



A Practical Field Guide to Bloodwork Interpretation

— Dr. Zain Hakeem

Introduction

I CREATED THIS GUIDE BASED on a conversation I had with one of my patients. She's super healthy, really on top of her stuff, and she'd ordered one of those big direct-to-consumer blood panels. They promise to unlock all your biological secrets and help you optimize everything. But what actually happens when you get the results?

She was trying to do the absolute right thing for her health, trying to get information and figure out how to improve. So she's scrolling through the report and sees a red flag - low leptin. And immediately, her mind starts racing. She's thinking, "Wait, leptin? Isn't that the satiety hormone? Is my metabolism broken? Do I need some kind of special supplement?"

So she texted me asking what it meant.

That moment is the reason this guide exists.

A lot of people are doing this now, and just like her, with the best of intentions. They are trying to be proactive. They are trying to catch problems early. They are trying to take their health seriously.

They are doing what sounds intelligent and responsible: getting more information.

What they actually get is a giant report full of numbers, flags, ranges, and unfamiliar terms, and then they are left alone trying to make sense of it. One value is low. Another is a little high. A third is technically "abnormal," but only barely. Many are "normal", but not in the "optimal" range.

And so, they start doing what she did - googling, asking AI, reading the blurb on the app. And, like she did for her "low leptin" result, you'll find a neat, tidy story about what that lab is and how it works. It reminds me of a favorite quote: "For any complex question, there is a solution that is simple, elegant, beautiful, and wrong."

It takes doctors years to learn how to interpret bloodwork correctly, and frankly, many still don't do it very well¹. Part of my own main business, thoughtful concierge medical care, is providing expert interpretation. The rest of this paper will cover how I do it, but frankly what most readers should take away is the *need* for true medical expertise in order to correctly interpret results, because bloodwork interpretation is actually quite complex, far more than just looking at the ranges and what's high or low, optimal or non-optimal.

“For any complex question, there is a solution that is simple, elegant, beautiful, and wrong.”



“Just coloring a number red doesn’t make it important.”

After all, just coloring a number red doesn't make it important. It's what it *means* that makes it relevant or irrelevant. That, after all, was my patient's question: "What does this *mean*?" One of the most common mistakes people make with these large blood panels is assuming that every abnormal result deserves an interpretation, a theory, and a plan.

Most of the time, it does not.

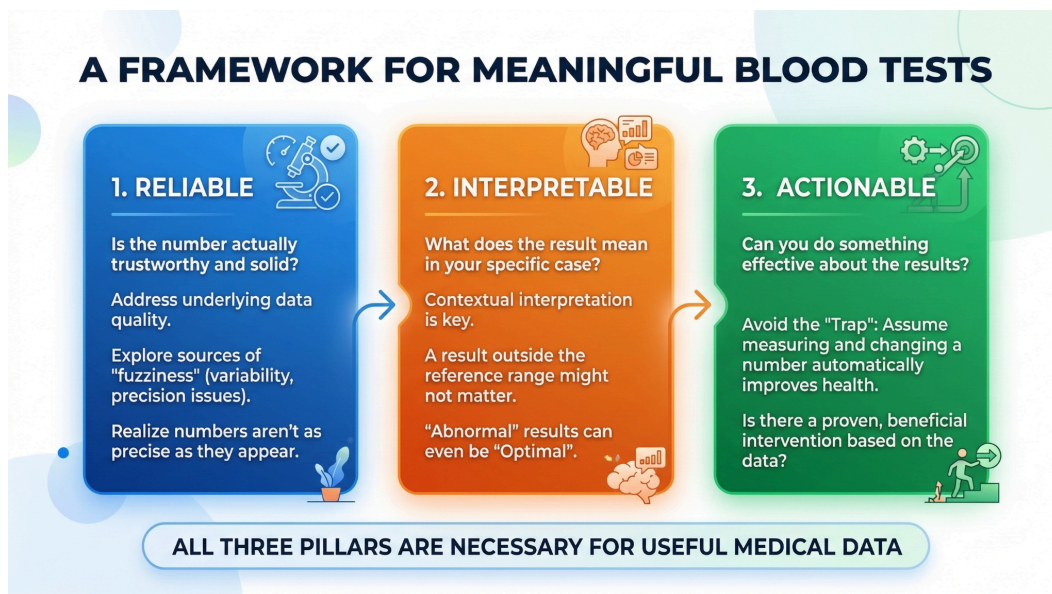
Most of the time, the result is *meaningless*.

That's a strong stance, but this paper is going to teach you to think about your bloodwork the way a great doctor would, though we all know standard medicine doesn't often live up to this standard either. I'll teach you my thought process by going through a framework of 3 things a blood test needs in order to be meaningful.

First, the test has to be reliable. In other words, can you actually trust that the number is solid enough to mean anything at all? Most people naturally assume that the numbers on the report are precise. But they are actually surprisingly fuzzy (as I proved by testing myself). We'll explore the types of fuzziness and the sources of it, and how to deal with it.

Second, the test has to be interpretable. Even if the number is real, what does it actually mean in your case? A result can be outside the reference range and still not matter. Actually, even stranger - it's entirely possible for a result to be "abnormal", and actually be *optimal* for your body. We'll discuss all the factors that go into test interpretation.

Third, the test has to be actionable. Even if the result is real, and even if it does mean something, it's useless if there's nothing you can do about it. This is one of the biggest traps in modern health culture. People assume that if a number can be measured, and if it's





associated with some problem, then changing that number must improve health. That is often false^[2]. I'll show how and why, and teach you how to tell if it's true for *your* results.

So, a blood test needs to be reliable, interpretable, and actionable. If it fails any one of those, the result is frankly meaningless and clinically uninterpretable. That's the framework for what we'll be exploring in this guide, ending by considering what it looks like when that standard is met.

Let's start with the first question:
Can you actually trust the number?

“A blood test needs to be reliable, interpretable, and actionable. If it fails any one of those, the result is ... meaningless”

Reliability

THE FIRST ISSUE IS RELIABILITY.

Before you can decide what a result means, you have to know what the "error bars" are on the number itself. If your test result for some lab is 24, is that plus or minus 0.05, or plus or minus 5?

Most people assume that the value on the report is exact. It is not. All measurements have some error margin, it's just a question of how much.

With any lab test, there are two major sources of variability, and in both cases, the variance they create is larger than most people realize (even doctors).

The first source of variance is from the lab test machines themselves. Labs are not infinitely precise. Assays vary. Machines vary. Processing varies. Even when the lab is doing everything correctly, there is some ordinary measurement noise built in.

I demonstrated this on myself in a very simple way. I had 15 tubes of blood drawn from my own vein in a single puncture. So, single vein, single moment, 15 tubes. I sent all of those to the same lab under different names.

The results varied, and by quite a lot more than I expected. Bicarb ranged from 21 to 26. Potassium ranged from 4.5 to 5.0. And Testosterone ranged from 454.0 to 498.0 (more than 40 points). It's worth noting that the actual machine variance is more than this - with only 15 samples, it's unlikely I saw the full range of possible variability.

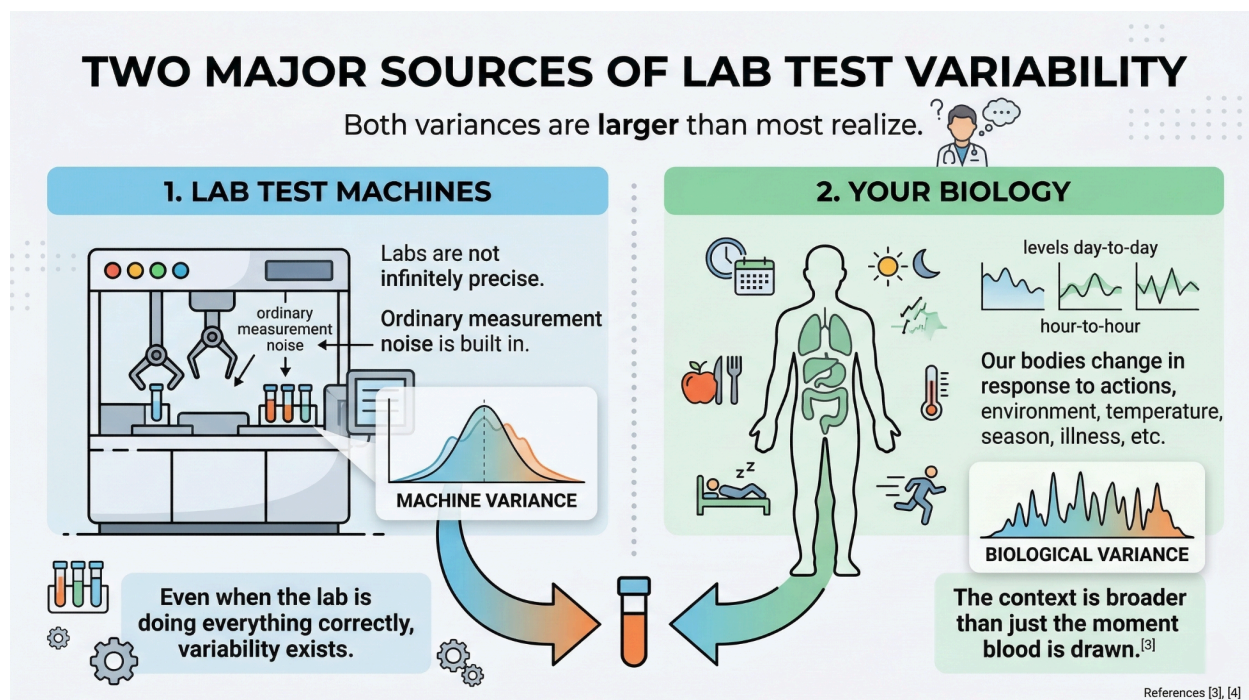
“When a doctor sees a result, he or she should think of it as ‘plus or minus.’ So should you.”



This is common, normal, and expected for any lab (see footnote 8). Remember, this wasn't different blood draws on different days. It was all the same blood, drawn from the same vein at one time. So if your single blood test is slightly below "optimum", how do you know what the "real" number is? You don't. You can't. No one can, because the machine itself is not that accurate.

It's important to note that some tests have tighter ranges than others. My A1c only varied by plus or minus 0.1 (5.1 - 5.3). That's not deadly precise, but it's much better than testosterone!

The second source of variance comes from your biology^{[3],[4]}. Your levels aren't the same day to day, or even hour to hour. To complete my experiment, I had more blood drawn - one before a workout, and one after. My testosterone shot up from 381 to 536 - more than 150 points! Another example, LDL and ApoB are known to fluctuate by about 10-16% seasonally^[5], so blood drawn 6 months apart can be dramatically different based on the natural yearly cycle^[6]. Our bodies change in response to actions, environment, temperature, season, illness, etc. The context, in other words, is broader than just the moment the blood is drawn.



So when two results are different, that difference does not automatically mean something important changed. Sometimes it does. But quite often, the difference is merely some combination of natural biological variation plus lab measurement imprecision.

This is one of the biggest reasons people get misled by repeat testing. They think they are tracking something with far more precision than the test actually allows.

And these giant wellness panels make the problem worse. The more values you measure, the more opportunities there are for small fluctuations, borderline abnormalities, and weak out-of-range results to look significant. If you check 20 labs, you have a 64% likelihood of an



abnormality by chance alone; if you check 50, that goes up to 92%^[7]. Then they promote the idea of "optimal" ranges, making it even easier to feel "abnormal", but those ranges are often narrow enough to be accounted for merely the lab variance alone.

So reliability is first for a reason. When a doctor sees a result, he or she should think of it as "plus or minus". So should you. A rough rule of thumb is plus or minus 20%, though it varies by which test result exactly. If the lab is off by MORE than the expected variance (RCV), then you may consider it a reliable indication of a true change, otherwise, it's just noise^[8].

That leads to the next question.

What does "abnormal" actually mean?

Interpretation

THIS IS WHERE THINGS GET much more complicated.

A result can be accurate, and still not mean what you think it means. In fact, this is where most people, including even doctors, go wrong. They look at the number, compare it to the range printed on the page, and assume they now know whether something is good or bad. They don't.

The first problem is the range itself. Most people treat the lab range as though it's some kind of universal truth, but it isn't. Most of the time, it's a statistical range. It tells you where a certain percentage of not-actively-ill people fall^{[9],[10]}. That's all. It does not tell you what is ideal for your body. It does not tell you what is dangerous. It does not tell you what is optimal. It doesn't even necessarily tell you what is healthy.

This is one of the places where direct-to-consumer panels create a lot of confusion. They often take a normal lab range and then invent an "optimal" range inside it.

Sometimes they shrink it dramatically. Sometimes they shift it based on weak evidence, theory, or pure marketing. A result can be perfectly normal, get labeled "non-optimal," and suddenly the patient feels as though they have discovered a problem, when in fact, the company *invented* the problem.

Even a genuinely abnormal result may not mean disease.

That sounds strange at first, but it's very common in medicine. A simple example is hemoglobin. An abnormally high hemoglobin can indicate someone with untreated sleep

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apnea, whose body is adapting to the low oxygen they have when they sleep^[11]. It can also be seen in elite athletes who train at high altitude, because their body is also adapting to low oxygen, but for a totally different reason. If you "fix" the athlete's blood count, they won't perform as well. If you "fix" the sleep apnea patient's blood count, making it "more optimal" by pulling out blood, their organs could get less oxygen and suffer damage when they sleep. By contrast, if you treat the sleep apnea, the blood count will go back to normal as well, but without the damage.

“This is why doctors are supposed to interpret bloodwork in context, not in isolation. Context is necessary for interpretability”

As we'll see later, *how* you fix a lab matters much more than just fixing the lab.

To finish our example, a low blood count may indicate anemia, from low iron or genetic diseases, or many other causes. But it can also be seen in extreme athletes who exercise so much that their bodies adapt to the "exercising" state, rather than the "resting" state. At rest, their veins hold on to more water, so their muscles can be rapidly hydrated when they start exercising. This dilutes their blood count, making it look low,

even though it's more optimal for their body.

This is why doctors are supposed to interpret bloodwork in context, not in isolation, and it's why the "interpretation" from these blood panel companies is complete nonsense. Context is necessary for interpretability, because it includes symptoms, history, what problem you were trying to investigate, what else is happening in your body, and whether the test was ordered for a good reason in the first place.

That last point matters a lot.

A test is much more interpretable when it's being used to answer a real question.

If someone is exhausted, constipated, cold all the time, gaining weight, and their hair is thinning, then an abnormal TSH fits into a pattern. It helps complete a clinical picture. The lab result now has a job. It helps answer a specific question. But if a healthy person orders a giant panel, with no specific symptoms and no specific question, that same kind of clarity usually is not there. Many perfectly healthy people have TSH numbers outside the normal range^[12]. Endocrinologists debate endlessly the value of treating this^[13], because there aren't clear benefits when studied^[14].

“When you go fishing in a giant pool of numbers, you will catch strange things. That does not mean you have found a true problem.”



Checking a huge panel is just a fishing expedition. And when you go fishing in a giant pool of numbers, you will catch strange things. That does not mean you have found a true problem. It certainly doesn't mean you've found a fixable problem.

And this same issue shows up all over these panels.

Low-titer ANA is a good example. People see an abnormal ANA and panic because they know it has something to do with autoimmune disease. But low positive ANAs are common in healthy people. In the classic healthy-adult data, 31.7% of people were positive at 1:40, 13.3% at 1:80, and even 5% at 1:160. That's exactly why ANA is so easy to misuse. An abnormal

ANA by itself is only indicative of autoimmune disease about 11% of the time¹⁵¹. That means 89% of the time, without symptoms, it's a false positive, because it was unlikely before you tested. It's like running a pregnancy test on a man - it doesn't matter how accurate the test is, if it's positive, it's a false positive. The same is true for any medical test without specific symptoms. The less symptoms or context you have, the more likely a false positive becomes.

“This is where bad interpretation gets dressed up in scientific language. Weak associations, mechanistic stories, animal data, and a lot of confident writing can make a lab result sound far more meaningful than it really is.”

That's why interpretation is harder than people think. The blood test is not telling a story by itself. You have to decide, based on other factors, whether the story makes sense.

And there's yet another layer that makes the problem even harder. People often assume that if a marker is associated with something in a study, then that marker must be telling them something important about their own health. This is where bad interpretation gets dressed up in scientific language. Weak associations, mechanistic stories, animal data, and a lot of confident writing can make a lab result sound far more meaningful than it really is.

This is not just an influencer problem. Institutions do it. Medical writing does it. AI does it (because it was trained on other people doing it). A marker can be statistically associated with some outcome and still be clinically useless for you, because the signal might be weak, or the correlation confounded, or the correlation could be non-causal.

Importantly, an associated marker can be a compensation for a different problem (like the high blood count in sleep apnea). Remembering that possibility is crucial, because there will be great correlation with the disease, but fixing the lab will be harmful if the underlying issue is not fixed.

So interpretation is not just “is it high or low?”, as the corporate or AI interpretation would have you believe. You have to ask what the context is. What symptoms would go along with this? Why was it ordered? How strong is the evidence that it means anything in



someone with your history, meds, and lifestyle. Does the rest of the clinical picture support the interpretation?

Without those answers, a result can be technically real and still be clinically uninterpretable.

And even when the result is real, and even when the interpretation is correct, there is one more question that matters.

Can you actually do anything useful with it?

Actionability

THIS IS THE PART ALMOST everyone gets wrong. Doctors, influencers, even guidelines sometimes get this wrong.

People see an abnormal result, assume it means something, and then jump straight to trying to fix it. Regardless of the lab, whether it's cholesterol, MTHFR or mercury, the key insight for "fixing" any lab result is that the benefits follow from the *way* you fix it, not just the fact that you fixed it.

“Benefits follow from the *way* you fix it,
not just the fact that you fixed it.”

Even if a result is real, and even if the interpretation is correct, that still doesn't mean changing the number will improve your health. You can only guarantee improvement in health if there is a proven method that has been proven to improve outcomes as well as the number.

This is one of the biggest mistakes in modern medicine and one of the biggest mistakes in the health influencer world. They treat the lab as though it is the disease. Lower the bad number. Raise the good number. Move the marker into the "optimal" zone. Problem solved.

But it turns out that you can usually improve a number in several different ways. Some of those ways will actually hurt the patient, others are neutral, and some ways really will help the patient. And you need real, randomized controlled studies on outcomes to be able to tell the difference.

Consider high hemoglobin, as we discussed before. If the high hemoglobin is due to a genetic mutation (cancer), then treatment by drawing out the excess blood (phlebotomy) is very helpful^[6]. It's been shown to reduce the risk of clots and other damage. If, on the other hand, the high hemoglobin is due to sleep apnea, where it's compensating for low oxygen during sleep, then phlebotomy may harm the patient by creating low oxygen in their



organs. The number will look better while the patient is doing worse. But lowering the high hemoglobin by treating the sleep apnea, will benefit the patient in numerous ways.

Benefits accrue to the method and the context, not the lab itself.

A lab can be linked, even *strongly linked* to a disease, and still be a terrible treatment target.

That pattern shows up all over medicine. It's easy when we can identify a deeper cause for the abnormality, like in my cancer vs sleep apnea example above. But often, we don't fully understand the pathway.

“A lab can be linked, even *strongly linked* to a disease, and still be a terrible treatment target.”

An example of this is MTHFR / homocysteine. It's remarkable because it has actually been tested, multiple times, in high quality randomized controlled trials^{[17],[18],[19],[20],[21]}, and demonstrated no benefit ... and yet, you'll still see it discussed, measured, and "treated" all over the health optimization world, with long science-y

sounding explanations of metabolic pathways, all because the reasoning pattern of "improved number must mean improved outcomes" is so pervasive.

High homocysteine is strongly associated with cardiovascular risk. Infants born with rare genetic mutations that raise homocysteine develop childhood cardiovascular disease^[22] making it seem obvious that MTHFR genes, which also raise homocysteine (not to the same degree), or elevated homocysteine for any other reason, like insufficient b-vitamins, should be an ideal treatment target.

And this is where people get fooled. We do have randomized trials addressing this. B vitamins (vs placebo) lower homocysteine quite well. The number improves. But there was no change in cardiovascular disease or outcomes. The method of using b-vitamins was ineffective at changing the outcomes, even though it was very effective at changing the number.

The lesson is that *each* potential intervention regarding a blood result needs its own evidence of beneficial effect on the outcome. Even major blood tests are subject to this rule.

How many science news article headlines have you seen that claim some supplement, protocol, or drug "lowers your risk of heart disease", only to find that the study showed a lowering of LDL? It's as if LDL is heart disease. But in fact, the drug torcetrapib lowers LDL, by ~25% (and ApoB by ~15%), and raised HDL by 60+%. It also caused more heart attacks, and more deaths^{[23],[24]}. The numbers improved. The patients did worse.

“The numbers improved. The patients did worse.”

See appendix 1 for additional comments, and appendix 2 for another example, mercury toxicity.



In summary, seeing an abnormal lab, even if it's significantly abnormal enough to be real, and even if there's enough context to interpret it, doesn't tell you anything about what to do about it. Sometimes there might be a proven treatment. Sometimes you need to treat an underlying, different condition. And sometimes, you have to accept that there is no known useful action you can take.

And if that's the case, as it is with MTHFR / homocysteine, then what is the real value of checking your levels in the first place? There's nothing useful you can do about them. The one recommended intervention has been proven, in three separate RCTs, to have no benefit.

This is why it's important to think about actionability *before* you run the test. If there's no possible solution, then it's useless information.

The Annoying Placebo Effect

THERE IS ONE MORE REASON that the underlying, incorrect, "improved number must mean improved outcomes" assumption of broad blood panels continues to persist. It's because this process naturally generates a variety of positive stories, based on a predictable sequence of events, that are nonetheless scientifically incorrect.

Here we are dealing with a sensitive issue, and so I ask for your grace as I address it. Much of the time, these panels are drawn for what doctors call "nonspecific" symptoms. Brain fog, fatigue, nausea or IBS, etc. And these labs can feel like they are providing an explanation that the doctor "dismissed". And after a patient takes an action to improve the lab, they may very often feel better.

But very often, uncomfortably, that sense of feeling better subjectively is just the placebo effect of taking the action. The placebo effect is real, and is truly indistinguishable from a real effect (otherwise, it wouldn't really exist). Many people have a subconscious belief that they "would be able to tell" if it were "just placebo". I promise you, you can't.

Placebo effects have added strength in trained lifters^[25], treated pain from torn meniscus, equivalent to surgery^[26], lowered blood pressure^{[27],[28]}, caused psychedelic experiences^[29], treated depression^[30], PTSD^[31], and many other *profound* effects^[32], including bloodwork^[33]. And, interestingly, the placebo effect is *getting stronger over time*^{[34],[35]}.

“Many people have a subconscious belief that they ‘would be able to tell’ if it were ‘just placebo’. I promise you, you can't.”

The unfortunate thing is that the placebo effect also creates incorrect anecdotes about how someone "found" a cause for their issues and healed themselves, when "my doctor had given up". The healing was real, but it was the power of their mind and spirit, not the bloodwork, not the supplement.



And those anecdotes serve as advertising for the scientifically invalid process of doing these big blood panels, while the anecdotes of harm are hidden. If torcetrapib were used by an unknowing biohacker, and he had a heart attack because of the increased risk, he still wouldn't realize that it was the med which had caused it. He would assume (unless he read the RCT) he had the heart attack *in spite* of the medication, and look to find new, additional, potentially riskier ways of lowering his ApoB.

And so this process of positive anecdote generation from the placebo effect may actually harm patients who begin believing in the flawed assumption underlying the process of testing and "improving" blood results.

So, before we veer too far into bloodwork nihilism, let's consider the opposite case. When is bloodwork actually useful?

When Bloodwork Actually Helps

BY THIS POINT, IT would be easy for you to conclude that bloodwork is mostly pointless. That would be an overcorrection. Bloodwork is often very useful. The issue is that it becomes useful under narrower conditions than people assume when they order large panels designed to look comprehensive.

Imagine someone who has been tired for months. They're colder than usual. They have become more constipated. Their hair is thinning. They have gained some weight. None of these symptoms felt dramatic enough to force the issue, so they were explained away in the usual ways. Stress, poor sleep, kids, work, the weather, climate change ... then the TSH comes back at 20.

That situation is different from the ones we have been discussing throughout most of this guide. A TSH of 20 is not a tiny abnormality sitting right at the edge of expected lab variation. It's a substantial enough deviation that it deserves attention. It also fits a familiar clinical pattern. Symptoms that had seemed vague, disconnected, and easy to dismiss now fit together coherently. And there is a treatment that can improve the underlying condition.

This is what useful bloodwork looks like. The number is large enough to be taken seriously, the interpretation is strengthened by the clinical picture, and there is an action that can plausibly help the patient.

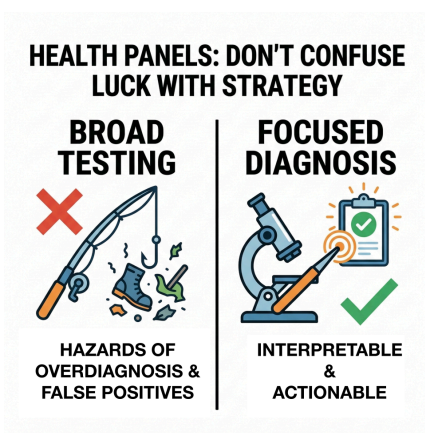
Sometimes people arrive there in a backward order. In an ideal sequence, the symptoms are recognized first, the doctor thinks through the differential diagnosis,

“A broad fishing expedition can still stumble onto a real diagnosis, but that doesn't make fishing a good strategy. It's just luck being mistaken for method.”



and the lab is ordered to clarify the question. In real life, patients often normalize symptoms for a long time. They adapt to them. They rationalize them. They stop seeing them clearly. A blood test may be the thing that causes them to reconsider what had slowly become normal. That is still a real use of bloodwork, even though the context was considered after the fact instead of before, as a doctor would.

This helps clarify the broader point. The problem with large wellness panels is not that they can never uncover something real. The problem is that when they do, people tend to treat the occasional useful finding as proof that the overall method is sound. But a few successes do not justify the harms of overdiagnosis, false positives, and fake "optimizations" that may be harmful. A broad fishing expedition can still stumble onto a real diagnosis, but that doesn't make fishing a good strategy. It's just luck being mistaken for method.



So bloodwork *can* be useful, but only when it clarifies a real question, supports a diagnosis that fits the patient, or points toward a response that improves the situation in some concrete way. That's a much more limited role than the role implied by the marketing language around "optimization," but it's also the only role that bloodwork can actually perform well.

Let's explore how a great doctor uses these constraints to make bloodwork useful.

How to interpret bloodwork like a (great) doctor

In 12 steps

1. **FIGURE OUT, SPECIFICALLY WHAT PROBLEM YOU'RE TRYING TO SOLVE.** If possible, find a way to measure that problem. Brain fog? Test reaction time, or recall time, or complete a cognitive creativity inventory. You may need to get creative, and often, it's just not possible, but try to find something objective to track. The pain scale is deeply flawed, but this is why it exists. The placebo effect is still possible with objective or pseudo-objective measures, but it is less.
2. **FIGURE OUT WHAT DIAGNOSES OR CONDITIONS COULD BE GOING ON** that would explain your symptoms. Sleep? Syphilis? Lupus? Side effects of other meds or supplements? Vitamin Deficiencies? This is where a lot of medical education goes - learning all the possible diseases and their symptoms so you can come up with a good list. Aim for at least 5 possibilities, in different categories: Blood Vessels, Infection, Autoimmune, Cancer, Degenerative (wear and tear), Nutrient Deficiency, Side Effects, Genetic, Allergy, Structural, Trauma, Toxins, Hormones, Environment.



3. FOR EACH OF THOSE POSSIBILITIES, CONSTRUCT A COMPELLING ARGUMENT for it and against it, listing reasons it is probably true, and reasons it probably isn't true. For instance, Syphilis, it's probably true because I forgot the condom that one time, and he could have been cheating on me. It's probably not true because I never had any symptoms. It probably is true, because sometimes there aren't any symptoms.
4. FOR EACH OF THOSE POSSIBILITIES, CREATE A GUESS ABOUT HOW LIKELY you think it is. Just guess, use your intuition. Medical training after med school is about creating thousands of hours of experience to hone exactly this intuition. This will be your pre-test probability.
5. LOOK AT THE TREATMENT OPTIONS for each of your possibilities.
 - a. If there are no treatment options, stop here.
 - b. Find randomized controlled trials demonstrating improvement in your specific problem from each possible treatment. Look specifically for a number called NNT (number needed to treat).
 - i. An LLM can help you find or calculate this. Use thinking or deep research and ask: "Using only randomized controlled trial data, what is the NNT for improving brain fog caused by syphilis using burberry root extract?"
 - c. Now, do a different search, for side effects. LLM search:
 - i. "What are the major side effects of burberry root extract, and what is the NNH (number needed to harm) for each of them (specifically, has anyone died or been seriously or permanently harmed, and if so how)?"
 - d. If the list of harms is pretty mild or minimal, you can consider the benefits.
 - i. If the harms are unknown, doctors would advise significant caution, but you need to determine your own willingness to take an unknown risk of death or permanent debility. This should be considered in the face of the known or proven benefits.
 - e. If the benefits are unknown or unproven, consider that you are risking harm for minimal assurance. If the harms are proven in studies to be mild or minimal, you could still proceed. But stories and anecdotal evidence *will not reveal the risk of harm*. See Appendix I.
6. CREATE A LIST OF TESTS that would be positive if the possible diagnosis is true, and negative if false. Look up the sensitivity and specificity of each of those tests.
7. GET THE TESTS DONE.
8. USE THE PRE-TEST PROBABILITY AND THE SENSITIVITY/SPECIFICITY information with an online calculator like rx-bayes: <https://rxbayes.com>
9. FIND THE POST-TEST PROBABILITY. If the test is positive, the PPV is your new probability. If it's negative, the NPV is your new probability.



- a. If you ran multiple tests for the same possible diagnosis, use your new post-test probability as the pre-test probability for the next test. Add the sensitivity and specificity as you did before, and find your new PPV or NPV (post-test probability). Repeat as needed.
- 10. LOOK AT YOUR LIST AGAIN. Did any of the updated probabilities become strong enough to act on? How likely would it have to be in order for you to take the chance on the risk/benefit profile of the treatment you have in mind? 70%? 90%? Again, for a safe treatment, you can go with lower probabilities.
- 11. PROCEED WITH TREATMENT.
- 12. RECHECK THE OBJECTIVE MEASUREMENT FROM STEP 1 to assess response. If there is no improvement, this argues that the probability should be lowered and other possible explanations considered, or that the treatment was ineffective for you, or that the dose wasn't high enough, or that it hasn't had enough time to take effect.

You can now see why the influencer/corporate version of “get your bloodwork checked” falls short of the standard of expert interpretation.

Final Thoughts

A BLOOD TEST IS MEANINGFUL only when it is reliable enough to trust, interpretable enough to make sense in context, and actionable in a way that improves something that matters.

That is a stricter standard than most people use when they look at their own labs. It's a stricter standard than most influencers use. It's a stricter standard than many apps, direct-to-consumer panel companies, and AI tools use. It's also a stricter standard than some doctors use. But that strictness is the only way for bloodwork to be clinically meaningful.

Without it, bloodwork becomes a machine for generating false certainty. Numbers are made to seem precise, interpretations easy. A mildly abnormal result, with no context, is made to look like a diagnosis. A weak association is promoted as a treatment target.

That's how people end up spending time, money, and emotional energy chasing results that never had much clinical meaning, unknowingly exposing themselves to potential harms in the process (like torcetrapib). It's also how they generate positive placebo stories that may have benefit for themselves, but harm someone else who believes in a flawed concept because of their placebo-driven anecdote.

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The purpose of this guide is to help you stop asking bloodwork to answer questions it is not equipped to answer. Bloodwork cannot tell you how to optimize your health. It cannot tell you what supplements to take, how to lose weight, or how to get more energy.

When it is used carefully, with the right expectations, it can be very valuable for diagnosing treatable diseases. But when it's used as a broad, decontextualized search for hidden “non-optimal” numbers, it just creates a proliferation of bullshit (a term I use here in the strict philosophical sense, by Professor Harry Frankfurt).

Hopefully now that you understand the true underlying complexity of bloodwork interpretation, you can better appreciate the value of true expert interpretation, and realize that most big “wellness” blood panels are unreliable, uninterpretable, and unactionable.

“A blood test is meaningful only when it is reliable enough to trust, interpretable enough to make sense in context, and actionable in a way that improves something that matters.”

Strange as it may seem, this is only the beginning of the problems with health “optimization”. If you would like to learn even deeper, check out the free deep-dive paper at: <https://riverrockmedical.com/illusion>

If bloodwork can only be used to diagnose problems, and can't help optimize health, then what *can* help us optimize our health?

What tools *do* work, if bloodwork doesn't?

RiverRock periodically runs a no-cost, live webinar, “An Evening With Dr.Z”, where we discuss exactly that.

Reserve your seat here: <https://riverrockmedical.com/briefing>



Appendix 1: Torcetrapib notes

Regarding the harms of torcetrapib, it's really worth noting that none of the harms would have been apparent without a randomized controlled trial. The drug *dramatically* improved all the lab values, but increased the risk of death overall by a relative 58%, and the risk of any cardiovascular event by a relative 25%. And yet, you would need to give 250 people the drug every day for 1.5 years to see ONE possible extra death (compared to placebo). Without the study and the placebo control, you could never possibly notice that risk.

If this were taken as a "biohack", people would be *raving* about the improvement in their labs, and there would be no possible way to notice that an extra 1 in 250 people were dying, and 1 in 83 were having extra heart attacks or strokes.

Appendix 2: Mercury

Ok, high blood mercury - that's *gotta* be bad, right? Heavy metals. Brain damage. No bueno.

Let's say a patient's blood has an elevated mercury level, it's significant, and it's confirmed on repeat testing. This is consistent with elevated *organic* mercury (methylmercury), not the same elemental or inorganic mercury found in industrial exposures. It's usually from diet.

First, interpretation isn't easy. The "normal" range is set by the normal healthy population, and the "harmful" range is set by levels that threaten fetal development in pregnant mothers. There's no evidence that those same levels are associated with harm in a 40 year old man.

With that said, lowering the amount of mercury in the diet will allow the mercury in the blood to be excreted into the feces gradually through bile absorption, bringing the level down. That's a useful, prudent action, with no risk of harm. Although the mercury level itself likely has no risk of harm, neither does the action.

However, some practitioners will recommend chelation therapy. This can actually be harmful^[36]. It removes metals broadly from the body, including iron and calcium, as well as other metals that are important for health. The chelation agents also penetrate the body's defenses *against* the mercury - often the mercury has been sequestered by the body in places where it won't do harm. Pulling it out of those locations causes damage and re-exposes the body to the harms of the mercury^[37]. Reactions to that harm can be mild (nausea, rash), moderate (liver injury, kidney damage, hypocalcemia), or severe (death).

Several of the agents used for chelation actually increase (potentiate) the harmfulness of the mercury by changing it to a more active form when binding it^[38]. Dimercaprol is specifically contraindicated in organic mercury exposure because it can increase mercury deposition in the brain.



This is a totally different scenario than using a chelation agent in a patient who has had an acute, sudden, severe industrial exposure to (elemental) mercury, where there is at least some evidence of benefit.

So once again, the *action*, like avoiding tuna vs taking a chelating agent, determines the outcome. Not the change on the bloodwork.

The same logic applies to many of the trendy "detox" ideas online. Lowering a number is not the same as improving health. Removing something from the bloodstream is not the same as proving benefit. Sometimes the evidence for meaningful improvement simply is not there.

This is also why a lot of bloodwork turns out to be useless even when it is accurate and interpretable. You may find a real difference. You may even understand what it probably means. But if there is no proven action that helps, or if the only action changes the lab without helping the person, then the practical value of that information becomes very limited.

That's hard for people to accept, because it feels like information should always be empowering. Sometimes it is. Sometimes it just creates anxiety and extra interventions.

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