

## NOSE (OLFACTORY SYSTEM)

### 1. Introduction

The nose is the primary organ of smell and an important part of the respiratory system. It detects odor molecules and helps in air filtration, warming, and humidification.

#### Functions

- Olfaction (sense of smell)
- Filtration of inspired air
- Humidification and warming of air
- Acts as a resonance chamber for speech

### 2. Anatomy of the Nose

#### A. External Nose

It consists of

- Nasal bones
- Cartilages
- Nostrils (external nares)
- Nasal septum (divides nose into two cavities)

**Function:** Entry of air.

#### B. Nasal Cavity

It is divided into right and left halves by the nasal septum which have the following regions

1. Vestibule
2. Respiratory region
3. Olfactory region (sensory part)

#### C. Nasal Conchae (Turbinates)

Three bony projections:

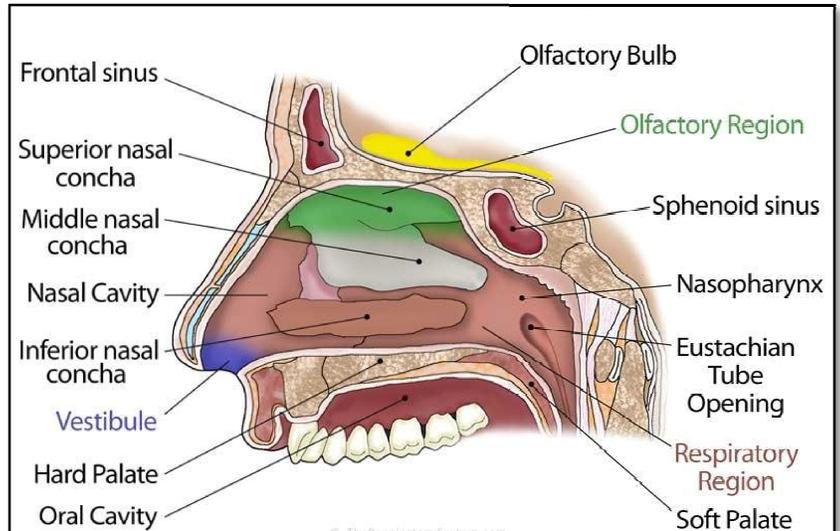
- Superior concha
- Middle concha
- Inferior concha

**Function:**

- Increase surface area
- Create air turbulence
- Help in warming and filtering air

### 3. Olfactory Region (Sensory Part)

Located in the upper part of nasal cavity near the superior concha.



## Structure of Olfactory Epithelium

It contains three types of cells:

### Cell Type

Olfactory receptor cells

Supporting (sustentacular) cells

Basal cells

### Function

Detect odor

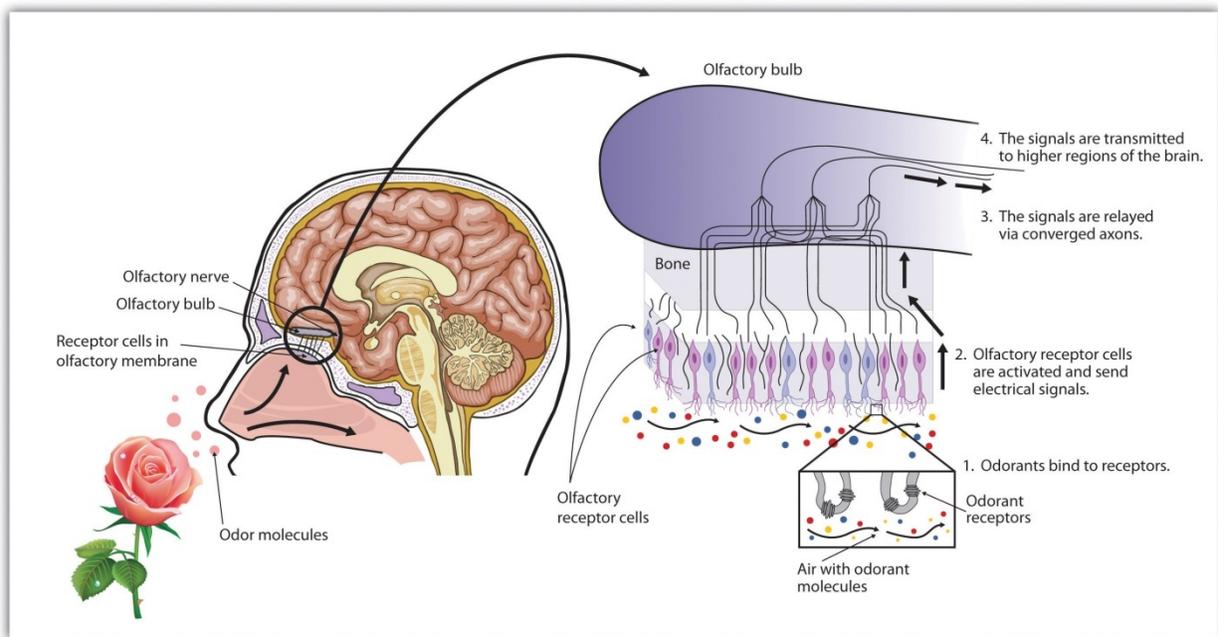
Provide support

Form new receptor cells

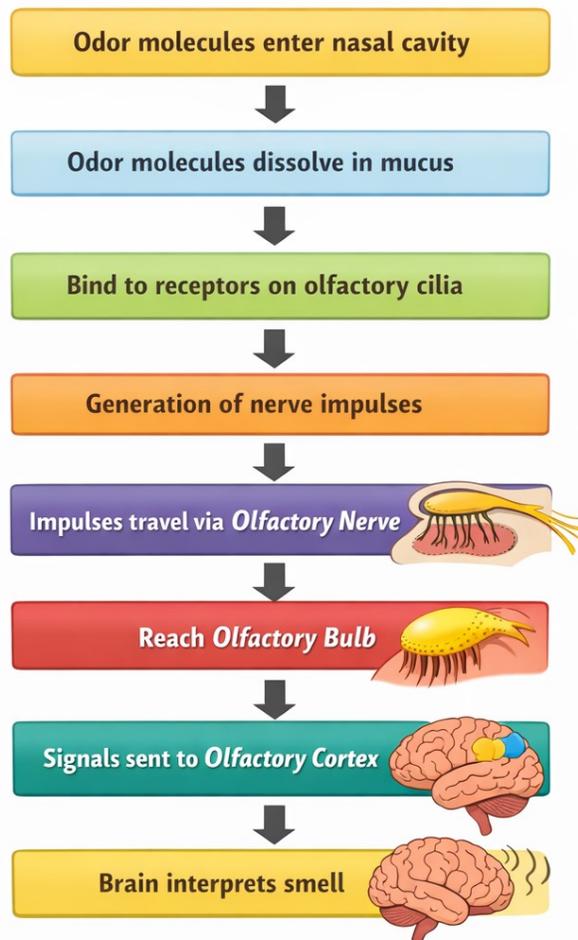
## 4. Olfactory Receptor Cells

It is consisted of Bipolar neurons which have cilia called **olfactory hairs** , embedded in mucus and sensitive to odor molecules. These neurons can regenerate.

## 5. Mechanism of Smell (Olfaction)



## Mechanism of Smell (Olfaction)



### 6. Blood Supply

It has mainly blood supply from branches of Sphenopalatine artery, Facial artery and Ophthalmic artery

### 7. Nerve Supply

Sensory (Smell) by Olfactory nerve and General Sensation by Trigeminal nerve branches.

### 8. Functions of Nose

#### Primary Functions

- Detection of odor
- Air conditioning (warm, humidify, filter)
- Immune defense (mucus + cilia)
- Voice resonance

### 9. Common Disorders

Anosmia

Complete loss of the sense of smell in which patient cannot detect odors. It is due to viral infections, head injury, nasal obstruction, aging.

### **Hyposmia**

It is reduced or decreased sense of smell which is caused by common cold, allergic rhinitis, nasal polyps. In this disorder smell is present but weaker than normal.

### **Rhinitis**

**It is the** Inflammation of the nasal mucosa which is caused by sneezing, runny nose, nasal congestion, itching.

#### **Types:**

- Allergic rhinitis
- Infectiousrhinitis

**Common cause:** Allergy or viral infection.

### **Sinusitis**

It is inflammation or infection of the paranasal sinuses caused by Bacterial, viral, or fungal infection.

**Symptoms:** Facial pain, headache, nasal blockage, thick nasal discharge.

### **Epistaxis**

It is Bleeding from the nose (nosebleed) which have following causes:

- Nose picking
- Trauma
- Dry air
- Hypertension

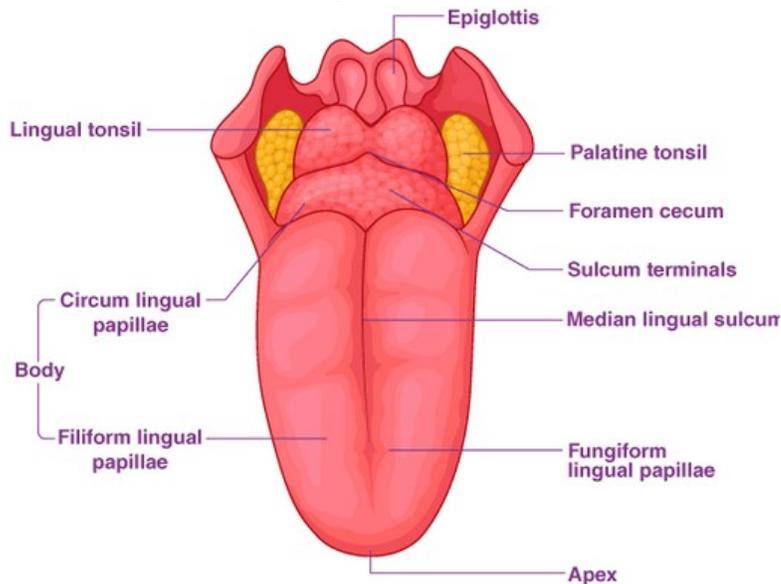
## TONGUE

The tongue is a highly mobile, muscular sensory organ situated on the floor of the oral cavity. It plays an essential role in taste perception, mastication, swallowing, speech articulation, and maintenance of oral hygiene.

Structure of the Tongue

### Gross Anatomy

It lies on the floor of the mouth and extends from the oropharynx to the lips. Anatomically, the tongue is divided into three main parts



### Parts of the Tongue

**A. Apex (tip):** Anterior free end which is a most mobile part.

**B. Body (oral part):** Anterior two-thirds part which is located in oral cavity and involved mainly in taste and manipulation of food

**C. Root (pharyngeal part):** Posterior one-third, faces towards oropharynx and contains lymphoid tissue (lingual tonsil)

### Surfaces

The tongue has two surfaces. The dorsal (superior) surface is rough and covered by numerous projections called papillae. It shows a median sulcus in the midline and the terminal sulcus posteriorly. At the apex of the terminal sulcus lies the foramen cecum, a developmental remnant of the thyroglossal duct. The ventral (inferior) surface of the tongue is smooth and is connected to the floor of the mouth by a mucosal fold called the frenulum linguae. Prominent deep lingual veins are often visible on this surface.

### Muscles of the Tongue

Structurally, the tongue is composed of skeletal muscle fibers arranged in two groups: Intrinsic and extrinsic muscles.

### **A. Intrinsic muscles**

The intrinsic muscles (superior longitudinal, inferior longitudinal, transverse, and vertical) are confined within the tongue and are responsible for altering its shape—such as curling, flattening, or elongating.

### **B. Extrinsic muscles**

The extrinsic muscles (genioglossus, hyoglossus, styloglossus, and palatoglossus) originate outside the tongue and insert into it; they are responsible for changing the position of the tongue, such as protrusion, retraction, elevation, and depression.

### **Nerve supply**

The motor nerve supply of the tongue is mainly through **the hypoglossal nerve**, which innervates all intrinsic and extrinsic muscles except the palatoglossus, which is supplied by the vagus nerve.

### **Taste Buds and Papillae on the Tongue**

The dorsal surface of the tongue contains specialized mucosal projections called papillae, many of which house taste buds. Together, they are responsible for the perception of taste and also assist in the mechanical handling of food.

### **Papillae of the Tongue**

Papillae are small elevations of the mucous membrane present mainly on the dorsal surface of the anterior two-thirds of the tongue. They are of four main types, each with distinct structure and function.

### **Filiform Papillae**

#### **Structure:**

- Most numerous papillae
- Slender, conical, thread-like projections
- Covered with keratinized epithelium
- Distributed over most of the anterior tongue

**Taste buds:** Absent

#### **Function:**

- Mechanical role
- Provide friction to grip and manipulate food
- Give the tongue its rough texture

These do not participate in taste sensation.

### **Fungiform Papillae**

#### **Structure:**

- Mushroom-shaped
- Scattered among filiform papillae
- More numerous near the tip and lateral margins
- Rich blood supply (appear as red dots)

**Taste buds:** Present (few per papilla)

**Function:**

- Taste perception
- Particularly sensitive to sweet and salty tastes

**Circumvallate (Vallate) Papillae****Structure:**

- Largest papillae
- 8–12 in number
- Arranged in a V-shaped row just anterior to the terminal sulcus
- Each papilla surrounded by a deep circular trench

**Taste buds:** Numerous (hundreds per papilla)

**Special feature:**

- Associated with von Ebner's glands that secrete serous fluid into the trench

**Function:**

- Major role in taste, especially bitter sensation

**4. Foliate Papillae****Structure:**

- Leaf-like folds
- Located on the lateral margins of the tongue
- Well developed in children, less prominent in adults

**Taste buds:** Present

**Function:**

- Taste perception
- Minor role in adults

**Taste Buds**

Taste buds are specialized sensory receptor organs responsible for detecting taste stimuli. They are oval, pale structures embedded within the epithelium of certain papillae.

Taste buds are found in:

- Fungiform papillae
- Circumvallate papillae
- Foliate papillae
- Soft palate
- Epiglottis
- Pharynx

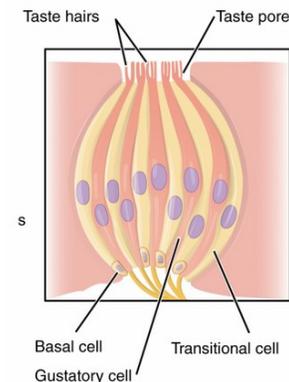
NOTE: Not present in filiform papillae

**Structure of a Taste Bud**

Each taste bud is an oval structure containing about 50–100 specialized cells.

**Types of Cells**

1. **Gustatory (taste receptor) cells**



- Detect dissolved chemicals
  - Have microvilli projecting into taste pore
2. **Supporting (sustentacular) cells**  
Provide structural support
  3. **Basal cells**
    - Stem cells
    - Replace worn-out taste cells

#### Taste Pore

- Small opening at the surface
- Microvilli of gustatory cells project into it
- Dissolved food substances enter here to stimulate taste

#### Mechanism of Taste

### Taste Perception Process

