Nutrition and supplements in migraine prophylaxis

Soodeh Razeghi, Associate professor of Nutrition, Beheshti university of medical Sciences

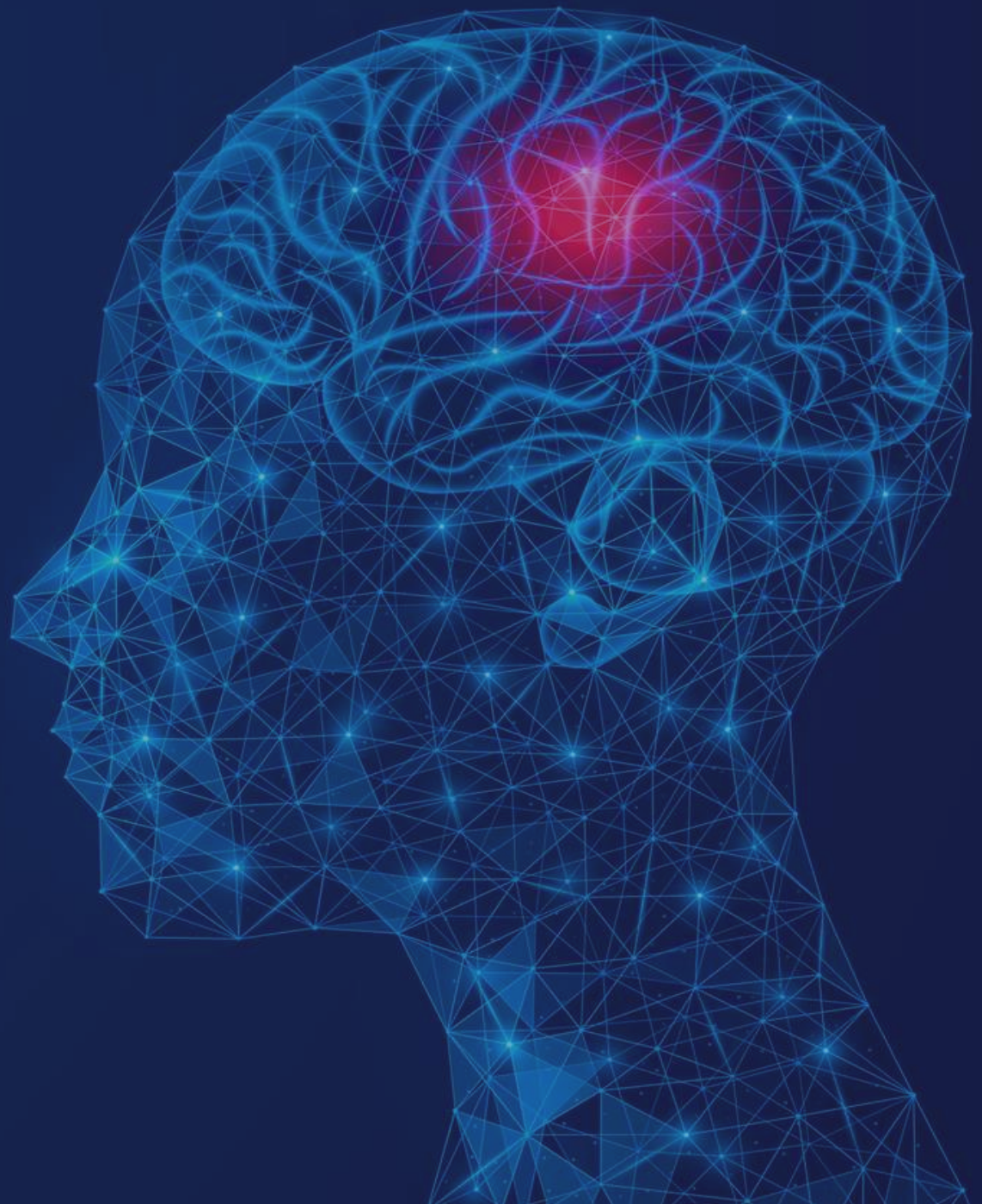
1400

Introduction

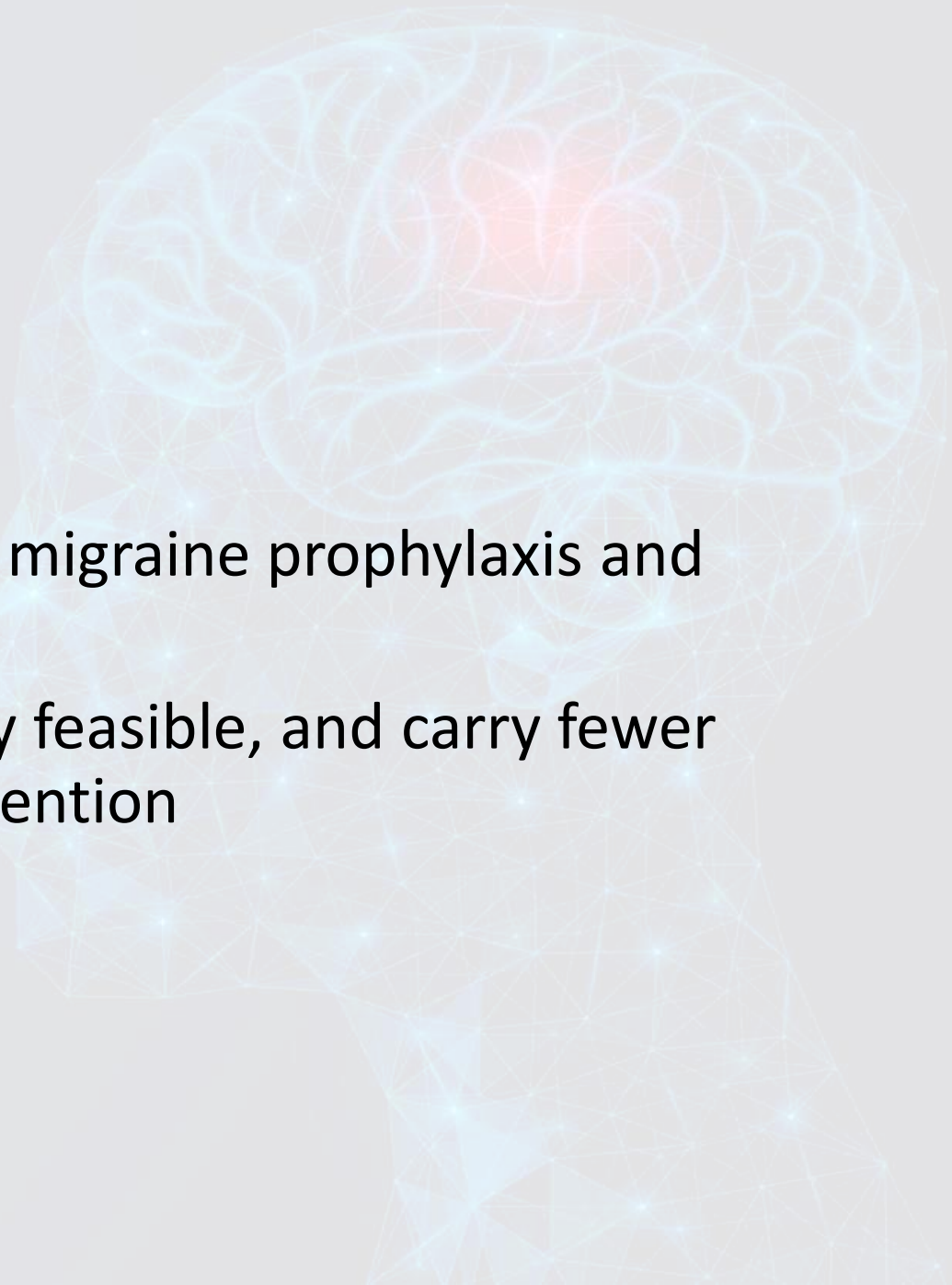
Supplements

Nutritional intervention

Take home message



Introduction



- dietary interventions can be effective in migraine prophylaxis and treatment.
- They may be less costly, more logistically feasible, and carry fewer side effects than pharmacological intervention

Supplements

Current Pain and Headache Reports
https://doi.org/10.1007/s11916-022-01019-9

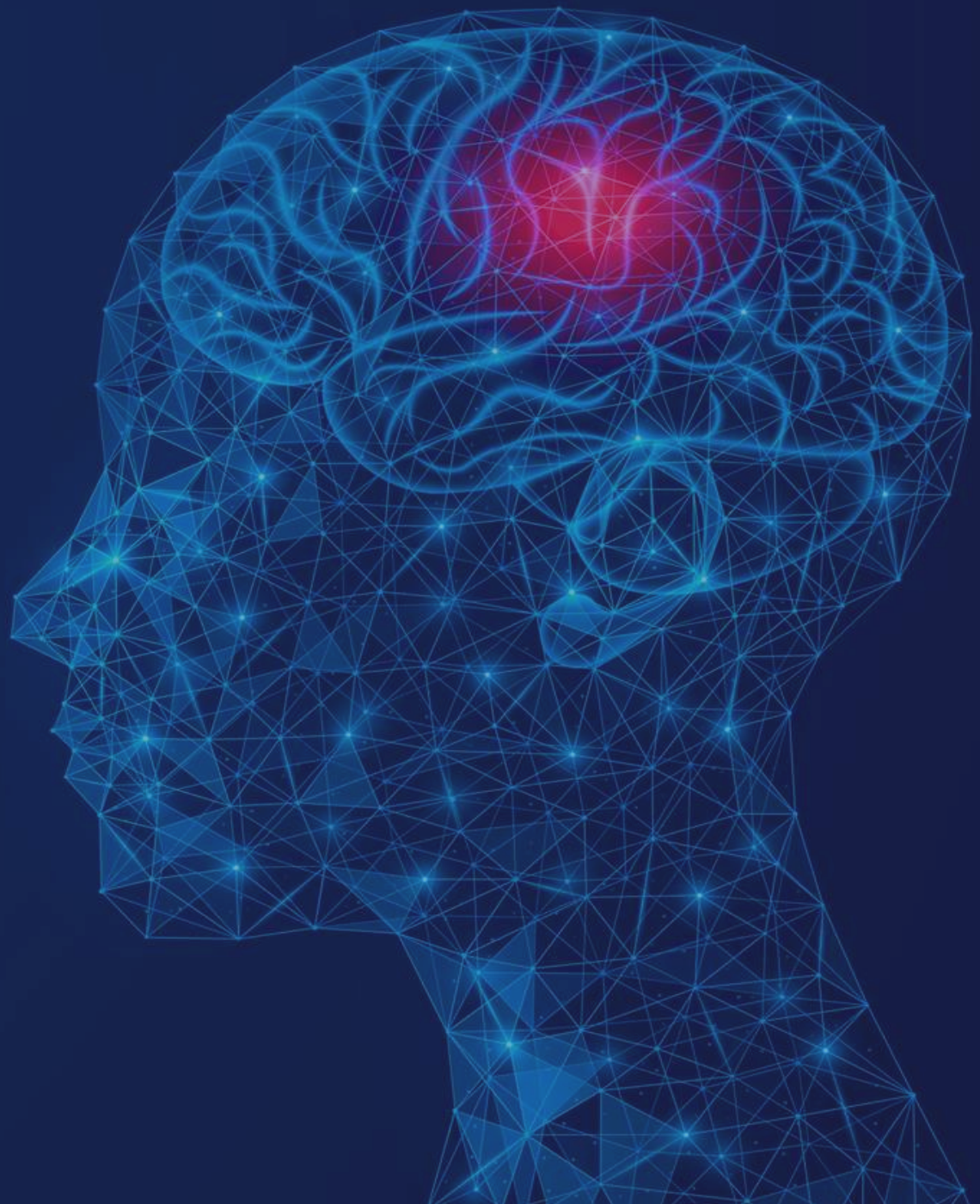
UNCOMMON AND/OR UNUSUAL HEADACHES AND SYNDROMES (J AILANI, SECTION EDITOR)

Check for updates

Review on Headache Related to Dietary Supplements

Shadi Ariyanfar[1] · Soodeh Razeghi Jahromi[2] · Mansoureh Togha[3] · Zeinab Ghorbani[4]

Vitamin B group



Vitamin B group

- In the year 1935, migraine was first defined as a **hypoglycemic headache**
- Energy-deficit syndrome with mitochondrial dysfunction should be considered as an upstream disorder in migraine pathophysiology
- Disrupted sensory processing demands lead to neuronal overactivation. This further warrants the need for higher energy demand
- On the other hand, A 16% reduction in ATP level of the brain has been reported in migraine sufferers

Vitamin B group

- The majority of the vitamin B group is responsible for metabolic and energy production pathways.
- Thiamine, riboflavin, niacin, and pantothenic acid active forms are a crucial part of the mitochondrial respiratory chain and energy generation at the cellular level

Vitamin B group

B2

Adults

supplementation with **400 mg/day vitamin B2 for three months** in episodic migraineurs could reduce:

- number of migraine attacks per month by 50%
- duration of headache
- use of abortive drugs

CHS, AAN, AHS, EFNS guidelines recommend (Level B & C) the daily intake of 400 mg of riboflavin to eligible patients for migraine prophylaxis.

Vitamin B group

B2

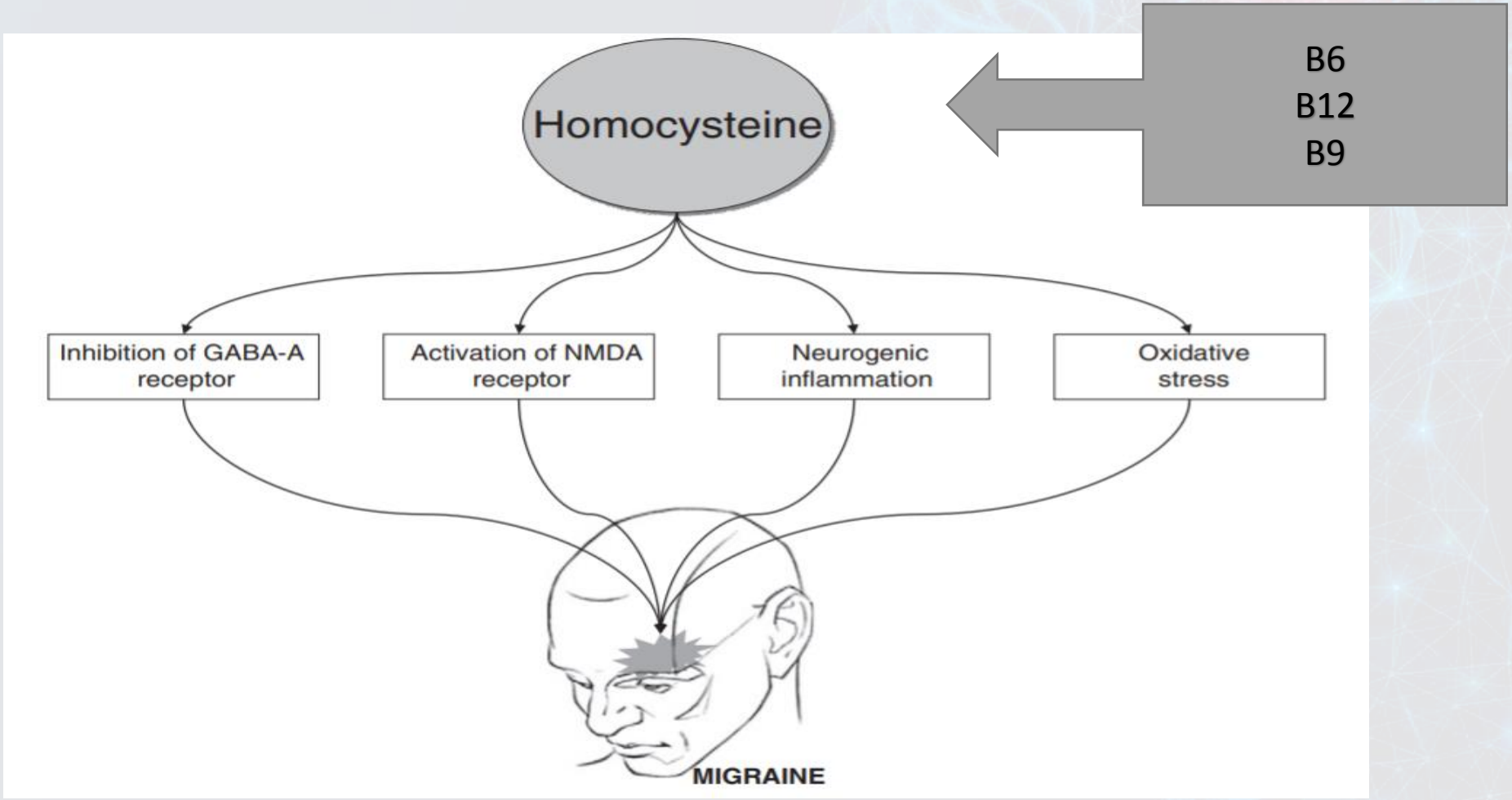
Pediatrics

from 3 to 6 months supplementation with either 200 or 400 mg/day (with no significant difference between 200 and 400 mg/day) could reduce:

- Frequency of migraine headache
- intensity
- Better intensity responders were boys and better frequency responders were less than 12 years old subjects

Vitamin B group

It is worth mentioning that the level of homocysteine was raised significantly among migraineurs, particularly in those patients with aura.



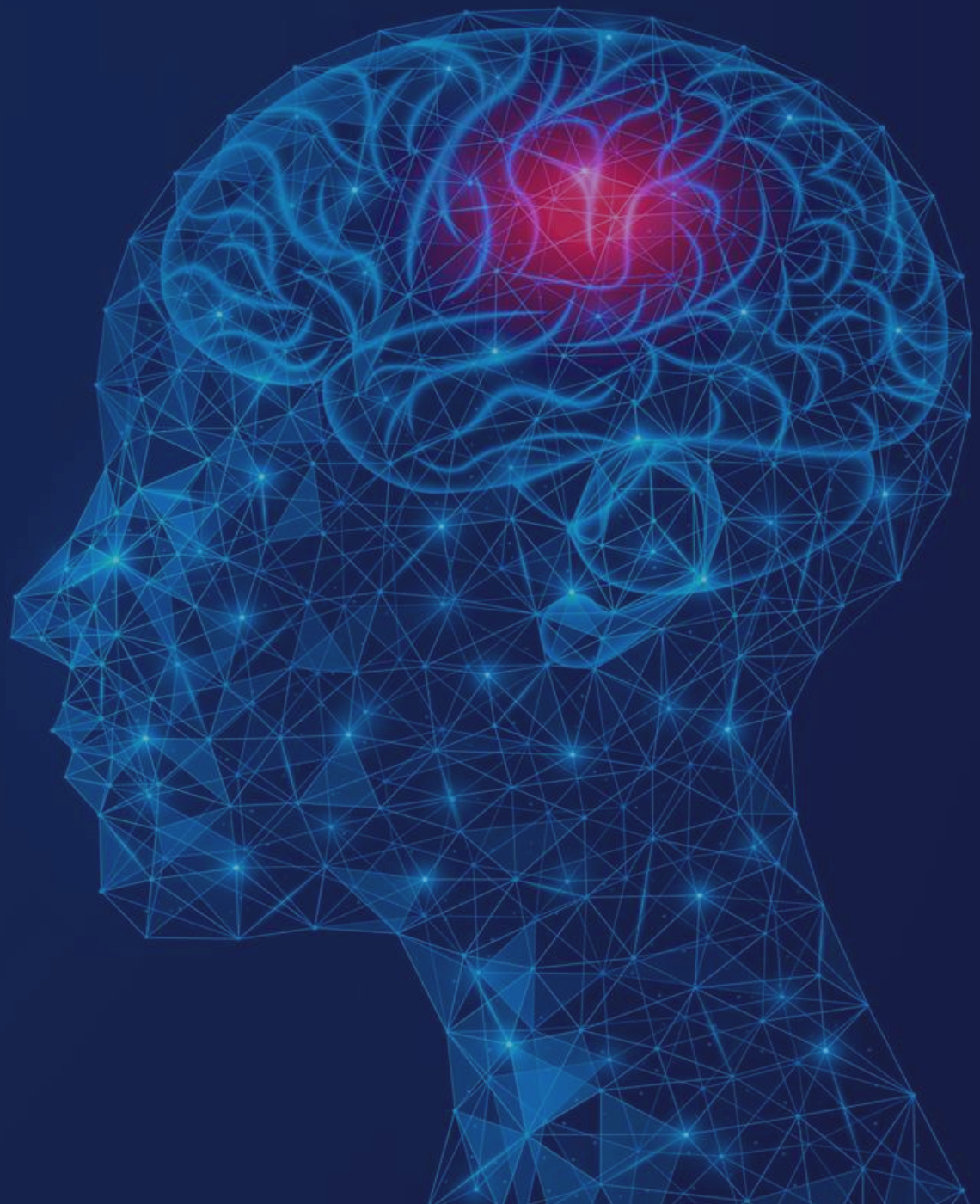
Vitamin B group-B12, B6, B9

- According to a study among the cases with tension-typed headache, 24% were vitamin B12 deficient
- In a study on adult migraine patients, those in the highest vs. the lowest serum B12 quartile had an 80% decrease in the odds of having migraine headaches
- **6 months of supplementation with 2 mg of folic acid, 25 mg of vitamin B6, and 400 mg of vitamin B12 can significantly reduce headache frequency and pain intensity**

Vitamin B group

- In a study on menstrual-related migraine headache, after two months of the run-in period, patients were injected with a combination of 100 mg vitamin B1, 100 mg vitamin B6, and 1000 mcg vitamin B12 one week before menstruation cycle for three consecutive months. **In individuals with chronic and episodic migraines, the mean severity of menstrual-related migraine attacks was decreased by 50%**

Coenzyme Q10



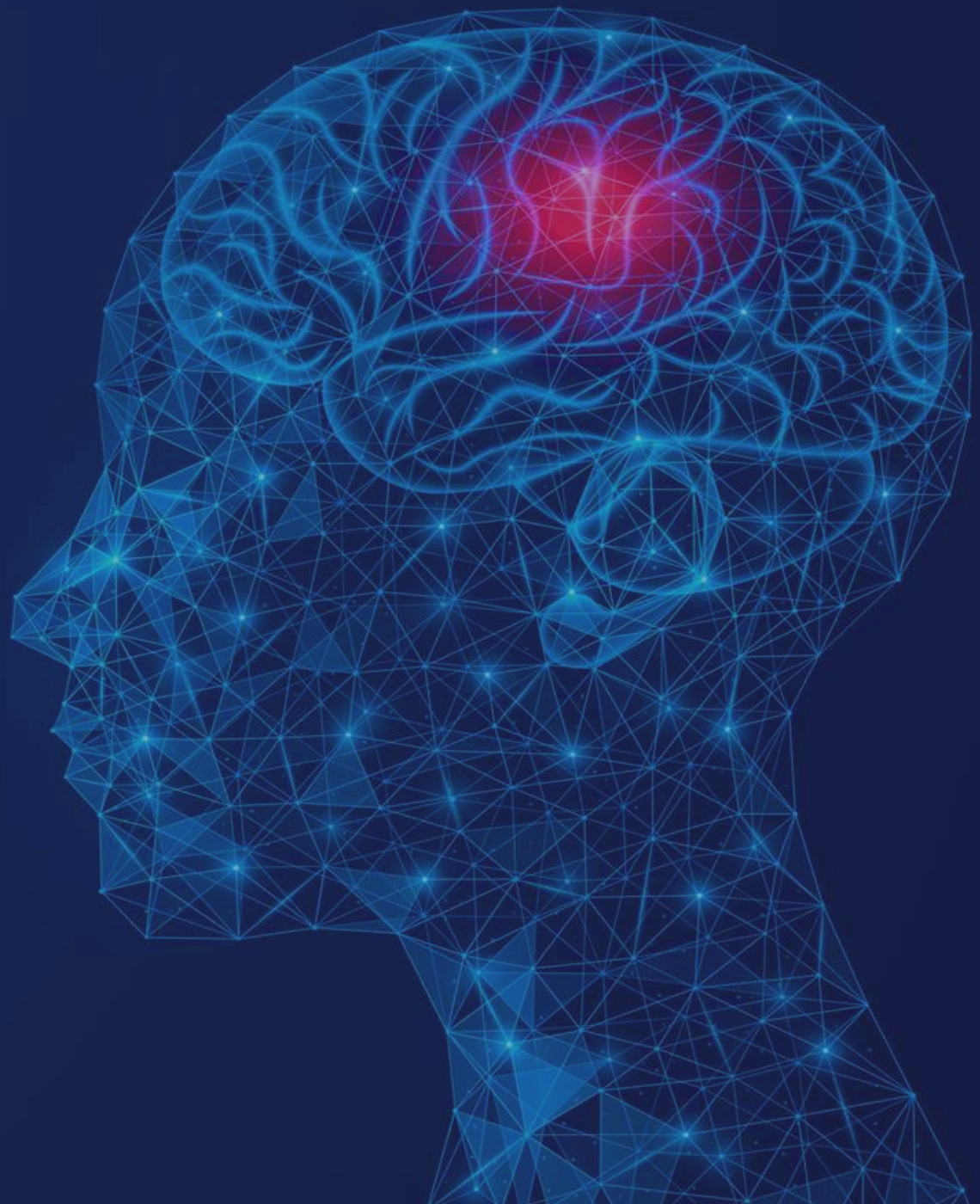
Coenzyme Q10

- Coenzyme Q10 is a fundamental factor for the oxidative phosphorylation process and cellular bioenergetics in mitochondria
- Coenzyme Q10 in its reduced form seems to protect mitochondria against free radicals as it can restore vitamin E & C.
- Most migraine patients are CoQ10 deficient.
- daily supplementation with **150 mg coenzyme Q10 for 3 months could diminish the number of days with migraine headaches (with/without aura) by more than 50%**.

Coenzyme Q10

- receiving **400 mg Q10 daily resulted in almost 50% reduction not only in frequency but also in intensity and duration of migraine attacks**
- **responses to trigger factors** were also among the improvement that was followed by Q10 supplementation

Magnesium

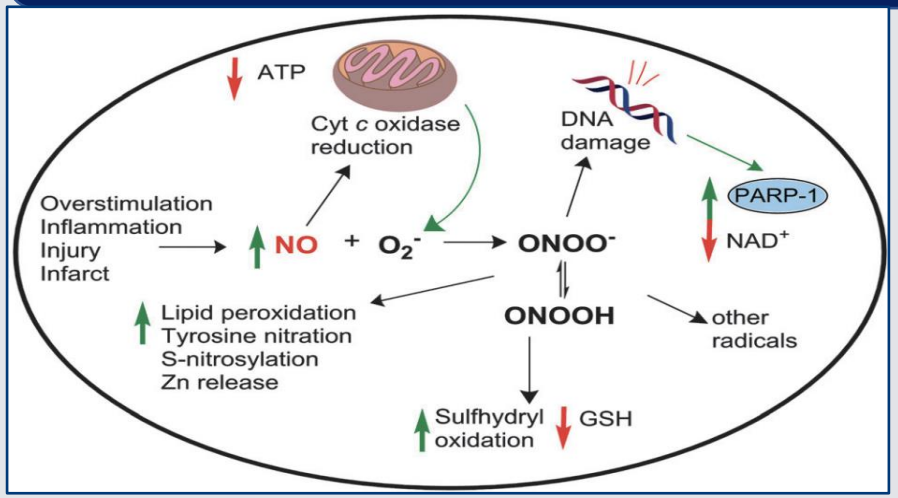


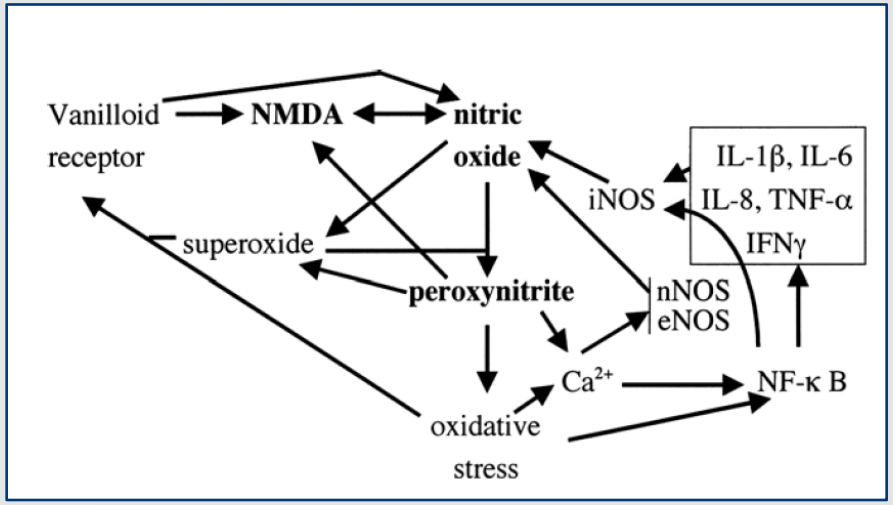
Magnesium

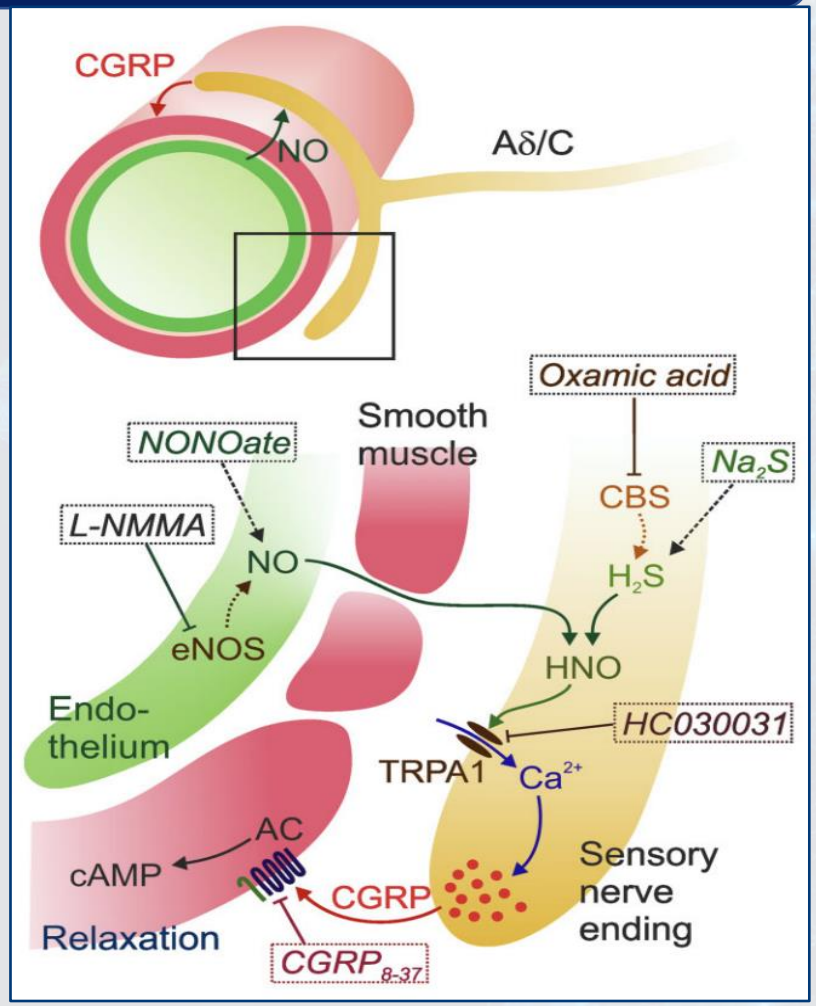
- decreased levels of Mg in cerebrovascular fluid have been detected during episodes of migraine.
- previous findings pointed to serum hypomagnesemia during migraine headaches.
- Magnesium deficiency was implicated in hyperexcitability of the brain

Magnesium

Mg has a modulatory role in Ca hemostasis through binding to N-Methyl-D-aspartate (NMDA) receptors, which led to the inactivation of NMDA glutamate receptors.

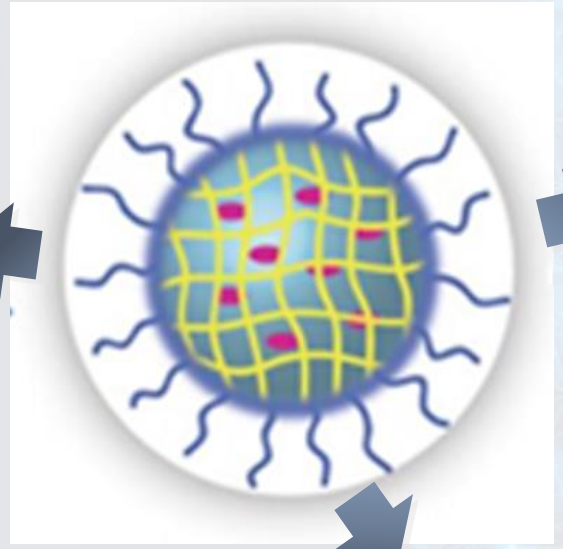






Magnesium

CHS: **600 mg elemental magnesium as magnesium citrate**



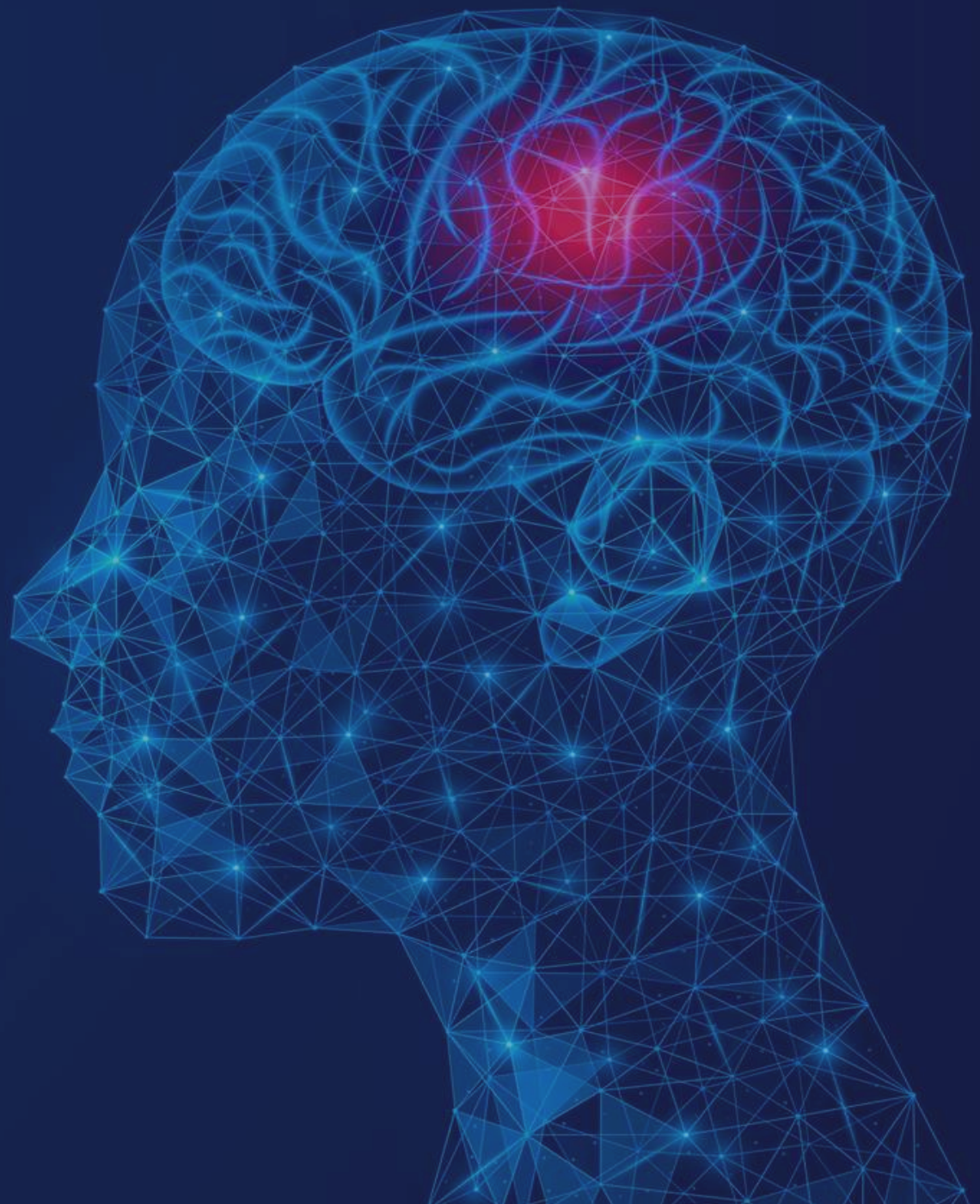
EFNS: Level C and supported use of the same dose of magnesium as the Canadian guidelines

AAN/AHS guideline : Level B recommendation

Magnesium

- In menstrual-related migraine, women who received 360 mg Magnesium (2S)-pyrrolidine-2-carboxylate, showed a decrease in migraine associated symptoms.

Vitamin D



Vitamin D

- Available evidence showed that 45-100% of patients with migraine was vitamin D3 deficient or insufficient
- 22% reduction in migraine headache occurrence was achieved for every 5 ng/ml rise in serum vitamin D levels

Vitamin D

Adults

2000 IU vitamin D3 or placebo for 16 weeks

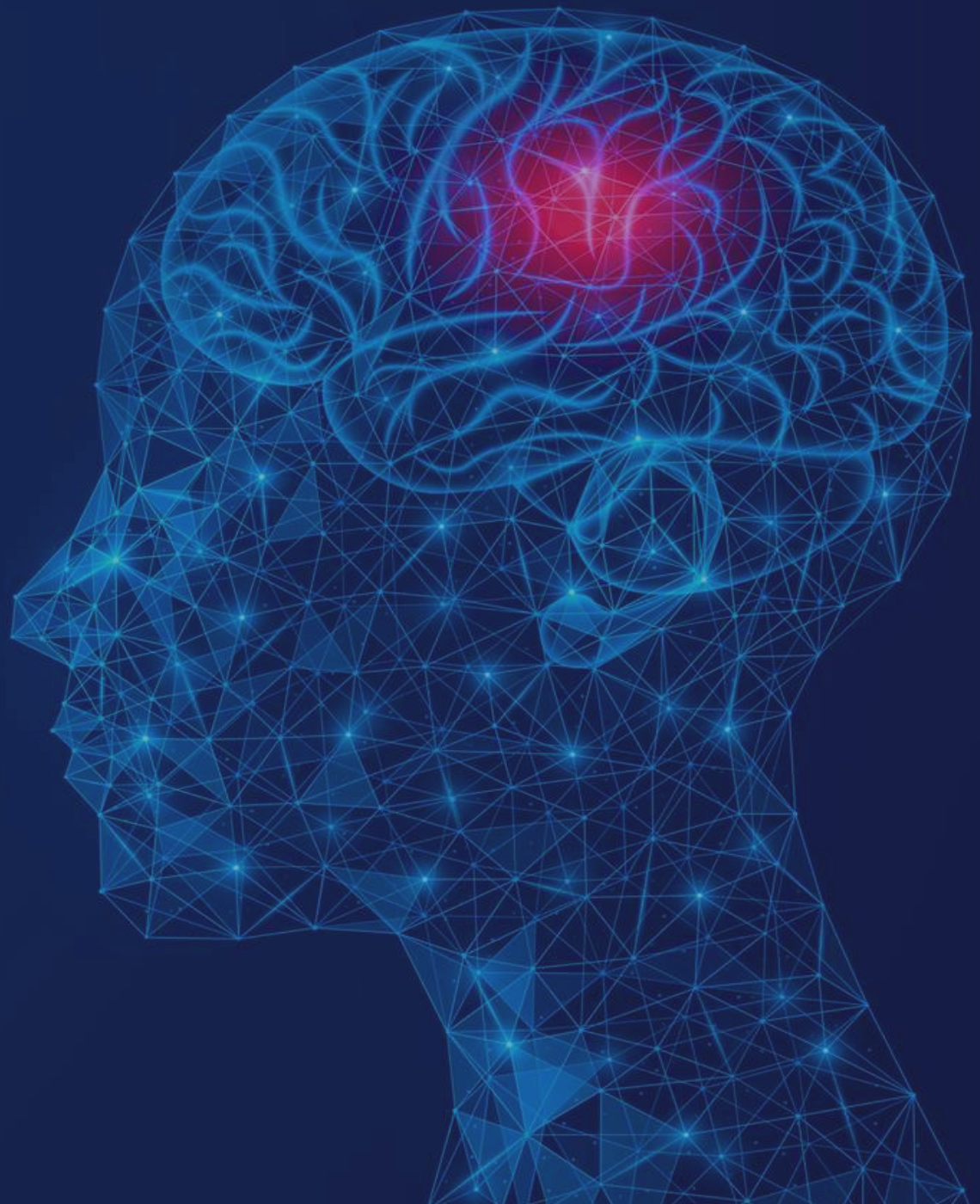
- Reduce CGRP level
- Reduce headache days
- use of abortive drugs
- Improvement of MIDAS

Vitamin D

Pediatrics

combination therapy of vitamin D in 3 doses of 400, 800, and 5000 IU with amitriptyline among children and adolescents with migraine for 6 months, improved the frequency of migraine attacks

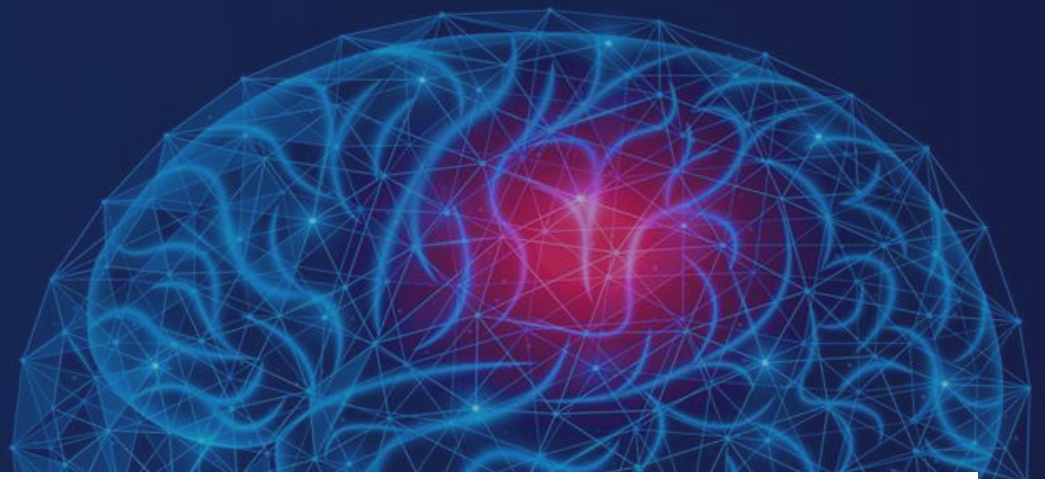
Omega-3



Omega 3 Fatty Acids:

Studied population	Study protocol	Results
adults with Episodic migraine	12-week, 2 treatment groups received a low omega-6 diet (<2% of calories) or a low omega-6 plus high omega-3 (1500-2000 mg/day) diet.	high omega-3:low omega-6 group experienced significantly fewer **headache days** per month than the low omega-6 only group **(–8.8 vs –4.0),** as well as **greater decreases in headache hours per day (–4.6 vs –1.2),** Headache Impact Test (HIT-6) scores (–7.5 vs –2.1),

Main source of Omega-6 fatty acids: regular vegetable oils (canola, sunflower, corn, and soy) and all types of meat specially red meat



Razeghi Jahromi *et al. The Journal of Headache and Pain* (2019) 20:106
https://doi.org/10.1186/s10194-019-1057-1

The Journal of Headache and Pain

REVIEW ARTICLE **Open Access**

Association of diet and headache

Soodeh Razeghi Jahromi[1,2†], Zeinab Ghorbani[3†], Paolo Martelletti[4†], Christian Lampl[5†], Mansoureh Togha[2,6*†] and On behalf of the School of Advanced Studies of the European Headache Federation (EHF-SAS)

Weight (Adult)

Study design	Studied population	Method of weight reduction	Results
Case series	29 adult migraineurs with morbid obesity	Bariatric surgery with 3 and 6 month follow-up	**headache frequency was reduced by more than 50%.** Attack duration, medication need during attacks, non-migraine pain were also reduced. Three months post-surgery, chronic migraine was converted to episodic migraine in 5 out of 6 chronic migraineurs.
Prospective observational study	24 adult migraineurs with morbid obesity	Bariatric surgery with 6 months	Number of patients with more than 14 headache days per month reduced by 16.2%. **Percent of patients with 4-12 h headache duration reduced by 53.2%.**
Non-randomized controlled trial	**51 obese women with migraine headache. Bariatric surgery**	**Bariatric surgery compared to diet/ exercise induced weight loss with 1 & 6 months follow up**	**Headache intensity was significantly reduced one and six months in both groups. One month after surgery, 68% became free of headache. Number of migraine free days increased in both groups. Significant reduction in attack duration was only observed in surgery group.**

Weight (Pediatrics)

Study design	Studied population	Method of weight reduction	Results
Retrospective observational study	913 pediatric patients with different type of headaches	Routine visit plus dietary consultation about health risk of obesity	In children with overweight, there is a direct correlation between BMI reduction and reduction in headache frequency (r=0.32)
Prospective open-label study	135 adolescents with migraine	Low-calorie diet, exercise & cognitive- behavioral consultation for 12 months	Headache intensity, frequency, PedMIDAS, and use of abortive medication, were decreased after 6 and 12 month.

migraine pathophysiology is closely linked to the central and peripheral pathways involved in obesity		
migraine	cytokine	IL-1β, IL-6, TNF-α levels have also been shown to be elevated in migraineurs especially during their attack phases leptin administration in Wistar rats could diminish threshold of pain
obesity		a rise in pro-inflammatory factors, such as IL-1β, IL-6, tumor necrosis factor (TNF)-α and leptin were reported in obese individuals. These events finally lead to a persistent low-grade inflammatory status
migraine	CGRP	CGRP is the cruial pain mediator secreted from trigeminal nerves during migraine attacks
obesity		administration of CGRP induces the accumulation of fat in obese animal models
		evidence proposed an increase in plasma CGRP level of adult with obesity
Migraine & Obesity	P Substance	SP was also detected in adipose tissue and shares a role in fat accumulation and the start of the inflammatory cascade related to obesity

Low fat diet

Study design	Studied population	Study protocol	Results
Open label trial, 1999	56 adults with migraine	28-days of run-in period, followed by 28 days of low-fat diet (<20 gr/d), without control group	**Fifty-one of the 54 subjects reported a >40%** improvement in their headache index, and 35 of the 54 subjects improved their headache index by 85%-100%.
Randomized controlled trial, 2015	55 adults with chronic daily headache	a diet high in n-3 and low in n-6 fatty acids (the H3-L6 intervention) compared to a diet low in n-6 fatty acids (the L6 intervention) for 12 weeks	for each SD increase in plasma n-3 DHA derivatives, **10% reduction in the number of headache days per month and a 40% reduction in the number of severe headache hours per day**

Gut-Brain Axis

Arzani *et al. The Journal of Headache and Pain* (2020) 21:15
https://doi.org/10.1186/s10194-020-1078-9

The Journal of Headache and Pain

REVIEW ARTICLE **Open Access**

Gut-brain Axis and migraine headache: a comprehensive review

Mahsa Arzani[1†], Soodeh Razeghi Jahromi[2†], Zeinab Ghorbani[3†], Fahimeh Vahabizad[1,4], Paolo Martelletti[5], Amir Ghaemi[6], Simona Sacco[7*], Mansoureh Togha[1,4*] and On behalf of the School of Advanced Studies of the European Headache Federation (EHF-SAS)

Original Article

Cephalalgia
An International Journal of Headache

International Headache Society

The effects of a multispecies probiotic supplement on inflammatory markers and episodic and chronic migraine characteristics: A randomized double-blind controlled trial

Cephalalgia
0(0) 1–13

DOI: 10.1177/0333102418820102
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Fahimeh Martami[1,2,*], Mansoureh Togha[2,*], Maryam Seifishahpar[1,2], Zeinab Ghorbani[2,3], Hossein Ansari[4], Tahereh Karimi[1,2] and Soodeh Razeghi Jahromi[1,2]

Bacillus subtilis PXN 21, *Bifidobacterium bifidum* PXN 23, *Bifidobacterium* breve PXN 25, *Bifidobacterium infantis* PXN 27, *Bifidobacterium longum* PXN 30, *Lactobacillus acidophilus* PXN 35, *Lactob. delbrueckii ssp bulgaricus* PXN 39.

, *Lactob. casei* PXN 37, *Lactob. plantarum* PXN 47 *Lactob. rhamnosus* PXN 54 *Lactob. helveticus* PXN 45 *Lactob. salivarius* PXN 57 *Lactococcus lactis ssp. lactis* PXN 63, *Streptococcus thermophilus* PXN 66.

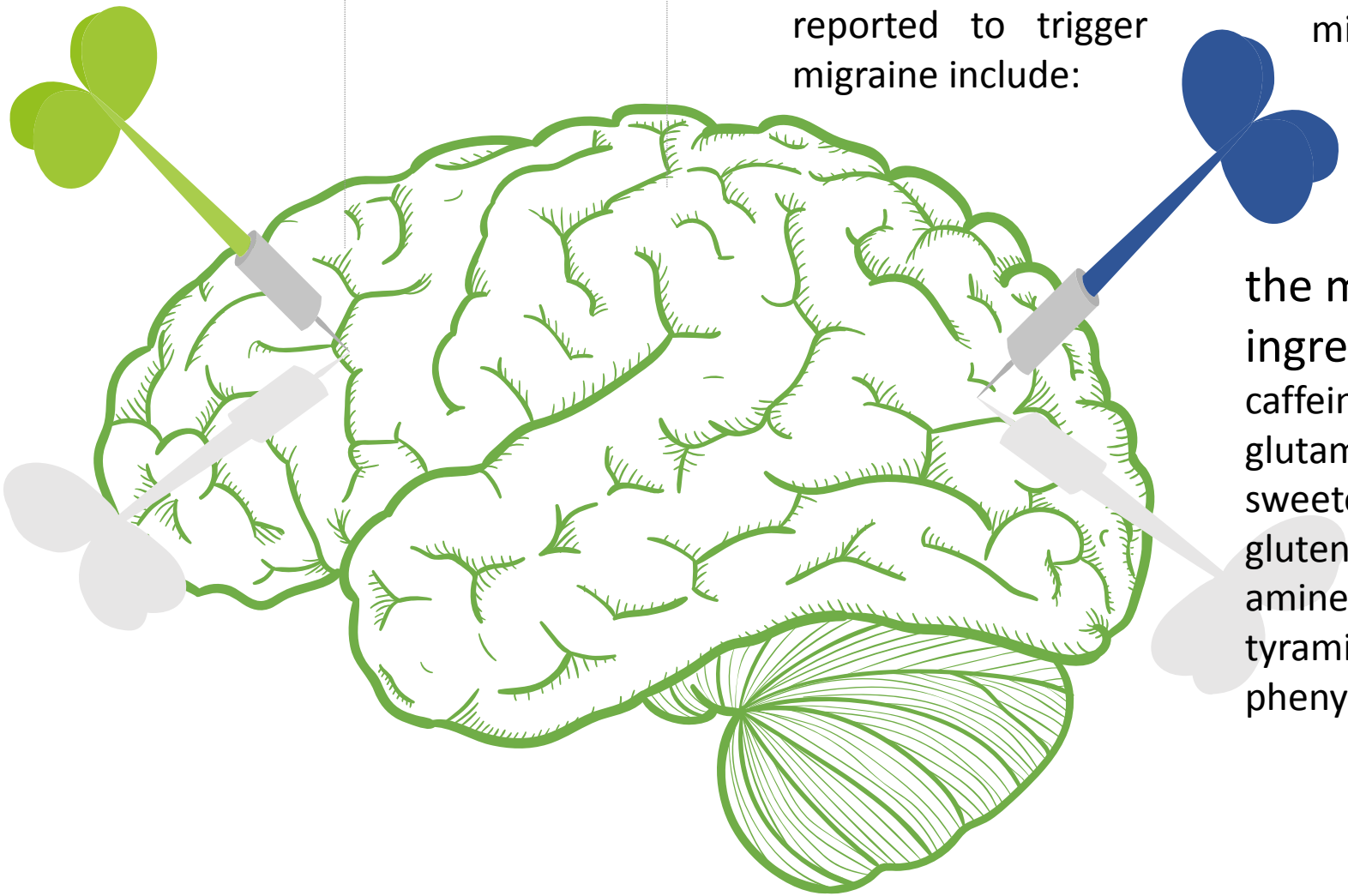
4 groups of Episodic and chronic migraine patients (n= 25/ group) for 8 to 10 weeks

Elemental diet

27-30% of migraineurs self-report that foods trigger attacks of migraine.

Specific Food/Nutrients-Avoidance

• **Identify & avoid triggers:**
  • Lists of potential food triggers to avoid
  • Food journals to ID triggers
  • Classic elimination diet
  • Immunological assay-based elimination diet



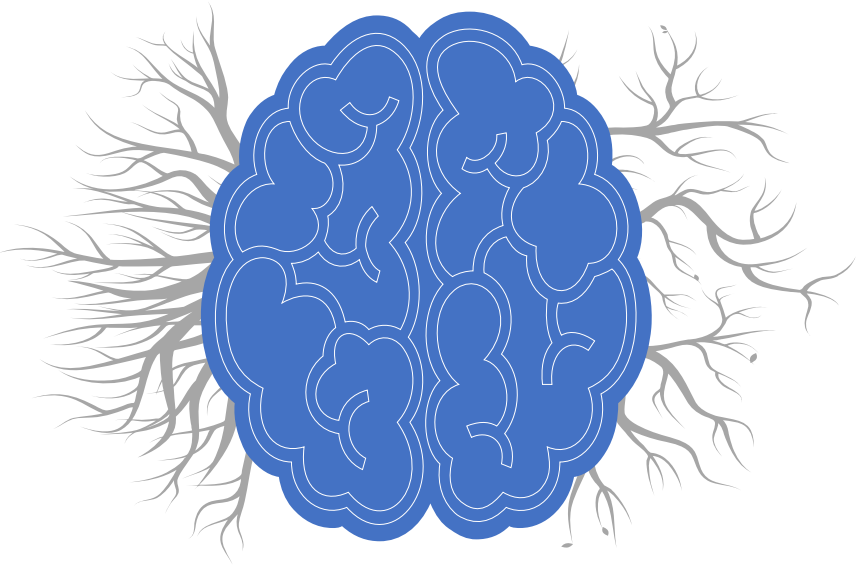
The most common foods and beverages that have been self-reported to trigger migraine include:

chocolate, coffee, nuts, salami, alcoholic beverages, milk, citrus fruits, and cheese

the most frequent ingredients are:

caffeine, monosodium glutamate (MSG), artificial sweeteners, nitrites, gluten, and biogenic amines (eg,histamine, tyramine, and phenylethylamine)

Mechanism



<u>The use of IgG antibodies to predict a successful elimination diet are the most promising</u>

In both migraine and food sensitivities, inflammation induced by food could make the pro-inflammatory environment which is needed for the induction of headache by other triggers.
All IgG subclasses, except for IgG4 can cause an inflammatory response in exposure to the respective antigen.

The adequate intake (AI) levels for water in the U.S. Dietary Reference Intakes are 2.7L total water for adult females (including approximately 2.2L consumed as fluids, and the remaining volume coming from the water content in foods) and 3.7L total water for adult males (including approximately 3L of fluids),

Take home message

- Manage weight
- Manage gut disbyosis
- Enough vitamin B group, vitamin D and magnesium intake
- Balanced, low fat-high Omega-3 diet


Thanks

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