

# Migraine Triggers and Helpful Treatments

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## STORY AT-A-GLANCE

- › Migraine is the third most prevalent illness in the world, yet researchers still struggle to understand exactly how and why migraines occur. Adding to the complexity, there are several different types of migraine
- › Migraine is thought to be a disorder of your nervous system, most likely originating in your brain stem. Evidence also suggests migraines are strongly related to mitochondrial dysfunction
- › One of the primary causes of mitochondrial dysfunction is excess linoleic acid (LA) consumption, so radically reducing your intake should be at the top of your list if you struggle with migraines
- › Nutrient deficiencies also appear to play a role. Of particular importance for prevention and treatment of migraine are vitamin D, magnesium, Coenzyme Q10 (CoQ10) and riboflavin (vitamin B2)

Migraines affect an estimated 12% of the American population and is the second leading cause of disability worldwide.<sup>1</sup> They can strike both young and old, but a majority of sufferers are women. According to research,<sup>2</sup> "Its prevalence increases in puberty but continues to increase until 35 to 39 years of age, decreasing later in life, especially after menopause."

Worldwide, as many as 1 billion people are affected,<sup>3</sup> making migraine the third most prevalent illness in the world. Yet, despite its prevalence, researchers still struggle to

understand exactly how and why migraines occur. Adding to the complexity, there are several different types of migraines, including:<sup>4,5</sup>

Cluster	Chronic	Episodic
Basilar	Hemiplegic	Retinal
Abdominal	Optical	With aura
Without aura	Status migrainous	Transformed
Menstrual	Vestibular	

## What Does a Migraine Feel Like?

Migraine attacks are typically recurring, of moderate to severe intensity, many times occurring only on one side of your head. Along with throbbing, piercing or "burning" pain, other common symptoms include nausea, visual disturbances, dizziness, numbness in your extremities or face, and extreme sensitivity to light, sound, smell and touch.<sup>6</sup>

An attack may last from a couple of hours to as long as three days, often requiring bed rest in complete darkness and silence. In a 2017 Greatist article, migraine sufferers were asked to describe their pain. Here are some of their answers:<sup>7</sup>

- **"My head feels like it's in a vise"** – Triggers often include stress,<sup>8</sup> weather changes, physical exertion, lack of sleep and/or eating the wrong foods. Artificial sweeteners<sup>9</sup> such as aspartame are also known to commonly trigger migraine.

Doctors suggest keeping a food diary to track the emergence of symptoms to pin down certain food triggers. You could do the same for weather and stress if you believe such factors may play a role.

- **It's "like when a light fixture starts to go out"** – This patient is describing the effects of ocular migraine, the onset of which often starts with flickering or flashing light

phenomena, or zigzagging lines in the peripheral vision, which can eventually take over the entire field of vision.

These visual disturbances are referred to as an "aura." Other common auras include blind spots, blurry, wavy or kaleidoscope vision. Auras can also involve other senses.

For example, you may experience paresthesia (tingling or numbness), aphasia (trouble speaking), auditory hallucinations or smelling something that isn't there. Approximately one-quarter of all migraines are accompanied by aura, which is thought to be caused by a chemical or electrical wave in the brain region that processes sensory signals.<sup>10</sup>

- **"It's like I've been staring at the sun"** — Oftentimes, the entire head, from the neck up, can feel overworked, "battered and bruised," or like your brain has been pounded with a hammer. Post-symptoms can also include a stiff neck for up to a day after the headache ends.
- **"Like I'm on a ship during a storm"** — Nausea and a feeling of being in motion is also common.

## **Estrogen Is a Major Player in Migraines**

Generally speaking, migraine is thought to be a disorder of your central nervous system, most likely originating in your brain stem.<sup>11</sup> While most brain regions do not register or transmit pain signals, the trigeminal nerve network does.

Pain is relayed through the trigeminal network to an area in your brain stem called the trigeminal nucleus. From there, it is conveyed to the sensory cortex in your brain that is involved in awareness of pain and other senses. Interestingly, estrogen appears to be a major factor in this chain of events.

The late Ray Peat, a pioneer in bioenergetic medicine, argued that estrogen is a major cause of migraines, and in 2018, research was published that offered fresh support for

that view. Researchers found that estrogen sensitizes cells around the trigeminal nerve and connected blood vessels in the head, thereby augmenting pain signals.

Estrogen, of course, is at its highest during women's' reproductive years, which also helps explain not only the gender difference in prevalence but also the age range at which migraines are most common. As noted by bioenergetic researcher Georgi Dinkov, a student of Peat, in 2018:<sup>12</sup>

*"After more than 80 years of claiming estrogen protected women from migraines and mood disorders (and prescribing HRT as prevention/treatment) modern medicine seems to be finally recognizing the causative role of estrogen in migraines. Peat has been saying this for years ...*

*The fact that stress also causes and/or exacerbates migraines is another 'obvious' sign for the role of estrogen (and serotonin/cortisol) in migraines.*

*In addition to implicating estrogen as a facilitator and cause of migraines, [a] study<sup>13, 14</sup> [in *Frontiers of Molecular Biosciences*] ... also states that progesterone and testosterone are protective.*

*I have personally noticed that all men who complained of migraines have quite obvious signs of hypogonadism and hyperestrogenism – low muscle mass, gyno, irritability, depression, etc."*

## **Migraines and Mitochondrial Dysfunction**

An even more foundational cause of migraines is mitochondrial dysfunction. As such, any strategy that helps improve your mitochondrial function is likely to be helpful. The most important of these strategies is to limit your intake of linoleic acid (LA), as this omega-3 fat acts as a mitochondrial toxin when consumed in excess. I published a paper together with Christopher D'Adamo on the detrimental health effects of LA in July 2023, which you can [read for free](#).<sup>15</sup>

Ideally, you'd want to keep your intake below 2% of your daily calories, but even 5% would be a significant improvement since most people consume far more than that. Seed oils, and hence most processed foods and restaurant foods, are the primary sources of LA and need to be radically limited. I'll expound on this further below.

The main reason why excess LA causes so many health problems – from migraines to heart disease and cancer – is that it prevents your mitochondria from working properly. Mitochondria are subcellular organelles responsible for producing most of your cellular energy in the form of ATP, and without ATP, your cells cannot function and repair themselves normally.

PUFAs such as LA are easily damaged by oxygen in a process called oxidation,<sup>16</sup> which triggers the creation of damaging free radicals.<sup>17</sup> These, in turn, give rise to advanced lipoxidation end-products (ALEs)<sup>18</sup> and oxidized linoleic acid metabolites (OXLAMs).<sup>19,20</sup>

## **LA-Induced Metabolites Cause Major Damage**

These ALEs and OXLAMs then go on to cause mitochondrial dysfunction, which is a hallmark of most all chronic disease, including migraines. In addition to oxidation, inflammation and mitochondrial dysfunction, processed seed oils can also:

**Damage the cells lining your blood vessels**

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**Cause memory impairment and increase your risk of Alzheimer's disease (canola oil, in particular, has been linked to Alzheimer's)**

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**Strip your liver of glutathione thereby lowering your antioxidant defenses**

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**Inhibit delta-6 desaturase (delta-6), an enzyme involved in the conversion of short-chained omega-3s to longer chained omega-3s in your liver**

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**Impair your immune function and increase mortality**

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**Make your fat cells more insulin sensitive, thereby causing insulin resistance**

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Inhibit cardiolipin, an important fat in the inner membrane of your mitochondria

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## How LA Impairs Your Mitochondria

The inhibition of cardiolipin in the inner membrane of your mitochondria explains much of the damage caused by LA. You have about 40 quadrillion to 100 quadrillion mitochondria throughout the cells of your body. The cristae of the inner membrane of the mitochondria contains a fat called cardiolipin,<sup>21</sup> and its function is dependent on the type of fat you get from your diet.

Cardiolipin is important, because it influences the structure of the cristae inside your mitochondria, which is the area where energy production occurs. If cardiolipin is damaged, then the complexes will not be close enough together to form supercomplexes and thus the mitochondrial energy production will be impaired.

Cardiolipin also works like a cellular alarm system that triggers apoptosis (cell death) by signaling caspase-3 when something goes wrong with the cell. If the cardiolipin is damaged from oxidative stress due to having too much LA, it cannot signal caspase-3, and hence apoptosis does not occur.

As a result, dysfunctional cells are allowed to continue to grow, which can turn into a cancerous cell. The type of dietary fat that promotes healthy cardiolipin is omega-3 fat, and the type that destroys it is omega-6, especially LA.

The good news is that dietary changes can improve the composition of fats in your cardiolipin in a matter of weeks, or even days. So, even though it will take years to lower your total body burden of LA, you will likely notice improvements well before then.

## What Foods to Avoid, and How

Primary sources of LA include seed oils used in cooking, processed foods and restaurant foods made with seed oils, condiments, seeds and nuts, most olive oils and

avocado oils (due to the high prevalence of adulteration with cheaper seed oils), and animal foods raised on grains such as conventional chicken and pork.

Ideally, consider cutting LA down to below 5 grams per day. If you're not sure how much you're eating, enter your food intake into [Cronometer](#) – a free online nutrition tracker – and it will provide you with your total LA intake.

Cronometer will tell you how much omega-6 you're getting from your food down to the 10th of a gram, and you can assume 90% of that is LA. Anything over 10 grams of LA is likely to cause problems. Healthy fat replacements include tallow, butter or ghee, all of which are excellent for cooking.

The table below provides a relatively comprehensive list of the most commonly consumed oils and their approximate LA content.<sup>22,23,24</sup> In general, the lowest LA-containing fats – butter and beef tallow – would be the fats of choice.

These excellent cooking fats would not only be the lowest in LA but will also provide the fat-soluble vitamins, A, D, and K2. Coconut oil is also very low in LA but doesn't provide the important fat-soluble vitamins that tallow and butter contain.

<b>COOKING OILS</b>	<b>% LINOLEIC ACID (LA)</b> AVERAGE VALUE (RANGE IN PARENTHESES)
SAFFLOWER OIL	70%
GRAPE SEED OIL	70%
SUNFLOWER OIL	68%
CORN OIL	54%
COTTONSEED OIL	52%
SOYBEAN OIL	51%
RICE BRAN OIL	33%
PEANUT OIL	32%
CANOLA OIL	19%
OLIVE OIL	10% (3% - 27%)
AVOCADO OIL	10%
LARD	10%
PALM OIL	10%
TALLOW (CAFO)	3%
GHEE/BUTTER (CAFO)	2%
COCONUT OIL	2%
TALLOW (GRASS FED)	1%
BUTTER (GRASS FED)	1%

## **Some Migraines May Indicate a More Serious Blood Vessel Problem**

One long-held theory was that a migraine is caused by vascular changes in your brain, from initial blood vessel constriction and a drop in blood flow, followed by dilation and



stretching of blood vessels, which activates pain-signaling neurons.

Newer studies have negated this theory, however, as researchers determined migraines are not actually preceded by constriction and decrease in blood flow, but rather by a blood flow increase of nearly 300 percent. Despite that, circulation appears normal, or even slightly reduced, once the attack is in full swing. The question remains: Why?

One small observational study<sup>25</sup> found that migraineurs tend to have a different blood vessel structure in their brains compared to those who do not get migraines. Using magnetic resonance angiography, the researchers examined the structure of blood vessels and the changes in cerebral blood flow, focusing on a system of arteries that deliver blood to the brain called "circle of Willis."

They found that an incomplete circle of Willis was significantly more common in those who get migraines, with or without aura, compared to the control group (73% and 67% versus 51%, respectively). As a result, compared to those with a complete circle of Willis, those with an incomplete circle had greater asymmetry in hemispheric cerebral blood flow.

According to one of the authors of the study, Dr. John Detre, a professor of neurology and radiology:<sup>26</sup>

*"Abnormalities in both the circle of Willis and blood flow were most prominent in the back of the brain, where the visual cortex is located. This may help explain why the most common migraine auras consist of visual symptoms such as seeing distortions, spots or wavy lines."*

Other research<sup>27</sup> suggests some migraines — primarily migraines without aura — may be caused by a tear in your neck artery (arterial dissection), which raises your risk of stroke.

Compared to people who had migraine with aura, those without aura were 1.7 times more likely to have an arterial tear. Arterial dissection and stroke was also more likely in

men and those under the age of 39. Overall, your probability of having this problem is very low, but it may be worth getting it checked out if you fall into a high-risk category.

## **Nutrient Deficiencies Linked to Migraine**

Nutritional deficiencies can also contribute to or cause a number of different health problems, including migraines. In the video above, "America's pharmacist" Suzy Cohen discusses drug-free solutions for migraine and headache relief, including nutritional supplements. Nutrients of particular importance here are vitamin D,<sup>28</sup> magnesium, coenzyme Q10 (CoQ10) and riboflavin (vitamin B2), and deficiencies in one or more of these is quite common.

In a migraine study<sup>29</sup> involving more than 7,400 children, teens and young adults, 16% to 51% of participants had below average levels of vitamins depending on the vitamin tested.<sup>30</sup> Those suffering from chronic migraines were overall more likely to have CoQ10 and riboflavin deficiency compared to those with episodic migraines.

Unfortunately, many of the patients in this study were prescribed preventive therapy and too few were given supplements alone for the researchers to determine if supplementation was enough to actually prevent migraines.<sup>31</sup> However, other research suggests they can.

For example, research using vitamin D supplementation demonstrated a reduction in C-reactive protein (CRP) and a statistically significant reduction in headache frequency.<sup>32</sup> Another more study by Finnish researchers found that men with the lowest vitamin D levels were twice more likely to suffer frequent headaches than those with the highest levels.

Overall, the lower the men's blood level of vitamin D, the more frequent their headaches. Those with a vitamin D blood level of 15.3 nanograms per milliliter (ng/mL) or lower typically had one or more headaches per week, while those with a level of 11.6 ng/mL or lower reported up to seven headaches per week. Ideally, your vitamin D level should be

in the 60 to 80 ng/mL range, so both groups were severely deficient. As reported by Deming Headlight:<sup>33</sup>

*"The researchers theorized that vitamin D has anti-inflammatory properties that prevent swelling in the sensory neurons and the microglial cells in the brain and is essential for proper brain function. In the study information, they also note that previous studies show vitamin D prevents musculoskeletal pain, a major cause of tension headaches."*

According to research presented at the 50th Annual Meeting of the American Headache Society<sup>34</sup> in 2010, nearly 42% of patients with chronic migraine were deficient in vitamin D. The study also showed that the longer you suffered from chronic migraines, the more likely you are to be vitamin D deficient.

## **Magnesium Is Empirically Recommended for All Migraine Sufferers**

Magnesium – which can affect both serotonin receptor function and the production and use of neurotransmitters – has also been shown to play an important role in the prevention and treatment of migraines, and migraine sufferers are more likely to suffer from magnesium deficiency than non-migraineurs.<sup>35</sup>

Researchers theorize that migraine sufferers may develop magnesium deficiency from a variety of reasons, including poor absorption, renal wasting, increased excretion due to stress or low nutritional intake. Since magnesium administration is both easy and safe, researchers have noted that empiric treatment with a magnesium supplement is justified for all migraine sufferers.<sup>36</sup>

As a prophylactic, be prepared to boost your magnesium intake for at least three months to experience results, ideally in combination with CoQ10.

In many cases, receiving a high dose of magnesium can also abort an attack in progress. The most effective way to administer magnesium for migraine would be to get

an intravenous (IV) infusion. I used to regularly administer magnesium IVs for those with acute migraines and it seemed to work for most patients to abort the headache.

Barring that option, magnesium threonate may be your best option for an oral supplement. It has superior absorbability compared to other forms of magnesium, and since its ability to cross the blood-brain barrier makes it more likely to have a beneficial effect on your brain.

## **B Vitamins Are Also Important**

Besides CoQ10, magnesium and vitamin D, other vitamin deficiencies linked to migraines include riboflavin (B2), B6, B12 and folic acid. One 2009 study<sup>37</sup> evaluated the effect of 2 mg of folic acid, 25 mg vitamin B6 and 400 micrograms (mcg) of vitamin B12 in 52 patients diagnosed with migraine with aura.

Compared to the placebo group, those receiving these supplements experienced a 50% reduction in migraine disability over a six-month period. Previous studies<sup>38</sup> have also reported that high doses of riboflavin can help prevent migraine attacks. For example, in one study patients who received 400 mg of riboflavin per day experienced a 50% reduction in migraine frequency after three months.

## **Are You Eating Plenty of These Foods?**

Although supplements are convenient, it's important you get as many nutrients from your diet as possible, as your body can metabolize and absorb vitamins and minerals from your diet more effectively and efficiently than from most supplements.

In addition to adding foods rich in magnesium, riboflavin and CoQ10 to your daily diet, look for organic, grass fed products to reduce your exposure to toxins and additional stressors. As for vitamin D, sensible sun exposure is your best bet. If you opt for a vitamin D3 supplement, be sure to increase your vitamin K2 and magnesium as well.

## Foods Rich in Magnesium<sup>39</sup>

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Dark leafy greens

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Wild Alaskan salmon

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Yogurt made from organic and/or grass fed milk with no added sugars

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## Foods Rich in Riboflavin<sup>40</sup>

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Beet greens

Tempeh

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Crimini Mushrooms

Organic low-PUFA eggs

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Asparagus

Broccoli

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Cauliflower

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## Migraines Are a Mitochondrial Problem

The fact that nutritional deficiencies worsen migraine and supplementation can ease it lends additional support to the theory that migraines are a mitochondrial disorder.<sup>41</sup>

Ubiquinol – the reduced form of CoQ10 – plays a vital role in ATP production, which is the basic fuel for your mitochondria.

Your body does produce ubiquinol naturally; in fact, it is the predominant form in most healthy cells, tissues and organs. However, with rampant pollution and poor diet, mitochondrial dysfunction has become increasingly common, warranting supplementation with either ubiquinol or CoQ10.

One study published in the journal *Neurology*<sup>42</sup> found that CoQ10 was superior to a placebo in preventing migraines and reducing severity. Of the patients who received 100 mg of CoQ10 three times a day, 50% reported significantly reduced frequency of headaches compared to only 14% of those who took the placebo.

That said, while ubiquinol may be beneficial, for long-term migraine relief you really need to address your diet in a more comprehensive manner, as detailed above.

## Migraine Prevention 101: Avoid Triggers

Last but not least, it's also useful to keep a diary of your migraines to identify potentially triggers. That way, you can avoid them. While there are many (and what triggers a migraine for one might not trigger it in another), the following are some of the most common.

**Food and drink**, especially wheat and gluten, dairy, cane sugar, yeast, corn, citrus, eggs, artificial preservatives or chemical additives, cured or processed meats, alcohol (especially red wine and beer), aspartame, caffeine and MSG.<sup>43,44</sup>

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**Allergies**, including food allergies<sup>45</sup> and food sensitivities and chemical sensitivities. Research published in the journal *Lancet* in 1979<sup>46</sup> showed migraineurs with food antigen immunoreactivity experienced profound relief when put on an elimination diet.

Another randomized, double-blind, cross-over study published in 2010<sup>47</sup> found that a six-week-long diet restriction produced a statistically significant reduction in migraines in those diagnosed with migraine without aura.

If you suspect you might have a food allergy, I suggest doing a diet elimination challenge to see if your symptoms improve. Keep in mind that depending on your typical migraine frequency, you may need to avoid the suspected food for a few weeks in order to evaluate whether it had an effect or not.

To confirm the results, reintroduce the food or drink on an empty stomach. If the suspected food is the culprit, you will generally be able to feel the symptoms return within an hour, although migraines can sometimes have a longer lag time than, say, bloating or drowsiness.

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**Hormones** – Some women experience migraines before or during their periods, during pregnancy or during menopause. Others may get migraines from hormonal medications like birth control pills or hormone replacement therapy.

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**External stimuli** – Bright lights, fluorescent lights, loud noises and strong smells (even pleasant ones) can trigger and/or exacerbate a migraine.

Blue light in particular can be problematic. Many digital devices and LED light sources emit mostly blue light. Research has found that this light increases your migraine pain and activates your trigeminal nerve, associated with the pain of migraines.<sup>48</sup> Meanwhile, green light may help ease migraine pain and photosensitivity.<sup>49</sup>

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**Changes in sleeping cycle**, either missing sleep and oversleeping.

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**Stress/post-stress** – Any kind of emotional trauma can trigger a migraine, even after the stress has passed.

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**Dehydration and/or hunger** – Skipping meals or fasting are also common triggers.

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**Physical exertion** – Extremely intense exercise, or even sex, has been known to bring on migraines.

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**Weather changes, and/or changes in altitude.**

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## **Acupuncture and Chiropractic May Be Helpful Adjuncts to Migraine Treatment**

Acupuncture may also be a helpful adjunct therapy. Research has found that getting regular acupuncture treatments can help reduce the frequency and severity of migraine attacks in those suffering from migraine without aura.<sup>50,51,52</sup>

In all, 249 adult migraineurs who reported two to eight migraine attacks per month were included in the study. They were randomly assigned to receive either 20 real

acupuncture treatments or 20 sham treatments over four months. Among those receiving the real treatment, migraine frequency declined by about three episodes per month, while the sham group had two attacks less per month. According to the authors:

*"Acupuncture should be considered as one option for migraine prophylaxis in light of our findings."*

It's interesting to note that even sham treatment had a significant response. Indeed, previous research has shown the placebo effect can be a potent tool in the prevention and treatment of migraines and other types of pain. As noted by neurologist Dr. Amy Gelfand, while the placebo response is troublesome for researchers, it can be a very beneficial effect for patients, especially when the treatment is otherwise safe, be it acupuncture or sugar pills.<sup>53</sup>

Chiropractic adjustments have also helped many patients, but not all chiropractors are skilled with the techniques to address migraine, so before you schedule an appointment it is important to confirm that your chiropractor has significant experience in helping people treat their migraines.

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