Low Histamine Diet 101: What to Eat, What to Avoid, and Why

The fundamental molecule which causes allergic, as well as many non-allergic reactions of all kinds is histamine. Although histamine is a compound that is produced by immune cells known as basophils and mast cells, it is also naturally occurring, found in many foods. In addition to allergic reactions, histamine also plays a vital role in several of the body's major systems, including the immune, digestive, and neurological systems. The body makes all the histamine it needs from its own cells, but we can consume a lot from foods and this excessive amount of histamine can cause all kinds of problems, including worsening allergy symptoms.

Receptors for histamine are located on just about every cell type in the body. A lot of histamine is released during allergic and inflammatory reactions that occur when our immune system detects a threat. When released, it causes typical allergic symptoms such as congestion through the stimulation of blood vessel cells, excessive mucus production when mucus producing cells are triggered, sneezing and itching when nerve cells area triggered. Other less typical symptoms also occur such as stomach cramps and diarrhea when gastrointestinal cells and intestinal smooth muscles are stimulated, low blood pressure when arterial cells are triggered, mucus secretion in the nasal passages and GI tract, blood vessel swelling leading to congestion, migraines when brain cell and brain blood vessel cells are influenced and many other physiologic. Once the perceived threat is over, histamine levels are reduced back to normal, and symptoms subside. There is also a natural, circadian secretion of histamine which occurs in everyone and it peaks in the middle of the night during sleep (which is why it's best for most people to take an antihistamine medication like Claritin, Allegra or Zyrtec before bed).

Histamine does have important, normal functions. There are 4 different types of histamine receptors throughout the body. The One most responsible for typical allergic reactions is the H1 receptor. This is the receptor blocked by the common antihistamine medications mentioned above. H2 receptors are the ones located in the stomach acid producing cells. H2 blockers are medications like Pepcid and Zantac, which reduce stomach acid production by blocking this receptor. In addition to the organs and cells mentioned above, receptors are located in the lungs, bone marrow and uterus. In the stomach, histamine receptors trigger acid production. Histamine plays a role in estrogen production in women and impact on erectile function in men.

Histamine In the Body. Our bodies naturally produce histamine from the amino acid histidine. This conversion is performed by the enzyme L-histidine decarboxylase in our immune cells (mast cells and basophils). Various bacteria also have this enzyme, and they make this conversion as the natural part of fermentation as well as of the natural life cycle of food as it ripens and eventually decays. Although produced and released by immune cells, it is also stored and released by other cells, such as nerve cells, platelets, cells lining the intestinal tract.

Histamine In Food. Histamine forms when certain bacteria or yeasts transform the amino acid *histidine* into *histamine*. Since ALL foods, whether from an animal or a plant, contain protein and ALL the amino acids in varying proportions, ANY food can form histamine under the right conditions. Generally speaking, aged and fermented foods or beverages contain the highest levels of histamine, while fresh foods contain almost none.

Histamine Breakdown. The body has two enzymes that are capable of degrading histamine: *N-methyltransferase (HNMT)* and *diamine oxidase (DAO)*. HNMT exists only in the cytoplasm, so it is responsible for breaking down any histamine found inside of cells. The highest concentrations of HNMT have been found in the kidney and liver but it also exists in many other tissues. DAO, on the other hand, is produced and stored by epithelial cells (cells that line our organs and blood vessels). When stimulated, it is secreted into the bloodstream and gut where it picks up and degrades any histamine that might be floating around. DAO is produced in large amounts within the intestines, but also by the

placenta during pregnancy. In some people, histamine degradation doesn't work the way it should, causing a condition known as histamine intolerance.

Histamine intolerance occurs when more histamine accumulates in the body than we are able to break down effectively. This build-up eventually causes symptoms that are very similar to an allergic reaction but can also manifest in many other ways. It is estimated that 1% of the population has histamine intolerance. It's unclear why women are more affected than men. One theory is that an imbalance of female sex hormones may cause the body to produce more histamine than normal. Histamine and estrogen are very tightly linked. Studies have shown that estrogen activates histamine release from mast cells while progesterone inhibits it. If the amount of estrogen being produced is higher than the amount of progesterone, more histamine is released. Interestingly, during pregnancy, both estrogen and histamine go up significantly, but the placenta makes an enzyme which breaks down the histamine, so there is no rise in histamine-related symptoms.

SIGNS AND SYMPTOMS. histamine intolerance can manifest in many different ways depending on the person and the amount of histamine that has accumulated. The following are some of the most common signs and symptoms of histamine intolerance:

- RESPIRATORY
    - Runny nose
    - Nasal congestion
    - Sneezing
    - Shortness of breath
- CARDIOVASCULAR SYSTEM
    - Heart arrhythmias including palpitations and a rapid or irregular heart rate
    - Lightheadedness
    - High or low blood pressure
- GI TRACT
    - Fullness after meals
    - Bloating (#1 symptom)
    - Diarrhea or constipation
    - Nausea and vomiting
    - Belching
    - Reflux
- SKIN
    - Itching
    - Flushing
    - Hives
    - Swollen or red eyes
- NEUROLOGICAL
    - Dizziness
    - Headaches including migraines
    - Insomnia
    - Ringing in the ears
- OTHER
    - Irregular periods
    - Fatigue

These symptoms are very general, so experiencing them is not enough to confirm a diagnosis of histamine intolerance. Further investigation is usually needed.

What Causes Histamine Intolerance? Histamine intolerance may occur for several reasons:

1. The body has produced too much histamine from allergies, immune reactions or a condition like mastocytosis, in which the body has too many mast cells that release histamine.
2. Too much histamine is ingested through food or beverages.
3. The degradation of histamine is impaired due to gut microbiome disturbance, genetic predisposition, medications, or other medical conditions.

General pointers to avoid higher histamine levels from foods.

1) EAT FRESH FOOD.
2) PERISHABLE FOOD HAS THE LOWEST HISTAMINE LEVEL AT HARVEST.
3) COOLING SLOWS DOWN HISTAMINE PRODUCTION. Freezing even more, especially if done at the point of harvest.
4) ALL FERMENTED FOODS ARE HIGH IN HISTAMINE. This includes alcohol, chocolate and vinegar.
5) AVOID CANNED FOOD, READY MEALS AND PROCESSED PERISHABLE FOODS.
6) FRYING AND GRILLING INCREASE HISTAMINE LEVELS.

It is thought that the main cause is the impaired breakdown of histamine due to alterations in DAO activity. Many studies have shown lower serum DAO activity in those with symptoms of histamine intolerance compared to healthy controls. This impaired DAO activity may simply be genetic however, our diet and its impact on poor gut health plays a greater role. Poor gut health caused by a poor diet, stress or infection may also be a trigger for histamine intolerance. Gastrointestinal diseases, such as Crohn's disease, Irritable Bowel Syndrome (IBS) or simple and common gut dysbiosis have been associated with impaired DAO activity. This is caused by a decrease in DAO production when intestinal cells become inflamed. In many cases, it may be possible to reverse histamine intolerance by healing the gut or removing whatever is inhibiting DAO activity.

When Is a Low-Histamine Diet Helpful? It can be helpful in both the diagnosis and treatment of histamine intolerance. Histamine intolerance should be considered in people who have the signs and symptoms but test negative for allergies and other disorders. The gold standard for diagnosis is a double-blind placebo-controlled oral challenge after a histamine-free diet. This requires following a very strict low-histamine diet for 4 weeks and then reintroducing a few high histamine foods to see if symptoms develop. Other than the oral challenge, there are no reliable tests to diagnose histamine intolerance.

Foods to Avoid on a Low Histamine Diet. On a low-histamine diet, it is important to avoid foods that contain high amounts of histamine. In severe cases, it may also be helpful to try cutting back on histamine-releasing and DAO-blocking foods (see below).

High-Histamine Foods. The longer a food has been aged, the more amino acids have been converted to histamine. Fermented foods have the highest levels. Keep in mind that histamine levels in a food can vary significantly depending on aging, storage time, and how it is processed. In general, aged and fermented items are much higher in histamine than fresh foods. Foods that are generally high in histamine include:

- Aged cheeses
- Alcohol of any kind
- Avocado (very high)
- Dried fruits
- Eggplant (very high)
- Fermented/aged meats including salami, sausage, pepperoni, lunch meat and hot dogs
- Canned meats/fish such as tuna or sardines.
- Fermented beverages like kombucha
- Fermented dairy including yogurt, kefir, sour cream, buttermilk, cottage & ricotta cheese

- Fermented vegetables like kimchi, sauerkraut, pickles, miso, natto (fermented soy)
- Seafood, especially if leftover, smoked, salted or canned.
- Ketchup
- Pineapple
- Soy sauce, tamari, coconut aminos, liquid aminos.
- Spinach (very high)
- Spoiled food
- Leftovers, unless very recent
- Tea (black/green/white)
- Tomatoes (very high)
- Vinegars
- Yeast products
- Kombucha
- Fermented soy products such as tempeh, miso, soy sauce, and natto
- Fermented grains, such as sourdough bread
- Vinegar

Histamine Releasers. Some foods are also thought to be “histamine releasers.” These foods are actually low in histamine but may cause cells to release histamine. Foods that may be histamine releasers include:

- Food Additives in processed foods and drinks such as colorants, preservatives, stabilizers, and flavorings
- Alcohol
- Bananas
- Chocolate/cocoa
- Citrus fruits including lemon, lime & grapefruit
- Eggs
- Fish
- Legumes
- Licorice
- Nuts
- Papaya
- Peanuts
- Pineapple
- Pork
- Seafood, especially shellfish
- Some spices
- Spinach
- Strawberries
- Tomatoes
- Strawberries
- Cocoa

DAO Blockers. There are other foods that are called “DAO blockers” because they inhibit the activity of DAO. The main one is alcohol. Since alcohol is both high in histamine AND slows its breakdown, it should definitely be avoided by people with histamine intolerance.

Low-Histamine Foods. Generally, fresh foods have the lowest amounts of histamine. Some low-histamine foods to try include:

- Fruits: apples, apricots, blackberries, blueberries, cherries, coconut, melons, peaches, plums, pomegranate, and raspberries, among others.

- Vegetables: arugula, asparagus, bell peppers, beets, bok choy, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, garlic, greens, leeks, lettuce, onions, rhubarb, rutabaga, shallot, summer squash, sweet potato, turnip, watercress, winter squash, and zucchini, among others.
- Grains: gluten-free options like amaranth, corn, millet, quinoa, rice, teff are less likely to exacerbate an irritated gut than gluten-containing grains.
- Fresh herbs
- Olive oil
- Fresh animal proteins: chicken, beef, lamb, goat

Please note that just because a food is low in histamine does not mean that it will be tolerated well by your body. Other types of adverse food reactions like allergies, sensitivities, and intolerances are always possible. Listen to your body first!

Food Purchasing and Preparation Tips. Since histamine forms as food ages and ferments, there are some tips for keeping food fresh and reducing the amount of histamine produced.

1. Purchasing Food. When purchasing animal-based foods, the fresher the better. Check the "packaged on" date when shopping for meat and choose the freshest. Look for meat that has been butchered and frozen quickly. Additionally, whole cuts may be better than ground meats, since the grinding process spreads bacteria throughout the meat, increasing their ability to create histamine. If buying fish, look for the "frozen-at-sea" (FAS) label. When shopping, select your meats at the end of your shopping trip and keep in a cooler on your way home.

2. Freezing. Freezing food prevents or slows down the development of histamine. Buying fresh meat or other foods and freezing in individual portions allows for quick thawing and minimal histamine accumulation. Of course, this doesn't work for ALL foods, because some are not freezer friendly.

3. Cooking Method. The histamine level in a food can change based on how it is cooked. Frying and grilling tend to increase histamine levels, while steaming or boiling can maintain or decrease levels, but the difference is relatively small. Other strategies include cooking with a pressure cooker, using quick thaw methods for frozen foods, freezing individual meals, and avoiding slow-cooked foods.

Supplements and Medications. While limiting histamine-containing foods is the most effective way to find relief from symptoms of histamine intolerance, low-histamine diets are definitely not easy to follow, and total avoidance of histamine is impossible. To help reduce symptoms even further, certain medications and supplements can help support the degradation of histamine:

1. Antihistamines. Antihistamines like Claritin (loratadine), Allegra (fexofenadine), Zyrtec (cetirizine) and Benadryl are sometimes used by those with histamine intolerance to block the action of histamine and quell symptoms. However, antihistamines just mask symptoms and do not address the root cause. They may provide temporary symptom relief, but it is expensive to routinely take antihistamines and they can cause side effects like excessive drowsiness. Additionally, antihistamines do nothing to boost DAO activity, which is typically at the root of histamine intolerance.

2. Supplemental DAO. Another option is to take supplemental DAO enzymes orally. These enzymes will enter the gut and help degrade histamine in food, much like the DAO naturally produced in your gut would. However, it is important to note that DAO taken orally is NOT absorbed into the bloodstream, and will do nothing to reduce systemic histamine levels. DAO

supplements can be helpful for breaking down histamine from food, reducing the amount of histamine that gets absorbed, but that's about it. There has not been a lot of research on the effectiveness of these supplements, but they do have a good amount of anecdotal support. A couple of small studies testing the effect of DAO supplements on symptoms of histamine intolerance are conflicted about its efficacy.

3. Vitamins to support histamine breakdown. There is also some evidence that vitamin B6, vitamin C, and copper increase the activity of DAO and aid in the breakdown of histamine; however, no randomized controlled studies have been conducted to confirm this. Several studies have shown that vitamin B6 deficiency is linked with lowered serum DAO activity, suggesting that status of this nutrient may influence serum DAO activity. The effect of copper on histamine has only been studied in vitro (in test tubes). Researchers found that a copper solution inhibited the release of histamine from mast cells in a dose-dependent relationship. It's best to consume foods rich in vitamin B6, vitamin C, and copper rather than rely on supplements, unless you have been diagnosed with a deficiency in one of these nutrients.

4. Mast Cell Stabilizers. Those suffering from gastrointestinal symptoms may benefit from supplementing with mast cell stabilizers like Cromolyn. Mast cell stabilizers inhibit the release of mediators (including histamine) from mast cells in order to reduce their inflammatory effects. The most popular mast cell stabilizer is disodium cromoglycate (DSCG), also known as cromolyn sodium. It is available by prescription-only as an oral solution under the brand name Gastrocrom and over-the counter as a nasal spray (NasalCrom) or eye drop (Opticrom).

5. Histamine degrading probiotics. Optimizing gut bacteria is vital for overall health and disease prevention. Unfortunately, that's not easy to do for those with histamine intolerance because probiotic foods (yogurt, kefir, kombucha, etc.) are high in histamine and should be avoided. Another option is to use probiotic supplements, but it's important to choose probiotic supplements containing bacteria that do not produce histamine.

Pros and cons of a low-histamine diet. Low-histamine diets are extremely restrictive and can lead to malnutrition. Histamine intolerance is poorly understood. There is no evidence that a low-histamine diet will improve your quality of life in the long term. The primary benefit of a low-histamine diet is that it serves as a diagnostic tool. By eliminating histamine-rich foods from your diet for several weeks (under the supervision of a doctor) and then slowly adding them back in, you can learn more about your individual tolerance to histamine. Histamine tolerance varies significantly from one person to the next. When you add histamine back into your diet, you can carefully evaluate which foods trigger uncomfortable symptoms, if any.

Low-histamine diet tips:

- cook all your own meals
- eat the freshest food possible
- record everything you eat in a detailed daily food diary (be sure to include the time of day you ate each food)
- record the times and dates of any uncomfortable symptoms for comparison
- avoid junk food and anything processed (look at the ingredients listed on the package, if you see words you don't recognize or understand, don't eat it)
- don't be too hard on yourself, this diet is very restrictive
- don't plan on eating this diet for more than four weeks (like a low FODMAP diet)
- eat only fresh foods that have been kept in a refrigerator

- speak with a dietician or a nutritionist about getting all the nutrients you need while you're on this diet
- talk to your doctor about vitamin and mineral supplements (consider DAO enzyme supplements, as well as vitamin B6, vitamin C, copper, and zinc)

For more information about diet, health and in particular, histamine diets along with elimination protocols and recipes, check out Dr. Will Bulsiewicz's book, "The Fiber Fueled Cookbook". This is a follow up to his bestseller "Fiber Fueled".