

# What dietary modifications are indicated for migraines?

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## EVIDENCE-BASED ANSWER

Migraine frequency, duration, and severity are not increased by dietary choices (strength of recommendation [SOR]: **A**, individual randomized trial [RCT]); they can be decreased by a low-fat

diet (SOR: **B**). Regular supplementation with high-dose riboflavin or magnesium reduces frequency and intensity of migraines (SOR: **B**, single RCT).

## CLINICAL COMMENTARY

**Have patients keep a migraine diary; experiment with dietary/activity modifications**  
Interestingly, this review of the literature seems to both disavow commonly accepted beliefs about migraine triggers and suggest new dietary interventions. In my experience, foods like chocolate, cheese, and citrus are rarely reported by patients as migraine triggers. Alcohol is reported as a trigger, though the possibility that it is a cofactor with stress and fatigue seems plausible. Certainly patients perceive that various foods and activities trigger their migraines. It is possible that no universal food triggers exist, but that persons have

individual triggers. In the end, I think the practical approach remains to have patients keep a diary of the events surrounding their migraines, identify patterns and experiment with dietary and activity modifications. An empiric trial of magnesium or riboflavin certainly seems worth consideration, as does a recommendation for a healthy low-fat diet that incorporates omega-3 fatty acids/olive oil. Migraine treatment remains a process of educated trial and error to find the optimal combination of lifestyle modifications and medications.

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### ■ Evidence summary

Contrary to what many physicians learned from their mentors—and to what many patients believe—no food or food additive has been proven to cause migraine headaches; and in fact, good evidence disproves this notion. The primary foods once thought to trigger migraines were cheese, alcohol, chocolate and citrus fruit.<sup>1</sup> Conversely, it appears that regular supplementation with some nutrients reduces the frequency and intensity of migraines (**TABLE 1**).

**Vasoactive amines.** Vasoactive amines (ie, tyramine and phenylethylamine) are present in aged cheese and red wine. One randomized trial of 80 patients with fre-

quent migraines showed that tyramine and placebo induced migraine at the same rate.<sup>2</sup> A systematic review on the relation of vasoactive amines to migraine found no evidence that any biogenic amines in red wine, cheese, or chocolate cause migraine.<sup>3</sup> Furthermore, an uncontrolled prospective trial failed to show that amount or type of alcohol correlates with migraines, but it did find a correlation between stressful events and migraines. These stressful events also correlated with a higher alcohol intake.<sup>4</sup> One final small randomized controlled trial enrolling children found no difference in migraine frequency between high fiber/high vasoactive amine and a high fiber/low vasoactive amine diet.<sup>5</sup> In

contrast to these RCTs, one series of lower-evidence-level patient surveys from a tertiary clinic reported that approximately 12% to 28% of patients perceived migraines were triggered by various foods (ie, cheese, wine, beer, chocolate).<sup>6</sup>

**Chocolate.** The role of chocolate in instigating headache was investigated in a 63-subject double-blind RCT comparing chocolate with carob. Chocolate was not more likely to provoke headache than carob in any of the headache diagnostic groups ( $P=.83$ ). These results were independent of subjects' beliefs regarding the role of chocolate in the instigation of headache ( $P=.39$ ). Unfortunately, this trial included multiple headache types, with only 50% being migraine.<sup>7</sup>

**Omega-3 fatty acids.** A small double-blind crossover study of 27 adolescents over 5 months showed no difference between fish oil supplementation and "placebo supplementation" with olive oil. The dose of fish oil used is approximately equivalent to 1.5 g of the recently approved Omacor fish oil capsules. Interestingly, the subjects reported dramatic decreases in headache frequency (15 per month down to 2 episodes per month) and decreases in headache severity (reduction from 5 to 3 on a 7-point Likert scale) with both compounds.<sup>8</sup> The possibility of olive oil being an active comparator muddles interpretation of the results.

**Riboflavin.** A good-quality RCT compared riboflavin 400 mg/d with placebo for prophylaxis of migraines.<sup>9</sup> Using intention-to-treat analysis, riboflavin was superior to placebo in reducing attack frequency ( $P=.005$ ) and headache days ( $P=.012$ ). The proportion of patients who improved by at least 50% was 15% for placebo and 59% for riboflavin ( $P=.002$ ). The number needed to treat (NNT) was 2.3. Adverse events were very rare—1 case of diarrhea was reported causing withdrawal (number needed to harm [NNH]=33.3). The effect of riboflavin on migraine began at 1 month but was maximal at 3 months, when this study ended. The most pronounced effect was shorter migraine

attacks followed by fewer migraine attacks. An additional large case series found that high-dose riboflavin reduced headache days by 50% ( $P<.05$ ) and use of abortive medicines by 36% ( $P<.05$ ).<sup>10</sup>

**Magnesium.** A good-quality RCT of 81 adults given 600 mg of magnesium or placebo showed that by weeks 9 to 12 frequency of attacks was reduced by 41.6% in the magnesium group and by 15.8% in the placebo group compared with the baseline ( $P<.05$ ; NNT=3.9). However, diarrhea was reported among 18.6% of magnesium recipients (NNH=5.2).<sup>11</sup> Additionally, a very small randomized trial of 20 women found that magnesium 360 mg/d in the luteal phase reduced the number of days with menstrual-related migraines ( $P<.03$ ) when compared with placebo. However, the absolute magnitude of the difference was not reported, so it is unclear if this study is clinically useful or can be extended to all patients with migraines.<sup>12</sup>

**Low-fat diet.** A prospective cohort trial of 54 patients evaluated the effect of lowering total fat intake per day. The dietary intervention successfully lowered fat intake from 65.9 to 27.8 g/d and was associated with statistically significant decreases in headache frequency (median decrease from 6 to 1 per week), intensity (median decrease 2.9 to 0.5 on a scale from 0 to 5), duration, and medication intake ( $P<.0001$  for all measures, confidence interval not available).<sup>13</sup>

**Caffeine.** One case series found that adolescents and children ingesting over 1400 mg/wk of caffeine from cola drinks experienced resolution of headaches with gradual reduction in cola intake,<sup>14</sup> but no prospective trials to confirm this observation have been completed. It is important to note that reduction in migraines may have been due to reduction in other ingredients, not just caffeine.

**Riboflavin/magnesium/feverfew.** One double-blind RCT compared a compound with daily doses of riboflavin 400 mg, magnesium 300 mg, and feverfew 100 mg with the proposed placebo of riboflavin 25 mg. There was no differ-

### FAST TRACK

**No food or food additive has been proven to cause migraine, but some nutrients reduce their frequency and intensity**

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TABLE

**Effects of dietary compounds on migraine headaches**

DIETARY COMPOUND OR DIET TYPE	EFFECT ON MIGRAINES	ADVERSE EFFECTS
Vasoactive amines	0	0
Chocolate	0	0
Omega-3 fatty acids	0	0
Low-fat diet (<20 g/day)	+	0
Riboflavin 400 mg/day	+++	+
Magnesium	++	++
Caffeine	?	?
Riboflavin/magnesium/feverfew	?	?

Key: 0=no effect, +=slight effect, +=moderate effect, +++=large effect, ++++=very large effect.

ence in response between the compound and the riboflavin placebo; however, response to riboflavin 25 mg was higher than expected for a placebo (44%). Further study with a placebo free of active ingredients is required to determine the ultimate effectiveness of this compound.<sup>15</sup>

**Recommendations from others**

The American Academy of Neurology makes no mention of dietary therapy in its most recent guideline on migraine, but it does identify both riboflavin (fair evidence) and magnesium (weak evidence) as safe options for preventing migraine.<sup>16</sup> The National Headache Foundation makes no statement regarding dietary therapy for migraines, but it does identify riboflavin and magnesium as possible preventive therapies.<sup>17</sup>

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**FAST TRACK**

**An empiric trial of magnesium and riboflavin is worth considering, as is a low-fat diet high in omega-3 fatty acids and olive oil**