

START HERE

A Beginner's Guide to **Metabolic Health**

Your health is more in your control than you've been told. This is where you start learning how.

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The purpose of this document is to introduce the concept of metabolic health and why it matters. It's meant to pique your curiosity about a topic that could transform your life, introducing you to a learning journey that could be not only enormously beneficial, but immensely exciting and fun.

Who am I?

My name is Dr. Nicholas Norwitz, MD, PhD. I graduated valedictorian from Dartmouth College with a major in cell biology and biochemistry before completing my Ph.D. in human metabolism at Oxford and my M.D. at Harvard.

I was introduced to metabolic health not through school, but through life.

During my graduate studies, I became sick. And despite having access to the best conventional medicine had to offer, conventional approaches were not able to heal me.

Instead, what saved my life was going back to the fundamentals: understanding how my body worked and how I could use that understanding of biology and metabolism to reverse my disease.

My inflammatory bowel disease, which had me spending many days in intensive care, is now in remission and has been for seven years.

But the most remarkable thing about my story is that it's not at all unique.

As I completed my Ph.D. and went through medical school, I began to recognize a pattern. People became desperate. Their chronic diseases weren't being adequately managed by conventional approaches, so they tried something outside the ordinary, and it worked. They found a new life they never could have dreamed of before.

I encountered people with schizophrenia, severe depression, Crohn's disease, lupus, epilepsy, diabetes, severe obesity, and Parkinson's disease who experienced massive improvements, and in some cases, remission.

It's my belief that we can make these outliers the norm. And the person who has the power to help make that so is *you*.

A note on reading: [red text](#) is a link to more — the studies, videos, and articles behind each claim.



SCAN TO WATCH

Nick's story: Why I
Quit Being a Doctor

A Teaser and Warm-Up

Let's start with three fast facts drawn from the scientific literature that'll hopefully pique your interest.

1 Eat more calories to lose weight

There are ways to trick your metabolism so that you can eat more calories and lose weight. For example, specific dietary patterns increase certain hormones that tell your fat cells to burn more energy. Even [in controlled human trials](#), using these approaches enables participants to eat 500 to 600 more calories per day without gaining weight, or even while losing weight. I've tried this on myself, and it's scary how well it works.

2 Eat bacon and eggs for heart health

You've probably been told oatmeal is a healthy breakfast and that bacon and eggs are high in saturated fat and cholesterol and will harm your heart. This is one of those oversimplified myths that itself is harmful. For example, in a recent [six-month randomized controlled weight-loss trial](#), researchers had people with obesity eat a high-fat, low-carb ketogenic diet, a Mediterranean diet, or a low-fat plant-based diet.

Even though the ketogenic diet had **7-times more saturated fat and 46-times more cholesterol** than the low-fat plant-based diet, it led to greater improvements in markers of liver and heart health, including blood sugar, liver fat, inflammation, and insulin resistance. Not only that, the low-carb, high-fat ketogenic diet (including breakfasts like bacon, eggs, and sausage) still lowered LDL cholesterol as much as the low-fat plant-based diet (including breakfasts like oatmeal with fruit).

3 Build muscle to protect your brain

Muscle isn't just for picking up heavy objects. Muscles are hormone factories, just like your thyroid or your adrenal glands. Muscles produce many signaling molecules that can travel to your brain, improve learning and memory, and may even protect against dementia. In fact, [in twins](#), the twin with more muscular power tends to show slower cognitive decline and larger brain volume later in life.

What is metabolic health? And how do you measure it?

Think of your body like a car. Metabolic health is a term for the health and functionality of the engine, the gears, basically everything that goes on inside the car that allows it to run.

Sometimes errors in metabolic health will show up on a lab report, like warning lights on your dashboard. Other times, they can be inferred from how well your car is running, or not.

There are a few key terms that will show up again and again in the metabolic health space that you should know, so let's define them.

Inflammation

Inflammation refers to your body's immune system becoming chronically overactive and releasing inflammatory molecules. It's almost like persistently revving your engine, creating excess heat and wear over time.

Chronic low-grade inflammation can contribute to the deterioration of organ systems throughout your body, including your liver, heart, muscles, and even your brain. Sometimes inflammation manifests as particular diseases, including inflammatory bowel disease and certain autoimmune conditions. But many people also live with lower-grade systemic inflammation without having an overt inflammatory disease.

DASHBOARD MARKER

One useful dashboard marker is **high-sensitivity C-reactive protein, or hs-CRP**, which can be measured with a blood test. Generally speaking, an hs-CRP below 1 mg/L is considered low cardiovascular risk, 1 to 3 mg/L intermediate risk, and above 3 mg/L higher risk.

Insulin resistance

Then there's insulin resistance. This is arguably the most misunderstood buzzword in the metabolic health space. And when I say misunderstood, I mean there's a decent chance your doctor doesn't fully appreciate the nuance.

But if you can give me your attention for just two minutes and understand what follows, you'll understand one of the most important concepts in metabolic health better than most doctors.

The truth is that **insulin resistance is more complicated than the name implies**. It sounds like every organ and signaling pathway in your body simply becomes resistant to insulin. That's not exactly what happens.

As you develop obesity, fat cells can swell and become dysfunctional. Certain insulin-signaling pathways, including those in your muscles and liver, become less responsive to insulin. Your pancreas then tries to compensate by pumping out more insulin.

So, particularly early in insulin resistance, blood insulin levels are typically **high**.

Now, if your pancreas could simply secrete more insulin and perfectly compensate for insulin resistance, we probably wouldn't have much of a problem.

But here's the issue: **insulin resistance is selective**.

Some pathways become more resistant to insulin while others remain relatively sensitive. And that creates metabolic chaos.

Consider three things insulin normally does after you eat:

- It tells your muscles to take up glucose from your blood, burning it for energy.
- It tells your liver to suppress its own glucose production because you've just eaten and don't need more glucose dumped into your bloodstream.
- And insulin tells your liver to make some of the carbs you just ate into new fat.

In insulin resistance, those pathways don't become impaired to the same degree.

So imagine you eat a bowl of oatmeal. Glucose enters your bloodstream, but your muscles aren't responding to insulin as effectively, so glucose clearance is impaired. At the same time, your liver may not adequately suppress its own glucose production.

Your pancreas sees the problem and responds by releasing even more insulin.

Meanwhile, some of insulin's signals promoting fat synthesis in the liver can remain relatively intact. So now you have elevated insulin, impaired glucose disposal, inappropriate hepatic glucose production, and increased pressure toward fat production.

In other words, your liver can end up spilling both excess sugar and fat into your bloodstream.

It's almost like your body is trying to make a metabolic milkshake.

This is dangerous. But the solution is also pretty obvious: remove the thing that stimulates insulin release, which is primarily dietary carbohydrates, particularly sugars, sweets, and starches like pasta and bagels.

And that doesn't mean you can't have any of these things ever. It just means that in the body you're currently living in, one that is insulin resistant, your metabolism is disadvantaged at handling them. So the more you can restrict them, the more you give your body a chance to heal.

Measuring insulin resistance

Measuring insulin resistance comes in many forms. The simplest way is probably a fasting insulin level. If you're insulin resistant, your fasting insulin will often be elevated. Targeting a **fasting insulin below about 7 μ U/mL** is probably a reasonable goal.

If your doctor is unwilling to order this, you can also get clues about insulin resistance from a standard lipid panel.

THE LIPID-PANEL FINGERPRINT

Specifically, if your **triglycerides are above 100 mg/dL and your HDL is below 50 mg/dL for a woman or below 40 mg/dL for a man**, that pattern is suggestive of insulin resistance.

If you understand this section on insulin resistance, then you understand one of the most popular and important topics in metabolic health better than most doctors.

This is only the tip of the iceberg. I'm just introducing you to some basic concepts about how your body works that are absolutely actionable and solvable.

Metabolic health scorecard

To give you a sense of your starting point, here is a metabolic health marker scorecard. Mark your scores in three categories: accomplished, needs work, or unknown. I'm guessing a lot of you are going to be in the unknown category to start. Simply take note of this and understand that this is a learning tool, not a diagnostic test.

	MARKER	TARGET	ACCOMPLISHED	NEEDS WORK	UNKNOWN
1	Blood pressure	<120/80 mmHg	☐	☐	☐
2	Fasting insulin	<7 µIU/mL	☐	☐	☐
3	Triglycerides	<100 mg/dL	☐	☐	☐
4	HDL cholesterol	≥40 mg/dL for men, ≥50 mg/dL for women	☐	☐	☐
5	Fasting glucose or HbA1c	<100 mg/dL or <5.7%	☐	☐	☐
6	hs-CRP (inflammation)	<1.0 mg/L	☐	☐	☐
7	Waist-to-height ratio (WHtR)	<0.50	☐	☐	☐

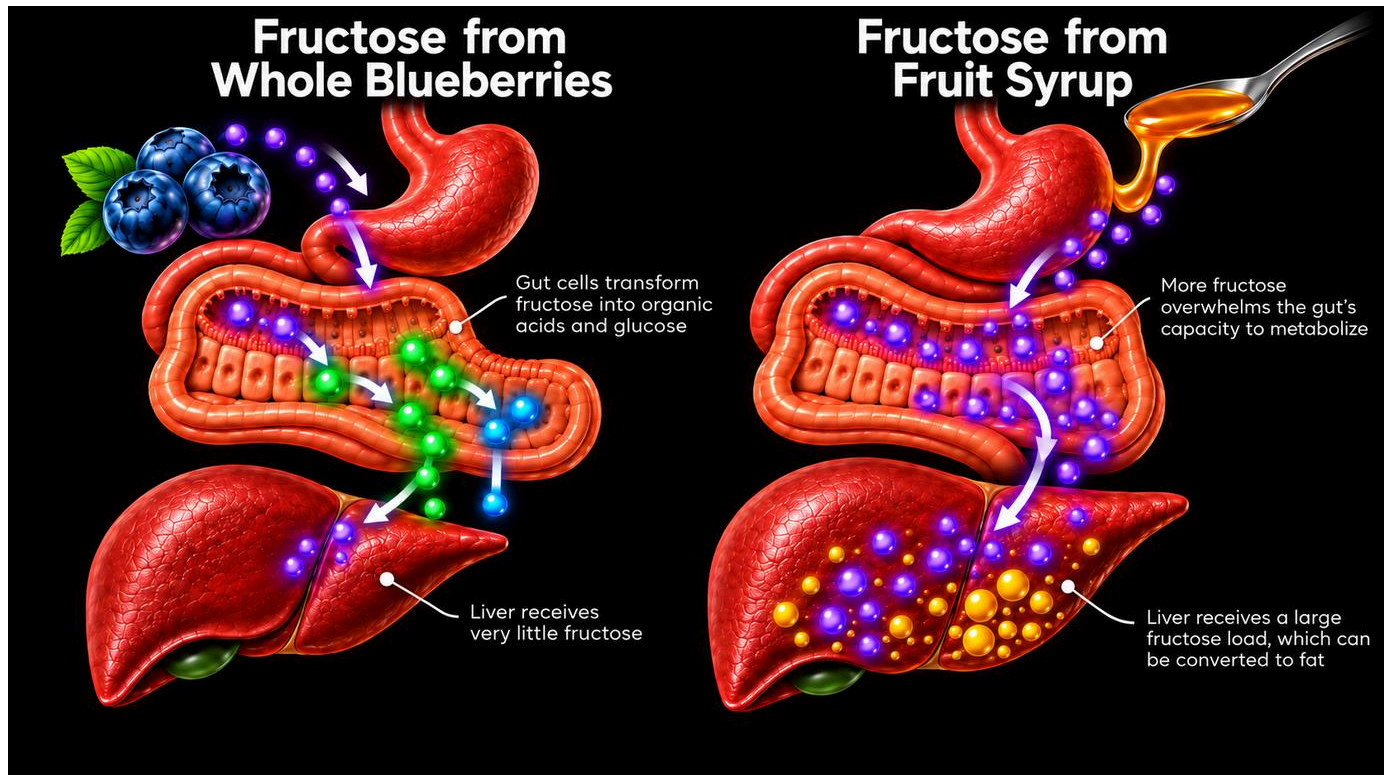
IN PRACTICE

Putting Metabolic Health in Context

The goal of this section is to put some of this knowledge into practical context by making a few direct comparisons between food choices you can make, or how those same foods might operate differently in different contexts.

Fruit, fructose and biological alchemy

What happens when you eat fructose from blueberries versus fructose from syrup?



When you eat it from the blueberries, the food matrix of the blueberries slows digestion and trickles the sugar into your small intestine. The small intestine then does some [biochemical alchemy](#) and transforms much of the fructose into other molecules before it gets to the liver.

In effect, your gut shields the liver from a large fructose load.

With the syrup, it's different. The rapid delivery and higher dose can overwhelm the small intestine's capacity to transform fructose.

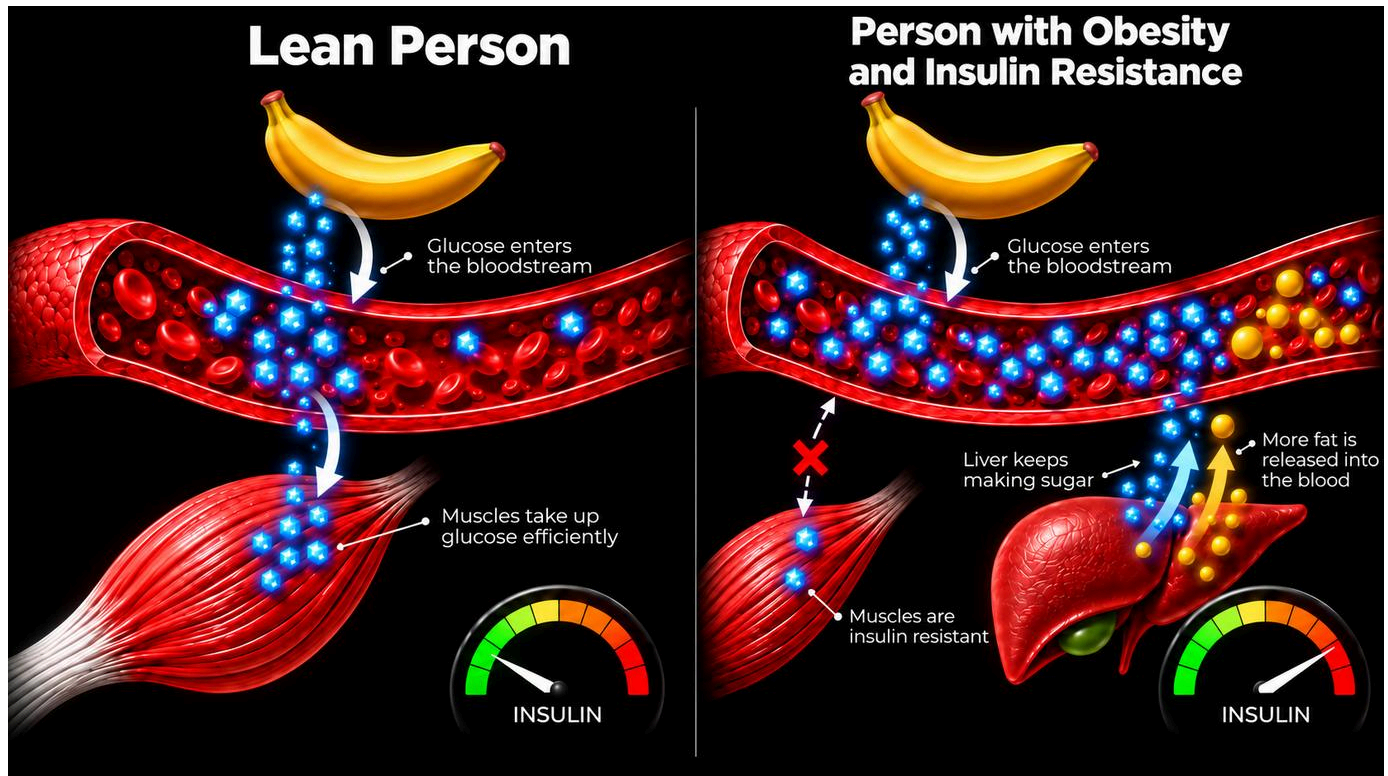
So more fructose hits the liver, and there it can drive the generation of new fat, which can contribute to fatty liver and metabolic dysfunction.

IMPLICATION

We tend to fixate on individual nutrients, like fructose. But how a nutrient is delivered into the body can matter as much as, or more than, the molecule itself. The same principle applies to saturated fat: it can behave differently depending on whether it comes from a milkshake or a steak. Or polyunsaturated fat: it can behave differently depending on whether it comes from refined vegetable oil or from a whole walnut. This is why it's so important to focus not just on individual nutrients, but on eating a primarily whole-food diet.

The two banana problem

What happens when a lean person and a person with obesity and insulin resistance each eat a banana?



Well, in the lean person, the sugars from the banana move quickly into the blood and then into muscles to be used as energy.

But in a person with obesity and insulin resistance, something very different happens.

1 Muscles are insulin resistant, so they don't efficiently take up sugar, meaning it lingers in the bloodstream. In the liver, things are worse.

2 Insulin resistance means the liver doesn't get the memo to stop making its own sugar, so it spills more sugar into the blood.

3 By contrast, the fat-generation pathway gets overstimulated, like the body is biologically yelling, "Make more fat!"

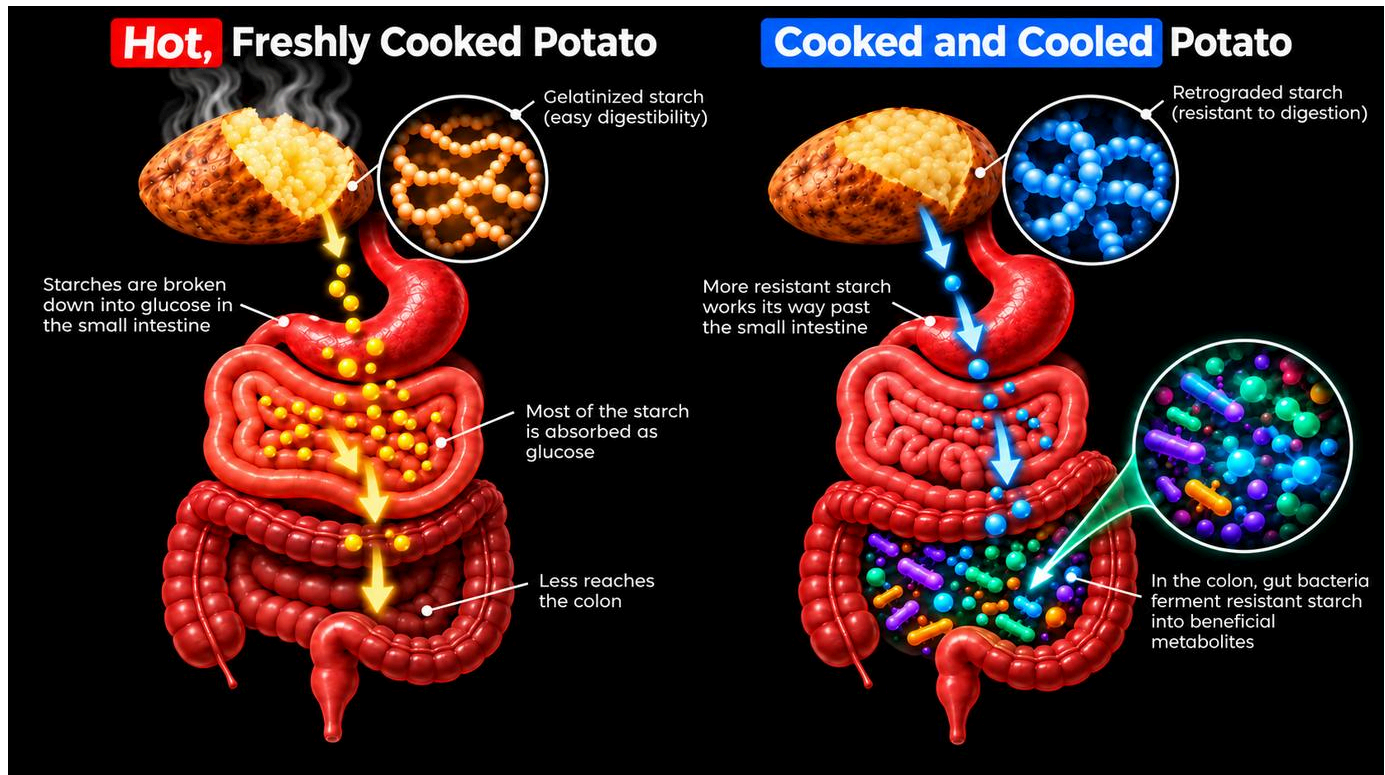
The ultimate result is that sugar lingers in the blood, while the liver is dumping out more sugar and fat, like it's trying to make a milkshake in your bloodstream.

IMPLICATION

Certain foods get a health halo they don't necessarily deserve. Unlike the blueberry we met above, which is much lower in sugar overall, a banana can be relatively rich in sugar. Lean, insulin-sensitive people can generally handle this well, but if you have obesity or insulin resistance, a banana may be a suboptimal choice. When evaluating whether something is healthy, you need to consider not just the properties of the food itself, but also your personal metabolic state.

Hot potato, cold potato

What happens when you eat a hot potato versus a potato that's been cooked and cooled?



Well, during the cooling process, some of the starch in the potato undergoes what's known as "retrogradation," which is a fancy word for the starch chains reorganizing into these crystal-like structures that your digestive enzymes have difficulty accessing.

Think of your digestive enzymes like fingers trying to pull apart a wire. Retrogradation is like knotting that wire up really tight.

As a result, that resistant starch makes it into your colon, where your gut bacteria can ferment it and produce metabolites that may have some profound effects on health.

For example, in [one calorie-controlled human trial](#), 40 g/day of resistant starch significantly reduced visceral fat, the inflammatory fat stored around your abdominal organs that contributes to the classic beer gut.

Sometimes leftovers get an upgrade.

IMPLICATION

This doesn't mean a cooled baked potato is suddenly a massive belly-fat burner. What it does show is that small adjustments can nudge your metabolism in the right direction, and those small changes can add up over time. Understanding what those adjustments are, and how to implement them consistently, can ultimately have a meaningful impact.

KEEP GOING

More (Long-Form) Learning Resources

The goal is to make the learning process fun. So, if your interest is piqued and you're feeling motivated to learn more, here are some free learning resources for you, including three videos and three podcasts you can listen to.

VIDEOS



The Gut Health Trick I Wish I Knew 10 Years Ago

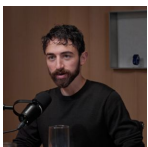


How to Reverse Heart Disease in 1 Year (Proven in RCT)



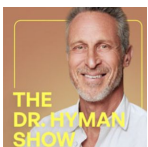
I Compared Every Popular Caffeine Source. Here's What I Learned

PODCASTS



What You're Getting Wrong About Metabolism, And How to Fix It

WHOOP Podcast



Rethinking Cholesterol and Cardiovascular Risk

The Dr. Hyman Show



Don't Take Omega-3 Until You Know This

The Neuro Experience

How to live your life like a scientist

As you embark on your metabolic health journey, you'll learn a lot of information, and the overarching question will be: *How do I apply this?*

In some cases, there'll be explicit tips. But there's something more powerful I want you to learn, which is how to live your life like a scientist.

We often think about "the science" as a body of work or an institution. But science is a process—and it's a process that we all have the right to exercise.

Science is about evolving your model of the world, or some corner of it, including your health. It's about taking what you think you understand, developing ideas about it, and then poking those ideas until they break so your model evolves.

More fundamentally, there are 4 steps:

Develop an objective → Hypothesize → Test → Iterate

1 Develop an objective Something you want to improve. For example, it could be your blood pressure.	2 Hypothesize Something like: the dietary nitrates in beetroot could lower my blood pressure.	3 Test Eat beets every day for two weeks and measure your blood pressure. That is your experiment. You're applying the scientific method to your own body as a lab.	4 Iterate The magic sauce. It's not about one experiment and being done. It's about living a life that is a process of scientific self-exploration.
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And you can do this for almost any variable, those involving biomarkers, as well as those involving subjective experiences like physical performance or mental health.

It doesn't mean every experiment is going to produce improvements in your health or transform your life. But cumulatively, those lessons, those learnings about your body, create an inevitable stepwise progression. Rather than having your health slowly slip away from you passively, like so many of us do, there is a gradual uptrend, getting healthier and healthier over time.

That's how I choose to live. And when I see people learn to adopt that lifestyle—and find pleasure in it—those are the people I know will live long, healthy, and happy lives.

WHY I SAY IT

Stay Curious.

It's not just a tag-line. It's the formula for good health.

Metabolic health is best practiced in communities.

So, on the following pages, you'll find two activities: a **quiz you can give to your family** and a **scavenger hunt for the grocery store**.

Welcome to the beginning of your metabolic health journey.

Family quiz

Five questions to try on the people you eat dinner with. Answers are at the end of the guide.

1 What percentage of American adults are considered metabolically healthy?

- A About 12%
 - B About 35%
 - C About 60%
 - D About 85%
-

2 Approximately how many mitochondria are there in the human body?

- A 10 million
 - B 10 billion
 - C 10 trillion
 - D A quadrillion
-

3 Which of the following foods is particularly rich in inulin, a type of prebiotic fiber?

- A Apples
 - B Brown rice
 - C Jerusalem artichoke
 - D Blueberries
-

4 Which of the following is not associated with increased longevity?

- A Having a lower body temperature
 - B Having lower blood insulin levels
 - C Maintaining strong social relationships
 - D Low cholesterol
-

5 Which activity can help lower your blood sugar after a meal?

- A Taking a nap
- B Drinking more water
- C Going for a walk
- D Taking a cold shower

Grocery store scavenger hunt

This scavenger hunt is designed to be played **in a group**, and there are two ways to play:

Option 1: Race the clock. Set a timer for **15 or 30 minutes**. Whoever completes the most items on the list within that time, including bonus points, wins.

Option 2: Race to the finish. The first person to complete the **entire scavenger hunt** wins.

Including bonus points, there are **12 possible points** up for grabs. *Ready, set, go!*

1 Find two hidden sugars in one food

Find a packaged food where two 'hidden' sugars appear in the ingredient list under a name other than simply "sugar." Here are some hints. Look for:

- Words ending in "-ose", like fructose, glucose, dextrose, maltose, or sucrose
- Anything containing "syrup," like corn syrup, rice syrup, maple syrup, or malt syrup
- Honey, agave nectar, molasses, fruit juice concentrate, evaporated cane juice, or malt extract

2 Find a protein trap

Find something labeled "high protein" or marketed as a protein food that actually contains fewer than 10 grams of protein per serving.

+1 bonus point if sugar grams are higher than protein grams.

3 Build a metabolic health meal for under \$10

Pick three foods that together:

- Cost less than **\$10**
- Include a source of **healthy fats**
- Contain **nothing artificial**
- Provide at least **18 grams of protein**
- Contain **fewer than 7 ingredients total**
- Would genuinely **fill you up**

And, most importantly, make something you'd actually enjoy eating. The challenge is to defend your choices.

4 Find three different fermented foods

Find three different fermented foods. These could include kefir, kimchi, sauerkraut, or yogurt with live cultures. *Hint: Look in the refrigerated section for products containing live or active cultures.*

5 Find a nitric oxide booster

Find a food that can help your body produce nitric oxide, a molecule that helps your blood vessels relax and improves blood flow. *Hint: One of the best answers might be purple.*

6 Find the ingredient-list monster

Find a packaged food with 24 or more ingredients. Whoever finds the food with the most ingredients wins.

7 Find the “natural” imposter

Find a food labeled “natural” that is decidedly not very natural.

The FDA does not have a formal regulatory definition of “natural,” and the term certainly doesn’t mean healthy, minimally processed, or free of added sugar.

Whoever finds the least healthy food labeled “natural” wins. Decide the winner by group vote.

8 Find the potassium champion

Find a food with more potassium per serving than a banana. Bananas have somehow won the potassium marketing war, even though plenty of foods contain more potassium. Whoever finds the food with the most potassium per serving wins.

9 Find a yogurt without added sugar

Find a yogurt containing **no added sugar**. Check the ingredients list.

+1 bonus point if you find a yogurt with less than 7 grams of total sugar per serving, and where grams of protein are at least twice that of grams of carbohydrates.

10 Find the ultra-processed doppelgänger

Find two products that are supposed to be essentially the same food, but one has at least 8 more ingredients than the other. Biggest ingredient gap wins.

Answers

1 A. About 12%

One widely cited analysis estimated that only about 12% of U.S. adults met all the criteria used for optimal metabolic health, including healthy blood sugar, blood pressure, triglycerides, HDL cholesterol, and waist circumference.

2 D. Roughly a quadrillion

Your cells collectively contain an extraordinary number of mitochondria, often estimated on the order of a quadrillion (10^{15}). For perspective, if you counted one every second, it would take you more than 30 million years to count them all.

3 C. Jerusalem artichoke

Jerusalem artichokes, also called sunchokes, are exceptionally rich in inulin. Inulin is a fermentable prebiotic fiber that feeds certain gut bacteria and can influence how the body handles nutrients. [There are interesting data](#) showing that inulin, a fiber composed of chains of fructose molecules with a glucose at one end, can [change how the intestines process fructose](#). Instead of more of that fructose reaching the liver as sugar, gut microbes can redirect some of its carbon into other metabolites, including amino acids and antioxidant-related compounds. The result is less fructose reaching the liver, with potential benefits for liver and cardiovascular health.

4 D. Low cholesterol

This is a complicated and controversial topic, but typically, low cholesterol levels are associated with increased mortality. In fact, even in populations with genetic mutations that lower cholesterol to exceptionally low levels, which in some cases reduces the risk of cardiovascular disease, there appears to be a trade-off because these individuals do not necessarily have increased longevity. And as an interesting aside, [a report from last year](#) on the oldest verified woman, [who lived to 117](#), found that she actually had what would be considered high cholesterol levels.

5 C. Going for a walk

When your muscles contract, they can take up glucose from the bloodstream through mechanisms that are partly independent of insulin. Even a relatively short walk after eating can reduce the size of the post-meal glucose spike.

KEEP GOING

Make metabolic health mainstream.

Three letters a week on Substack, deep dives on YouTube, and a community that reads the citations.

NEWSLETTER

staycuriousmetabolism.com

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This guide is for education and curiosity, not medical advice. Talk to your clinician before changing your diet, exercise, or medications.