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Chapter 1

Histamine: More Than Meets the Eye

Oh, histamine. How complex thou can be. But never fear: This book removes the complication!

In essence, *histamine* is a chemical. (It's an organic, nitrogen-containing compound that's synthesized from the amino acid histidine, to be exact.) But we promised we'd keep it simple, yes? So let's translate that science-class glaze-over definition back down to "a chemical" and we'll do just fine. However, even understanding that histamine is a chemical can be a tough concept to grasp because despite histamine being a single chemical, it has multiple — and sometimes opposing — roles throughout the body.

Histamine's effects depend on where in the body it's showing up, what kind of cells it's affecting, and which of four different receptor types it's activating. (*Receptor types? Back to the science-class glaze-over. More on receptor sites soon.*)

All this variation creates a complex network of signaling that can lead to confusing and contradictory symptoms.

Many people associate histamine solely with allergies, but histamine's job extends far beyond causing itchiness and hives. One can imagine histamine as a sassy little jug of chemical shouting, "Don't underestimate me! I'm multifaceted! I'm *deep*." That sassy little jug of chemical appears in several places in the body. This chapter introduces you not only to histamine as a chemical, but to all things histamine.

Understanding Histamine's Biological Role

Histamine is a powerful chemical messenger in the body. Because it has many functions, you can think of it not only as a sassy little jug filled with a powerful chemical, but also as a mega multitasker, that superstar colleague who keeps plates spinning in multiple departments companywide. This multitasking molecule is a key player in the immune system.

Histamine is also a neurotransmitter in the brain, where it influences cognitive functions such as learning, memory, and attention. Another hat that histamine wears is that it's a regulator throughout the body. For instance, we rely on histamine for essential functions such as producing stomach acid and managing our sleep-wake cycle. The body uses histamine for wound healing as well. High concentrations of histamine can even cause an increased heart rate. (See Chapter 2 for more details on histamine's roles in the body.)

Histamine protects your health, but it sometimes also causes allergy symptoms. (Uh oh, calm down, Multitasker — you're doing too much! Indeed, the "little jug of chemical" called histamine really *is* sassy.) When your immune system spots trouble — like a pathogen or injury — histamine triggers inflammation, expands blood vessels, and calls other immune cells into action. Pollen, pet dander, and more . . . they can all get histamine called to the scene, and then you may experience what is commonly referred to as "allergies." (Chapter 4 has the scoop on histamine and the immune system.)



REMEMBER

The terms *histamine* and *allergy* often get used inaccurately. Some people use them interchangeably, but while there is some overlap, histamine and allergies are very different. Note that histamine and allergies are connected but are not the same thing. Keep reading to find out why.

Differentiating between Histamine and Allergies

Do you have a friend or relative who overreacts? A slight noise and they jump out of their seat? Or they see a threat where you see a new experience to enjoy? Allergies can kind of be drama queens.

Allergies occur when your immune system overreacts to harmless substances. This overreaction prompts *mast cells* (a type of white blood cell) to dump histamine into the affected area. This overreaction isn't really histamine's fault — histamine is just a product being used to solve a problem that never should have been a problem. Kind of strange, isn't it?

Immune system overreactions can occur from allergens such as pollen, dust mites, insect bites, or certain foods. Your immune system treats these harmless substances as a threat and then summons histamine. The result is that you get classic allergy symptoms such as the following:

- » Itching
- » Sneezing
- » Hives
- » Swelling

You may experience other symptoms too, boooooooo. These symptoms can be so troubling that you end up hating pollen, for instance, but pollen in itself isn't dangerous. Our bodies just *think* it is. Bizarre! Can't we evolve past this overreaction? Unfortunately, humans haven't gotten there yet.

You may wonder why some people have an allergic reaction to, say, pet dander, while others don't. Good point! Here are some factors and theories:

- » **A family history of allergies.** This is the most significant risk factor.
- » **Exposure to air pollutants and cigarette smoke.**
- » **Underdeveloped immune systems.** This may be because these people weren't exposed to enough microbes and bacteria in early childhood.
- » **Early and repeated exposure to allergens.** Admittedly, this can sound contradictory to the former reason, but it can *also* increase the risk of developing allergies.

And so, we see that the jury's out. One constant, though, is that regardless of the cause of allergies, they all involve our multitasker friend (or sometimes foe?): histamine.



REMEMBER

Every allergic reaction involves histamine, but not every histamine release means you have an allergy.

Locating Where Histamine Is Produced and Where It Acts

Around the clock, histamine is at work somewhere in our bodies, yet even the most allergic person among us doesn't experience allergies 24/7.



REMEMBER

Multiple body systems manufacture histamine. You can think of histamine as a single type of product that can be manufactured at several different factories.

Large amounts of histamine can be released during immune reactions from white blood cells called *mast cells*, and another type of white blood cell called *basophils*. With histamines, much as with real estate, it's all about location, location, location. Different areas in the body that contain histamine use it in very different ways. For instance, cells in your stomach (called *parietal cells*) secrete histamine to regulate acid production, which is a key part of digestion. Far away from the stomach, in your brain, certain neurons also produce histamine, but the histamine there affects alertness and appetite. So different!



REMEMBER

Histamine acts locally. Its effects depend on where your body releases it and which of the four histamine receptors are activated (see Chapter 2).

Checking Out Common Histamine Symptoms

The range of symptoms that histamine can cause is pretty staggering. Also remarkable is that the symptoms appear in so many very different parts of the body. Here are some:

- » **Headaches or migraines:** Often described as pulsating or throbbing, these symptoms are often triggered by high-histamine foods like processed meat, aged cheese, and soy sauce.
- » **Skin issues:** Including hives (urticaria), itching (pruritus), rashes, or eczema, these issues are due to histamine's role in skin inflammation.
- » **Digestive problems:** These can include bloating, abdominal pain or cramps, diarrhea, nausea, or vomiting.
- » **Flushing:** Redness appears, especially in the face or neck, and is often accompanied by a sensation of warmth.
- » **Nasal congestion:** Get ready for mouth breathing!
- » **Runny nose:** This mimics allergy symptoms like sneezing and rhinitis (the inflammation of the mucous membrane inside the nose), as histamine plays a role in allergic responses.
- » **Fatigue:** Persistent tiredness or low energy levels can be a result of chronic inflammation or other histamine-related issues.
- » **Cardiovascular symptoms:** These include palpitations, irregular or fast heart rate (tachycardia), or low blood pressure (hypotension).
- » **Anxiety or mood swings:** Histamine can act as a neurotransmitter and influence the nervous system, leading to psychological symptoms.
- » **Difficulty regulating body temperature:** Some individuals report feeling overly cold or hot, or having unexplained shivers.

Exploring Real-World Examples of Histamine in Action

Let's now migrate from science terms to real-life rubber-hits-the-road examples (speaking of rubber, latex — for some people — is an allergen). In a veritable haunted house of symptoms, let's get itchy, scratchy, swollen, and sneezy.



TIP

Part 2 of this book covers the diagnosis of histamine disorders. Parts 3 and 4 are about managing histamine disorders when you're diagnosed and in the future.

Itching: Why histamine might make us scratch

Imagine walking in the woods and your calf brushes against something. You look down to see what it was. Dang it — poison ivy! You know the drill: Your skin gets itchy and soon turns red. But why?

Because of a chain reaction. Your skin itches and turns red due to your mast cells releasing histamine. Next, the histamine that's been released activates your nerve endings.

Then, your activated nerve endings send “itch” signals to your brain. That's when you start going to town with your fingernails, *scratch scratch scratch*. Scratching blocks the itch momentarily (oh sweet relief!), but as long as histamine remains active, the sensation will return.

You continue your walk in the woods and . . . ugh! A mosquito bites your arm. Gee, you just can't catch a break here, can you? Poison ivy, and now mosquitos? Get ready for another histamine response.

When a mosquito bites, it injects saliva into your skin. Your immune system detects that saliva as foreign, and mast cells in the skin try to protect you by releasing histamine directly at the site. This histamine release leads to swelling, redness, and . . . you got it: itching. Just like with poison ivy, every time you scratch the affected area, the itchiness is relieved, but only momentarily. As long as histamine remains present, the itching sensation will return.

Sneezing: Achoo! Why histamine might make us sneeze

Spring. Do you love it or hate it? Your answer tells instantly whether you suffer from allergies. During “hay fever” season — which in many parts of the world is strongest during spring, but can also happen in fall or summer — pollen may tell the mast cells in your nose to release histamine. Histamine, the loyal servant, rushes into action and stimulates the blood vessels in your nose. This stimulation can lead to symptoms such as a tickly sensation, swelling, sneezing, and/or a runny nose.

Inhaling allergens

Just like the question “Do you like spring?” quickly shows whether the responder has allergies, the question “Do you like cats?” or “Do you like dogs?” can also be quite the giveaway. When a person inhales pet dander or dust mites, it can set off asthma or allergy symptoms.

How? Because of a chain reaction. The chain reaction starts with inhaling an allergen, then that allergen prompts your body to release the chemical called histamine, and histamine being released then leads to you experiencing symptoms.

When you inhale pollen, dander, or dust mites, histamine might be released into your airways. This can cause swelling, extra mucus, and narrowed breathing passages. You may cough, wheeze, or feel congested — all thanks to histamine being released. As a result, you couldn’t sleep at cousin Maria’s house growing up, since she had a dog, and when you’re an adult, *you’re* the reason your kids can’t get a dog. Thanks, histamine response!

Ingesting allergens

The nose certainly isn’t the only way to take allergens into your body — the mouth is a common route as well. If you eat a food you’re allergic to (say, shellfish), your immune system kicks into high gear. In your gut, mast cells race to release histamine.



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Mast cells are a type of white blood cell in the immune system that reside in tissues of the skin, lungs, and intestines. Mast cells protect the body by releasing chemicals, such as histamine. Those chemicals battle invaders that range from allergens, germs, and parasites to toxins. However, if mast cells become overactive or multiply abnormally, they can trigger unwanted allergic reactions and symptoms, even in response to harmless substances.

Once your mast cells have released histamine in response to that shellfish you ate, you may experience hives, swelling, stomach cramps, or even trouble breathing. According to the U.S. Food and Drug Administration (FDA), the nine foods that most often cause allergic reactions are as follows:

- » Milk
- » Eggs
- » Peanuts
- » Tree nuts (such as almonds, walnuts, pecans, and cashews)

- » Fish (such as bass, cod, and flounder)
- » Crustacean shellfish (such as crab, lobster, and shrimp)
- » Wheat
- » Soybeans
- » Sesame products