



NUTRIGENOMI[®]

HISTAMINE RISK INSIGHTS REPORT

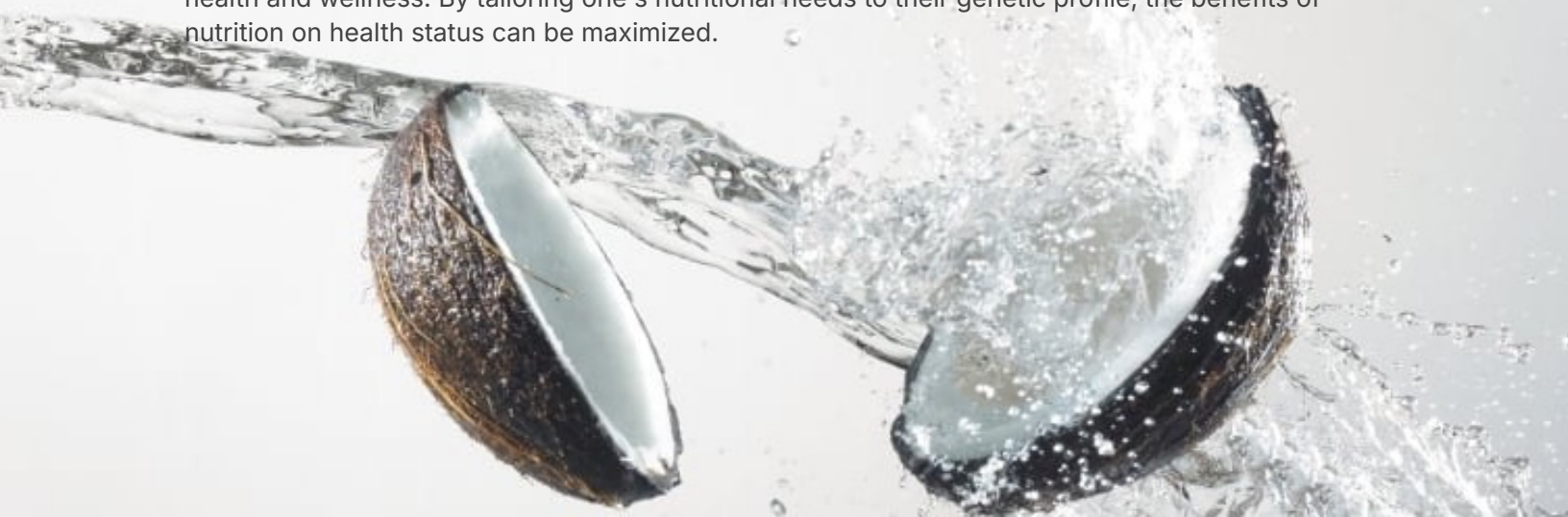
The Science Behind Nutrigenomix

One man's food is another man's poison – Lucretius

Nutrition is one of the most important lifestyle factors affecting your risk for developing certain diseases and has a significant impact on overall well-being. Over the past decade, there has been growing recognition of the importance of how genes influence our nutritional status, which directly impacts our health. The human genome consists of about 25,000 genes and virtually all can exist in different forms. The variations in our genes make us unique from one another. Genetic variation determines not only the color of our eyes and hair, but how we metabolize and utilize the foods, nutrients and supplements we ingest. Nutrigenomics is the science that applies genomic information and advanced technologies to uncover the relationship between genes, nutrition and human health. The term nutrigenomics refers to both the study of how the food, beverages and supplements we consume affects our genes and how our genes can influence our body's response to what we consume.

Different versions of a gene can make us respond differently to certain components in food such as the lactose in milk, the gluten in bread, the caffeine in coffee, along with carbohydrates, fats, proteins vitamins and minerals found in various foods. We are all familiar with people who are lactose intolerant or cannot eat gluten. These differences between individuals can be explained by gene variations within the population. Through science and research we have learned that genetic variations in the population and between individuals affect a wide variety of responses to key components of the human diet. For instance, some individuals may benefit from limiting their consumption of caffeine or increasing their intake of omega-3 fat, while others can follow the general recommendation for either or both. Your best diet depends on the specific variants you have for these nutrient-related genes. Understanding your genetic profile and its implications on your unique response to the foods, supplements and beverages you consume will provide you with the tools needed to make the best dietary choices.

The science of how specific genes change how we respond to dietary components enables us to use nutrition to its fullest potential to prevent, manage or improve various health issues. These personalized diets can optimize an individual's nutritional status and empower them to focus on preventing diet-related diseases or conditions. A healthy, balanced diet should provide enough energy and nutrients to support optimal health, reduce the risk of disease and maintain a healthy body weight. While general dietary recommendations might be prudent to follow, the one-size-fits-all approach to nutritional advice could limit some individuals from reaching their full potential for health and wellness. By tailoring one's nutritional needs to their genetic profile, the benefits of nutrition on health status can be maximized.



Histamine

Histamine is a signalling molecule important in a number of physiological pathways in the body, including inflammation and stomach acid secretion, and acts as a chemical messenger in the brain. Histamine is derived from the amino acid histidine, and produced in white blood cells, specialized gastric cells, and in the central nervous system. During an immune response, histamine is released from cells and binds to a histamine receptor and activates an immune response. The body breaks down histamine by an enzyme called Diamine oxidase (DAO). In addition to histamine being produced in the body, histamine can also be found in some foods, such as cheese, fish, and citrus fruits. Some gut bacteria can produce histamine by converting histidine into histamine through the enzyme histidine decarboxylase (HDC).

Histamine Intolerance

Histamine intolerance (HIT) refers to a specific kind of food intolerance where people experience unpleasant symptoms when histamine is consumed. Due to the wide distribution of histamine receptors throughout the body, people who experience HIT have different symptoms once histamine enters the bloodstream. These symptoms include nasal congestion, asthma, diarrhea, skin rashes or hives, and less frequently can experience headache, irregular heartbeat or low blood pressure. HIT is difficult to diagnose but it is estimated to occur in approximately 1-3% of the population. Since DAO is the main enzyme to breakdown histamine in the gastrointestinal tract, it is proposed that the inability to efficiently metabolize histamine is the primary contributor to HIT symptoms. In people who have decreased DAO enzyme function, also known as a 'DAO deficiency', histamine builds up faster than it can be broken down. Foods can contribute to HIT among DAO deficient individuals not only as a source of histamine, but can also trigger histamine release, inhibit DAO activity or have a combination of these effects. Randomized controlled trials have shown that a low histamine diet can reduce HIT symptoms.

*Comas-Basté, O.; Sánchez-Pérez, S.; Veciana-Nogués, M.T.; Latorre-Moratalla, M.; del Carmen Vidal-Carou, M. Histamine intolerance: The current state of the art. *Biomolecules* 2020, 10, 1181.

**Maintz, L. and Novak, N. Histamine and Histamine Intolerance. *Am J Clin Nutr* 2007;85:1185–96.





Your Results

Gene	Marker
AOC1	rs2052129 rs10156191 rs2268999

Risk Variant	Your Variant
Algorithm	GT TT TA

Your Risk

High

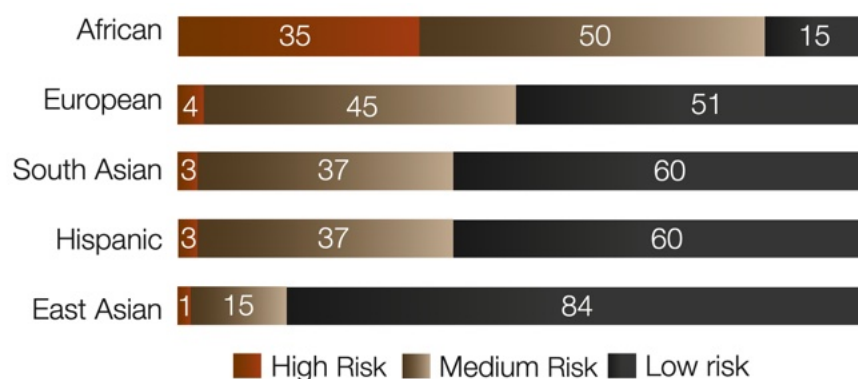
High risk for histamine intolerance. Follow a low-histamine diet if you are experiencing symptoms.

AOC1 (DAO Enzyme)

The AOC1 gene codes for the enzyme DAO, which helps to metabolize dietary histamine as well as gut-bacteria produced histamine. Studies have shown that variations in the AOC1 gene can affect DAO enzyme activity and lower its ability to break down histamine. Three variants of the AOC1 gene can be used to classify individuals into low, medium, or high-risk for histamine intolerance.

*Maintz L, Yu C-F, Rodri'guez E, Baurecht H, Bieber T, Illig T, Weidinger S, Novak N. Association of single nucleotide polymorphisms in the diamine oxidase gene with diamine oxidase serum activities. Allergy 2011; 66: 893-902.

Distribution of Histamine Intolerance risk status across ethnic groups*



* Data obtained from 1,000 Genomes Project via Ensembl Genome Browser (www.ensembl.org).

Nutrition Considerations when Following a Low-Histamine Diet

The main treatment for HIT is following a low-histamine diet. The protein content, freshness, processing, and storage method of food are some of the many factors that affect how much histamine is present. Meat and fish are more likely to be high in histamine because they contain a high amount of histidine, the precursor to histamine. When raw meat and fish have been sitting at room temperature, bacteria can thrive and produce more histamine. It is best to consume meat and fish products at their freshest and ensure that cross-contamination with bacteria is prevented in the kitchen while preparing them. Some pulses such as beans, chickpeas, or soybeans can contain high levels of histamine, especially if canned, while others such as lentils are considered to be low in histamine.

Leftovers are not ideal for people on a low-histamine diet because histamine-producing microbes can accumulate in the food during storage. Similarly, fermented products including cured meats and mature cheeses are best avoided due to the aging process, which leads to a greater histamine content. Food preparation methods such as frying and grilling can also influence histamine levels. In contrast, boiling in water has been found to reduce histamine content in some vegetables. It should be noted that it is not possible to attain a complete elimination of dietary histamine and therefore avoidance of histamine-rich or histamine-releasing foods is recommended, balanced by selecting foods lower in histamine. It is important that people at risk of HIT include adequate amounts of vitamins B6, vitamin B12, vitamin C, iron and copper in their diets, as these are cofactors necessary to support the function of the DAO enzyme and efficiently metabolize histamine.

*Jochum C. Histamine Intolerance: Symptoms, Diagnosis, and Beyond. Nutrients. 2024;16(8):1219. Published 2024 Apr 19. doi:10.3390/nu16081219
**Hrubisko, M.; Danis, R.; Huorka, M.;Wawruch, M. Histamine Intolerance—The More We Know the Less We Know. A Review. Nutrients 2021, 13, 2228. <https://doi.org/10.3390/nu13072228>

Histamine-rich and Histamine-releasing Foods*	
	Canned/fermented fish products (e.g., sardines in oil, canned tuna, mackerel)
	Hard (Parmesan, Grana Padano) or semi-hard cheese (e.g., cheddar, feta, Gouda)
	Dry-fermented meat products (e.g., air-dried sausages, hams, prosciutto)
	Cured fish (e.g., smoked salmon, salt cured mackerel, dried cod, pickled herring)
	Fatty fish (e.g., tuna, salmon, mackerel, sardines, anchovy, herring, swordfish)
	Shellfish
	Legumes (especially if canned) - beans, chickpeas, soybeans, peanuts
	Fermented vegetables and legumes (e.g., Sauerkraut, kimchi, tempeh, soy sauce)
	Chocolate, nuts
	Spinach, tomatoes, avocado, eggplant
	Citrus fruits, strawberries, dried fruits, banana, plum, pineapple, kiwi
	Vinegar (incl. vinaigrettes, ketchup, relish, tabasco)
	Alcohol (e.g., wine, beer)*

* Alcohol contains histamine, triggers histamine release, and inhibits DAO enzyme function. Wine, champagne, and beer have the highest content.

Foods Possibly Suitable for a Low-Histamine Diet	
	Fresh/immediately frozen fish (e.g., cod/pollock, trout, halibut)
	Fresh soft cheese (e.g., mozzarella), butter
	Fresh/immediately frozen veal, beef, lamb, pork, or poultry
	Eggs (cooked)
	Grains and derived products (e.g., rice, oats, millet, corn, bread, pasta)
	Potatoes, sweet potatoes, squash
	Dried lentils
	Lettuce, cucumber, radish, cauliflower, broccoli, asparagus, carrots, zucchini, pepper, artichoke, rhubarb
	Onion, garlic, spices, herbs
	Apple, pear, cherry, peach, apricot, watermelon, blueberries
	Homemade juices from low-histamine fruits and vegetables
	Yogurt



Eat According to Your Genes

TO LEARN MORE, CONTACT:

info@nutrigenomix.com



This report is for information purposes only and is not intended to be used as medical advice. The information in this report is not intended to treat, diagnose or cure any medical condition or disease. It is intended for general health and wellness purposes only and is not specific to clients who require a specific nutrition care plan based on a certain disease or condition. Clients with medical conditions should not change or stop their medications or medical care without consulting with their physician first. The information in this report is not intended for children or for women who are pregnant or nursing. The Nutrigenomix Health and Wellness panel has not been cleared or approved by the United States Food and Drug Administration. If you have any questions, please ask your healthcare provider or contact us at info@nutrigenomix.com. For Terms of Use and Privacy information please visit our website at www.nutrigenomix.com.

© Copyright 2025 Nutrigenomix Inc. All rights reserved.