PEMF and Your Mitochondria

The body's tiny powerhouses

Could gentle PEMF therapy help support healthy ageing by keeping our cells' little energy factories running smoothly? Let's take a friendly look.

Mitochondria are tiny structures found in almost all our cells. They're often nicknamed the "**powerhouses of the cell**" because they produce ATP — the fuel our cells run on for everything from thinking to walking to healing.

> **Two quick terms: Mitochondria** *are miniature "power stations" inside your cells. ATP (adenosine triphosphate) is the fuel they make — the energy currency that keeps every part of you running.*

How mitochondria produce energy

Mitochondria make ATP through a process called oxidative phosphorylation — or "OxPhos" for short. Think of it as a tiny production line within each cell, turning the food we eat and the oxygen we breathe into usable energy. (Watch a short animation here if you're curious how it works.)

A quick history of PEMF

Nikola Tesla didn't invent PEMF therapy, but his groundbreaking work on electricity and electromagnetic fields laid much of the scientific groundwork for it. PEMF was first introduced in the late 1800s and has since been used as a drug-free option for arthritis, pain, insomnia, and everyday muscle and joint troubles.

In 1979, the US Food and Drug Administration (FDA) approved the use of electromagnetic fields to help heal fractures that weren't mending on their own. A decade later, that approval was extended to treating pain and swelling (known medically as *oedema*) in soft tissue. Since then, a growing body of research has uncovered encouraging findings.

> **"Oedema," explained:** *It's simply the medical word for swelling — a build-up of fluid in the body's tissues.*

A boost to general well-being

Most PEMF research has focused on age-related issues such as osteoarthritis, bone fractures, and soft-tissue healing. But along the way, something else keeps coming up in feedback from everyday users: a simple sense of feeling better overall.

Scientists now believe this may be because PEMF stimulates the OxPhos process inside mitochondria—helping maintain the *mitochondrial membrane potential* (essentially the electrical charge mitochondria need to keep working efficiently) and supporting healthy ATP production.

More energy at the cellular level

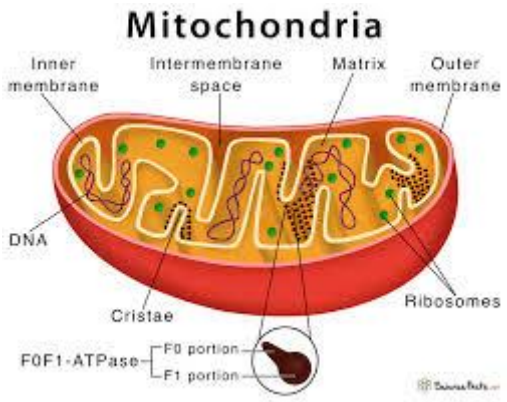
Between the science and the mountain of positive experiences shared by users, there's good reason to believe PEMF—such as the Oska Pulse—can support well-being and help slow some of the effects of ageing.

About the Oska Pulse

The Oska Pulse is registered in Australia as a Class IIa medical device. Its purpose is simple: help your body do what it already knows how to do — heal — a little faster. Portable, wearable devices like this are becoming a genuine alternative to long-term reliance on painkillers. Learn more about the Oska Pulse here.

Let's look a little closer — meet the mitochondria

Mitochondria (just one is a "mitochondrion") are found in almost every cell in your body. Here are a few things worth knowing about these remarkable little helpers:



- **Built for the job.** Each mitochondrion has two membranes, and the inner one folds in on itself many times, forming ridges called cristae. This folding gives it far more surface area to work with — a bit like crumpling a sheet of paper to fit more of it into a small box.
- **Turning food into fuel**. Its main job is to produce ATP through cellular respiration—breaking down glucose and other nutrients in the presence of oxygen.
- **Their own genetic material.** Mitochondria carry a small amount of their own DNA (called mtDNA), separate from the DNA in the cell's nucleus. Interestingly, it's passed down only from mothers.
- **A role in cell renewal.** They help manage a natural process called apoptosis — essentially the planned "retirement" of old or damaged cells, a normal and important part of keeping tissue healthy.
- **Keeping things balanced.** They're involved in many everyday processes, including regulating calcium (important for muscle movement and cell communication) and metabolising fats.
- **When things go wrong.** If mitochondria aren't working properly, it can lead to health issues — particularly in energy-hungry organs such as the brain, muscles and heart.

> **"Apoptosis," in plain terms:** *The body's tidy, built-in way of clearing out old or damaged cells so fresh, healthy ones can take their place — a normal and healthy bit of housekeeping.*

So, can PEMF help mitochondria make more energy?

PEMF uses gentle electromagnetic fields to support various functions inside the body's cells. A growing body of evidence suggests it may help mitochondria work more efficiently, potentially boosting ATP production. Here's how researchers think it might work:

Supporting the electron transport chain. This is the chain of proteins inside the mitochondrion that shuttles electrons to produce ATP. PEMF may help this run more efficiently, supporting higher energy output.

Maintaining the membrane potential. That's the electrical charge the mitochondrion needs to function—and some studies suggest PEMF helps support it.

Making better use of oxygen. PEMF may help cells use oxygen more effectively, which matters because oxygen is essential for how mitochondria generate energy.

Keeping the internal chemistry balanced. PEMF may help support "redox balance" — the healthy give-and-take of electrons within cells — which supports energy production and helps reduce oxidative stress (a form of cellular wear and tear).

> **What's "oxidative stress"?** *Think of it as rust or wear-and-tear at the cell level — damage that builds up over time. Keeping it in check helps cells stay healthy and energetic.*

In summary

Several studies have examined how PEMF affects mitochondria and ATP production in both laboratory and animal research. Some results have been encouraging; others less conclusive. Researchers are still working out exactly which PEMF settings — frequency, strength and duration — work best. It's an exciting area, and one we'll keep watching closely.

With warm regards,
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Reference

1. Electromagnetic stimulation increases mitochondrial function in osteogenic cells and promotes bone fracture repair. Scientific Reports (nature.com). Read the study