

Foods to Increase and Decrease for People Who Get Migraines

Approximately 1 billion people worldwide have migraine. This makes migraine the third most common illness in the world. This is probably an underestimate since many people with migraines go undiagnosed.

Men, women and children can all suffer from migraine, but there are several risk factors making likelihood of suffering a migraine more so. Certain ethnic populations, people with a family history of migraines, people aged 18 to 44, those with depression, anxiety, and sleep problems, people who are unemployed, those with income lower or just being a woman - one out of 4 women will have migraines at some point in their life.

More than 8 out of 10 people with migraines are women, the reason why it affects more women is not fully understood, but it's thought that can be due women's fluctuating hormone levels during the month or even triggered at life stages such as puberty, pregnancy or menopause.

Symptoms and severity can vary from a person having one or two migraines a year or month, to some people who hardly ever have a migraine-free day. The latter being life-affecting and debilitating.

Symptom relief can be as simple as having a lie down and rest, for others exploring complementary therapies such as acupuncture, daith ear piercing or Botox injections may help. Medications have an important role in prevention and treatment of migraines but are limited in effectiveness while carrying side effects that may include cardiovascular risks, gut dysbiosis and headaches due to medication overuse.

Root cause

For anyone who suffers from migraines - getting to the root cause of what is causing them can bring them the freedom they long for.

There are many factors that can trigger a migraine attack, and several theories of the underlying causes of on-going episodes for migraine sufferers. Scientists haven't quite concluded what the exact causes are, but we are beginning to understand much more with recent advances in scientific research, especially when it comes to nutritional therapies for migraine.

Identifying the cause of migraine can be tricky, as it can be one, or a combination of contributing factors. Migraines may be part of multiple system imbalance affecting homeostasis – the natural balance and functioning at a level our bodies are constantly striving for.

Migraines are a neurological condition, thought to be a result of an impaired sensory nerves in the nervous system. Also, narrowing of the blood vessels in the brain



(vasoconstriction) is thought to be involved. Migraines are complex, there are often several physical, structural, genetic, mental, environmental, dietary and lifestyle factors to consider that span across multiple body systems.

Stress and depression are often key factors. Other factors include hormonal changes (in women), anxiety, irregular sleeping or eating, impaired digestive (gut) function, poor dietary choices, and metabolic factors may also be behind migraine. In recent years inflammation has been identified as factor as the body's defence mechanism to correct imbalances. (1).

What I have noticed with my clients, is that migraine can be an additional symptom on top of other disease processes or another condition that they already suffer from. Clients who come to see me about something else – for example their diabetes type II, thyroid issues, digestive problems, weight gain or depression, often mention in passing that they have migraines. With many people it appears to be just another thing they must cope with, and many just accept it as part of their life.

Where to start

With recent scientific advances we have learned that we can personalise nutritional therapies based on a person's genetic make-up; individual genetics may determine a wide range of micronutrient requirements. (2)

If you already eat a clean diet and live a healthy lifestyle, then you may want to get some functional testing done. Testing for my clients depends on their personal circumstances, but I use tests such as a comprehensive stool analysis to find out what is going on in the gut, genetic testing to ascertain tendencies, nutrient assessment to check for any deficiencies, hormonal testing using saliva or urine and so on. The results determine a personalised dietary and lifestyle plan, often with appropriate natural food supplements at therapeutic doses.

But before you embark on any of this, if you haven't looked at your diet, then what you eat on a day to day basis is a great starting point. The good news is, changing your diet it is something you can do for yourself, and it's as simple as switching up your grocery list to include the foods that will serve you well.

Low-fat whole food plant based (WFPB) diet

Whole plant foods are packed full of vitamins, minerals, healthy carbohydrates, proteins, essential healthy fats, and phytonutrients, which all serve to keep the body strong and protect it from disease.

Long term population [studies](#) show that those eating predominantly plants, live longer and healthier lives.



A whole food plant-based diet consists mainly of foods that are as least processed as possible, in their natural whole form. It is a diet low in salt, oil, and refined flours and sugar.

Our modern western diet is much higher in animal products and processed foods than our ancestral diets. These foods may exacerbate underlying inflammation that is present with migraine headaches.

By replacing these foods typically consumed out for whole plant foods, we are giving our bodies the right chemical balance for healing to take place.

With meals being based around mostly vegetables and fruits, beans, legumes, wholegrains, nuts and seeds, with no animal products, a low-fat plant-based diet naturally lends itself to being helpful for people who suffer from migraines because it is anti-inflammatory, full of hydrating foods high in antioxidants and abundant in the key nutrients needed to support reduction in migraine headache symptoms. (3)

Blood sugar balance

Intense cravings for carbohydrate and sugary foods prior to a migraine attack are very common. This is an effect of migraines and not the cause, but to manage cravings, it is vitally important to focus on keeping blood sugars balanced.

To balance blood sugars, sufferers may benefit from eating little and often, especially when they feel a migraine coming on. Highly refined carbohydrate processed products, like biscuits, chocolate, sweets, some cereal snack bars and cake, even brown bread, will spike blood sugar levels – and what goes up, must come down.

As the blood sugars come back down, fatigue can set in, causing more sugar cravings with some reaching for stimulating ‘pick me ups’ like coffee or energy drinks. Coffee and caffeine consumption can be linked to migraines, so these are best kept to a minimum or avoided altogether.

This ‘roller coaster’ effect of blood sugar levels throughout the day can make reaching for ‘pick me ups’ become a habit, especially when sleep is disturbed because of the stimulant effects of caffeine and sugar. Dysregulated blood glucose levels are often a trigger for migraines.

Migraine sufferers have been shown to have higher resistance to insulin, even in non-obese sufferers, insulin resistance can be a result of the long-term blood sugar dysregulation. Moreover, insulin resistance may lead to increased risk for future type 2 diabetes mellitus in patients with chronic migraine. (4)

To avoid sharp spikes in blood sugar levels, reduce refined sugar intake by replacing processed sugary snacks with healthier alternatives.

Replace with healthy snacks such as whole fruit, crudités, and hummus. Satisfy any sweet cravings with healthier alternatives like fresh fruit, juicy medjool dates, [chia seed pudding](#) or [raw cinnamon seed snack bar](#).

Be mindful of your carbohydrate: protein ratio and try to always eat some protein alongside any carbohydrate foods. E.g., If you are eating an apple have some nuts with it.

Protein

Including a healthy source of protein at every meal will help keep you fuller for longer thus stabilising blood sugars. If you do feel sugar cravings in between meals, choosing the right snacks like a handful of nuts and seeds for example is ideal.

The amino acid tryptophan is a key nutrient for migraine sufferers. It is found in protein-rich foods. Tryptophan is important mainly because it's involvement in making brain serotonin which has been linked with fewer episodes of migraines. (5) See list of tryptophan plant foods below (Pic 1).

Gut Health

There is a strong association between the health of our gut microbiome and migraine headaches. (6) The exact mechanisms involved are not clear, but several studies have shown that migraine is associated with some gastrointestinal (GI) disorders such as *Helicobacter pylori* infection, irritable bowel syndrome (IBS), and celiac disease. Migraine sufferers with long headache history and high headache frequency have a higher chance of being diagnosed with IBS. IBS and migraine share some similarities and can alter gut microflora composition and thereby may affect the gut-brain axis and inflammatory status.

We know that there is a lot of interaction between the gut microbes and our health, making the gut the centre of health in the body, not just for digestion, but for many bodily functions including hormone, immunity, and neurological health.

Our bodies play host to a myriad of different species of bacteria, fungi, yeasts, and parasites. In fact, bacteria outnumber our human cells by ten to one.

Collectively known as the 'microbiome', these organisms live all over our bodies and scientific research is uncovering the important role they play in our health, having a mutually beneficial or 'commensal' relationship with us. It is now known that the oesophagus, stomach, and intestines are home to hundreds of species of microbes, and that these commensal micro-organisms represent a vital component of the gastrointestinal microbiome.

The highest concentration of these can be found in our digestive tract, mostly lower down in the intestines where nutrients are extracted from the food we digest. Gut microbiome accounts for about 2-3 lbs of our body weight!

Unfortunately, sometimes the microbiome gets out of balance and opportunistic organisms may become overgrown, this can then pave the way for disease to set in.

If our digestion is impaired, this can lead to nutrient deficiencies that can contribute to migraine symptoms. An unbalanced gut microbiome can cause intestinal permeability or 'leaky gut' which puts our immune system in a hyper-aroused state that leads to chronic inflammation, food sensitivities, intolerances and allergies – all of which may be mediators of chronic migraine headaches. Unfortunately, long term use of pain killing medications are not conducive to healthy gut function.

No two microbiomes are the same. We know from research that we all have a unique microbiome profile. Gut microbiome can even determine how you react to different migraine medications. which may be why there is a variation in how effective medications are for an individual.

When we eat the foods that encourage growth of beneficial bacterium – prebiotic fibres that are only found in plant foods, we provide the fibres that are what our gut bacterium love to feed on.

Fibre

A whole food plant-based diet is naturally high in fibre. Fibre rich plant foods are prebiotic, these fibres are the food that our beneficial microbes in our gut microbiome feed on to survive and thrive, keeping harmful bacteria at bay.

As these friendly beneficial bacteria ferment the plant fibres and nutrients from the food we eat, they produce unique chemicals called short chain fatty acids (SCFAs) that act in the brain and provide a sense of well-being. This is particularly helpful to manage stress and anxiety that make migraines worse. (7)

For anyone who suffers from migraines, its important to keep the routes of elimination in the body clear to remove toxic waste from the body. One of the main routes of elimination is the bowels. The waste products of digestion in your colon contain many harmful toxins that need to be eliminated, these are waste products from the myriad of internal and external toxins we are exposed to that all get detoxified by our liver and excreted from the body.

Fibre is vital for proper digestion and for preventing constipation. If diet is lacking in fibre it can lead to constipation (i.e., less than one bowel movement a day. This can result in some of the toxins being re-adsorbed into the body instead of being eliminated, and so increasing the toxic load on the liver. If levels of toxins become elevated due to constipation this can be a mediator in migraine headaches. This can also have a very detrimental effect upon the balance of organisms (beneficial and harmful bacteria, yeast etc.) that inhabit the colon.

I recommend that people aim to eat a variety of up to 30 different types of fruits and vegetables a week. Eat the rainbow! That may sound a lot, but most of us don't eat anywhere near the amount of plant fibre we should be eating. For someone who is new to plant-based eating, this might mean a gradual build up to including more plants to allow the body to adjust to all that extra fibre.

Green leafy vegetables

Your Mum was right! You need to eat your greens; about two cups a day is optimal. Dark green leafy vegetables like kale, cabbage, broccoli and spinach are especially useful for people who suffer from migraines because of the key nutrients they contain. They are a great source of folate. A higher dietary intake of folate has been associated with reduced migraine frequency, particularly in individuals with the genetic mutation MTHFR C677T (8)

It becomes quite easy to get adequate dark green leafy vegetables per day if you just throw them in everything! Cabbage is a very good source of glutamine which is also gut healing, so I always keep a shredded cabbage in the fridge to add to curries, casseroles, soups and raw in salads.

Magnesium

Magnesium is a key nutrient for migraines because it supports clearance of neurotransmitters (chemical messengers in the brain) and relaxes nervous system. Magnesium is helpful for muscle relaxation and may help with the vasoconstriction (narrowing) of blood vessels experienced with migraines.

It is challenging to get magnesium in therapeutic doses from diet alone, but dark green leafy vegetables, nuts, beans, legumes, brown rice, oats, rye, buckwheat and quinoa are all good sources.

Beans and legumes are also rich in magnesium. At least one cup of beans/legumes daily provides a good dose of magnesium, alongside the other benefits of beans and legumes. Easy ways to incorporate them in the diet would be things like blending beans into soups for extra creaminess, slow cooked casseroles, adding beans or hummus to salads, lentils in shepherd's pie, chick-pea curry etc.

Studies have shown that a lower dietary intake of magnesium increases risk of migraine, while attaining the recommended daily allowance (400mg men/ 310mg women) is associated with reduced risk of migraine (9).

B Vitamins

It's possible that people who suffer from migraines have a higher requirement for vitamin B2 riboflavin (10) Good sources of this vitamin are found in tofu, nuts, green vegetables and mushrooms.

Not getting enough vitamin B12 is associated with increased oxidative stress, we can think of this as a sort of rusting of the cells, this happens especially in older people (11).

Insufficient vitamin B12 is also associated with increased tumour necrosis factor alpha (TNFa) in the body. This is a protein manufactured by white blood cells to stimulate and activate the immune system in response to infection or cancer, however too much of it is inflammatory. (12)

Since vitamin B12 is not naturally found in the diet, and meat eaters only get it from animal foods because of supplements in the animals feed, supplementation is recommended, either with a regular intake of fortified foods or a supplement product. Fortified foods include yeast extract, nutritional yeast, vegan cheese, and milks – however check the label when buying as not all of these foods are fortified.

Vitamin D

Ascertaining vitamin D status for someone who suffers from migraines is vital, this is because vitamin D levels have been linked to increased sensitivity to pain in migraine. (13)

Vitamin D acts more like a hormone in the body regulating a wide range of functions from immunity to bone health to sleep.

Migraines are higher in those who are deficient. Its estimated that deficiency or insufficiency is present in 45-100% of migraine sufferers and serum vitamin D levels correlated negatively with frequency of headaches. (14)

Most people can get all the vitamin D they need through the action of sunlight on their skin, but as a safeguard supplementation is recommended during the autumn and winter. Very few foods are fortified with this vitamin, but some that are include cereals, margarines and milks, and mushrooms grown under ultraviolet light.

Healthy fats

Fats are important for nutritional value for anyone who suffers from migraines. Fats found naturally in plants help keep us feeling satiated and provide omega 3 essential fats known for their anti-inflammatory effect, not forgetting that the brain itself is made of 60% fats.

Healthy fats like unsalted nuts, seeds, olives, avocados and unflavoured plant-based yogurts are all good choices. I recommend oils are kept to a minimum as they add empty calories and may contribute towards inflammation. It is far better to get the natural oils from whole food sources rather than extracting the oils from foods.

Hydration

A simple, but often overlooked basic in avoiding migraines is to make sure you keep properly hydrated at all times.

Water – by increasing water intake, especially first thing in the morning, we are assisting the body to cleanse by flushing out toxins. This will help keep your digestive system on track. Aim for 2 litres a day (including herbal tea and other liquids). Also eating hydrating foods helps with uptake of hydration into your cells – foods like citrus fruits, melon, cucumber, berries, and celery.

Avoid fizzy drinks, containing sugar or sweeteners. These can actually be quite dehydrating. Replace with still or sparkling water with slices of fruit. Artificial sweeteners can trick the brain into thinking it is going to receive sugar and will lead to more sugar cravings.

Iron

Migraines can be a symptom of iron deficiency anaemia which is a severe depletion of iron stores that results in a low blood haemoglobin concentration of iron. Iron deficiency anaemia is not typically presenting with migraine, but it could get overlooked as there's evidence to suggest that getting enough iron greatly reduces frequency of attacks. (15)(16) Especially in menstruating women (17) (18) Include plenty of iron-rich foods –the largest plant-based concentrations are in: Pine nuts, sunflower seeds, pumpkin seeds, apricots, dark leafy green vegetables whole grains, tofu, green vegetables, and pulses.

Co enzyme Q10 (CoQ10)

Deficiency of this enzyme is common in migraine sufferers. Low serum level is a bio marker for mitochondrial dysfunction (19). Mitochondria are the little power packs found in nearly every cell of the body, that generate the majority of our adenosine triphosphate (ATP), the energy currency of the cell. Good sources of CoQ10 are vegetables: Spinach, cauliflower and broccoli. Fruit: Oranges and strawberries. Legumes: Soybeans, lentils and peanuts. Nuts and seeds: Sesame seeds and pistachios.

Helpful herbs and spices

Rather than using salt, include plenty of fresh herbs and spices to flavour foods, which are naturally anti-inflammatory, anti-oxidant and have anti-microbial and anti-bacterial properties to support overall health.

Ginger, chilli and turmeric are especially good and have been used in traditional medicine systems such as Ayurvedic and Tibbs for centuries to help ease pain and reduce inflammation.

Ginger was shown in one [study](#) (20) to have the ability to suppress a migraine from starting and if taken regularly may have prophylactic effects in migraine headache.

In a randomised controlled trial [study](#) (21) an eighth teaspoon of powdered ginger was found to work as well as the migraine headache drug sumatriptan (e.g. Imigran) without the side effects.

Chillies contain an active substance called capsaicin which may be useful for or migraines. Capsaicin is thought to cause a desensitizing effect by relieving both peripheral and central pain by decreasing release of pain causing neuropeptides, such as substance P, from nerve terminals.

Turmeric is another spice traditionally used for its anti-inflammatory effects that may be useful in migraine headaches. The medicinal properties of turmeric are primarily due to the curcuminoid content (22). Curcuminoids give turmeric its rich yellow colour and generally make up 5% of turmeric composition. Turmeric and curcumin have potent anti-inflammatory properties which help reduce inflammation that may contribute to migraines.

Curcumin turmeric together with CoQ10 was found in one study to be more effective at preventing migraines than either alone (23)

Rosemary is a circulatory and nervine stimulant that can be useful for migraine and headaches. This may help dilate constricted blood vessels to the brain.

Cinnamon is another useful spice for migraine sufferers. It is anti-inflammatory, high in antioxidants and may help curb sugar cravings by balancing blood sugars.

Food sensitivities/allergies and intolerances

For some migraine sufferers, where there are indicating factors, I sometimes recommend trialling a gluten free diet to see if that helps. It is common for people with a degree of gut imbalance to react to gluten and I often see this in people with migraines. This reaction can cause the immune system to detect gluten as a problem and mount a defence. This defence mechanism involves raising inflammation and it is this low-grade inflammation that can exacerbate symptoms of migraine pain.

Histamine foods can be a trigger for some migraine sufferers. Some people are sensitive to histamine and other amines, and [may experience headaches](#) (24) after eating fermented foods. Because amines stimulate the central nervous system, they can increase or decrease blood flow, which can trigger migraines.

There are quite a few foods that are high in histamines that can for some people be a contributing factor in migraines, the list of foods is quite long. Some examples of histamine foods are: Pickles, tomatoes, aubergine, spinach, vinegar, ketchup,

Pineapple, prunes, plums, raisins, raspberries, avocado, olives.

We often hear that probiotic foods are good for our gut microbiome - and that is true, but they may not be suitable for everybody. Fermented foods rich in probiotics – including yogurt, sauerkraut, pickled vegetables and fermented soy products like miso and tempeh contain natural biogenic amines produced during fermentation. Amines are created by certain bacteria to break down the amino acids in fermented foods. The most common ones found in probiotic-rich foods include [histamine and tyramine](#) (25).

A low histamine diet can serve as a diagnostic tool to identify triggers. Keep a food diary and note any correlation between eating histamine foods and migraines.

Working on improving gut health can again be key here because often food sensitivities only develop when the gut microbiome and digestive function becomes unbalanced.

Supporting Methylation

Poor methylation can be another contributing factor in migraine sufferers. Methylation is a key chemical process occurring in every cell, every second of the day. It involves the transfer of 'methyl groups' from one molecule to another, which is dependent on many nutrients including folate (as the active form - methylfolate), vitamins B12, B6, and magnesium.

This basic process underpins the function of every system in the body, it can be another factor in migraines, not least by supporting nervous system function, stress management, detoxification, circulation, and energy production.

Methylation can become easily disrupted in the face of genetic variants (e.g. MTHFR), nutrient deficiencies, and challenges of the modern world (e.g. high stress, toxin exposure). MTHFR gene is one of the main genes involved in methylation and detoxification.

To determine whether methylation needs supporting, I would look at a client's symptoms, alongside family history and possibly perform a DNA test for certain genes involved in the methylation process. The most common gene mutation that affects migraine sufferers is the MTHFR gene, that around 30-50% of people carry (the majority being women).

Genes are simply instructions for our cells that can be greatly influenced by diet and lifestyle. Most people remain unaffected and having this gene mutation is not inherently dangerous. However, with some people, enzyme efficiency can drop between 30-50% depending on the degree of gene mutation. Those with a genetic

mutation on this gene may need extra support with methylation, hormone and detoxification support through diet and lifestyle.

MTHFR is responsible for adding a methyl group to folic acid/folate (from food) ensuring the body can use this vital B vitamin. There is a risk of vitamin B deficiencies for people with this gene variant which are not always picked up on standard blood tests. It is advised to eat more folate (green leafy vegetables) and if supplementing folate, choose the natural folate in a methylated form rather than synthetic folic acid.

Some well-known effects of having reduced methylation that may be linked with migraines are fatigue, light headedness, hormone imbalances, inefficient absorption of vitamin D, risk of vitamin B deficiencies and impaired detoxification (leading to inflammation),

Methylation promoting foods: Citrus peel, Rosemary, Onions and garlic, Broccoli sprouts, Leafy green vegetables, Shiitake mushrooms, Blueberries and cranberries Pumpkin and Sunflower seeds, Beetroot, Tomatoes Brown rice, Turmeric, Beans – all types (tinned or dried) Green tea, and Nuts – especially walnuts.

Supporting Neurotransmitters

Neurotransmitters are chemical messengers in our brain and diet can influence how they work. If our neurotransmitters become imbalanced, it can be another factor in migraine headaches.

Gamma amino butyric acid (GABA) is the major inhibitory presynaptic neurotransmitter in the brain and retina, produced from an amino acid called glutamic acid, using the enzyme glutamic acid decarboxylase (GAD) which is vitamin B6 (pyridoxine) dependant. Since vitamin B6 is the co-factor for the rate limiting step in GABA production, including plenty of food rich in B vitamins is key for migraine sufferers.

Vegetable foods rich in vitamin B6 are: Carrots, sweet potato, green peas, bananas, chickpeas, spinach and avocado are great plant-based sources of vitamin B6.

Glutamate (glutamic acid) is a major excitatory neurotransmitter of the central nervous system - it plays a role in memory and learning. Many plant foods contain glutamic acid, including beetroot, cabbage, spinach, kale, parsley, wholewheat and wheatgrass.

Both glutamate and GABA have a yin-yang relationship in functioning, so the right balance is vital as excess glutamate has been linked to migraine. (26)

Triggers

Triggers for migraines can be varied, anything from the weather, to stress, to chocolate. Identifying triggers, then avoiding them would be ideal. For the fortunate migraine sufferers, certain food products, and food additives that can be attributed to migraines can be avoided. The most commonly reported food triggers include: Chocolate, cheese, citrus, alcohol, and coffee. I recommend my clients keep a food diary alongside noting their symptoms as this can help identify food triggers.

Whilst avoiding triggers may help some, this is not always as simple as it sounds.

Pic 1

A List of The Best Vegan Tryptophan Food Sources (Per Serving)

Foods with tryptophan	Tryptophan g / per 100g	Tryptophan g / per 100 calories
Seaweed (dried)	0.93	0.33
Chia seeds	0.44	0.09
Sesame seeds	0.39	0.07
Hemp seeds	0.37	0.07
Pumpkin seeds	0.33	0.07
Flaxseed	0.30	0.06
Peanuts	0.25	0.04
Pistachio nuts	0.25	0.04
Cashew	0.24	0.04
Buckwheat groats	0.17	0.05
Oats	0.23	0.06
Almonds	0.21	0.04
Hazelnut	0.19	0.03
Walnut	0.17	0.03
Soybeans	0.15	0.11
Brazil nut	0.14	0.02
Black beans	0.11	0.08
Pine nuts	0.11	0.02
Rye grain	0.11	0.03
Kidney beans	0.10	0.08
Lima beans	0.09	0.07
Pecans	0.09	0.01
Chickpeas	0.08	0.05
Lentils	0.08	0.07
Mung bean	0.08	0.07
Adzuki beans	0.07	0.06
Garlic	0.07	0.05
Macadamia nut	0.07	0.01
Pecans	0.09	0.01

Macadamia nut	0.07	0.01
Coconut meat	0.04	0.01
Avocado	0.03	0.01
Chestnut	0.03	0.01
Banana	0.01	0.01
Cherry	0.01	0.01
Fig	0.01	0.01
Grapes	0.01	0.01

Despite not having much protein overall, some grains have a relatively high percentage of tryptophan. Oats, buckwheat, and rye grain are all near the top of the list.

After the grains, **seeds and beans make up the majority of the top foods**. When it comes to just about any amino acid, legumes are always one of the best plant-based sources. They should be a staple of most plant-based diets, especially if you're active.

The best low-calorie foods for tryptophan are leafy greens like seaweed, spinach, kale, and red leaf lettuce. But you'll need to eat a lot of them to meet your recommended daily intake with them alone.

References

- (1) Christian Waeber, Michael A. Moskowitz. Migraine as an inflammatory disorder. *Neurology* May 2005, 64 (10 suppl 2) S9-S15; DOI: 10.1212/WNL.64.10_suppl_2.S9
- (2) High-dose vitamin therapy stimulates variant enzymes with decreased coenzyme binding affinity (increased $K(m)$): relevance to genetic disease and polymorphisms. Ames BN, Elson-Schwab I, Silver EA. *Am J Clin Nutr.* 2002 Apr;75(4):616-58.
- (3) Bunner, A.E., Agarwal, U., Gonzales, J.F. et al. Low-fat plant-based diet intervention on migraine severity and frequency. *Nutrition intervention for migraine: a randomized crossover trial. J Headache Pain* 15, 69 (2014).
- (4) Siva ZO, Uluduz D, Keskin FE, et al. Determinants of glucose metabolism and the role of NPY in the progression of insulin resistance in chronic migraine [published online December 20, 2017]. *Cephalalgia*. doi:10.1177/0333102417748928
- (5) The association between dietary tryptophan intake and migraine Soodeh Razeghi Jahromi^{1,2} & Mansoureh Togha² & Zeinab Ghorbani^{2,3} & Azita Hekmatdoost¹ & Faezeh Khorsha^{2,3} & Pegah Rafiee^{1,2} & Pedram Shirani² & Morvarid Nourmohammadi² & Hossein Ansari⁴ Received: 8 January 2019 / Accepted: 15 June 2019 / Published online: 28 June 2019 # Fondazione Società Italiana di Neurologia 2019
- (6) Arzani, M., Jahromi, S.R., Ghorbani, Z. et al. Gut-brain Axis and migraine headache: a comprehensive review. *J Headache Pain* 21, 15 (2020). <https://doi.org/10.1186/s10194-020-1078-9>

- (7) Joël Doré 1, Hervé Blottière The influence of diet on the gut microbiota and its consequences for health. *Curr Opin Biotechnol* 2015 Apr;32:195-199. doi: 10.1016/j.copbio.2015.01.002. Epub 2015 Jan 20.
- (8) Menon S, Lea RA, Roy B, Hanna M, Wee S, Haupt LM, Oliver C, Griffiths LR. Genotypes of the MTHFR C677T and MTRR A66G genes act independently to reduce migraine disability in response to vitamin supplementation. *Pharmacogenet Genomics*. 2012 Oct;22(10):741-9.
- (9) Slavin M, Li H, Khatri M, Frankenfeld C. Dietary magnesium and migraine in adults: A cross-sectional analysis of the National Health and Nutrition Examination Survey 2001-2004. *Headache*. 2021 Feb;61(2):276-286.
- (10) Di Lorenzo C, Pierelli F, Coppola G, Grieco GS, Rengo C, Ciccolella M, Magis D, Bolla M, Casali C, Santorelli FM, Schoenen J. Mitochondrial DNA haplogroups influence the therapeutic response to riboflavin in migraineurs. *Neurology*. 2009 May 5;72(18):1588-94. doi: 10.1212/WNL.0b013e3181a41269. PMID: 19414726.
- (11) European journal of clinical nutrition Jan 2015 LR Solomon Functional cobalamin (vitamin B12) deficiency: role of advanced age and disorders associated with increased oxidative stress <https://www.nature.com/articles/ejcn2014272> which means elevated inflammation.
- (12) Tumor Necrosis Factor Gene Polymorphisms and Migraine: A Systematic Review and Meta-Analysis <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3303222/>
- (13) Gazerani P, Fuglsang R, Pedersen JG, Sørensen J, Kjeldsen JL, Yassin H, Nedergaard BS. A randomized, double-blinded, placebo-controlled, parallel trial of vitamin D3 supplementation in adult patients with migraine. *Curr Med Res Opin*. 2019 Apr;35(4):715-723. doi: 10.1080/03007995.2018.1519503. Epub 2018 Sep 28. PMID: 30182753
- (14) Ghorbani Z, Togha M, Rafiee P, Ahmadi ZS, Rasekh Magham R, Haghighi S, Razeghi Jahromi S, Mahmoudi M. Vitamin D in migraine headache: a comprehensive review on literature. *Neurol Sci*. 2019 Dec;40(12):2459-2477. doi: 10.1007/s10072-019-021-z. Epub 2019 Aug 3. PMID: 31377873.
- (15) Pamuk GE, Top MŞ, Uyanık MŞ, Köker H, Akker M, Ak R, Yürekli ÖA, Çelik Y. Is iron-deficiency anemia associated with migraine? Is there a role for anxiety and depression? *Wien Klin Wochenschr*. 2016 Dec;128(Suppl 8):576-580. doi: 10.1007/s00508-015-0740-8. Epub 2015 Apr 9. PMID: 25854909.
- (16) Tayyebi A, Poursadeghfard M, Nazeri M, Poursadeghfard T. Is There Any Correlation between Migraine Attacks and Iron Deficiency Anemia? A Case-Control Study. *Int J Hematol Oncol Stem Cell Res*. 2019 Jul 1;13(3):164-171. PMID: 31649807; PMCID: PMC6801325.
- (17) Vuković-Cvetković V, Plavec D, Lovrenčić-Huzjan A, Galinović I, Serić V, Demarin V. Is iron deficiency anemia related to menstrual migraine? Post hoc analysis of an observational study evaluating clinical characteristics of patients with menstrual migraine. *Acta Clin Croat*. 2010 Dec;49(4):389-94. PMID: 21830449

- (18) Gür-Özmen S, Karahan-Özcan R. Iron Deficiency Anemia Is Associated with Menstrual Migraine: A Case-Control Study. *Pain Med.* 2016 Mar;17(3):596-605. doi: 10.1093/pm/pnv029. Epub 2015 Dec 14. PMID: 26814264.
- (19) Quinzii CM, López LC, Gilkerson RW, Dorado B, Coku J, Naini AB, Lagier-Tourenne C, Schuelke M, Salviati L, Carrozzo R, Santorelli F, Rahman S, Tazir M, Koenig M, DiMauro S, Hirano M. Reactive oxygen species, oxidative stress, and cell death correlate with level of CoQ10 deficiency. *FASEB J.* 2010 Oct;24(10):3733-43.
- (20) J Ethnopharmacol . 1990 Jul;29(3):267-73. doi: 10.1016/0378-8741(90)90037-t. Ginger (*Zingiber officinale*) in migraine headache. T Mustafa 1, K C Srivastava. PMID: 2214812 DOI: 10.1016/0378-8741(90)90037-t
- (21) *Phytother Res.* 2014 Mar;28(3):412-5. doi: 10.1002/ptr.4996. Epub 2013 May 9. Comparison between the efficacy of ginger and sumatriptan in the ablative treatment of the common migraine. Mehdi Maghbooli 1, Farhad Golipour, Alireza Moghimi Esfandabadi, Mehran Yousefi
- (22) Prasad S, Aggarwal BB. Turmeric, the Golden Spice: From Traditional Medicine to Modern Medicine. In: Benzie IFF, Wachtel-Galor S, editors. *Herbal Medicine: Biomolecular and Clinical Aspects*. 2nd edition. Boca Raton (FL): CRC Press/Taylor & Francis; 2011. Chapter 13.
- (23) Parohan M, Sarraf P, Javanbakht MH, Foroushani AR, Ranji-Burachaloo S, Djalali M. The synergistic effects of nano-curcumin and coenzyme Q10 supplementation in migraine prophylaxis: a randomized, placebo-controlled, double-blind trial. *Nutr Neurosci.* 2021 Apr;24(4):317-326. doi: 10.1080/1028415X.2019.1627770. Epub 2019 Jun 26. PMID: 31241007.
- (24) *Headache.* 2016 Oct;56(9):1543-1552. doi: 10.1111/head.12953. Diet and Headache: Part 1. Vincent T Martin 1, Brinder Vij PMID: 27699780 DOI: 10.1111/head.12953
- (25) Bioactive Molecules Released in Food by Lactic Acid Bacteria: Encrypted Peptides and Biogenic Amines. Enrica Pessione, Simona Cirrincione, PMID: 27375596 PMCID: PMC4899451 DOI: 10.3389/fmicb.2016.00876
- (26) *CNS Spectr.* 2003 Jun;8(6):446-9. doi: 10.1017/s1092852900018757. The link between glutamate and migraine. Nabih M Ramadan. PMID: 12858134 DOI: 10.1017/s1092852900018757