HOW TO BUILD YOUR CELLULAR ENGINE

SUMMARY DOCUMENT
How To Build Your Cellular Engine – Summary Document

Key Energy Habit #2: Build Your Cellular Engine - Summary Document

**MITOCHONDRIA**

Big Cell Engine = MORE ENERGY!

As you saw in the last video, step 1 for overcoming fatigue and maximizing your energy levels is establishing a solid foundation of cell regeneration habits.

Step 2 is just as important, if not important! It is building your cellular engine.

So first of all, what the heck is the “cellular engine”? What does that really mean?

Well, in simple terms, it is the mitochondria of our cells, which are the energy generators in our cells—the actual part of the cell that “burns” carbohydrates and fats and turns them into energy in our cells.
Naturally, if your cellular engine is weak and does not produce energy very well, you are going to FEEL weak and low in energy!

First of all, how do you know if you have weak mitochondria and a weak cellular engine?

Here are some common symptoms of low mitochondrial function. If you answer yes to these, then that may indicate low mitochondrial function:

- Do you get tired often?
- Do you have a low metabolism?
- Do you lack energy in the day?
- Do you have a disturbed circadian rhythm? (sleepy during the day and/or have trouble sleeping at night)
- Do you have chronic inflammation?

Do you have some of that stuff going on? If so, then you probably need to build up your mitochondrial strength (a.k.a. your cellular engine).

**What are Mitochondria?**

Mitochondria are the cellular energy generator!

Mitochondria are the part of the cell that "burn" the calories (carbs and fats) and turn them into energy for the cell. We have 500-2,000 per cell!

Now, here is the really incredible part that most people are not aware of. Depending on your lifestyle habits and environment, you have the ability to dramatically increase the size and power of the mitochondria in your cells. And you even have the ability to create and build new mitochondria from scratch, and dramatically increase the amount of these power plants in your cells.

**Why is Mitochondrial Biogenesis so Important to Increasing Energy Levels?**

Think about that for moment in most areas of life, we can only get 10 or 20% improvement, but with energy levels, you can double or triple your energy levels.
Now you might start to see how this is possible.

If you are looking at the cellular engine in our cells, and you have the ability to **double** the **size** and **power** of the mitochondria of your cells (the place where energy is being produced), then it makes logical sense that you can **double** your energy levels.

But it actually goes beyond that... remember, you also have the ability to literally create **more** mitochondria from scratch.

Not only are you building bigger and more powerful cellular power generators, but at the same time, you can actually go from having say 500 little cellular engines in your cell to 1,000.

Think about that, you can go from 500 **small** little energy generators in each cell to 750 or 1,000 **big** **powerful energy generators**!

**More Mitochondria = Bigger Cell Engine!**

With well designed strategies, you can go from 500 mitochondria in your cells to 750 or 1,000 or more!

When you increase the amount of mitochondria in your cells and the **size** and **power** of those mitochondria, you can **double** the energy producing capacity of your cells!

**THE HIDDEN KEY TO HIGH ENERGY LEVELS: MITOCHONDRIAL GROWTH AND BIOGENESIS**

The bottom line here is that if you can **double** or **triple** the **size** and **power** of your cellular energy generators ...which is like taking out your car's engine and replacing it with a bigger, far more powerful engine... Basically, you can **double** or **triple** the amount of energy your body is capable of producing, and you can **double** or **triple** your energy levels.

**The Problem**

The only problem is they are very sensitive to damage from uncontrolled oxidative stress, which results from toxic insults, infections, allergens, stress, and just eating too much poor quality food.
But even more importantly than that (and left out by most people)... the biggest factor is that, much like a **muscle**, mitochondria will **shrink** (atrophy) and become **weak** when not stimulated through **hormetic stressors**!
Hormesis is the process by which a mild or acute stressor promotes adaptations in the organism that increase the health, resilience, and vitality of the organism. And although you have probably never heard of the concept of hormesis, more and more scientific research now points to it as being one of the most—if not the most—important factor in human health!

**Hormesis: Major Key to Enhanced Health, Longevity, and Energy**

It might sound like a foreign concept, but you're more familiar with it than you think. Exercise is a form of hormesis! It is a stress placed upon the body that increases resistance to a number of other stressors: physical exertion, cardiovascular disease, depression, diabetes, age-related cognitive decline, neurodegenerative disease, etc.

Hormesis is basically introducing an acute stress (lower dose stressor) to the body that stimulates the body to adapt and grow more fit to be prepared for greater loads of that stressor. By being prepped, the body can be shifted into a state of higher performance as it makes adaptations that benefit whole organism health.

The mechanism of hormesis appears to be overcompensation to re-establish homeostasis - which is a technical way of saying that an organism responds to small stresses by becoming more robust to adapt to a challenging environment.

This is one of the most important—if not the most important—strategy for health and energy enhancement.

**What is Hormesis?**

Hormesis is the process by which a mild or acute stressor increases resistance to other stressors and increases the health, resilience, and vitality of the organism.

It can increase resistance to a variety of stresses, not only the one to which you are exposed.

This is exactly how exercise works!

Exercise is not intrinsically healthy. This may be a shock to you, but exercise is actually a physical stressor to your body. Exercise becomes healthy to us because it stimulates adaptations (like increase heart strength, or blood vessel formation to deliver blood more efficiently, or stronger muscles, or
stronger mitochondria in our cells) and these adaptations in our bodies are what confer the health benefits and disease prevention benefits of exercise.

More and more research is pointing to hormesis as being the key to longer life, disease prevention, and the key to higher energy levels!

**CANDLE VS. FIRE (A METAPHOR FOR UNDERSTANDING HOW HORMESIS WORKS)**

"Wind extinguishes a candle and energizes fire. Likewise with randomness, uncertainty, chaos: you want to use them, not hide from them. You want to be the fire and wish for the wind."

NASSIM NICHOLAS TALEB

Importantly, you need to understand that not all “stress” is “bad.” The avoidance of stressors (like exercise, for example) can be just as harmful as chronic stress! So while most people associate the word “stress” with bad things, the reality is that humans need certain kinds of stressors in our lives to be healthy. And if we are lacking those stressors in our life, we become weak, fragile, prone to disease, and fatigued!

Here you can see the reality of hormetic stressors. Too little stress (e.g. being sedentary instead of doing exercise) is just as unhealthy as chronic stress.

The Paradigm Shift: There are both “good” and “bad stressors.” We need ample exposure to hormetic stressors to be optimally healthy and energetic! (But brief exposures, not chronic exposure!)

Now, here is an important point to understand: It is not just exercise that does this—lots of things do!

By exposing your body to these forms of
Hormesis, your body makes adaptations that make it more energetic, more resilient, and healthier. (Just like with exercise!)

Humans are biologically wired to need certain amounts of exposure to hormetic stressors (e.g. exercise) to be healthy. When we are deprived of those stressors, we become weak, diseased and fatigued.

We now live in an age of, we might call it, anti-hormesis. Exercise is no longer a requirement, food is available whenever we want it, and a junk food diet excluding dietary phytochemicals is the norm for many.

As a result, we have the obesity epidemic, rampant diabetes and heart disease, and all the rest.

So other than exercise, what other things act through hormesis? Here are some examples of hormesis:

1. Exercise (all subtypes)
2. Intermittent fasting
3. Intermittent nutrient cycling (i.e. carbs/fats/proteins)
4. Cold
5. Heat
6. Red and near-infrared light
7. Hypoxia
8. Oxygen bankruptcy
9. UV light
10. Xenobiotics (caffeine, nicotine, alcohol, many drugs)
11. Dietary phytochemicals (xenohormetins)

All of these have between dozens and thousands of studies showing proven health benefits.
Question for you to think about: How many of these do you think most people use? If you think about it, most people living in the modern world are lacking almost all of these forms of hormesis from their lives! Hopefully it’s starting to make sense to you why we have become so weak, fragile, diseased, and fatigued...

Having multiple layers of hormesis in your life is a major key to optimal health and energy.

**HOW DOES HORMESIS RELATE TO ENERGY LEVELS?**

Simple: The body responds to hormetic stressors by **building up the cellular engine!**

- It builds bigger, more powerful mitochondria, and more of them!
- More mitochondria and more powerful mitochondria = bigger cell engine = more energy!

Here is the KEY POINT:

- The more your body has been exposed to hormetic stressors and had the chance to adapt to them, the more resilient your body becomes.
- ...which means the more optimal your metabolic health is, the more resistant to disease your body is, and the more cellular energy your cells produce and the more energy you feel.

For our purposes here, we do not have time or space to go in-depth on all of these factors, so I am just going to give you a little piece of what is in The Energy Blueprint system and we’re going to look at just one of these factors: Exercise.

1. **Exercise** (all subtypes)
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As I went over in the video, the research looking into the most effective types of exercise for building the cellular engine has found the following...

**SUMMARY: EXERCISE AND MITOCHONDRIAL BIOGENESIS**

**Untrained subjects (people who were sedentary prior the studies):**
Continuous and interval exercise have a similar effect on PGC-1α, and other genes regulating mitochondrial biogenesis, if the duration and work done are the same.

Concurrent resistance and endurance exercise dramatically enhances the signaling pathway of mitochondrial biogenesis (over endurance exercise alone).

**Trained subjects (people who were already fit):**
Sprint interval training is a powerful inducer of PGC-1α, and other genes regulating mitochondrial biogenesis. Likely needs to be done fasted (Note: Does not actually need to be “sprinting” running—sprint efforts on a cycle also work.)

Eight weeks of concurrent strength and endurance training does not enhance mitochondrial biogenesis (CS-activity) or performance. (I.e. Resistance exercise and “cardio” are NOT good enough to build your cellular engine effectively.)

Exercise with low muscle glycogen enhances the expression of PGC-1α, and other genes regulating mitochondrial biogenesis

**General findings**
Both exercise type and glycogen status in the muscle play a role in mitochondrial biogenesis.

In sedentary people, basically ALL types of exercise will work to some extent to build your cellular engine.

In people who already do some exercise, you really need sprint-interval training or high-intensity interval training to build your cellular engine. (Weight lifting and “cardio” are not going to work well). It's even more effective if you time it to be first thing in the morning after an overnight fast.

*(If any of this does not make sense to you, please watch the video because I explain it in-depth there).*
### Sedentary Person vs. Regular Exerciser

<table>
<thead>
<tr>
<th>Category</th>
<th>Sedentary Person</th>
<th>Regular Exerciser</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sleep Quality</strong></td>
<td>56% say they get fairly or very good sleep.</td>
<td>83% say they get fairly or very good sleep.</td>
</tr>
<tr>
<td><strong>Average Resting Heart Rate</strong></td>
<td>60-80 beats per minute</td>
<td>40-60 beats per minute</td>
</tr>
<tr>
<td><strong>Maximal Oxygen Uptake</strong>*</td>
<td>Women &lt;25, Men &lt;30</td>
<td>Women 46-50, Men 48-53</td>
</tr>
<tr>
<td>*in ml/kg of body weight per minute</td>
<td></td>
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</tr>
<tr>
<td><strong>Average Daily Calorie Needs</strong></td>
<td>Women 1,600 - 2,000, Men 2,000 - 2,600</td>
<td>Women 2,000 - 2,400, Men 2,400 - 3,000</td>
</tr>
<tr>
<td><strong>Life Expectancy</strong></td>
<td>The average American lifespan is 78.7 years</td>
<td>About 4 years longer</td>
</tr>
<tr>
<td><strong>Sweat</strong></td>
<td>Sweat less efficiently</td>
<td>Start sweating sooner</td>
</tr>
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This is just one example of a strategy to boost mitochondrial biogenesis. There are literally dozens of other strategies that are scientifically proven to boost mitochondrial biogenesis—and I have outlined them all in my program, The Energy Blueprint.

Many of them are synergistic! So you can layer them together to make them way more powerful!

**Hormetic Stressors Build The Cellular Engine**

Hormesis may be the single most important strategy to increase your metabolic health and boost energy levels.

Now, remember, building the cellular engine is just one half of the equation for high energy levels. Too much hormesis without adequate cell regeneration is not going to result in great energy levels. (Picture running a marathon every single day—you are just going to end up sore, inflamed, and exhausted.) Likewise, cell regeneration is not enough—it is also just half the overall equation for optimal energy. (Picture sleeping 12 hours a day and sitting around on the couch all day eating—not exactly a recipe for high energy levels!)

So what we need is the alternation of both of these two key factors. We need a solid foundation of optimal cell regeneration habits (like sleep, good nutrition, etc.) and we need to build our cellular engine through frequent short exposures to hormetic stressors. that is the key to high energy levels!

The magic key to key energy levels in the pulsation and cycling between these states.

It is when we lose one or both of these two factors that we become fatigued...
Finally, to put this all in big picture form, basically lack of hormesis makes you weak, diseased, and fatigued. And layering in hormesis into your life builds your cellular engine to make you bulletproof, disease-proof, powerful, and super energetic!
Now, go download the document with your assignment for this section so you can start implementing this information to increase your energy levels!