

# Mirror, mirror on the wall is tyramine a migraine trigger after all?



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## Tyramine: a case study in migraine trigger mythology

Numerous foods have been implicated in migraine, ranging from cheese, chocolate, citrus fruits, pickled foods such as herring, and even Chinese food. In fact, there is no doubt that certain foods can trigger attacks of migraine in susceptible individuals, and there are times when a consistent link between intake of the suspect food or beverage and the onset of migraine has been so obvious that the patient has learnt to avoid them already. Sounds straightforward but there are many exceptions to this rule, and one of them revolves around the ingestion of tyramine-containing foods.



Tyramine foods

One of the largest on-going migraine studies concerning tyramine is being conducted by Curelator Headache. What have we found so far? User data can be visualized at the [Migraine Trust](#), [NHF](#) or [Curelator](#) websites. Ironically tyramine appears to be associated more commonly with decreased risk ("protectors") of migraine attacks in about 10% of patients than increased risk ("triggers") in about 7% of patients in our Migraine Trust study. In other

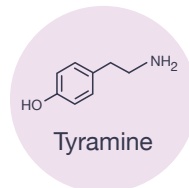
words, the vast majority of migraineurs in our study, 93%, don't have to worry about tyramine at all.

**Tyramine has long been the culprit implicated in dietary induced migraine. Read any lay publication on migraine (and many medical) and you will be advised to avoid foods containing tyramine. However, in almost half a century of multiple studies, no one has been able to establish a clear link between migraine and tyramine!**

**What is tyramine and where is the evidence that avoiding tyramine containing foods benefits migraine?**



Proteins



Tyramine

Tyramine turns out to be a chemical breakdown product of the amino acid tyrosine and can be found in protein-rich foods (proteins are strings of amino acids) that have been processed or left at room temperature: cured or leftover meats, some cheeses, some plants that lie around before being eaten (e.g. avocado), etc. Tyramine content in these kinds of foods can vary greatly depending on freshness, processing etc.

**An additional controversy is the finding that not all foods implicated as containing tyramine actually do so and not all food containing tyramine are common migraine triggers<sup>(1)</sup>. Studies confirm high concentrations of tyramine in some aged cheeses and in Marmite<sup>(2)</sup>, the former commonly reported as a trigger but the latter not. Chianti wines are**

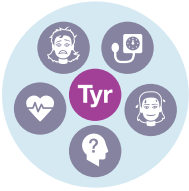
**often implicated yet modern refined methods for measuring levels of tyramine show that they are not the culprits that they were thought to be. Chocolate has only small amounts of tyramine but does contain dopamine and serotonin – two biochemicals much more likely to have a positive rather than negative effect on migraine<sup>(3)</sup>.**



The tyramine story starts with Dr Edda Hanington's 'Preliminary Report on Tyramine Headache' published in the British Medical Journal in 1967<sup>(4)</sup>. Dr Hanington was Assistant Director at the Wellcome Trust, a prestigious research organisation based in central London. Her observations suggested that tyramine in food induced migraine

attacks in as many as three out of ten sufferers. Tyramine was thought to occur in a wide range of foods, including cheese, citrus fruits, red wine and chocolate. In one study, 73% percent of people with migraine suspected chocolate as a trigger for attacks, while 48% suspected cheese, and 25% suspected alcohol<sup>(5)</sup>. Dr Hanington's young son who had migraine was, unsurprisingly, not allowed to eat chocolate.

The commonly held theory at the time was that migraine was caused by the blood vessels around the brain expanding – the 'vascular' theory of migraine. Researchers such as Dr Hanington and Professor Merton Sandler, a pioneer in pharmacology of the brain and a migraine sufferer himself, thought that many patients with migraine had a genetically inherited enzyme defect which meant they were unable to break down amines such as tyramine or phenylalanine in their blood. The theory was plausible, since it was recognised that severe headache could be triggered by monoamine oxidase inhibitors (MAOI) – drugs used to treat depression but which had the unwanted effect of enhancing the effects of dietary amines by blocking the enzyme that breaks them down. Professor Sandler also demonstrated links between migraine and depression, suggesting that the enzyme abnormality could be a common link to both conditions<sup>(6)</sup>.



Symptoms of tyramine-induced headache

Plausible? Maybe but the symptoms of tyramine-induced headache did not quite match the symptoms of migraine. Patients taking MAOI who eat tyramine-containing foods not only get a headache, they also get a potentially life-threatening spike in blood pressure, inducing sweating, anxiety, rapid heartbeat and confusion<sup>(7)</sup>. Not symptoms that migraine sufferers typically experience during attacks.

**Neither is the timing of symptoms quite right – tyramine headache rapidly follows ingestion of the offending foods. As Dr Hanington said at the time: “If migraine victims eat these foods they will get blinding headaches within half an hour”<sup>(8)</sup>. Yet most migraine sufferers report that cheese and chocolate were ingested several hours or even the day before the headache starts. And if tyramine is the culprit, sufferers should report attacks triggered by all foods containing tyramine, not just some.**

Whatever the link between tyramine and migraine, too many people strictly avoid suspect foods without first discovering whether or not they contribute to their own headaches. While there are undoubtedly some migraine sufferers who have confirmed an unequivocal link between certain foods and migraine, the tyramine theory does little to establish a mechanism. Much more common dietary triggers are lack of food, missed meals and dehydration. Ensuring regular food intake is likely to be much more beneficial to most migraine sufferers than concern about the type of food eaten.

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#### References:

- <sup>1</sup>McCabe-Sellers *et al J Food Comp Analysis* 2006;19:S58-S65
- <sup>2</sup>Marmite® is a savoury bread spread made from yeast extract, which is popular in the UK and Australasia.
- <sup>3</sup>Pastore P, *et al. Journal of chromatography A.* 2005;1098:111-115
- <sup>4</sup>Hanington E. Preliminary report on tyramine headache. *Br Med J.* 1967;2:550-551
- <sup>5</sup>Hanington E, Harper AM. *Headache* 1968;8:84-97
- <sup>6</sup>Sandler M, Jarman J, Fernandez M, *et al. Clin J Pain.* 1989;5:19-21
- <sup>7</sup>McCabe-Sellers *et al J Food Comp Analysis* 2006;19:S58-S65
- <sup>8</sup>The Weekly News September 18, 1971