugars and sweeteners than ever before. This is what's attributed to an increase in obesity and health conditions — not carbohydrates from wholesome, natural sources like whole grains, fruits, and vegetables.

Carbohydrates are in food as simple carbohydrates and complex carbohydrates.

Simple carbohydrates include the following:

- **Monosaccharides** are the simplest form of carb and contain only one sugar molecule. Examples include glucose, fructose, and galactose.
- **Disaccharides** contain two sugar molecules linked together. Examples: lactose, maltose, and sucrose.

Complex carbohydrates include starch and fiber, which are simple sugars strung together by the hundreds or thousands.

Fiber isn't broken down the same way as the other carbohydrates. Depending on whether the fiber is soluble or insoluble, it's either broken down into a gel form (soluble) or not really digested at all. Fiber helps keep you fuller longer than any carbohydrate-containing food and is a major metabolism booster. Find out why in Chapter 5.

Besides fiber, no matter where your carbohydrate comes from, it's broken down into glucose to either get utilized for energy or stored for later as fat. It takes longer to break down the chains in complex carbohydrates for use as energy, which is why they make you feel fuller longer, without the rapid highs and lows in your blood glucose levels like you get with simple sugars.

The body uses glucose as part of metabolism in many ways:

- Glucose is used immediately in the Kreb's cycle to create energy.
- Glucose is converted into glycogen by the liver and muscles to supply energy when needed.
- When the muscle and liver stores are full, your liver turns the excess glucose into fat stores. When needed, those can be burned for fuel, but can't be converted back to glucose.

Your brain requires glucose to think, remember, and act. Therefore, restricting carbohydrates too much can be detrimental to your metabolism because your judgment is lowered, you feel deprived, and you'll be more likely to overeat later on. Just as with fats and proteins, choosing the right kinds of carbohydrates is key to achieving that balance between storing and using energy the best you can. Chapter 5 talks more about the best kinds of carbs to boost your metabolic rate.

Picturing protein

Protein is the second-most prominent feature in your body after water. The brain, muscles, skin, blood, hair, and nails are all comprised of *amino acids*, the building blocks that make up protein. The antibodies that fight infection, as well as enzymes, which are the catalysts for lots of the metabolism reactions, are built from protein too.

So, protein on its own isn't a readily available source of energy for your body, but you need protein to help process the other two macronutrients, fat and carbohydrate, for energy. In addition, a small amount of protein also serves to create hormones like insulin, which regulates the amount of glucose in your blood.

When it comes to your metabolism, building and maintaining lean muscle mass is protein's primary goal. Muscle mass burns more calories at rest than fat mass does and is therefore very precious to any metabolism-conscious person. There's a lot of protein turnover, and your body needs to constantly supply the tissues with amino acids as they get broken down to be built up again.

When you do resistance exercises like using weights, the tissue in your muscles gets broken down and needs to be repaired with a new influx of amino acids coming from the protein you eat in your diet.

Every food contains protein except for pure oil, but the composition of amino acids varies. Some foods offer up a better combo than others:

- *High-quality* proteins are ones that contain all the essential nine amino acids you need to eat (because your body can't make them). These are mainly proteins from animals: meat, dairy, and eggs.
- *Low-quality* proteins, or incomplete proteins, are from vegetable sources like beans, grains, and vegetables. However, by combining two vegetarian foods together, you can retrieve all the amino acids your body needs. Examples include pairing rice and beans, tofu with rice and vegetables, or peanut butter on whole-wheat bread.

Experts used to think that because the body doesn't store amino acids, as it stores fats and carbs, you'd have to pair low-quality proteins at the same meal. Although that may still be true for children, it's not so important for adults. As long as you have complementary proteins throughout the day, you'll meet your needs.

The bottom line is that your body is resourceful, and when you have too much or too little of any of the macronutrients — fat, carbohydrate, or protein — there are consequences for your metabolism. Table 1-2 shows why having a balance of all three helps boost your metabolism and keeps your body working the best it can.

Table 1-2 Macronutrient Under/Over Effects

Macronutrient	*Not Enough*	*Too Much*
Fat	Vitamin deficiencies	Stored as fat
Carbohydrate	Low energy, impaired digestion, dehydration	Stress on pancreas to produce insulin, stored as fat
Protein	Lose lean muscle	In absence of carbohydrate, fat is processed for energy, which puts stress on your kidneys

Recognizing the Role of Hormones

Once the food you eat gets broken down, that's when hormones jump into action. They not only help monitor what's absorbed but also how those nutrients are used by your body. Hormones communicate messages from one cell to another, and certain cells are programmed to understand the messages of only specific hormones. In this section, I outline the four main need-to-know hormones and their role in your metabolism.

Basically, *hormones* are chemicals which are released from your endocrine glands into your bloodstream to be used by your body. (Your *exocrine* glands, sweat and salivary glands, release secretions onto the outside of your body.)

The endocrine glands, such as the thyroids and adrenals as well as other organs like your kidneys, produce and release hormones. These chemicals are at the center of your metabolism, making sure your body is operating the way it should to either burn or store energy and impacting how effectively you're able to lose weight.

Your metabolism may be sluggish because these hormones are affected by your diet, lifestyle, and even your genes. Chapter 12 reviews a few hormone-disrupting conditions like diabetes, menopause, and thyroid disease which cause many metabolism woes.

You can make changes to your diet to help get your hormones working for you and boost your metabolic rate.

Glucose has an "in" with insulin

Insulin, a hormone produced by the beta cells of your pancreas, regulates carbohydrate and fat metabolism:

- It's released when it senses carbohydrate or protein in your blood as they're being digested.
- It causes your cells to take up glucose to be used for energy or to store either in the liver or muscle as glycogen or in your fat cells as triglycerides.
- When present, insulin stops your body from breaking down stored fat to use for energy.
- Insulin stimulates protein synthesis and encourages amino acid uptake by your muscles.

When your metabolism is working at its peak, your body has feedback mechanisms to regulate the amount of insulin your body makes so there's neither too much nor too little. That way, you're using glucose appropriately for energy and not storing too much fat.

If you have diabetes, your body either doesn't make enough (or any!) insulin or your body doesn't respond well to it, which is known as *insulin resistance*. But if your cells aren't as receptive to insulin, there are ways to help reverse that. By seeking out medical care, making changes to your diet and activity levels, and achieving a healthy weight, you can regulate your blood glucose.

"Stress"-ing cortisol

Cortisol is produced by your adrenal glands and is released in response to stress. It has many primary functions in the metabolism realm and basically functions to make energy available if needed for quick use, like if you need to escape from a risky situation (also known as the fight or flight response) or even to face a challenging day at the office. Cortisol is within a class of hormones called *glucocorticoid* and it increases blood glucose levels:

- It works against insulin to keep glucose around and breaks down glucose from stored fat to release energy (through a process called gluconeogenesis).

- It reduces protein uptake (those proteins are used in gluconeogenesis) by the muscles. So, if cortisol is around for long periods of time, it can lead to a reduction in lean muscle mass.
- The release of cortisol increases blood pressure.
- Cortisol suppresses the immune system because those functions aren't vital to surviving an immediate threat or stressful situation.

The problem is that over time, our stressful situations don't necessarily require an energy release. If you're sedentary at your job and are experiencing stress, you aren't using up that circulating glucose that cortisol makes available for you. Therefore, that excess can get re-stored as fat, particularly abdominal fat.

In my online article "Taking Care to Change Your Lifestyle", you can read more on how your lifestyle affects your cortisol levels, metabolism, and the steps you can start taking today for change. Briefly, the factors in your life that may be causing an increase in cortisol include the following:

- You're not sleeping enough or getting at least seven hours of sleep per night.
- You're not active enough. Regular exercise helps reduces anxiety.
- You're drinking too much caffeine. Stick to one cup per day or less to minimize the rise in cortisol.
- You don't have a balanced diet or are lacking B vitamins and magnesium, which help lower cortisol and boost your immune system.

The thyroid connection

The thyroid is an endocrine gland in your neck that's responsible for regulating the pace at which your metabolism is working. It basically uses the iodine you consume in foods to produce two main hormones called T3 and T4. Every single cell in your body responds to these hormones to either pick up the pace or slow down when it comes to converting oxygen and calories to energy. More specifically, your thyroid hormones:

- Encourage normal growth and development in your whole body.
- Speed up all of insulin's activities.
- Enhance the body's response to stress hormones.
- Regulate your body temperature.

The most common cause of any abnormality with your thyroid is due to a genetic autoimmune disease where your body attacks its own cells. If your thyroid is working too slowly, your body isn't able to transfer calories to energy, and they may be more easily stored as fat. That's why people with hypothyroid may gain weight or have difficulty losing weight. With hypothyroid, your ability to build up or break down proteins, fats, and carbohydrates is slowed — and that ability is at the core of your metabolic rate.

But all hope isn't lost with a thyroid diagnosis. By following the metabolism-boosting plan in this book, you can still lose weight at a steady rate. For more tips specific to the thyroid diet, check out Chapter 12.

Hungry for hunger hormones

If you've lost weight, only to gain it back, you may be all too familiar with your hunger and satiety hormones. *Leptin* and *ghrelin* are your body's main hormones that regulate when you're hungry and when you're full and may be the key to your metabolism and body weight.

Leptin is what makes you feel full:

- It's secreted by fat cells, and the more fat you have, the more leptin is secreted.
- Leptin signals to the thyroid that there's adequate fat so you burn it off instead of keep storing it up. The problem that comes into play with obesity is that you can develop resistance to leptin over time.
- Your body may think you're starving because of leptin resistance, or because you're not eating adequately (such as when you're on a too restrictive diet). So, what happens, then?
- You increase fat storage instead of burning and burn less calories overall.
- Your appetite increases, you don't feel satisfied, and you're more likely to overeat.
- You're more likely to develop insulin resistance.

If you've been overweight for awhile, it's harder for you to lose weight. But it's definitely not impossible. This is where activity plays a major role in helping to burn off more calories and stabilize your hormones. Chapter 11 highlights metabolism-boosting moves to help jump-start weight loss.

Ghrelin is the hormone I call the "hunger gremlin," because it's the one that increases your appetite:

- It's made in your stomach and tells your brain to eat or drink when your stomach is empty.
- It also controls genes that hold on to fats instead of burning them off.
- Research shows that when you're sleep deprived, your ghrelin levels are elevated, and leptin levels are depressed, which is why you're hungrier after a few sleepless nights.
- Studies also suggest that when you skip breakfast, high-calorie foods are more appealing to you due to the ghrelin's powers.

Your response to these hunger hormones may differ from the person standing next to you. Just as everyone's metabolism is different, the way a body copes with stress and hormones and nutrients isn't the same for everyone. Your environment, diet, and lifestyle can affect how your metabolism reacts, and that's what this book addresses. On some level, metabolism can be a mystery, but you can take actionable steps to change the hand you've been dealt.

Let's talk about sex hormones

Whether you're a man or woman, the hormones testosterone and estrogen play a leading role in your metabolism. Most notably, your sex hormones impact your body composition, which may be seen with a glance at the male and female physiques. Males tend to have more muscle mass and burn more calories at rest, which is why men can typically eat more and not gain weight. For women, it may seem like whatever you eat goes straight to your thighs and hips, and it's more difficult to lose fat.

Estrogen

Estrogen is the hormone that's integral for reproduction as well as development of sex characteristics like breast tissue. The hormone, which is produced in your ovaries, adrenal glands, and fat tissue also protects cognitive functioning, promotes healthy bones, and helps control your cholesterol levels.

During menopause, estrogen levels rapidly decline, resulting in the following:

- **Increased conversion of calories to fat:** Because fat cells also make estrogen, your body favors being in fat storage mode to increase those cells and promote estrogen production.

- **Hot flashes that can interrupt your sleep:** Not getting a good night's sleep contributes to alterations in your hunger hormones with negative metabolism effect.
- **Mood swings that can impact what you eat:** You may crave more fatty foods or sweets.

See Chapter 12 for more info on menopause and how diet and exercise can help balance you out and boost your metabolic rate.

Testosterone

Testosterone, on the other hand, is produced by both males and females but is more prominent in males. It's produced primarily in the testes in men, and in the ovaries in women. Testosterone

- Promotes protein synthesis and increases muscle mass function.
- Promotes endurance, which helps with activity and exercise.
- Helps prevent heart disease by keeping cholesterol and triglyceride levels in check.

Human growth hormone: Fountain of youth?

Human Growth Hormone (also known as HGH) is a hormone produced by the pituitary gland in your brain and is released during childhood and adolescence. Production of this hormone starts decreasing steadily in your 20s. It's the hormone responsible for the part of metabolism. HGH

- Spurs growth and development of cell tissue and bones
- Promotes more muscle mass
- Decreases glucose storage so you use that for energy, shrinking fat cells
- Increases blood vessels and collagen, resulting in younger-looking skin

Synthetic production of HGH began in the 1950s to treat children who were not making enough of it due to an inborn genetic error. But now it's being used illegally in sports to increase muscle mass (it's one of the drugs that Lance Armstrong was accused of taking, which stripped him of his Tour de France titles). It is also prescribed under the table to women who want to look younger and lose weight.

Unfortunately, although HGH increases muscle mass, it's not proven to improve strength. And synthetic HGH has potential side effects, including insulin resistance, increased diabetes risk, and perhaps even promotion of cancer growth. The truth may be that synthetic HGH "cheats" Mother Nature and could shorten your life.

You can't alter HGH production with diet. In adulthood, it's released more during sleep. Just another reason why getting seven hours per night can boost your metabolism.

As with estrogen, your testosterone levels decrease after age 40, resulting in less muscle mass, more fat mass, and a more sluggish metabolic rate. Stress hormones also interfere with both estrogen and testosterone, reducing their metabolism-boosting effects even further at any age. As you age, losing weight becomes more and more difficult in large part because of these sex hormones. But through diet and exercise, you can work to balance out your hormones so that they're working for you rather than against you.

Why Other Diets Used to Work and Don't Now

In the past, you may have reached your goal weight just in time for your high school reunion. But then the holiday season came around and threw you off track, or you injured yourself and weren't able to go to the gym, or your life simply became too hectic and you ended up gaining all your weight back (or more).

Sound familiar? You may have also heard the terms *yo-yo dieting* and *yo-yo weight* because the truth is that losing and gaining is so common it's become part of American culture.

Everywhere you turn you see advertising for a diet plan with celebrity endorsements. "If she can look that way, so can I." Although these diets do have a goal to make you slim, often they're not concerned about your health. Being on too restrictive a diet hinders your healthy relationship with food. It may work in the short term, but it backfires later, setting you up for a weight rollercoaster the rest of your life.

You're reading this book because you want to make changes that last a lifetime, right? Not a quick fix (which doesn't exist). The metabolism-boosting plan in this book is meant to help you get there in ways that are realistic for you, one step at a time.

Your body on a diet

Believe me, I know how tempting it is to pick up a book that promises you'll lose 20 pounds in two weeks. You're bombarded with transformations of bodies on infomercials for the latest diet trends.

These changes aren't forever. They're quick fixes that can actually harm your health *and* your ability to lose weight, boost your metabolism, and live a long, healthy, happy life.

The dangers of the HCG diet

A diet that restricts calories and injects you with hormones to help you lose weight — sounds like the perfect combo? Think again. HCG, or Human Chorionic Gonadotropin, is a hormone normally produced during pregnancy. It's been approved by the FDA to treat infertility, but is illegal when sold for weight-loss purposes.

The HCG diet combines a mere *500 calories* per day from foods like organic meats, veggies, and fish (don't even think about eating any dairy, carbs, or alcohol) with shots of the hormone. If dieters have a slip, they're supposed to eat nothing but apples and water for 24 hours. The hormone supposedly helps stave off hunger and blasts fat. However the quick weight loss that may result is extremely harmful to your metabolism. It can cause severe muscle wasting, bone loss, as well as electrolyte imbalances — and can even be fatal. Not to mention, you can only keep this restriction up for so long, and then you'll go back to your old habits. Once you do, because your metabolism is out of whack, you'll not only gain the weight back very easily, but more often than not, you'll gain even more weight because your body is storing up on fat, unsure when you'll decide to deprive it again.

A *diet* is the quantity and quality of the foods you eat in your everyday life. Over the past few decades, the word *diet* has become synonymous with a restrictive weight-loss plan that inevitably cuts out your favorite foods or demonizes an entire food group like fat or carbohydrate.

There are a few intrinsic problems with the new definition of diet:

- When you cut out food groups, a slew of negative side effects can occur (covered earlier in this chapter).
- When you cut out the foods you love completely, you're *more* likely to crave and overeat those foods later.
- You develop an unhealthy relationship with food. Instead of thinking of food as fuel, it becomes just a means to gain or lose weight. You obsess and constantly think about what you're eating, social situations around food provoke anxiety, and you let food take over your life.
- On a physiological level, your body chemistry is altered when you restrict calories.

As you lose weight, your caloric needs also decrease. If you're 200 pounds, you need to eat about 1600 calories a day to lose weight. But at 150 pounds, your needs are closer to 1400 calories per day to continue losing weight at a steady rate. The less you weigh, the less you'll be burning at rest. Part of the reason is that your muscle fiber twitch is altered so that your muscles are actually burning off fewer calories than someone else who has been at 150 pounds forever.

Instead of turning to a drastic restrictive diet, when you're at a halt with your weight loss, it may just be time to reduce your calorie intake in your diet or increase the amount you burn with activity. In Chapter 3, you can estimate your metabolic rate, or *caloric burn*, and also learn about the more sophisticated methods of gaining a better understanding of the amount of calories you need to eat to lose weight.

Riding a weight rollercoaster

Once you hit your goal weight, it's smooth sailing, right? Not so much. Maintaining your weight is often even harder than losing weight in the first place:

- You've been depriving your body too much in ways that aren't realistic for you to sustain.
- Your hunger hormone ghrelin is elevated after a restrictive diet. Research also shows your brain is programmed to respond even more emotionally to decadent food cues after such a diet. Researchers found that the pleasure centers of your brain light up more when faced with fatty or sugary foods post-dieting. So, you may not be able to resist food like you could in the past.
- All your body's hormones are used to being overweight, so it almost actively fights to get back to the weight you were at before. That's why more gradual, slow weight loss is more likely to last long term, because you're giving your hormones time to adjust to the change in body weight.

It's hard to know how long the post-restrictive-diet vulnerable state persists, but experts think it could be for years. That doesn't mean it's impossible to maintain your weight, it's just much harder. Acknowledging that is the first step toward tackling the changes you can make. A huge part of stepping off of the weight rollercoaster ride is changing your thought process surrounding the foods you eat.

It's time to break those bad habits

It's hard to know which habits are genetic and which are due to your environment, but both play a role in your metabolic rate. You may have grown up in a household where everyone was a member of the Clean Plate Club, and your parents, or siblings were perpetually "on a diet." Studies suggest that some people are programmed in their genes to crave high-calorie foods. But you're also surrounded by fast-food joints, and with most social situations revolving around food, it becomes more difficult to avoid those foods and reprogram yourself psychologically.

It's easier said than done to reverse your mentality. But the more you focus on how you look and feel, and not just the number on the scale, the more you'll realize the long-term benefits of maximizing your metabolism the healthy way.

My goal is that you'll know the following when you finish this book:

- How to set realistic goals, both for the short term and long term
- How to challenge your thoughts about dieting and what a healthy lifestyle means
- The practical steps you can take to set yourself up for success with your new mentality
- How to take action with manageable changes to your diet and activity levels to maximize your metabolism for the long term!