**Beyond MSG: Could Hidden Sources of Glutamate Be Harming Your Health?**

*on September 16, 2014 by* [**Chris Kresser**](https://chriskresser.com/author/chriskresser/)

This is a guest post written by staff clinician Amy Nett, MD.

A few weeks ago, Chris interviewed Yrmis and Bobby from Mission Heirloom on his [**podcast**](https://chriskresser.com/a-sneak-peek-into-the-future-of-food-production), and the topic of glutamate in our food was briefly discussed. Since then, we have had several questions from our patients about potential health concerns regarding glutamate, so I decided to take a closer look to see what role dietary glutamate plays in our health.

### What is glutamate and why is it so important?

Glutamic acid is an amino acid found in abundance in both plant and animal protein.  It is considered a non-essential amino acid, meaning that our bodies are able to generate glutamic acid even without ingesting it through food sources. (Yes, glutamic acid is just that important that we cannot risk being without.)

Glutamate is essentially the same compound as glutamic acid and is the most common form of glutamic acid in our bodies. Glutamate is not only beneficial, but essential for life. It is the most abundant neurotransmitter in the brain. (Neurotransmitters are chemical messengers that nerve cells use to communicate.) Glutamate thus activates—or excites—cells in the brain in order to communicate messages and is particularly important in the growth and development of the brain, learning, and memory.  Because of the way glutamate sends these messages, by “exciting” the cells, it is called an excitatory neurotransmitter. You can think of glutamate as a stimulant. And as anyone who’s had too much coffee can tell you, too much of a stimulant is not a good thing.

### What’s the difference between bound and free glutamate?

It’s important to note the distinction between bound and free glutamate since any potential health concerns are associated with the free form of glutamate. Bound glutamate refers to glutamate in a whole, unmodified protein source and is therefore generally digested and absorbed slowly. Free glutamate, by contrast, is no longer bound to other amino acids, and may therefore be absorbed much more rapidly, causing spikes in the concentration of glutamate in the blood. Free glutamate is found in natural food sources, with particularly high sources listed at the end of this article.  But of more concern is the abundance of free glutamate in nearly all processed and packaged foods, also described in more detail below.

### All glutamates are not created equal

MSG, or monosodium glutamate, is a synthetic chemical that is added to manufactured and processed foods to make them more palatable.This form of free glutamate is present in almost all processed foods and is valued by manufacturers for imparting a pleasing, savory taste. Though MSG contains glutamic acid, due to the manufacturing process it is also almost always accompanied by unwanted by-products or contaminants. Searching the scientific literature regarding the health effects of MSG indicates controversy over the potential of MSG to cause various adverse reactions—from headaches and migraines to endocrine disruption. However, careful attention to the source of funding from these studies often reveals that many confirming the safety of MSG are in fact supported by food manufacturers. The [**Truth in Labeling**](http://www.truthinlabeling.org/) Campaign has extensively studied the role of MSG and found that some people are clearly sensitive, with the most common sensitivity likely being intolerance to one or more of the contaminants produced through the manufacturing process ([**1**](http://www.westonaprice.org/health-topics/new-propaganda-about-msg/)).

**Even those of us without an identifiable reaction to MSG should aim to avoid this additive due to the lack of reliable safety data.**

So let’s get back to natural glutamate…

### How does glutamate affect the brain?

Glutamate and glutamate receptors are well established as playing critical roles in normal and abnormal brain development and function ([**2**](https://www.ncbi.nlm.nih.gov/pubmed/11369436?dopt=Abstract), [**3**](https://www.ncbi.nlm.nih.gov/pubmed/15135231), [**4**](https://www.ncbi.nlm.nih.gov/pubmed/15804404), [**5**](https://www.ncbi.nlm.nih.gov/pubmed/16800850), [**6**](https://www.sciencedirect.com/science/article/pii/S0306452204008723)).

In particular, abnormal concentrations of glutamate are associated with migraines ([**7**](https://www.ncbi.nlm.nih.gov/pubmed/19170689), [**8**](https://www.ncbi.nlm.nih.gov/pubmed/17691981), [**9**](https://www.ncbi.nlm.nih.gov/pubmed/25030431)), and hypersensitivity to glutamate is proposed in several other diseases, including Huntington’s Disease ([**10**](http://web.stanford.edu/group/hopes/cgi-bin/wordpress/2011/06/about-glutamate-toxicity/)) and autism ([**11**](http://www.neurology.org/content/57/9/1618.short)). Genes that predispose patients to glutamate sensitivity are being investigated. An imbalance in glutamate and GABA (another neurotransmitter that counters the effects of glutamate) is increasingly [**implicated in many conditions**](http://www.cortjohnson.org/blog/2013/02/15/glutamate-one-more-piece-in-the-chronic-fatigue-syndrome-mecfs-puzzle-the-neuroinflammatory-series-pt-ii/) involving the brain. This imbalance likely disrupts the brain’s ability to efficiently process information, and gradually leads to lasting injury to the brain.

### Can lowering dietary glutamate help treat autism and ADHD?

Because of this genetic sensitivity to glutamate seen in children with autism spectrum disorder and ADHD, some [**clinicians**](http://www.dramyyasko.com/wp-content/files_flutter/1279663001Neuroprovokers8.pdf) recommend lowering glutamate intake in the diet ([**12**](http://www.msgtruth.org/images/Theory%20of%20Autism-Simplified.pdf)). Decreasing glutamate intake intuitively seems like a potentially effective approach to decreasing the amount of glutamate exposure to our brain. However, this strategy is not as straightforward when we consider the role of the blood-brain barrier (BBB).

### How the blood-brain barrier protects your brain

The BBB is a layer of cells surrounding most of the brain, that acts to limit the compounds entering the brain. Under normal circumstances, there is careful regulation of the types and amounts of compounds that enter the brain.  This means that normally, glutamate can only enter the brain through specific receptors that regulate the amount allowed in. (This is analogous to a bouncer letting only a limited number of people through the door.) [**One study**](http://ajcn.nutrition.org/content/90/3/867S.long), notably funded in part by the International Glutamate Technical Committee (a nongovernmental organization funded by industrial producers and users of glutamate in food), perhaps not surprisingly demonstrated that glutamate, even at high concentrations, does not readily cross the BBB.

Even if glutamate does not cross the healthy BBB, there are many factors which may contribute to a leaky BBB, potentially allowing too much glutamate to enter the brain. In his podcast on the “[**gut-brain axis**](https://chriskresser.com/the-healthy-skeptic-podcast-episode-9),” Chris explained that having a leaky gut (which itself can be due to a number of underlying causes, including food intolerances, dysbiosis, or small intestinal bacterial overgrowth) can contribute to a state of chronic low grade inflammation. This low grade inflammation then also makes the BBB leaky, which essentially loosens the control over what enters the brain. More [**recent research**](https://www.eurekalert.org/pub_releases/2014-06/foas-wil060214.php) has identified a specific molecule that damages the cells to create microscopic gaps allowing material through, bypassing the normal regulatory pathways, and explaining how general inflammation within the body can cause a leaky BBB.

Thus, it may be that in the setting of inflammation, we have a leaky BBB, which allows more glutamate to enter the brain than normal.  Moreover, since some people have a genetic predisposition to glutamate sensitivity, it may be that a combination of excess glutamate in the diet, combined with chronic low grade inflammation, and an associated leaky BBB, contribute to symptoms. It seems less clear if people without an underlying genetic predisposition to glutamate sensitivity experience any adverse effects from excess dietary glutamate. Further research is clearly needed to elucidate the contribution of dietary glutamate to symptoms.

### How to lower glutamate in your diet

**What we can take from all of this is that some individuals do have a particular sensitivity to glutamate.**  Understanding the different sources and types of food that contain glutamate can help you make the best food choices for you and your family, and avoid symptoms of sensitivity. If you suspect that glutamate may be playing a role in your symptoms, you can try to eliminate any sources with added free glutamate (specifically in processed and packaged foods) and monitor your symptoms. If symptoms persist, then try eliminating sources of natural free glutamate as well. Once your symptoms have subsided or resolved, gradually introduce some natural sources of free glutamate back into your diet as tolerated over a period of weeks to learn which foods may trigger a reaction.

Additionally, given that glutamate excess may be associated with symptoms only in the setting of chronic inflammation, consider adding turmeric or ginger to some of your meals for their potent anti-inflammatory properties while you investigate potential causes of inflammation.

Free glutamate may be listed as any one of a number of ingredients:

Monosodium glutamate, monopotassium glutamate, yeast extract, anything “hydrolyzed” such as hydrolyzed protein, calcium caseinate, autolyzed yeast, textured protein, gelatin, soy protein (including isolate and concentrate), whey protein (including isolate and concentrate), carrageenan, bouillon and broth, stock, and “flavors” or “flavoring” (i.e. natural vanilla flavor), maltodextrin, citric acid, pectin, milk powder, soy sauce, anything “protein fortified,” corn starch, corn syrup and modified food starch.

Here are links to more inclusive lists of hidden free glutamate, including a link to [**unblindmymind.org**](https://unblindmymind.org/), which is a nonprofit working to raise awareness of the link between autism and MSG ([**13**](http://unblindmymind.org/wpsystem/wp-content/uploads/2013/04/Various_Ways_Free_Glutamate.pdf), [**14**](http://www.dramyyasko.com/wp-content/files_flutter/1279663001Neuroprovokers8.pdf)).

### Natural sources of free glutamate:

* Foods matured, cured, or preserved, such as matured cheeses (Parmesan and Roquefort) and cured meats
* Fish sauce
* Soy sauce and soy protein
* Mushrooms
* Ripe tomatoes
* Broccoli
* Peas
* Walnuts
* Grape juice
* Bone broths and meats cooked for long times (generally using moist cooking methods such as braising)
* Malted barley used in breads and beer
* Wheat gluten
* Dairy casein

**About Amy:** Amy Nett, MD, graduated from Georgetown University School of Medicine in 2007.  She subsequently completed a year of internal medicine training at Santa Barbara Cottage Hospital, followed by five years of specialty training in radiology at Stanford University Hospital, with additional subspecialty training in pediatric radiology.

Along the course of her medical training and working through her own personal health issues, she found her passion for functional medicine, and began training with Chris in June of 2014.  She has recently joined his clinical practice to work with patients through a functional medicine approach, working to identify and treat the root causes of illness.  Similar to Chris, she uses nutritional therapy, herbal medicine, supplements, stress management, detoxification and lifestyle changes to restore proper function and improve health.