

PHYSIOLOGY

Lecture : 10

DONE BY : BASHAR SMADI

Taste / gustation

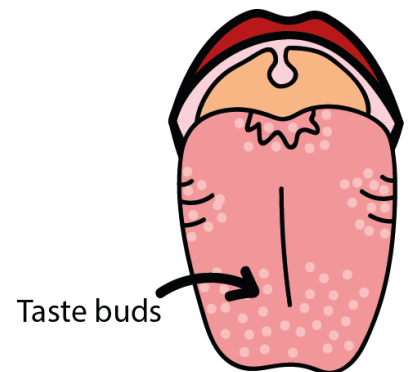
Taste

- Taste is a chemical sense-chemoreceptors
- Taste is not crucial for life
(it only improves the quality of life like the smell)
- One of the main advantages of the taste is to allows one to separate undesirable or lethal foods 🦋 from those that are nutritious. 🥗



Taste Buds

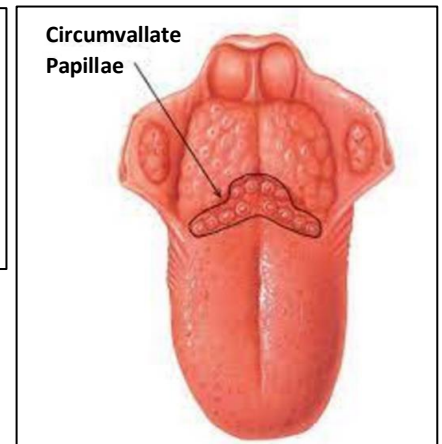
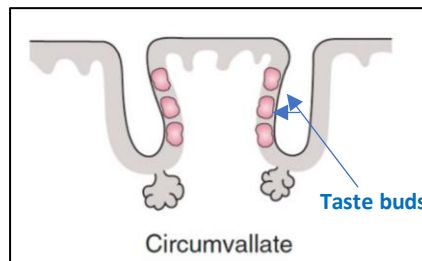
- Taste buds are found in papillae of the tongue.
- Also in the mucosa of epiglottis, palate, pharynx and the proximal part of esophagus.
- adults have 3-10,000 buds.
- children have more.
- beyond age 45 taste buds start to degenerate taste becomes less critical.



Types of the papillae of the tongue :-

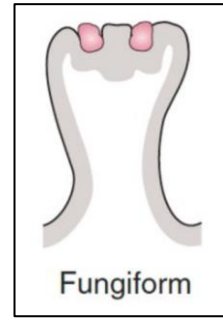
1. Circumvallate Papillae

- ✓ large
- ✓ posterior part of tongue
- ✓ many in number.
- ✓ arranged in the shape of 'V'.
- ✓ Each papilla contains many taste buds (up to 100).



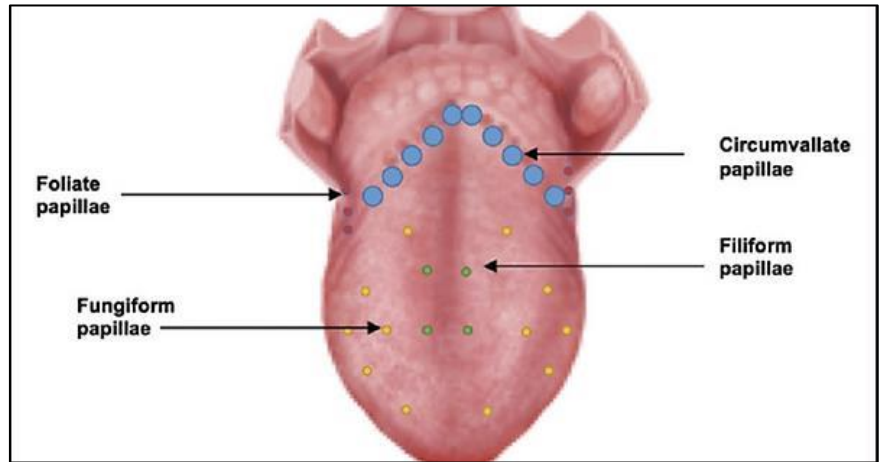
2. Fungiform Papillae

- ✓ round in shape (*looks like a fungus*)
- ✓ over the anterior surface of tongue near the tip.
- ✓ moderate number of taste buds



3. Filiform Papillae

- ✓ small
- ✓ conical-shaped مخروطي
- ✓ Dorsum of tongue
- ✓ Few numbers of taste buds



4. Foliate papillae

- ✓ Lateral surfaces of the tongue
- ✓ Moderate numbers of taste buds

Additional taste buds

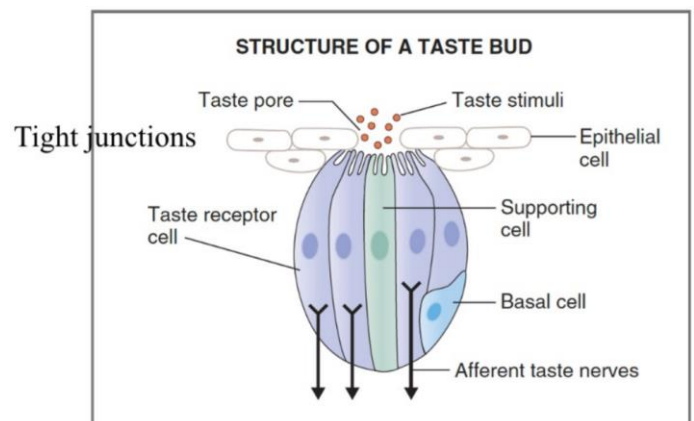
- Palate
- tonsillar pillars
- Epiglottis
- proximal esophagus.

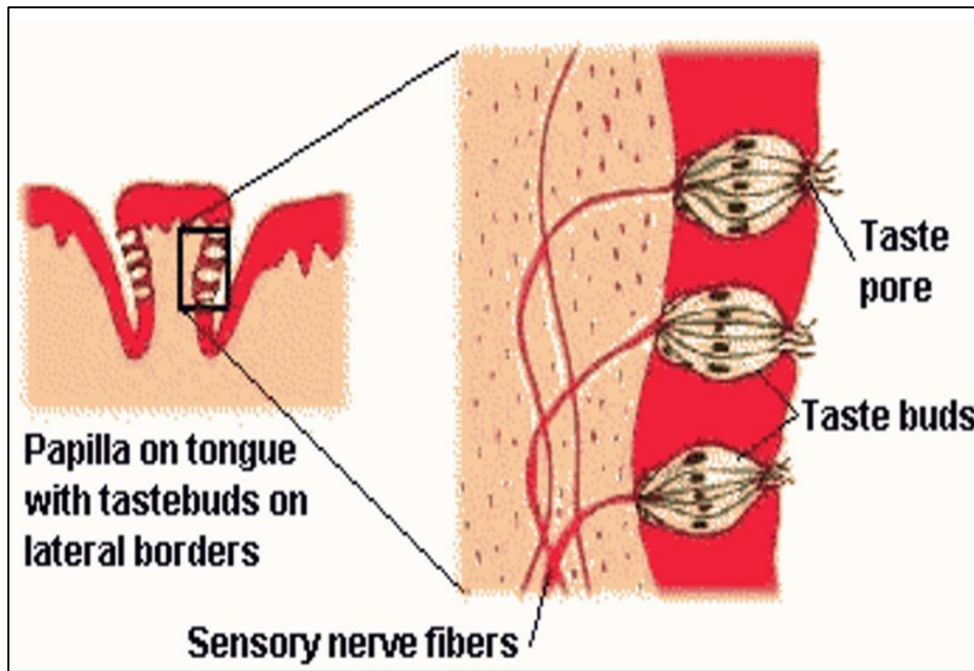
STRUCTURE OF TASTE BUD

Type of Cells in Taste Bud

- 1 Taste receptor cells (epithelial cells)
 - microvilli
 - Taste pore
- 2 Sustentacular cells- -microvilli
- 3 Basal cells

Cells of taste buds undergo constant cycle of growth, apoptosis and regeneration.





Primary Sensation of Taste

similar to the perception of color

- Humans can perceive hundreds of different tastes ...

- all are various combinations of the five primary taste sensations :

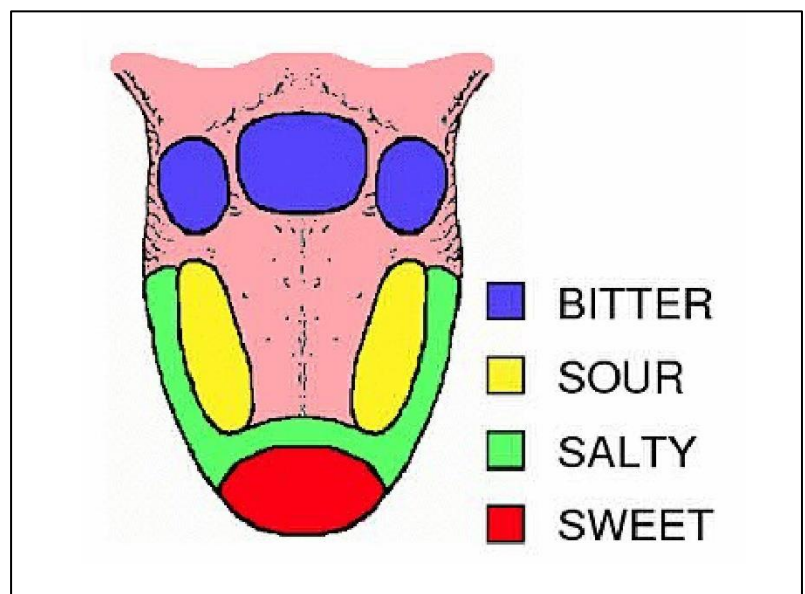
- 1 **sour** حامض (caused by acid concentration)
- 2 **salty** ملح (caused by ionized salt)
- 3 **sweet** حلو (caused by many chemicals mostly organic compounds- sugar, amino acids)
- 4 **bitter** مر (caused by long organic molecules containing Nitrogen)+(caused by alkaloids)
- 5 **umami** طعم موجود في مأكولات بحرية (caused by glutamate)

Taste Bud Facts

- **sweet** and **salty** buds located on the tip of the tongue,

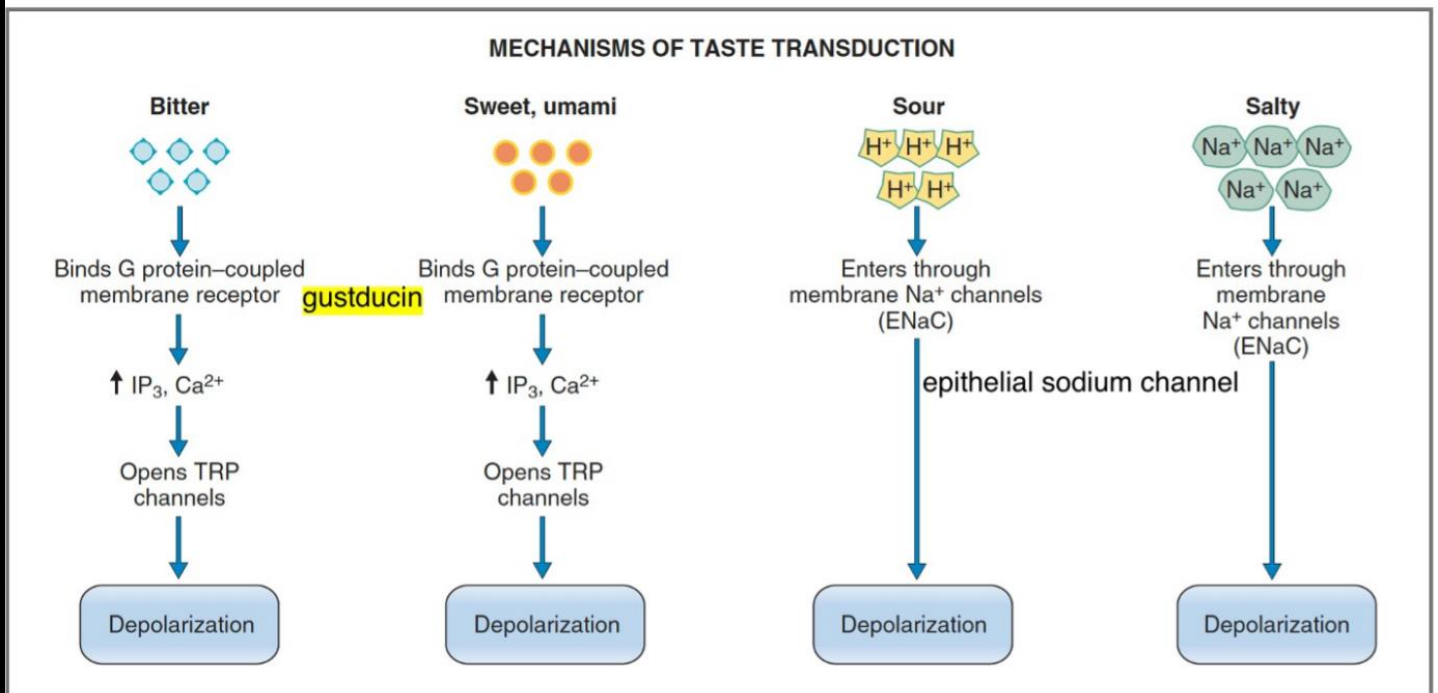
- **sour** on the lateral sides of the tongue,

- **bitter** on the posterior tongue and soft palate.



TASTE TRANSDUCTION

Taste transduction is how to convert the tastant (chemical stimulus) into electrical energy (action potential)



● Bitter and Sweet, umami will bind to G-protein-coupled membrane receptor (gustducin) gustducin are different G-proteins (in Bitter it is different from Sweet) When it (Bitter or Sweet or Umami) binds to G-protein receptor it will generate Inositol trisphosphate (IP₃) and that will trigger calcium release The increase of intra-cellular calcium will trigger the TRP (Transient receptor potential) channels to open , that will cause sodium ion influx leading to Depolarization.

● Sour and Salty taste: it is mainly hydrogen(in sour) OR Sodium(in salty) that will enter through membrane Na⁺ channels (ENaC) leading to Depolarization.

● change in electrical potential in the taste cell is called the receptor potential →it will result Action Potential in terminal endings of afferent nerve fibers.

Primary modalities of taste

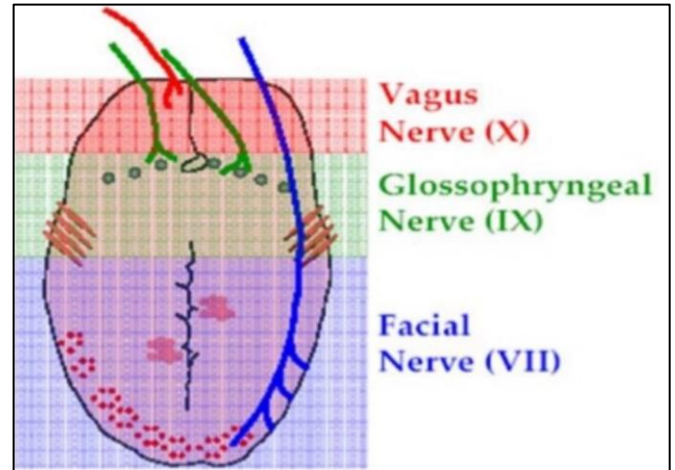
Responses of Taste buds:

- Each taste bud responds strongly to one type of taste
- But they also respond to other tastes as well تستجيب بدرجات متفاوتة لأنواع اخرى

Transmission of Taste Sensations

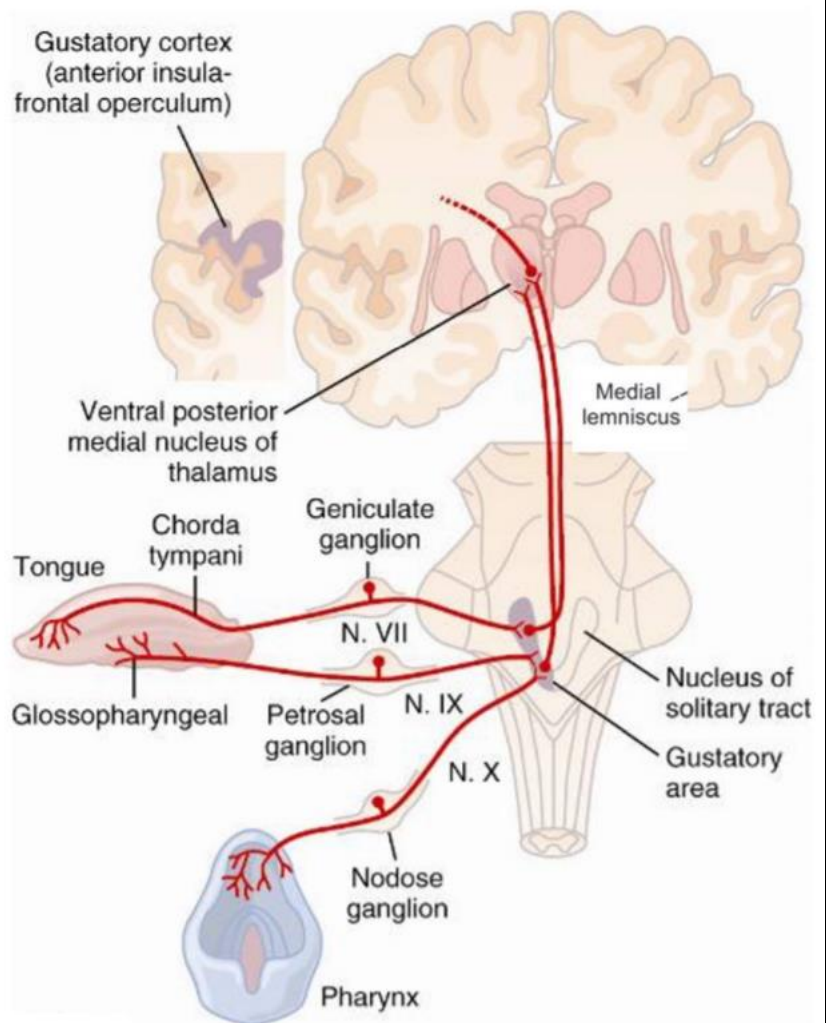
activation of taste buds excites taste fibers,

- anterior 2/3 of tongue through **facial nerve**,
- posterior 1/3 of tongue through **glossopharyngeal nerve**,
- posterior aspects of the mouth through **vagus nerve**.
- transmitted to **solitary nucleus**, from solitary nucleus to **thalamus**, from thalamus to **cortex**.



Taste Pathways

- chorda tympani (Tongue)
 - synapses to ↓
 - Geniculate ganglion
- Glossopharyngeal nerve
 - ↓
 - Petrosal ganglion
- Vagus nerve
 - ↓
 - Nodose ganglion
- from these ganglions
 - ↓
 - Nucleus of solitary tract
 - ↓
 - Medial lemniscus
 - ↓
 - Thalamus (Ventral posterior medial nucleus of thalamus)
 - ↓
 - Gustatory cortex (taste cortex) (anterior insula- frontal operculum)



Taste Perception

- Influenced by information derived from other receptors, especially odor
also the pain receptors الشَّم يُؤثِّر على التذوق
- Temperature and texture of food influence taste
- Psychological experiences associated with past experiences with food influence taste
- How cortex accomplishes perceptual processing of taste sensation is currently unknown

Adaptation of Taste

- taste sensations adapt rapidly.
- adaptation of the taste buds themselves accounts for only about 50% of the adaptation.
- central adaptation must occur but the mechanism for this is not known.

Clinical considerations

terms

- Ageusia: Absence of sense of taste
- Dysgeusia: Disturbed sense of taste
- Hypogeusia: Diminished sense of taste
- Hypergeusia: increased sense of taste



THANK YOU AND GOOD LUCK