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Comprehensive Functional Medicine Blood Panel Interpretation Guide

Your bilingual Mexico Lab Panel Checklist for men and women is here.

You can download it here: [Lab Panel Checklist in Mexico - Men & Women](#)

Discover Your Path to Optimal Health with Comprehensive Functional Lab Testing
Unlock a deeper understanding of your health with Functional Medicine Blood Labs, designed for health-conscious individuals eager to optimize their wellness. These tests provide a detailed roadmap of your body's vital systems, empowering you to address imbalances and enhance vitality.

This comprehensive panel includes essential tests like Complete Blood Count (CBC) with differential, Comprehensive Metabolic Panel (CMP14), Lipid Panel with LDL/HDL ratio, and Complete Thyroid Profile (TSH, T3 Free, Antiperoxidase, and Antithyroglobulin Antibodies). It also measures key biomarkers such as C-Reactive Protein (CRP), Homocysteine, Ferritin, Vitamin D, B12, Folate, and Total/Free Testosterone, offering insights into inflammation, cardiovascular health, thyroid function, and nutrient deficiencies.

By identifying early markers like elevated eosinophils, monocytes, or basophils, we can detect potential parasitic infections that may contribute to chronic symptoms.

Metabolic health is a cornerstone of disease prevention, and labs assess critical markers like fasting glucose, hemoglobin A1c, triglycerides, and insulin (ideally 2-5 μ IU/mL), which are linked to cancer risk and metabolic syndrome. High-sensitivity CRP (target ≤ 0.36 mg/L) and homocysteine provide stronger predictors of cardiovascular health than cholesterol alone, helping you address inflammation and insulin resistance. These insights enable targeted interventions to reduce chronic inflammation, support immunity, and promote anti-aging, weight management, and emotional well-being.

Additional tests, including Iron Kinetics, GGT, LDH, Magnesium, Phosphorus, TIBC % saturation, Cortisol AM, DHEA-S, Uric Acid, Fibrinogen, and Routine Urinalysis, evaluate

liver function, hormone balance, and overall organ health. While liver enzymes may temporarily rise during antiparasitic protocols due to toxin release, they typically normalize post-treatment, underscoring the importance of addressing parasites as a root cause of health issues.

Conducted after a 10-hour fast between 7-9 AM, these labs ensure accurate results tailored to your needs.

Ready to take control of your health with precision insights?

Book your free 15-minute **Discovery Call** with Emily to uncover the root causes of fatigue, inflammation, or other concerns.

Start your journey to vibrant health today.

Functional Medicine Blood Labs List:

Instructions:

- **Fasting Requirement:** 10-hour fast prior to blood draw.
- **Timing:** Blood draw should be performed between 7:00 AM and 9:00 AM.
- **Note for Female Hormone Panel:** For premenopausal women, testing is typically done on Day 3 (follicular phase) or Day 21 (luteal phase) of the menstrual cycle, depending on the clinical goal. Consult your provider for specific timing.

Blood Health & Inflammation

- Complete Blood Count (CBC) with Differential and Platelet Count
- High-Sensitivity C-Reactive Protein (hs-CRP)
- Fibrinogen
- Homocysteine
- TGF-B1 (Transforming Growth Factor Beta-1)
- Zonulin

Metabolic & Organ Function

- Comprehensive Metabolic Panel (CMP-14)
- Gamma-Glutamyl Transferase (GGT)
- Lactate Dehydrogenase (LDH)
- Uric Acid, Serum
- Urinalysis, Routine
- Serum Osmolality + ADH

Lipid Profile

- Lipid Panel with LDL/HDL Ratio

Iron & Nutrient Status

- Iron, Serum
- Total Iron-Binding Capacity (TIBC) with % Saturation
- Ferritin
- Vitamin B12
- Folate
- 25-Hydroxy Vitamin D
- Magnesium, Serum
- Phosphorus, Serum

Thyroid Function

- Complete Thyroid Profile with Thyroid-Stimulating Hormone (TSH)
- Free T3
- Anti-Thyropoxidase (TPO) Antibodies
- Anti-Thyroglobulin Antibodies

Hormones (General)

- Cortisol (AM)
- Dehydroepiandrosterone Sulfate (DHEA-S)
- Total Testosterone
- Free Testosterone

Female Hormone Panel

- Estradiol
- Progesterone
- Follicle-Stimulating Hormone (FSH)
- Luteinizing Hormone (LH)

Blood Sugar Regulation

- Hemoglobin A1c (HbA1c)

Key Points

- Research suggests C-reactive protein (CRP), homocysteine, and lipoprotein(a) may predict cardiovascular health better than cholesterol, though this is debated.

- It seems likely that liver enzymes can rise during parasite treatment but typically normalize afterward, with parasite toxins being a bigger concern.
- Parasite suspicion arises with eosinophils $\geq 3 \times 10^9/L$, monocytes $\geq 7 \times 10^9/L$, or basophils $\geq 1 \times 10^9/L$ (absolute counts).
- The evidence leans toward metabolic biomarkers like triglycerides, fasting glucose, HbA1c, fasting insulin, and CRP being key for early cancer detection, linked to metabolic syndrome and inflammation.
- Zonulin, Serum Osmolality + ADH, and TGF-B1 are added tests for gut health, hydration, and immune regulation, respectively.

Blood Health & Inflammation

These tests assess systemic inflammation and blood cell health, crucial for energy, immunity, and chronic disease prevention. Optimal levels aim for peak health, often narrower than standard ranges.

- Complete Blood Count (CBC): Checks red and white blood cells, hemoglobin, and platelets. High white blood cells may indicate infection; low red blood cells suggest anemia. Parasite suspicion includes eosinophils $\geq 3 \times 10^9/L$, monocytes $\geq 7 \times 10^9/L$, or basophils $\geq 1 \times 10^9/L$.
- CRP, Homocysteine, Lipoprotein(a): These may predict heart health better than cholesterol, with optimal levels like CRP $< 0.36 \text{ mg/L}$ (Dr. Casey Means).
- New Tests: Zonulin shows gut barrier function, optimal at lower levels; TGF-B1 ($< 2380 \text{ pg/mL}$) indicates immune regulation, high in mold toxicity.

Metabolic & Organ Function

These evaluate liver, kidney, and metabolic health, essential for detoxification and energy.

- Comprehensive Metabolic Panel (CMP): Covers liver enzymes, kidney function, and blood sugar. Liver enzymes may rise with parasite meds but normalize post-treatment.
- Serum Osmolality + ADH: New test for hydration, optimal at $\sim 280\text{-}290 \text{ mOsm/kg}$, high indicating dehydration.

Cancer and Other Insights

- Metabolic biomarkers like triglycerides, fasting glucose, and HbA1c are crucial for early cancer detection, linked to insulin resistance and inflammation. Optimal fasting insulin is $2\text{-}5 \text{ }\mu\text{IU/mL}$.

Background and Methodology

Functional medicine aims to identify and address the underlying causes of disease by viewing the body as an integrated system. Unlike conventional medicine, which often uses broader reference ranges, functional medicine employs narrower optimal ranges to detect imbalances early, preventing chronic conditions. The tests listed require a 10-hour fast and should be drawn between 7:00 AM and 9:00 AM for accuracy, with specific timing for premenopausal women's hormone panels (Day 3 or Day 21 of the menstrual cycle, depending on clinical goals). Consult your provider for precise timing.

The following interpretations are derived from functional medicine resources, including clinical guidelines from Root Functional Medicine, Dr. Will Cole, and Rupa Health, ensuring a comprehensive and evidence-based approach. Optimal ranges are often more stringent, aiming for peak performance, not just disease prevention, as of the current time, 04:31 PM MDT on Wednesday, May 28, 2025.

Detailed Test Descriptions

Blood Health & Inflammation

This category assesses systemic inflammation and blood cell health, critical for energy, immunity, and chronic disease prevention. The user's notes highlight that CRP, homocysteine, and lipoprotein(a) may predict cardiovascular health better than cholesterol, supported by research suggesting these markers offer superior risk stratification. Additionally, new tests like Zonulin and TGF-B1 are included for gut and immune health.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Complete Blood Count (CBC) with Differential and Platelet Count	Overall blood health, including red and white blood cells, hemoglobin, and platelets. Specific white blood cell types indicate immune responses,	Varies by component (e.g., WBC: 5–10 $\times 10^3/\mu\text{L}$, RBC: 4.4–5 $\times 10^6/\mu\text{L}$, HGB: 13.5–15 g/dL (men), 12–14 g/dL (women), Platelets: 155K–379K / μL). Functional medicine may use	Low RBC or HGB can indicate anemia, fatigue, or nutrient deficiencies; high WBC signals infection or inflammation; low platelets suggest bleeding risk, while high platelets indicate clotting or chronic inflammation. Parasite suspicion: Eosinophils $\geq 3 \times 10^9/\text{L}$, monocytes ≥ 7

	including parasite infections.	narrower ranges for early detection.	$\times 10^9/L$, or basophils $\geq 1 \times 10^9/L$ (absolute counts) may suggest parasitic infections, as per user notes, with toxins more concerning than temporary liver enzyme rises during treatment.
High-Sensitivity C-Reactive Protein (hs-CRP)	Low-grade systemic inflammation.	$< 1.0 \text{ mg/L}$ (functional medicine); $< 0.36 \text{ mg/L}$ is ideal for minimizing inflammation risk, as per Dr. Casey Means. Standard is $< 3 \text{ mg/L}$.	High levels drive fatigue, brain fog, and autoimmunity risk, and are a key marker for cancer risk due to chronic inflammation fueling tumor growth. Low is ideal but rarely an issue. CRP is considered a better predictor of cardiovascular health than cholesterol alone, as per user notes.
Fibrinogen	Blood clotting function and inflammation status.	$175\text{--}300 \text{ mg/dL}$ (functional medicine aims for $< 300 \text{ mg/dL}$ to reduce cardiovascular risk).	High levels scream cardiovascular risk, inflammation, or clotting disorders; low levels are rare but can indicate bleeding risk or liver dysfunction.
Homocysteine	Methylation status and cardiovascular risk.	$5\text{--}7 \text{ }\mu\text{mol/L}$ (functional medicine); standard is $< 15 \text{ }\mu\text{mol/L}$.	High levels yell poor B-vitamin status, brain fog, fatigue, and inflammation risk. Homocysteine is also a better predictor of cardiovascular health than cholesterol alone, as per user notes. Low levels are rare, signaling over-methylation.

Lipoprotein(a)	Genetic risk factor for heart disease, more predictive than cholesterol.	<50 mg/dL or <125 nmol/L (functional medicine); high risk >50 mg/dL.	High levels significantly increase the risk of heart attack and stroke, independent of other risk factors. Low levels are not a concern.
Zonulin	Gut barrier function and intestinal permeability.	Lower levels are better; specific cutoffs may vary by lab, typically <34 ng/mL for women (functional medicine).	High levels indicate "leaky gut," associated with autoimmune diseases, inflammatory bowel diseases, and other chronic conditions. Low levels are not typically a concern.
TGF-B1 (Transforming Growth Factor Beta-1)	Immune regulation, inflammation, and tissue repair.	<2380 pg/mL (functional medicine).	High levels are associated with immune dysregulation, mold toxicity, Lyme disease, and chronic inflammation. Low levels are not typically measured.

- Complete Blood Count (CBC) with Differential and Platelet Count:** This test is crucial for assessing blood cell counts, hemoglobin levels, and platelet function, all of which impact oxygen transport, immunity, and clotting. Functional medicine interprets these results in context with lifestyle and diet, looking for early signs of nutrient deficiencies or inflammation. For example, a high red cell distribution width (RDW) might indicate B12 or folate deficiency before anemia is evident. The user's note on parasite markers (eosinophils $\geq 3 \times 10^9/L$, monocytes $\geq 7 \times 10^9/L$, basophils $\geq 1 \times 10^9/L$, likely absolute counts) aligns with research suggesting these elevations can indicate parasitic infections, with toxins from parasites being more concerning than temporary liver enzyme elevations during treatment, which should normalize post-medication, as supported by clinical observations.
- High-Sensitivity C-Reactive Protein (hs-CRP):** Even small elevations (<3 mg/L conventionally) are significant in functional medicine, as chronic low-grade inflammation can drive fatigue, brain fog, and autoimmune conditions. Optimal levels (<0.36 mg/L, per Dr. Casey Means) are key for reducing cardiovascular and metabolic risks, and are also critical for cancer detection, as inflammation fuels tumor growth. Research from Dr. Will Cole supports this, noting CRP <0.5 mg/L as

optimal, and the user's note aligns with evidence that CRP is a better predictor than cholesterol for heart health.

- **Fibrinogen:** As an acute-phase reactant, fibrinogen levels rise with inflammation, making it a marker for cardiovascular risk. Functional medicine aims for levels below 300 mg/dL to minimize heart disease risk, as supported by Peak Metabolism.
- **Homocysteine:** High levels (>7 µmol/L) are a red flag for poor methylation, often due to B6, B12, or folate deficiencies, increasing cardiovascular and cognitive risks. Functional medicine targets 5–7 µmol/L for optimal health, as seen in Dr. Will Cole's inflammation labs, and the user's note aligns with research suggesting it's a better predictor than cholesterol.
- **Lipoprotein(a):** Added based on user notes, this genetic marker is a significant risk factor for heart disease, with optimal levels <50 mg/dL or <125 nmol/L, as per Testing.com, supporting its superiority over cholesterol for prediction.
- **Zonulin:** A new test for gut health, elevated levels indicate "leaky gut," linked to autoimmune and inflammatory conditions, with optimal levels typically <34 ng/mL for women, as per ScienceDirect and Wikipedia.
- **TGF-B1 (Transforming Growth Factor Beta-1):** A new test for immune regulation, high levels are associated with mold illness and chronic inflammation, with optimal <2380 pg/mL, as per Portland Clinic of Natural Health and PMC.

Metabolic & Organ Function

These tests evaluate liver, kidney, and metabolic health, essential for detoxification, hydration, and energy production. The user's note on liver enzymes rising during parasite treatment but normalizing afterward is supported by clinical observations, with parasite toxins being a bigger concern. Serum Osmolality + ADH is added for hydration assessment.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Comprehensive Metabolic Panel (CMP-14)	Liver function, kidney function, electrolyte balance, blood sugar,	Varies by component (e.g., Glucose <90 mg/dL, BUN 13–18 mg/dL, Creatinine 0.65–0.9 mg/dL (women), 0.85–1.1 mg/dL (men)). Includes ALT: males 29–33 U/L, females 19–25 U/L; AST: ~25 U/L.	High glucose signals insulin resistance; high liver enzymes (ALT/AST) hint at liver stress, possibly from parasites (temporary rise during treatment, normalizes post-medication); off

	and protein levels.		kidney markers indicate dysfunction or dehydration.
Gamma-Glutamyl Transferase (GGT)	Liver health and oxidative stress.	10–21 IU/L (women), 10–29 IU/L (men) (functional medicine); standard is <55 U/L for men, <32 U/L for women.	High flags liver damage, alcohol use, or toxin exposure, including from parasites. Low is rare, indicating nutrient deficiencies.
Lactate Dehydrogenase (LDH)	Tissue damage and cell turnover.	135–180 IU/L (functional medicine prefers lower levels); standard is 140–280 U/L.	High points to tissue damage, anemia, or cancer risk. Low is uncommon, reflecting nutrient deficiencies.
Uric Acid, Serum	Metabolic waste and gout risk.	3.2–5.5 mg/dL (women), 3.5–7.0 mg/dL (men); functional medicine aims for the lower end.	High screams gout, kidney issues, or metabolic syndrome; low signals liver dysfunction or poor protein metabolism.
Urinalysis, Routine	Kidney and urinary tract health, hydration, infection.	Clear, no glucose/protein/blood, pH 5.0–7.0.	Blood or protein in urine flags kidney damage or infection; abnormal pH points to metabolic or dietary issues.
Serum Osmolality + ADH	Hydration status, electrolyte balance, and kidney function.	Serum osmolality ~280-290 mOsm/kg; ADH levels should be appropriate for hydration status.	High serum osmolality indicates dehydration; low indicates overhydration. High ADH can lead to hyponatremia (e.g., SIADH); low ADH can cause polyuria and polydipsia (e.g., diabetes insipidus).

- Comprehensive Metabolic Panel (CMP-14): This panel is a cornerstone of functional medicine, assessing multiple systems. For instance, fasting glucose <90 mg/dL is optimal to prevent insulin resistance, as noted by Rupa Health. High liver enzymes (ALT/AST) can indicate early liver stress, with the user's note that they may rise during parasite treatment but normalize post-medication, supported by clinical observations that parasite toxins are more concerning long-term. Optimal ALT is 29–33 U/L for males and 19–25 U/L for females, AST ~25 U/L, as per SW Integrative Medicine and backed by PubMed.
- Serum Osmolality + ADH: A new test for hydration, optimal levels (~280-290 mOsm/kg) ensure proper water balance, with abnormalities indicating dehydration or overhydration, as per StatPearls and PubMed.

Lipid Profile

This assesses cardiovascular risk through cholesterol and lipid levels, crucial for heart health, with the user's note emphasizing CRP, homocysteine, and lipoprotein(a) as better predictors than cholesterol.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Lipid Panel with LDL/HDL Ratio	Cholesterol levels and heart disease risk.	Total cholesterol: 150–220 mg/dL, LDL: <100 mg/dL, HDL: >55 mg/dL (women), >40 mg/dL (men), Triglycerides: <100 mg/dL. Functional medicine emphasizes stricter ranges.	High LDL or triglycerides scream heart disease risk or insulin resistance; low HDL points to poor cardiovascular protection. Note: CRP, homocysteine, and lipoprotein(a) are better predictors of cardiovascular health than cholesterol alone, as per user notes.

- Lipid Panel with LDL/HDL Ratio: Functional medicine aims for LDL <100 mg/dL to reduce cardiovascular risk, with HDL >55 mg/dL for women and >40 mg/dL for men to protect heart health. High triglycerides (<100 mg/dL optimal) are linked to insulin resistance, as seen in Dr. Will Cole's hormone health insights. The user's note aligns with research suggesting CRP, homocysteine, and lipoprotein(a) offer superior prediction, with optimal Lp(a) <50 mg/dL or <125 nmol/L, as per Testing.com.

Iron & Nutrient Status

These tests evaluate iron storage, nutrient levels, and their impact on energy and immunity, with no changes from previous descriptions.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Iron, Serum	Circulating iron available for red blood cell production.	40–135 µg/dL.	Low yells anemia, fatigue, or malabsorption; high signals hemochromatosis or inflammation.
Total Iron-Binding Capacity (TIBC) with % Saturation	Body's capacity to bind and transport iron.	TIBC: 250–350 µg/dL, % Saturation: 20–40%.	High TIBC/low saturation points to iron deficiency; low TIBC/high saturation screams iron overload or liver issues.
Ferritin	Iron storage and inflammation.	Women: 40–100 ng/mL, Men: 70–150 ng/mL.	Low ferritin flags iron deficiency, fatigue, or hair loss; high points to inflammation or iron overload.
Vitamin B12	Nerve health and red blood cell production.	>500 pg/mL (functional medicine); standard is >200 pg/mL.	Low screams fatigue, brain fog, or neuropathy; high levels are rare, masking folate deficiency.
Folate	DNA synthesis and methylation support.	>10 ng/mL (functional medicine); standard is >4 ng/mL.	Low points to anemia, fatigue, or poor methylation; high levels are uncommon, masking B12 deficiency.
25-Hydroxy Vitamin D	Vitamin D status for bone, immune, and hormone health.	50–80 ng/mL (functional medicine); standard is >30 ng/mL.	Low screams immune dysfunction, fatigue, or bone issues; high signals toxicity or over-supplementation.

Magnesium, Serum	Electrolyte balance and muscle/nerve function.	2.0–2.5 mg/dL. Note: Serum may not reflect total body stores; RBC magnesium is preferred in functional medicine.	Low points to muscle cramps, fatigue, or heart rhythm issues; high is rare, signaling kidney problems.
Phosphorus, Serum	Bone health and energy metabolism.	3.5–4.0 mg/dL.	High flags kidney issues or hormone imbalance; low points to malnutrition or malabsorption.

Thyroid Function

Thyroid tests assess metabolism and energy, crucial for weight, mood, and temperature regulation, with no changes from previous descriptions.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Complete Thyroid Profile with Thyroid-Stimulating Hormone (TSH)	Thyroid gland activity and metabolism regulation.	TSH: 0.5–2.0 μ IU/mL (functional medicine); standard is 0.4–4.0 μ IU/mL.	High TSH screams hypothyroidism, fatigue, and weight gain; low TSH points to hyperthyroidism or pituitary issues.
Free T3	Active thyroid hormone driving metabolism.	3.0–4.2 pg/mL; functional medicine may aim for 3.5–4.5 pg/mL.	Low yells sluggish metabolism, brain fog, and fatigue; high signals hyperthyroidism or overmedication.
Anti-Thyroperoxidase (TPO) Antibodies	Autoimmune attack on thyroid (Hashimoto's).	<35 IU/mL.	High screams autoimmune thyroiditis, leading to hypothyroidism or fluctuating symptoms.
Anti-Thyroglobulin Antibodies	Autoimmune thyroid damage.	<40 IU/mL.	High points to Hashimoto's or Graves', wrecking thyroid function and energy.

Hormones (General)

These tests evaluate stress and sex hormones, impacting energy, mood, and reproductive health, with no changes from previous descriptions.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Cortisol (AM)	Stress hormone and adrenal function.	10–20 µg/dL (morning).	High screams chronic stress or Cushing's; low points to adrenal fatigue, burnout, or Addison's.
Dehydroepiandrosterone Sulfate (DHEA-S)	Adrenal hormone for energy and sex hormone production.	Age-dependent (e.g., women: 100–350 µg/dL, men: 200–500 µg/dL).	Low yells fatigue, low libido, or adrenal issues; high signals PCOS or adrenal tumors.
Total Testosterone	Overall testosterone production for energy and muscle health.	Women: 15–70 ng/dL, Men: 300–900 ng/dL.	Low screams fatigue, low libido, or muscle loss; high points to PCOS (women) or steroid use (men).
Free Testosterone	Active testosterone available to tissues.	Women: 0.5–5 pg/mL, Men: 9–30 pg/mL.	Low yells low energy and poor recovery; high drives acne, hair loss, or aggression.

Female Hormone Panel

These tests are critical for reproductive health, especially for premenopausal women, with timing based on menstrual cycle phases, with no changes from previous descriptions.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Estradiol	Primary estrogen for reproductive and bone health.	Follicular: 30–100 pg/mL, Luteal: 100–250 pg/mL (cycle-dependent).	Low screams hot flashes, fatigue, or menopause; high points to estrogen dominance or liver issues.

Progesterone	Hormone for pregnancy and calming effects.	Luteal: >10 ng/mL.	Low yells PMS, infertility, or anxiety; high is rare, signaling pregnancy or supplementation.
Follicle-Stimulating Hormone (FSH)	Ovary stimulation and reproductive health.	Follicular: 3–10 IU/L, Luteal: 2–8 IU/L.	High screams ovarian failure or menopause; low points to pituitary issues or PCOS.
Luteinizing Hormone (LH)	Ovulation trigger and testosterone production.	Follicular: 2–10 IU/L, Luteal: 1–10 IU/L.	High points to PCOS or menopause; low signals pituitary dysfunction or stress.

Blood Sugar Regulation

This test assesses long-term blood sugar control, crucial for metabolic health, with the user's note linking it to cancer risk via metabolic syndrome.

Test	What it shows	Optimal Level	If High or Low, What it Points To
Hemoglobin A1c (HbA1c)	Average blood sugar over 2–3 months.	<5.4% (functional medicine); standard is <5.7%.	High screams insulin resistance or diabetes risk, and is a key metabolic biomarker for early cancer detection, as insulin resistance fuels tumor growth. Low is rare, pointing to hypoglycemia or anemia.

Additional Notes on Cancer Detection and Cardiovascular Health

- The user's notes emphasize that CRP, homocysteine, and lipoprotein(a) are better predictors for cardiovascular health than cholesterol, supported by research from Chris Kresser, noting Lp(a) as the single most significant lipid risk marker. For cancer detection, Dr. Casey Means highlights metabolic biomarkers, with the user's note aligning with evidence that metabolic syndrome and obesity create a pro-inflammatory state driving cancer and insulin resistance, as insulin is an anabolic hormone fueling both fat storage and tumor growth. Optimal fasting insulin should be 2–5 µIU/mL, as per Rupa Health's prediabetes approach.

Additional Tests needing a Functional Medicine Practitioner for interpretation.

1. PCR Stool Test

What It Is:

The Polymerase Chain Reaction (PCR) Stool Test is a highly sensitive molecular test that detects genetic material (DNA or RNA) of pathogens in a stool sample, identifying bacteria, viruses, and parasites causing gastrointestinal (GI) infections with greater accuracy than traditional culture methods.

Benefits:

- **High Sensitivity and Specificity:** Detects low-level pathogens missed by culture or microscopy (sensitivity 67–100%, specificity 99–100% for some assays).
- **Rapid Results:** Provides results in ~3 hours vs. 72 hours for cultures, enabling faster diagnosis and treatment.
- **Multiplex Capability:** Tests for >20 pathogens (e.g., Salmonella, Norovirus, Giardia) in one sample, streamlining diagnosis.
- **Non-Invasive:** Requires a small stool sample, preserved in Cary-Blair medium for reliable transport.
- **Outbreak Management:** Ideal for high-risk settings (hospitals, daycare) to prevent pathogen spread.
- **Guides Treatment:** Identifies specific pathogens, reducing unnecessary antibiotics and informing susceptibility testing when cultured.

Symptoms Leading to Needing This Test:

- **Acute or Chronic Diarrhea:** Persistent loose stools, especially with blood or mucus, lasting days to weeks.
- **Abdominal Pain or Cramping:** Severe or recurring pain, often with bloating or nausea.
- **Fever and Malaise:** Unexplained fever, fatigue, or systemic illness alongside GI symptoms.
- **Recent Travel or Exposure:** Symptoms after travel to high-risk areas or contact with contaminated food/water.
- **Weight Loss or Malabsorption:** Unexplained weight loss, nutrient deficiencies, or greasy stools suggesting parasitic infection.
- **Suspected Foodborne Illness:** Outbreaks or symptoms after consuming undercooked meat, unwashed produce, or contaminated water.
- **Immune Compromise:** GI symptoms in immunocompromised patients (e.g., HIV, chemotherapy) where infections are more severe.

What It Can Indicate:

- **Infectious Gastroenteritis:** Pathogens like Salmonella, Shigella, Campylobacter, E. coli (Shiga toxin strains), Norovirus, Giardia, or Cryptosporidium causing diarrhea or pain.
- **Parasitic Infections:** Chronic diarrhea, weight loss, or malabsorption from parasites (e.g., Giardia, Entamoeba histolytica).
- **Asymptomatic Carriage:** Pathogen detection in carriers, though clinical correlation is needed as nucleic acids persist post-infection.
- **Travel-Related Infections:** Region-specific pathogens based on travel history.
- **Gut Dysbiosis:** Pathogen overgrowth suggesting microbiome imbalance, potentially driving systemic inflammation.
- **Complications:** Risk of dehydration, electrolyte imbalances, or hemolytic uremic syndrome (e.g., E. coli O157).

Where to Get This Test and How to Order It:

- **Providers and Labs:**
 - **Labcorp:** Offers the Gastrointestinal Profile, Stool, PCR test. Available through healthcare providers or direct-to-consumer in some regions.
 - How to Order: Visit Labcorp's website to find a local testing center or order online if direct access is available in your state. Schedule an appointment, collect the stool sample per instructions (use Para-Pak® vial with Cary-Blair preservative, fill to the red line, shake to mix), and drop off at a Labcorp facility. No doctor's order may be needed in some cases, with costs around \$69–\$75.
 - **Quest Diagnostics:** Provides PCR-based GI pathogen panels.
 - How to Order: Contact a healthcare provider to order through Quest's Test Directory or check for direct-to-consumer options. Collect the sample at home using provided kits and drop off at a Quest location.
 - **Diagnostic Solutions Laboratory:** Offers the GI-MAP Stool Test, a comprehensive qPCR-based test.
 - How to Order: Work with a functional medicine practitioner to order via Diagnostic Solutions. Register the test kit online, collect a single stool sample in the provided vial, and ship using prepaid materials. Results are accessed via the practitioner portal.
 - **Walk-In Lab:** Sells the Gastrointestinal Profile, PCR Stool Test online.
 - How to Order: Purchase directly from Walk-In Lab. Receive a kit, collect the sample, and ship to the designated lab (e.g., Labcorp). No special preparation is required.

- **Local Hospitals or Clinics:** Facilities like Mayo Clinic Laboratories or OhioHealth offer PCR stool testing.
 - How to Order: Consult a healthcare provider to order through a hospital lab. Collect the sample (fresh or in Cary-Blair preservative) and deliver within 24 hours or as instructed.
- **Sample Collection:** Collect a fresh stool sample in a clean container, avoiding urine or water contamination. Transfer to a Para-Pak® or FecalSwab vial with Cary-Blair medium within 1–2 hours, filling to the red line, and shake to mix. Ship or deliver per lab instructions.
- **Cost and Insurance:** Costs range from \$69–\$200 depending on the provider. Some insurers reimburse PCR stool tests if medically necessary; check with your plan.
- **International Ordering:** For non-U.S. residents, contact labs like MosaicDX or Diagnostic Solutions for distributors in your country. Shipping costs may apply.

Limitations:

- Detects nucleic acids, not viability, so positive results may not confirm active infection.
- Not ideal for hospital-acquired diarrhea (>3 days post-admission); consider C. difficile or Norovirus testing.
- Requires proper sample handling to avoid false results.

2. Organic Acids Test (OAT)

What It Is:

The Organic Acids Test (OAT) is a urine-based test measuring 75–76 organic acid metabolites, reflecting metabolic processes, gut health, nutrient status, mitochondrial function, and microbial activity.

Benefits:

- **Comprehensive Metabolic Snapshot:** Assesses gut microbiome, mitochondrial function, neurotransmitter metabolism, detoxification, and nutrient deficiencies in one test.
- **Non-Invasive:** Uses a single urine sample, ideal for children or those with chronic conditions.
- **Detects Subtle Imbalances:** Identifies dysfunctions (e.g., yeast overgrowth, bacterial toxins) missed by blood tests, guiding personalized interventions.
- **Supports Chronic Disease Management:** Useful for autism, chronic fatigue, autoimmunity, and digestive issues by targeting root causes.

- **Guides Interventions:** Informs dietary changes, supplementation (e.g., B vitamins), and lifestyle adjustments.
- **Complements Other Tests:** Pairs with stool or mycotoxin tests for a holistic view.

Symptoms Leading to Needing This Test:

- **Chronic Fatigue or Brain Fog:** Persistent tiredness, poor concentration, or mental sluggishness.
- **Digestive Issues:** Bloating, gas, constipation, diarrhea, or food sensitivities suggesting dysbiosis.
- **Mood Disorders:** Anxiety, depression, or irritability potentially linked to neurotransmitter imbalances.
- **Neurological Symptoms:** Autism spectrum behaviors, ADHD, or seizures possibly tied to metabolic or microbial issues.
- **Unexplained Pain or Inflammation:** Joint pain, muscle aches, or autoimmune symptoms without clear cause.
- **Nutrient Deficiency Signs:** Hair loss, brittle nails, or skin issues despite supplementation.
- **Suspected Yeast or Bacterial Overgrowth:** Itchy skin, sugar cravings, or recurrent infections (e.g., vaginal yeast infections).

What It Can Indicate:

- **Gut Dysbiosis:** Elevated D-arabinitol (Candida), 4-Cresol, or HPHA (Clostridia) suggest microbial overgrowth.
- **Mitochondrial Dysfunction:** Abnormal succinic acid or other markers indicate energy production issues, linked to fatigue or neurological disorders.
- **Nutrient Deficiencies:** Low methylmalonic acid (B12) or other markers signal deficiencies impacting energy or detoxification.
- **Neurotransmitter Imbalances:** Abnormal VMA or HVA reflect dopamine/norepinephrine issues, linked to mood or ADHD.
- **Toxin Exposure:** Elevated hippuric or quinolinic acid may suggest environmental toxins or inflammation (not mold-specific).
- **Oxalate Overload:** High oxalates indicate dietary or metabolic issues, linked to kidney stones or joint pain.
- **Systemic Inflammation:** Microbial overgrowth drives inflammation, contributing to autoimmunity or chronic disease.

Where to Get This Test and How to Order It:

- **Providers and Labs:**
 - **MosaicDX:** Offers a comprehensive OAT measuring 76 organic acids.

- How to Order: Work with a healthcare practitioner to order via MosaicDX. Register the test kit online, collect a first-morning urine sample (avoid apples, grapes, pears, cranberries, and certain supplements 48 hours prior), and ship using prepaid materials. Results are accessible via the MosaicDX portal. Schedule a practitioner consultation to interpret results.
- **Great Plains Laboratory (via MosaicDX):** Provides the OAT, often paired with other tests like MycoTOX.
 - How to Order: Order through a functional medicine practitioner or directly via MosaicDX if permitted in your region. Follow collection instructions and ship to the lab.
- **Smart Nutrition (UK):** Offers the OAT for international clients.
 - How to Order: Contact Smart Nutrition to purchase the test kit. Collect the urine sample per instructions and return via courier using the prepaid label. Results are emailed, but interpretation requires a practitioner appointment.
- **The Health Suite Leicester:** Provides OAT as part of functional testing.
 - How to Order: Book a consultation at The Health Suite to determine if OAT is appropriate. Order the kit, collect the sample, and ship to the lab (often in the USA or Europe).
- **TrueHealthLabs:** Sells OAT kits online for U.S. and international clients.
 - How to Order: Purchase directly from TrueHealthLabs. Receive a kit, collect the urine sample, and ship to the lab using prepaid shipping. Results are provided in 5–8 business days.
- **Sample Collection:** Collect a first-morning urine sample in the provided container, avoiding specified foods and supplements for 48 hours. Women should not collect during menstruation. Ship per instructions, typically via courier.
- **Cost and Insurance:** Costs range from \$300–\$400, depending on the provider. Insurance coverage is rare, as OAT is considered specialized; check with your plan or use HSA/FSA if eligible.
- **International Ordering:** MosaicDX supports international orders through distributors or their international patient ordering site. Contact their customer service for details; shipping costs apply.

Limitations:

- Yeast/bacterial markers may reflect systemic, not just gut, overgrowth, requiring correlation with stool tests.
- Limited research validates some markers in healthy adults; clinical context is essential.

- Requires functional medicine expertise for interpretation.

3. Mycotoxin Test

What It Is:

The Mycotoxin Test (e.g., MycoTOX Profile) is a urine-based test using mass spectrometry to detect 11 mycotoxins from 40 mold species (e.g., Aspergillus, Penicillium, Stachybotrys), assessing exposure to mold toxins from food, air, or environments.

Benefits:

- **Comprehensive Mold Detection:** Screens multiple mycotoxins across numerous mold species, offering thorough and cost-effective testing.
- **Non-Invasive:** Requires a single urine sample, simplifying collection.
- **High Sensitivity:** Detects low-level mycotoxins, critical for chronic exposure, with 98% specificity and 97% sensitivity.
- **Monitors Detoxification:** Tracks mycotoxin levels pre- and post-treatment to assess detox efficacy.
- **Links to Chronic Conditions:** Identifies mold as a root cause of unexplained symptoms, supporting complex disease treatment.
- **Pairs with Other Tests:** Combines with OAT or glyphosate tests for a complete toxin profile.

Symptoms Leading to Needing This Test:

- **Respiratory Issues:** Chronic sinusitis, asthma, wheezing, or pneumonia-like symptoms after mold exposure.
- **Neurological Symptoms:** Brain fog, memory loss, headaches, or dizziness potentially linked to mold neurotoxicity.
- **Mood Changes:** Anxiety, depression, or irritability without clear cause, possibly from mycotoxin effects on neurotransmitters.
- **Chronic Fatigue:** Persistent exhaustion or weakness not explained by other tests.
- **Skin or Immune Symptoms:** Rashes, hives, or recurrent infections suggesting immune dysregulation from mold.
- **Environmental Exposure History:** Symptoms after living/working in damp, moldy buildings or consuming contaminated grains.
- **Unexplained Systemic Symptoms:** Joint pain, fever, or autoimmune-like symptoms with no clear diagnosis.

What It Can Indicate:

- **Mold Exposure:** Confirms exposure to mycotoxins from mold in food (e.g., grains), buildings, or vehicles, common in damp environments.
- **Chronic Disease Triggers:** Mycotoxins linked to asthma, sinusitis, chronic fatigue, memory loss, depression, ADHD, cancer, liver damage, or autoimmunity.
- **Neurological Impact:** Mycotoxins (e.g., ochratoxin A) inhibit dopamine pathways, causing brain fog or mood issues.
- **Respiratory Dysfunction:** Mold exposure exacerbates asthma or causes pneumonia-like symptoms.
- **Systemic Inflammation:** Mycotoxins drive inflammation, contributing to rheumatic diseases, rashes, or heart disease.
- **Detoxification Needs:** Elevated levels indicate a need for binders, antioxidants, or other detox protocols.

Where to Get This Test and How to Order It:

- **Providers and Labs:**
 - **MosaicDX (Great Plains Laboratory):** Offers the MycoTOX Profile, screening 11 mycotoxins.
 - How to Order: Order through a functional medicine practitioner via MosaicDX. Register the test kit online, collect a first-morning urine sample (fasting for 12 hours may increase mycotoxin excretion), and ship using prepaid materials. Results are accessible via the MosaicDX portal; consult a practitioner for interpretation.
 - **Vibrant Wellness (via TrueHealthLabs):** Provides a mycotoxin test measuring 29 mycotoxins.
 - How to Order: Purchase directly from TrueHealthLabs. Receive a kit, collect a first-morning urine sample, and ship to the lab using prepaid shipping. Results are provided in 5–8 business days. Local drop-off options are available; check the website for locations.
 - **Axe Holistic Medicine:** Offers the MycoTOX Profile.
 - How to Order: Contact Axe Holistic Medicine to order through a practitioner. Collect the urine sample and ship it to the lab per instructions.
 - **The Health Suite Leicester:** Provides mycotoxin testing as part of functional medicine services.
 - How to Order: Book a consultation at The Health Suite to assess if the test is needed. Order the kit, collect the sample, and ship to the lab (often in the USA or Europe).

- **Sample Collection:** Collect a first-morning urine sample in the provided container. Fasting for 12 hours is optional but may enhance results. Ship per instructions, typically via courier.
- **Cost and Insurance:** Costs range from \$300–\$500, depending on the provider. Insurance coverage is rare; check with your plan or use HSA/FSA if eligible. Retesting every 3–6 months may be recommended.
- **International Ordering:** MosaicDX supports international orders through distributors or their international patient ordering site. Contact customer service for details; shipping costs apply.

Limitations:

- Does not identify exposure sources (food vs. environment), requiring environmental testing.
- Results need clinical correlation and functional medicine expertise for actionable insights.