Mitome™

Mitochondrial Analysis

Transform Your Cellular Health at the Source

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Email:
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Name:
Sarah Smith

Date of Birth:
03/30/1988

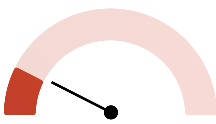
Client ID:
MITO-000000000000

Biological Sex:
Female

Report for Sarah Smith

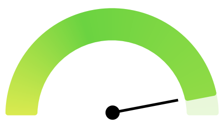
Complex I
Low

15%



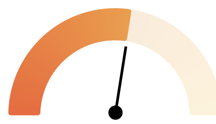
Complex II
Normal

94%



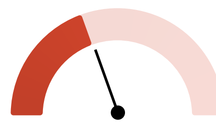
Complex II + III
Low-Normal

55%



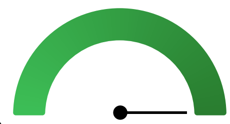
Complex IV
Low

39%



Citrate Synthase
High

212%



Results Summary

[illegible]

You may benefit from supporting your body with key nutrients such as CoQ10, vitamin C, vitamin K2 (MK-4), sulfur amino acids, methylene blue, succinate, alpha-ketoglutarate, and glutamine. Additionally, near-infrared light (700-1000 nm) may offer support. It's also important to minimize inhibitors of mitochondrial complex III in your diet, lifestyle, and medications. A low-carb, high-fat diet may further support optimal function.

Your detailed action plan is on page 13, with the following sections providing an in-depth explanation of your results.

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Methods Used to Measure Your Respiratory Chain Activities

Buccal cells were isolated from your oral mucosa and analyzed for the enzymatic activities of citrate synthase, complex I, complex II, complex II + III, and complex IV of the mitochondrial respiratory chain. Citrate synthase is the first enzyme in the citric acid cycle, which operates inside the mitochondrion but is not part of the respiratory chain. These assays use standard spectrophotometric procedures to test the ability of substrates to be processed by these enzymes and electrons to flow to their proper targets.

All values were first expressed as **nanomoles per minute per milligram buccal protein**. Citrate synthase activity was then expressed as a percentage of control means. Citrate synthase can act as a marker of mitochondrial density but can also be upregulated in response to the cell's perception of a respiratory chain deficit. In the latter case, the balance between the respiratory chain and citrate synthase is often more informative than the absolute activity of the respiratory chain enzymes. Therefore, **respiratory chain enzymes were then normalized to citrate synthase activity** and then expressed as a percentage of control means.

The table below gives normal ranges based on 95% confidence intervals in control samples. Your percentages listed on the previous page are a percentage of the mean control. For example, if your citrate synthase was "100%," you can derive its activity in nanomoles per minute per milligram buccal protein by multiplying 100% times 12.1 in the below table, meaning it was operating at 12.1 nanomoles per minute per milligram buccal protein. You can then compare that to the normal range and conclude that it is normal.

Due to the lack of large sample sizes and associated statistical precision in these normal ranges, the Mitome analysis categorizes results as a percentage of control means into normal (70-140%), low (≤ 50%), high (≥ 200%), or low or high normal between these ranges, based on standardized cutoffs for the sake of optimal pattern analysis. This is the basis for the descriptors you see on the previous page and for any patterns we derive from those descriptors.

Enzyme Normal Ranges and Mean Activities

Activity Name	Normal Range	Mean ± SD
Citrate Synthase (CS)	4.4-22	12.1 ±5.1
Complex I (normalized to CS)	3.4- 11.9	6.8 ±2.0
Complex II (normalized to CS)	0.03-0.35	0.194 ±0.08
Complex II + III (normalized to CS)	0.032-0.152	0.092 ±0.03
Complex IV (normalized to CS)	0.15- 0.6	0.31 ±0.1

An Overview of Mitochondrial Energy Metabolism

Food is broken down into molecules such as amino acids, fatty acids, pyruvate, and ketone bodies that provide usable energy. These enter the mitochondria and are primarily converted to acetate, which is joined to coenzyme A (CoA) a derivative of the B vitamin pantothenic acid (vitamin B5), to form acetyl CoA. This acetyl CoA then enters the citric acid cycle, where the acetyl group is broken down into smaller components. Most of the usable energy is extracted as high-energy electrons that are carried away on NADH, a derivative of the B vitamin niacin (vitamin B3), which delivers them to complex I of the mitochondrial respiratory chain.

A portion of the high-energy electrons are sent to the respiratory chain as succinate, which delivers them to complex II, becoming fumarate with the help of FAD, a derivative of the B vitamin riboflavin (vitamin B2) which transfers them within complex II by interconverting with FADH2. The carbons of the acetyl group are released as carbon dioxide The respiratory chain is where we make 90% of our ATP, the main energy currency of the cell. We breathe in oxygen from the air, which draws electrons through the chain as it is converted to water. Electrons flow from complex I or II through complexes III and IV, using coenzyme Q10 (Q) and cytochrome C (C) as intermediaries. Complexes I, III, and IV use this energy to pump hydrogen ions (H+), which are used by ATP synthase to power ATP production.

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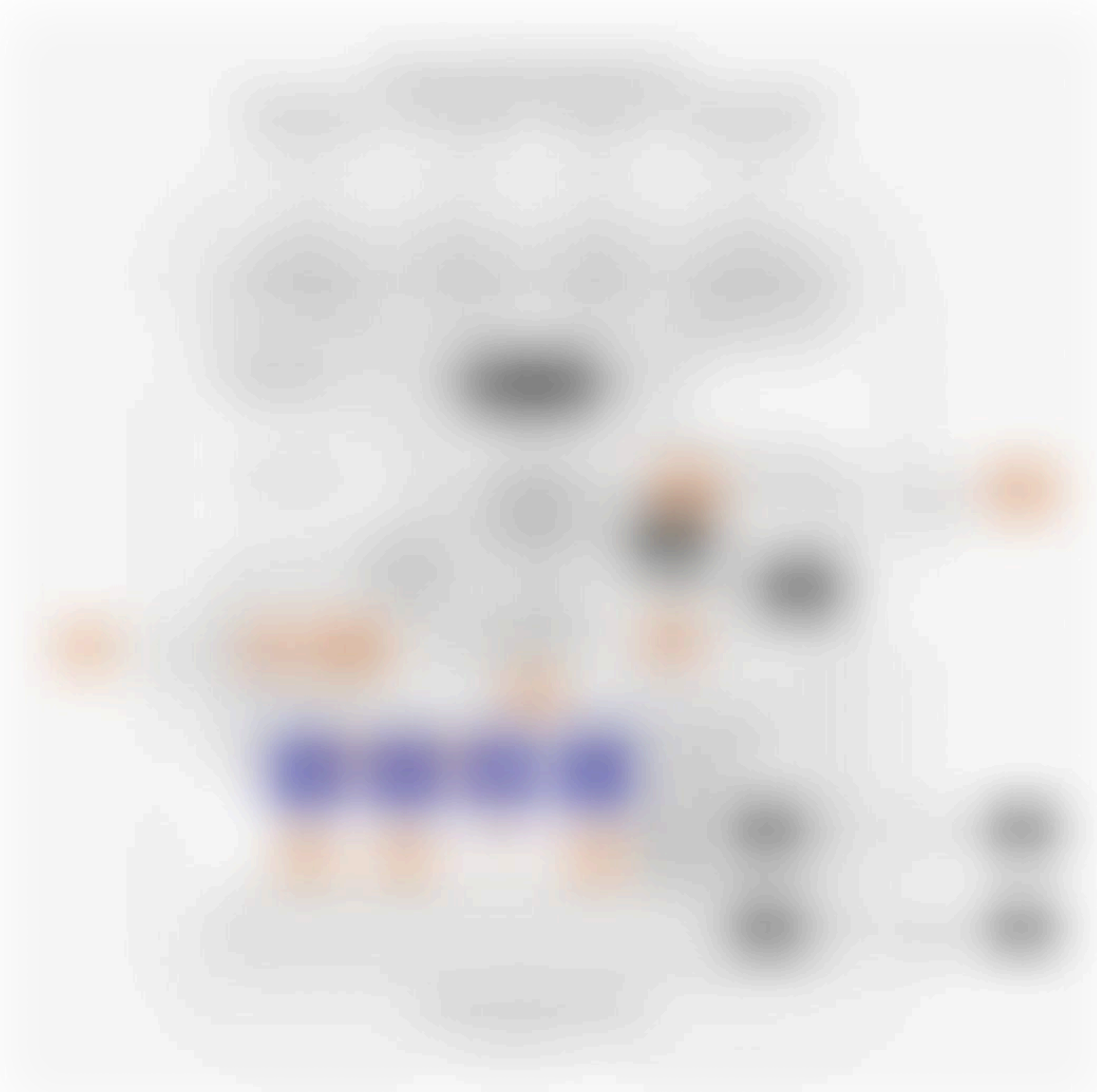
How Your Mitochondria Metabolizes Food to Energy



Interpreting Your Results

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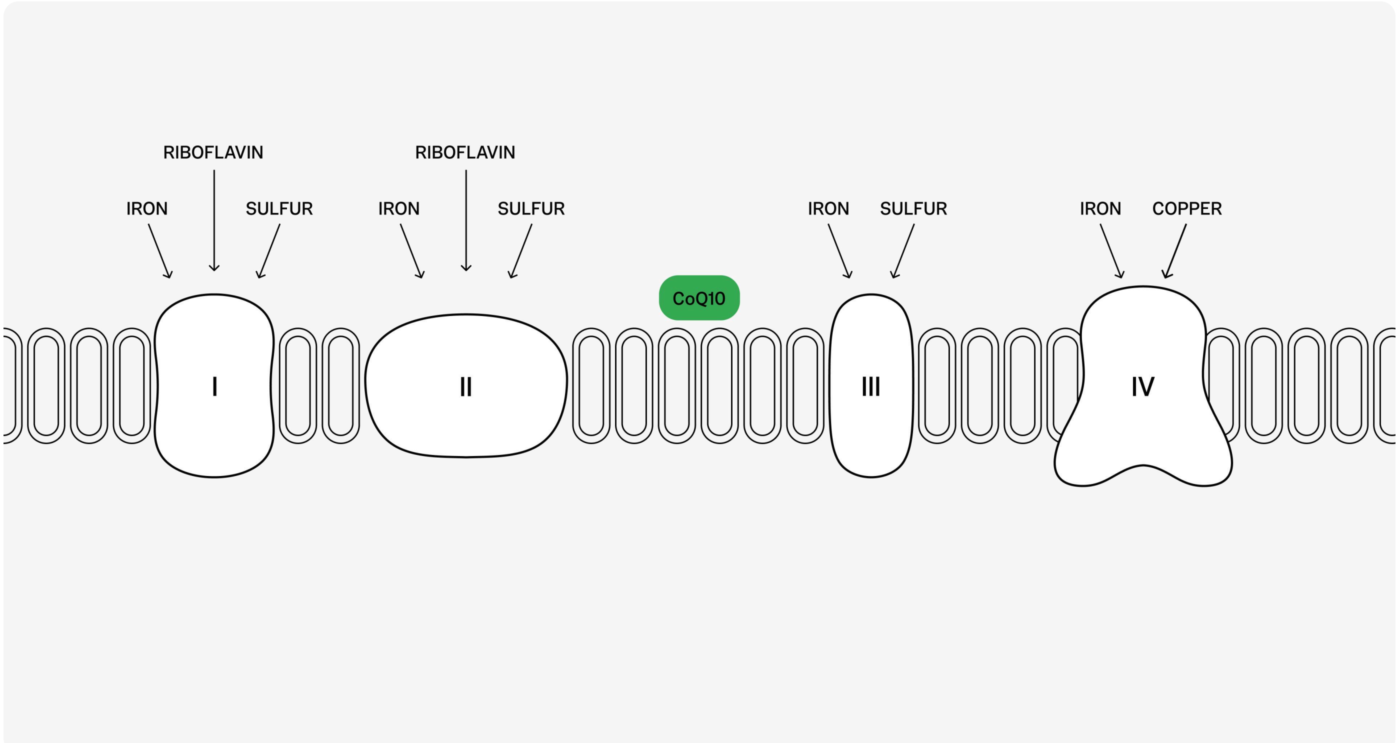
Nutritional Support for Mitochondrial Complexes

Each complex has unique nutrients that serve as cofactors to power the complex.



Impairments in Mitochondrial Function

Your test results reveal reduced complex II + III activity, a critical finding that demands attention.

Complex II + III dysfunction are primary drivers of mitochondrial inefficiency and has profound implications for cellular energy production, oxidative stress management, and long-term health outcomes.

As shown in the first figure above, the complex II + III step measures everything between complex II + III, including the vitamin-like substance CoQ10 that bridges the gap between the two complexes. This measurement may have came in low simply because you need more CoQ10.

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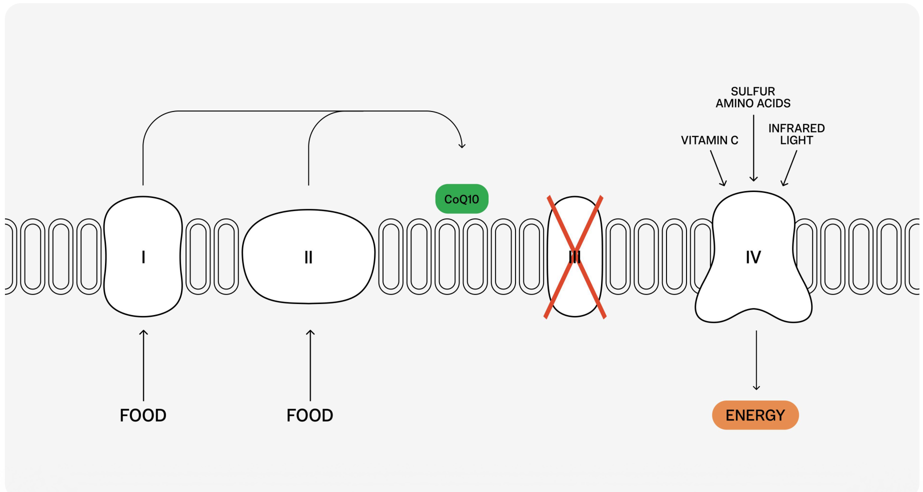
Impairments in Mitochondrial Function

Block in Complex III Function



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Optimizers & Bottlenecks

The table below lists a variety of nutrients, lifestyle factors, environmental toxicities, and medications that may help or hurt each notable issue we found in your respiratory chain. This is meant as a general reference for you. The pages that follow explain each component in more detail. Your final protocol simplifies this by selecting the factors we consider most important for you, reconciling any conflicts, and placing everything in the ideal order for you to experiment with.

Your Bottleneck	Things That Hurt	Things That Help
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

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Complex II + III

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Protocol Snapshot

Ubiquinol | Complex III Inhibitors | Iron | Sulfur/Cysteine | Vitamin K2 (MK-4) | Vitamin C | Near Infrared Light | Ketogenic Diet | Fire in a Bottle Disodium Succinate | Alpha-Ketoglutaric Acid | Glutamine | Adjust Your Carbohydrate Intake | Methylene Blue

Your Protocol Recommendations

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Ubiquinol

Suggested Range:
Ubiquinol, 100-400 milligrams per day, taken with meals.

If you experience overstimulation or insomnia when taking ubiquinol, try 150-600 micrograms of Mo-Zyme taken with meals, 500-1500 milligrams of taurine taken with water before meals, and/or 500-1500 milligrams of glutathione taken with water before meals.

If ubiquinol brings your glucose and lactate into optimal ranges, you may be able to skip the following steps addressing complex III inhibitors, iron, cysteine, vitamin K2 as MK-4, vitamin C, near infrared, and methylene blue. However, if ubiquinol raises your lactate, proceed directly to those steps and consider experimenting with higher doses of ubiquinol after you have completed them if you have gotten your lactate down to healthy levels.

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Near Infrared Light

Five to thirty minutes per day (700-1000 nanometers) on each part of the body. For example, Saunaspace (expensive, whole body), or RedRush Pulse (less expensive, sit by it a lot, turn to face different sides). You can also get near infrared from the sun, but you have to be very careful to manage not getting burned, and these devices allow a greater dose of near infrared without exposure to burning rays.

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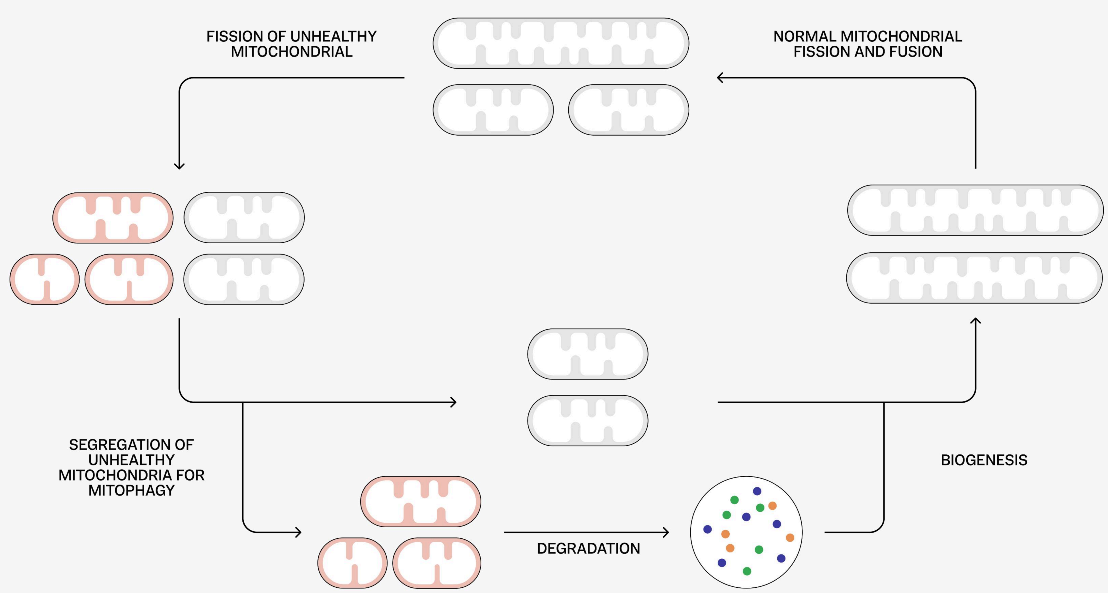
Additional Mitochondrial Support Strategies

Fasting-Feeding Reset



Mitochondrial Quality Control Cycle

The Research Backing Your Protocol

We analyzed the four major respiratory chain complexes within your mitochondria and categorized you into one or more of twelve distinct patterns. This breakthrough analysis represents a fundamental advancement in longevity, as mitochondrial function is now recognized as one of the primary drivers of biological aging. By identifying your specific bioenergetic profile, we've pinpointed exactly what you should be focused on for optimizing not just your daily energy production, but the cellular mechanisms that determine your health trajectory over decades. Email us to join our waitlist for how to take your Mitome results to the next level with whole genome sequencing for even further individualization and optimization.

The science behind the underlying lab test includes hundreds of papers on the utility of testing respiratory chain results in biopsies and skin fibroblasts, and the studies showing the correlation between cheek swab and muscle biopsy results.

Mitome is an proprietary interpretive algorithm built on the base layer of the respiratory chain testing that is based on Dr. Masterjohn's unique analysis of the published literature as well as an in-house sample of over 150 clients analyzed over the past two years where respiratory chain analysis was cross-referenced to whole genome sequencing and testing of amino acids, organic acids, vitamin concentrations inside and outside cells, acylcarnitine and acylglycine profiles, complete blood counts, metabolic panels, and assorted other biochemical markers, as well as client responses to protocols derived from this data.

Mitome synthesizes the unique pattern analysis generated from this dataset with published biochemical literature and insights from case reports of respiratory chain disorders to produce a unique protocol for each person.