

# Difference Between Sinus and Allergies

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## Key Difference – Sinus vs Allergies

The exaggerated and inappropriate immune responses that result in [tissue](#) damage and death are called the allergies. On the other hand, sinuses are air filled spaces present within some bones around the nasal cavity. From these definitions, you can understand that there is no similarity between these two at all. The key difference between sinus and allergies is that **a sinus is an anatomical structure whereas an allergy is a physiological derangement**. But in a pathological perspective, they are interconnected because an allergy is capable of [inflaming](#) the sinuses causing [sinusitis](#).

## What are Allergies?

Allergies, also known as hypersensitivity reactions, are the exaggerated and inappropriate immune responses that result in tissue damage and death. Some of the [allergens](#) that cause these hypersensitivity reactions are proteolytic enzymes that have the ability to penetrate the skin and the other protective mucosal barriers.

## Pathophysiology

In type I (immediate type) hypersensitivity reactions, an [antigen](#) entering the body is immediately taken up by IgE antibodies. These antigen-antibody complexes then bind to the specific receptors on the membrane of the mast cells, resulting in an extensive cell degranulation and inflammatory changes. Surprisingly, most of the molecules that act as allergens are inert and harmless substances.

After the exposure to the antigen, a cascade of events is triggered. This can be described under two stages as early phase response and late phase response.

In the early phase, typical features such as [edema](#), rubor and itching appear.

The late phase response is dominated by Th2 cells and its hallmark feature is the recruitment of the [eosinophils](#). The mediators involved in the late phase give rise to subsequent chronic inflammatory changes.

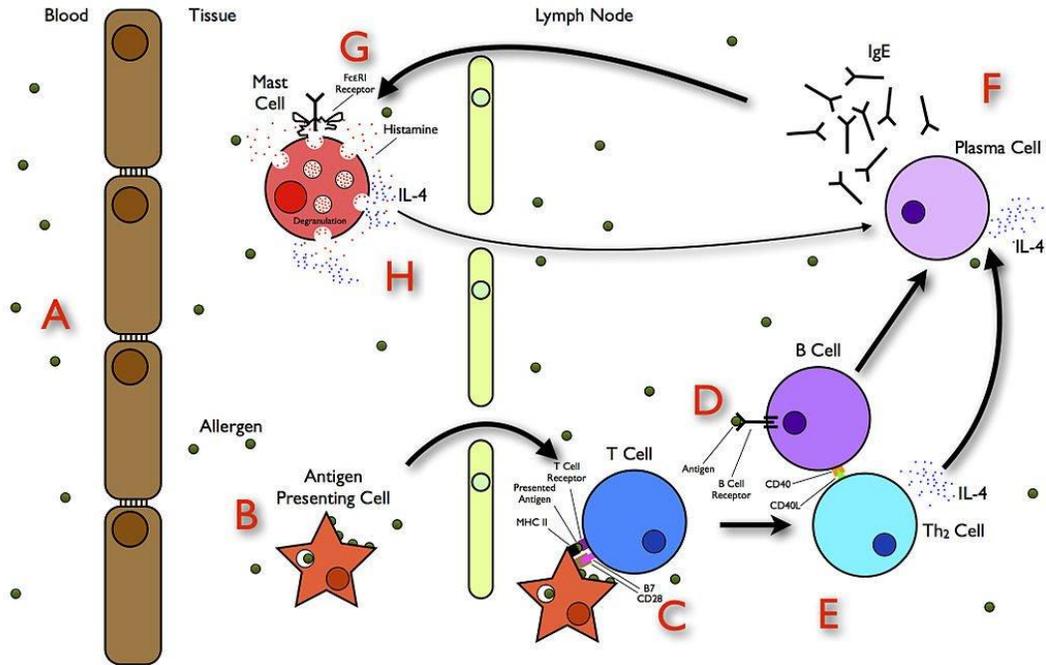


Figure 01: The Allergy Pathway

Immunopathological events taking place during the late phase are enumerated below

- Increased activity of the [neutrophils](#) and eosinophils which persist for about 3 days
- Accumulation of the Th2 cells around the blood vessels. They remain in these extravascular spaces for about 2 days
- Th2 cells, IL4 and IL5 set up the stage for the action of eosinophils which result in indiscriminate and extensive tissue damage.

## Why do Only Some People React to Allergens?

A countless number of research studies that have been conducted on this subject suggests that there is a genetic predisposition for the development of allergies. If your parents are allergic to something, you are also more likely to have the same problem. The genes encoding the beta chain of the IgE and IL4 play a key role in this.



**Figure 02: Some common food that triggers allergies.**

## **Diagnosis**

- History of the patient is very important in making a diagnosis.
- The clinical suspicion can be confirmed by doing a skin prick test or by measuring the allergen specific IgE level in the serum.

## **Treatment**

- The patient should be educated on how to avoid the exposure to the particular allergen.

The immune response and the chronic inflammatory reactions can be controlled by the administration of the drugs listed below.

- Antihistamines
- Corticosteroids
- Cysteinyl leukotriene receptor antagonists

- Omalizumab
- Immunotherapy can be of assistance to desensitize the patient.

## **What is a Sinus?**

Sinuses are air filled spaces present within some bones around the nasal cavity.

There are four sinuses:

- Frontal
- Ethmoidal
- Maxillary
- Sphenoidal

## **Functions of the Sinuses**

- They make the skull lighter.
- Sinuses add resonance to the voice.

At birth, sinuses are either absent or at a rudimentary stage. Gradually they develop and enlarge with the growth of the bones.

## **Anatomy**

### **Frontal Sinus**

Frontal sinus is located in the frontal bone just behind the superciliary arch. It opens into the nasal cavity through the middle meatus. The left and right sinuses are usually not equal in size and are more prominently developed in the males than in the females. These sinuses reach their maximum size after puberty.

Blood supply to the frontal sinuses comes through the supraorbital artery. Venous drainage is via the supraorbital and superior ophthalmic veins. Supraorbital nerve is the nerve that supplies the frontal sinus.

### **Maxillary Sinus**

The maxillary sinus is the largest sinus and it is located in the body of the maxilla. This sinus opens into the middle meatus in the lower part of the hiatus semilunaris. Arterial supply to the maxillary sinus is via the facial, infraorbital and greater

palatine arteries. The sinus is drained by the facial vein and the pterygoid venous plexus. Posterior superior alveolar nerves from maxillary and anterior and middle superior alveolar nerves from infra orbital are the nerves that supply the maxillary sinus.

### **Sphenoidal Sinus**

Sphenoidal sinus lies within the sphenoidal bone. The left and right sinuses are separated by the nasal septum. They open into the sphenoethmoidal recess. Posterior Ethmoidal and internal carotid are the arteries that supply the sphenoidal sinus. Blood from these sinuses drains into the pterygoid venous plexus and the cavernous sinus. Nerve supply to the sphenoidal sinus is from the posterior ethmoidal nerve and the orbital branch of the pterygopalatine nerve.

### **Ethmoidal Sinus**

This group is a set of intercommunicating air filled spaces located within the labyrinth of the ethmoid bone.

### **Sinusitis**

Inflammation of the sinuses is known as the sinusitis.

#### **Causes**

- Common cold
- Allergies
- Nasal polyp
- Deviation of the nasal septum

#### **Types of Sinusitis**

- Acute – duration of the symptoms is less than one month
- Sub acute – symptoms last for 1 to 3 months
- Chronic –symptoms persist for more than 3 months
- Recurrent – more than 4 episodes of acute sinusitis per year

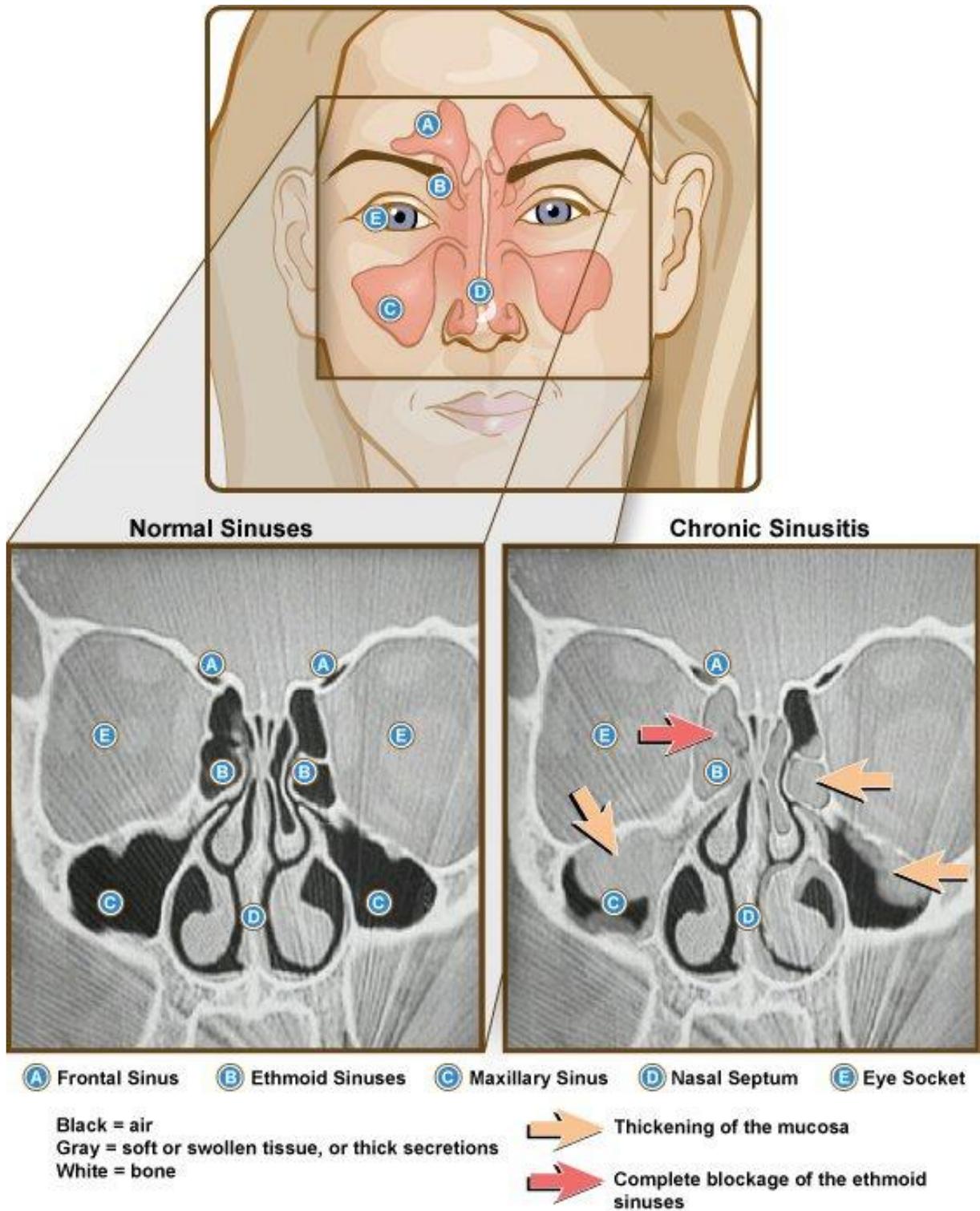


Figure 03: Sinuses and Sinusitis

## Clinical Features of Sinusitis

- Headache
- Purulent nasal discharge
- Sometimes sore throat
- Frontal sinusitis and ethmoiditis can cause edema of the lids.
- Facial pain with tenderness
- Fever

## Treatment

It is important to understand what the cause of sinusitis is before starting the treatments.

- If sinusitis is due to an allergy the anti inflammatory drugs mentioned above can be given.
- When a bacterial infection causes sinusitis broad spectrum antibiotics such as co-amoxiclav can be given along with a nasal decongestant like xylometazoline. In order to control any secondary inflammation, a topical corticosteroid such as fluticasone propionate can be used.

The maxillary sinus is the most prone to get infected. The source of infection is usually the nose or dental caries. Drainage of the sinus is difficult because its ostium lies at a higher level than its floor. Therefore an artificial opening is surgically created near the floor in order to remove the purulent materials accumulated within the sinus.

## What is the difference between Sinus and Allergies?

Sinus vs Allergies	
Allergies are the exaggerated and inappropriate immune responses that result in tissue damage and death.	Sinuses are air filled spaces present within some bones around the nasal cavity.
Type	

An allergy is a physiological derangement.	Sinuses are anatomical structures.
<b>Cause</b>	
Allergic reactions can cause sinusitis.	Sinusitis is caused by many other factors as well.

## Summary – Sinus vs Allergies

The main difference between sinus and allergies is that sinus is an anatomical structure whereas an allergy is a physiological derangement. Sinusitis is the inflammation of the sinuses. Since allergies and sinuses are related in a pathological sense, it is important to always consider the possibility of any allergic reactions giving rise to the symptoms of sinusitis without straightaway prescribing the antibiotics.

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- 1."Allergy food" By David Castor (dcastor) – Compilation of six photos: Wine bottles by Guillaume Paumier, Assorted Peaches by NaJina McEnany, Camembert Cheese by Abanima, Prawns by Frank C. MüllerHazelnuts by English Wikipedia user Fir0002, Apples by Scott Bauer ([CC BY-SA 3.0](#)) via [Commons Wikimedia](#)
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