

BIOHACKING FOR ENERGY





Biohacking is a type of bioengineering that uses natural means to optimize your brain, body and environment for peak performance. While the benefits are many, biohacking your energy is one of the most important things you can do. The following are some top strategies to bio hack your energy and achieve more each day.

Eat a high-quality diet with the right macronutrient ratio

What you eat has a big impact on your energy levels. Eating a high-quality diet with the right macronutrient ratio can help you maintain optimal energy levels throughout the day. The three macronutrients - carbohydrates, proteins, and fats - all play a role in providing energy for your body. Carbohydrates are the body's main source of energy, and they are found in foods like bread, rice, pasta, and vegetables. Where possible, choose whole grain carbohydrates. Proteins are important for repairing and building muscle tissue. The best quality sources are grass-fed meat, free-range, organic poultry, wild, line-caught fish, beans, legumes and nuts. Fats are a concentrated source of energy. The best sources are extra virgin olive oil, oily fish, nuts, seeds and avocado.

Intermittent fasting or time-restricted eating

If you're looking for a bio hack to boost your energy levels, you may want to try intermittent fasting. This involves alternating periods of eating and fasting, on a daily basis. A common approach is to fast for 16 hours and only eat within an 8-hour window. This usually involves skipping breakfast and sometimes lunch.



Intermittent fasting boosts energy levels because the body becomes very efficient at burning fat for energy. When we are eating throughout the day, our blood sugar goes through peaks and troughs, which affects our energy levels. However, when we haven't eaten for a few hours, the body breaks down the glycogen in our muscles and then body fat. As the energy source is constant, it is a steady process, meaning energy levels are stable with no highs and lows (1).

Use an app to track fat and carbohydrate metabolism

The Lumen app is designed to help you optimize your metabolism by tracking when you are burning carbohydrates or fat for energy. By understanding how these nutrients affect your metabolism, you can make adjustments to your diet and exercise routine to boost energy as well as achieve your weight loss goals (2).

Boost energy by boosting mitochondrial health and function

Mitochondria are organelles that produce the energy cells need to function (3). They generate ATP, which is used for everything from muscle contraction to cell signalling (4). So it makes sense that the more mitochondria we have, and the healthier and bigger they are, the more energy we have.

There are a few ways to boost mitochondrial production and so increase energy levels.



Fasting, mentioned earlier, has been shown to boost mitochondrial biogenesis (5). Fasting appears to boost mitochondrial activity by increasing the levels of enzymes involved in energy production and protecting mitochondria from damage.

It may sound counterintuitive, especially when you are not feeling very energetic, but exercise is a great way to boost your energy. The reason for this is the increase of mitochondria in your muscles after you exercise (6). Strength training or high-intensity training, (known as HIIT training) are the best ways to do this.

Reduce intake of medication

Biohackers tend to use food and nutrition to keep themselves fit and healthy. However, for those of us just starting with bio hacking, we may be used to calling the doctor as soon as we get ill. Millions of people take anti-biotics, NSAIDS, and statins for the management of various diseases. These drugs, amongst others, damage mitochondria and consequently affect energy levels. This is particularly of note with regard to drugs taken long-term, such as statins (7). This article is not meant to diagnose or treat anything, and it is important that you speak to your doctor. However, it may be worth looking at other ways to manage the disease, especially if you lack energy.

Sauna

Hormesis is an important concept in biology and medicine. It refers to the beneficial effects of low doses of toxins or stressors on the body. For example, a small amount of alcohol can actually have protective effects against heart



disease, while higher doses increase the risk. This is because the body responds to small amounts of stress by increasing its defences, while larger amounts overwhelm these defences. This principle also applies to other stressors, such as heat and cold, and the effect that they have on mitochondria. While there are only a few studies testing this directly, heat stress has been shown to induce profound changes in mitochondrial health.

Heat is an excellent way to improve your mitochondrial health. The major benefits you will experience from heat exposure are:

- greater capacity for energy production,
- improvements in the antioxidant response, which fights off free radicals that cause cell damage,
- autophagy- where damaged or toxic components of cells are recycled
- mitophagy, which enables the mitochondria to be more robust (8).

Cold therapy

When it comes to boosting mitochondrial activity, cold showers can increase mitochondrial multiplication (9). This increase in mitochondria occurs in both the muscle and brown fat. Brown fat contains a high concentration of mitochondria, which gives it its colour. Unlike white fat, it is metabolically active, which means it can produce energy (10). In addition to increasing mitochondria, cold showers also have a host of other benefits. They can help to improve circulation, relieve muscle soreness, and boost immunity, whilst not directly boosting energy, all of which make us feel better and less sluggish.



When taking cold showers, start with 10 seconds and build up each day. You can also visit a plunge pool at your local leisure centre, take an ice bath, or even try open-water swimming. Just remember with the last two to do it under supervision and take advice from the appropriate professionals.

Get enough sleep

Most people are aware that poor sleep can lead to fatigue and irritability. It is important to get enough sleep and for the body clock to be optimised. To do this, it is essential to follow hacks to improve sleep. These include going to bed and getting up at the same time, blocking blue and green light from screens an hour before bedtime, getting some natural daylight first thing in the morning, and tracking sleep, amongst others. However, poor sleep can also have an impact on mitochondria. When we don't get enough sleep, our mitochondria don't function as effectively (11) because it can lead to oxidative stress, which affects the DNA in the mitochondria (12). This can lead to a number of problems, including weight gain, an increased risk of chronic disease, premature aging and lack of energy. So if you're looking to protect your mitochondria, make sure you're getting enough shut-eye.

Red light therapy

One of the most exciting things about red light therapy is its potential to boost mitochondrial function. Red light therapy is a type of photobiomodulation that uses low-level red and near-infrared light. Red light therapy has been shown to boost mitochondrial function by stimulating the production of ATP (13). Red light can also improve sleep quality, so this bio hack has double the benefit for boosting energy (14).



While you can get red light therapy at your local salon, you can also purchase devices for use at home. Home devices are typically portable and easy to use, making them a convenient option for busy people. If you're considering using red light therapy at home, check with a dermatologist or other medical professional first to ensure that it's safe for you.

Supplements to boost energy:

Astaxanthin

Astaxanthin is a naturally occurring compound that is found in a variety of plant and animal species. It is best known for its ability to give certain seafood, like salmon, their pink or red colour. In recent years, astaxanthin has become a popular supplement due to its potential health benefits. Some preliminary research suggests that it may help to boost energy levels, improve mental clarity, and protect against oxidative stress. While more studies are needed to confirm these effects, astaxanthin appears to be safe and well-tolerated by most people. If you're looking for a natural way to boost your energy levels, astaxanthin may be worth considering (15).

Quercetin

Quercetin is a flavonoid compound that is found in a variety of plants, including onions, apples, and green tea, as well as being available as a supplement. Unlike other flavonoids, quercetin is able to cross the blood-brain barrier, making it biologically active in the brain (16). Quercetin has a wide range of potential health benefits, including neuroprotective effects. One mechanism by which quercetin may exert its neuroprotective effects is through its ability to protect mitochondria.



Mitochondria are particularly vulnerable to oxidative damage, which can lead to cell death. Quercetin has been shown to reduce oxidative damage to mitochondria, and it also helps preserve mitochondrial function (17).

Green Tea

One reason many bio hackers drink green tea is that it can increase their energy. Green tea is loaded with polyphenols, which are powerful antioxidants. One of these polyphenols is epigallocatechin-3-gallate (EGCG), which has been shown to boost mitochondrial multiplication (biogenesis). Furthermore, EGCG has also been shown to protect mitochondria from damage caused by oxidative stress (18). Therefore, drinking green tea may help to keep your mitochondria healthy and functioning properly while boosting your energy.

Biohacking your energy levels can be accomplished by implementing one or all of these strategies. Give them a try and watch your energy levels and overall health improve.

References

1. Can fasting give you more energy?

<https://www.freeletics.com/en/blog/posts/intermittent-fasting/>

2. Lumen <https://www.lumen.me/benefits>

3. Mitochondrion – much more than an energy converter

<https://bscb.org/learning-resources/softcell-e-learning/mitochondrion-much-more-than-an-energy-converter/>



4. adenosine triphosphate

<https://www.britannica.com/science/adenosine-triphosphate>

5. Fasting and Mitochondrial Health

<https://www.ifm.org/news-insights/fasting-mitochondrial-health/>

6. Novel, high-intensity exercise prescription improves muscle mass, mitochondrial function, and physical capacity in individuals with Parkinson's disease <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4073951/>

7. Mitochondria—Fundamental to Life and Health

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4684129/>

8. Heat stress induces mitochondrial adaptations in skeletal muscle

https://www.jstage.jst.go.jp/article/jpfs/6/3/6_151/_pdf

9. The effects of exercise and cold exposure on mitochondrial biogenesis in skeletal muscle and white adipose tissue

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5545200/>

10. How brown fat improves metabolism

<https://www.nih.gov/news-events/nih-research-matters/how-brown-fat-improves-metabolism>

11. Short-term sleep deprivation with exposure to nocturnal light alters mitochondrial bioenergetics in *Drosophila* <https://bit.ly/3y5RhUT>

12. Mitochondrial DNA Copy Number in Sleep Duration Discordant Monozygotic Twins

<https://academic.oup.com/sleep/article/38/10/1655/2468608>

13. Low-Intensity Light Therapy: Exploring the Role of Redox Mechanisms

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2996814/>

14. Red Light and the Sleep Quality and Endurance Performance of Chinese Female Basketball Players

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3499892/?fbclid=IwAR1wBZbiQ10ih74-uhThxhQJES-3klrWY9EhWtyZQeJapd7d26UE5Vgog54>

15. Astaxanthin as a Novel Mitochondrial Regulator: A New Aspect of Carotenoids, beyond Antioxidants

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8746862/>

16. Quercetin permeability across blood-brain barrier and its effect on the viability of U251 cells <https://pubmed.ncbi.nlm.nih.gov/21302433/>

17. In vivo effects of dietary quercetin and quercetin-rich red onion extract on skeletal muscle mitochondria, metabolism, and insulin sensitivity

<https://link.springer.com/article/10.1007/s12263-014-0451-1>

18. Green Tea Polyphenols Stimulate Mitochondrial Biogenesis and Improve Renal Function after Chronic Cyclosporin A Treatment in Rats

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3670924/>