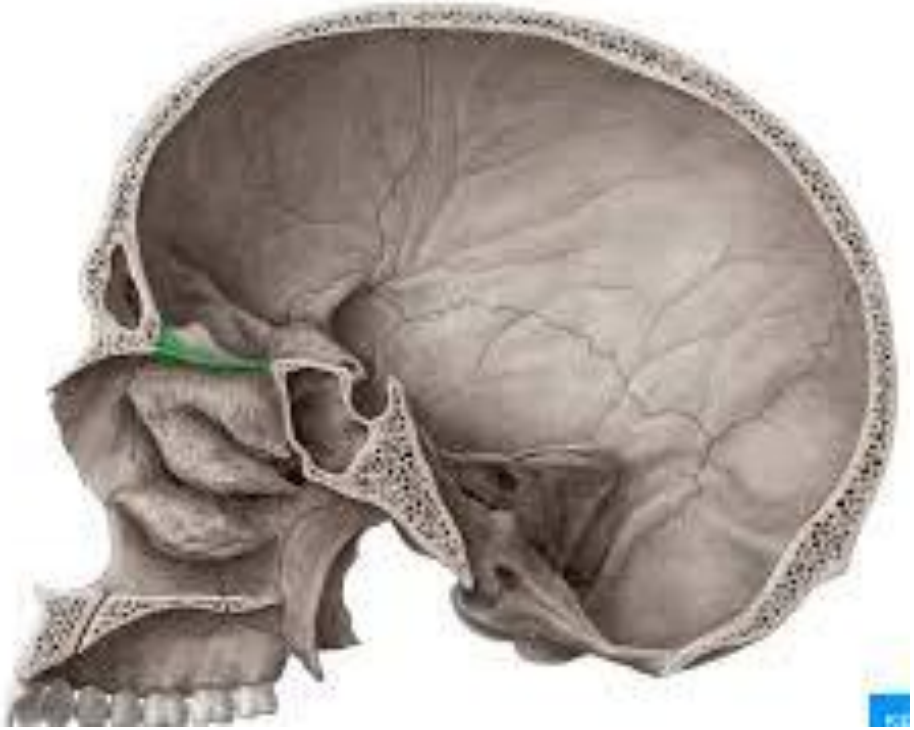


Special Care and Sedation Dental Nursing:

Anatomy and physiology update: Part 2: Head and Neck

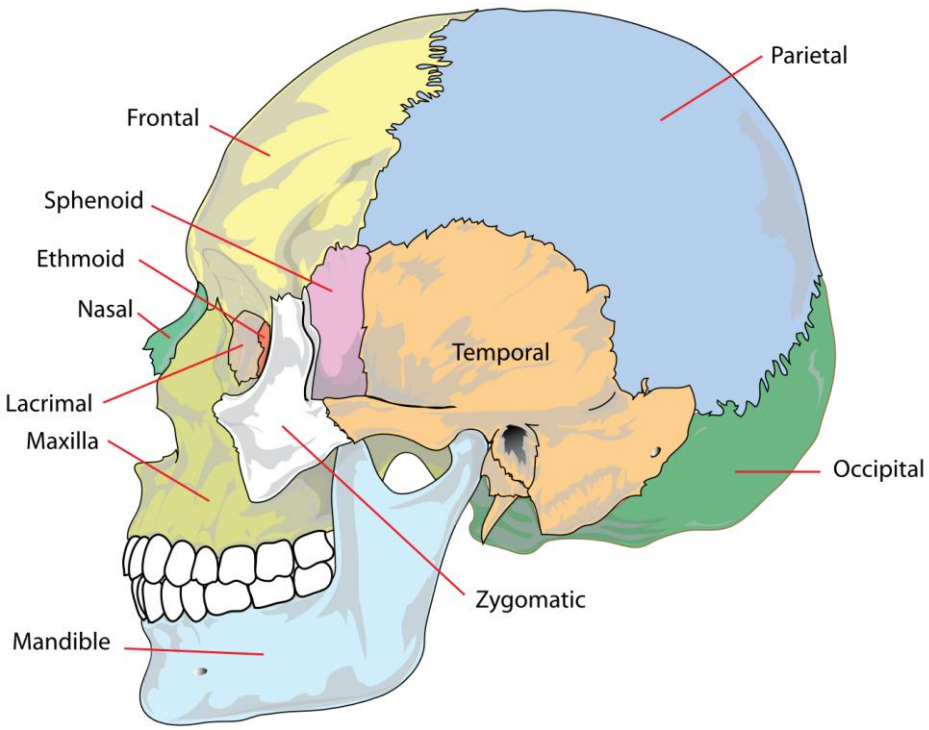
Oct 2025

Structure

- Skull bones
- Brain
- Arteries of brain
- Muscles of face
- Nerves of face
- Salivary glands
- Speech
- Olfaction and taste

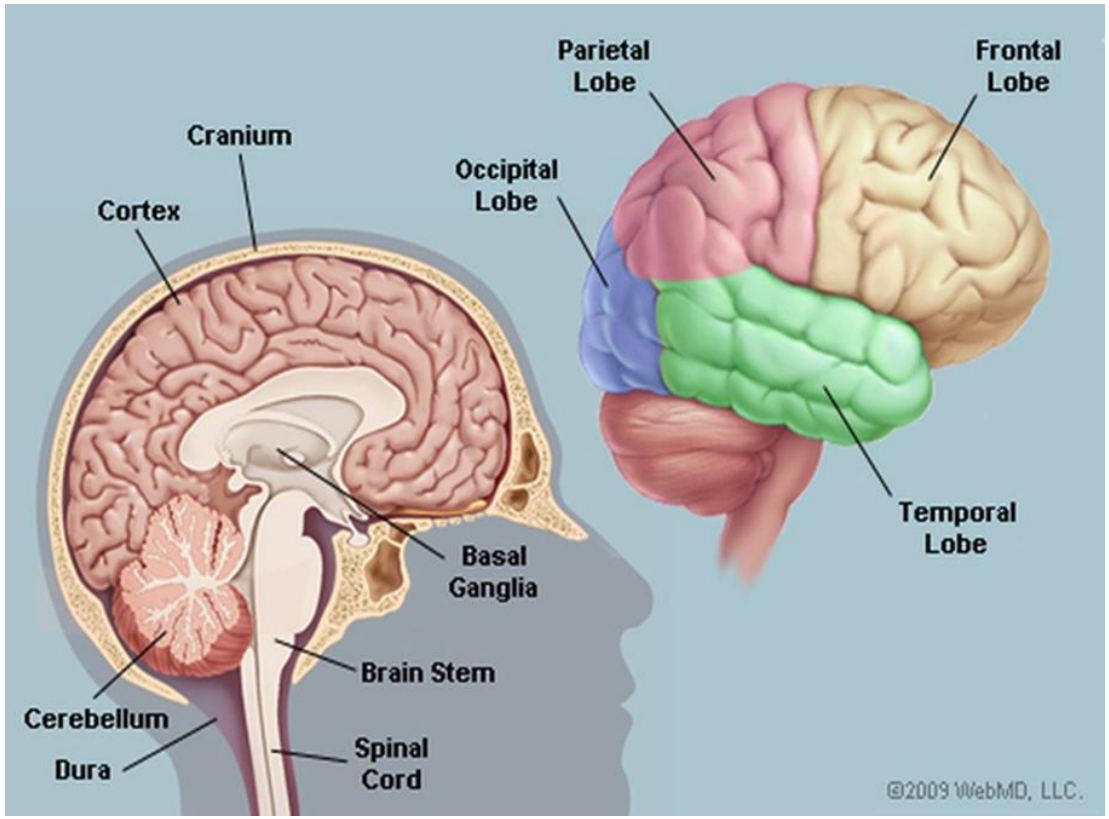
Skull bones

- Vault:
  - frontal
  - parietal
  - temporal
  - occipital
- Facial:
  - maxilla
  - zygoma
  - mandible
  - sphenoid



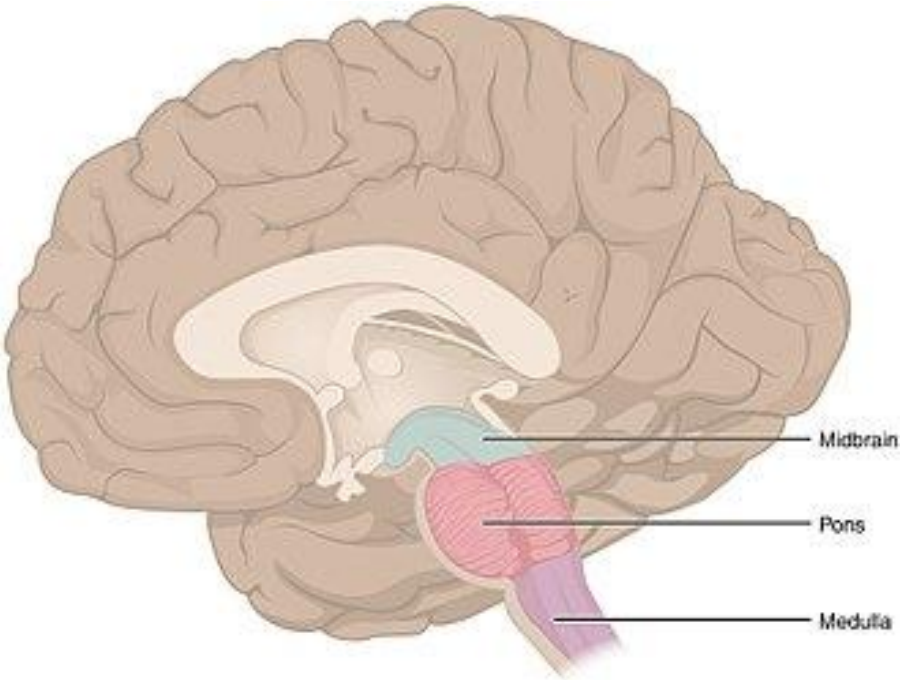
Brain

- Forebrain
  - cerebral hemispheres
  - thalamus and hypothalamus
- Midbrain
- Hindbrain
  - pons
  - medulla
  - cerebellum



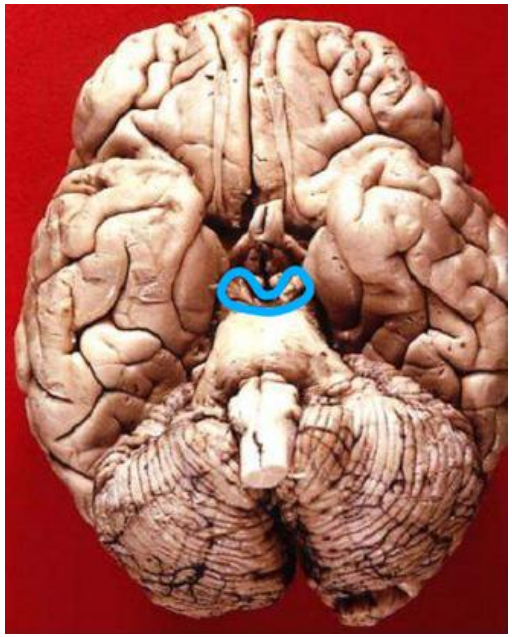
Brainstem

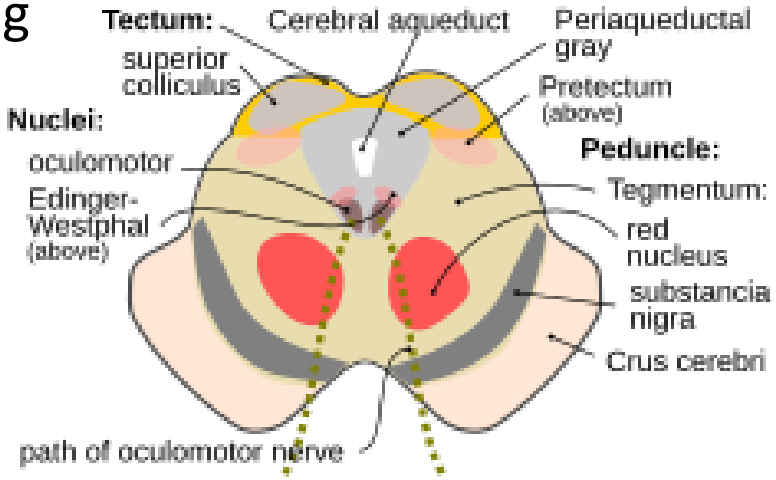
- Midbrain, Pons and Medulla
- basic automatic functions, including breathing, swallowing, control of blood pressure and heart rate, control of sleep and alertness etc;
- origin of cranial nerves;
- conduction of motor and sensory nerves to and from the rest of the body;
- damage to brainstem usually very serious



Midbrain

- relatively small in humans
- contain black areas involved with producing a neurotransmitter called **dopamine**
- involved in movement
- loss of dopamine-producing nerve cells associated with **Parkinson's Disease**

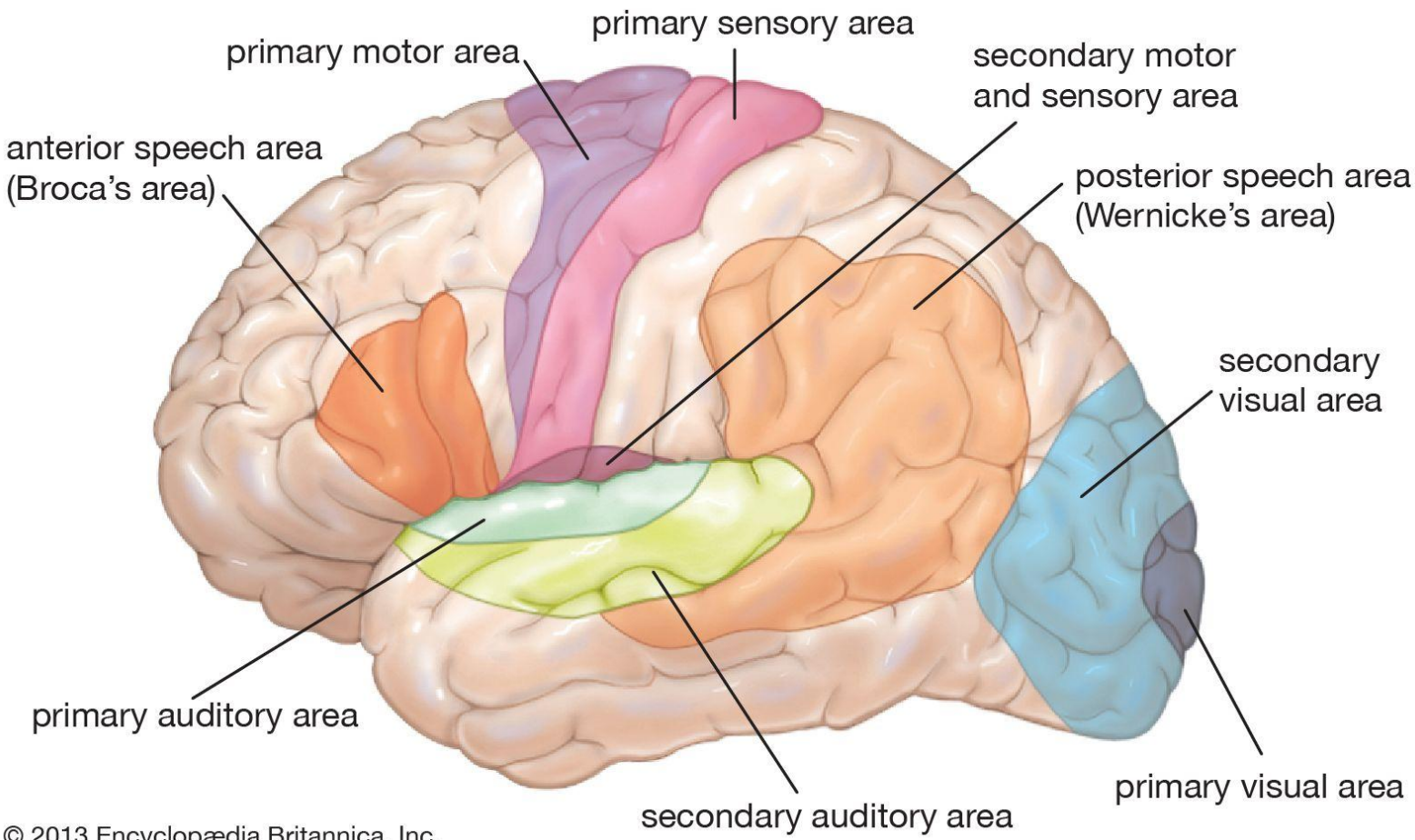




Parkinson's Disease

- neurodegenerative condition
- symptoms can include rigidity, tremors and loss of balance
- associated with loss of dopamine-producing nerve cells in substantia nigra of midbrain

Functional Areas



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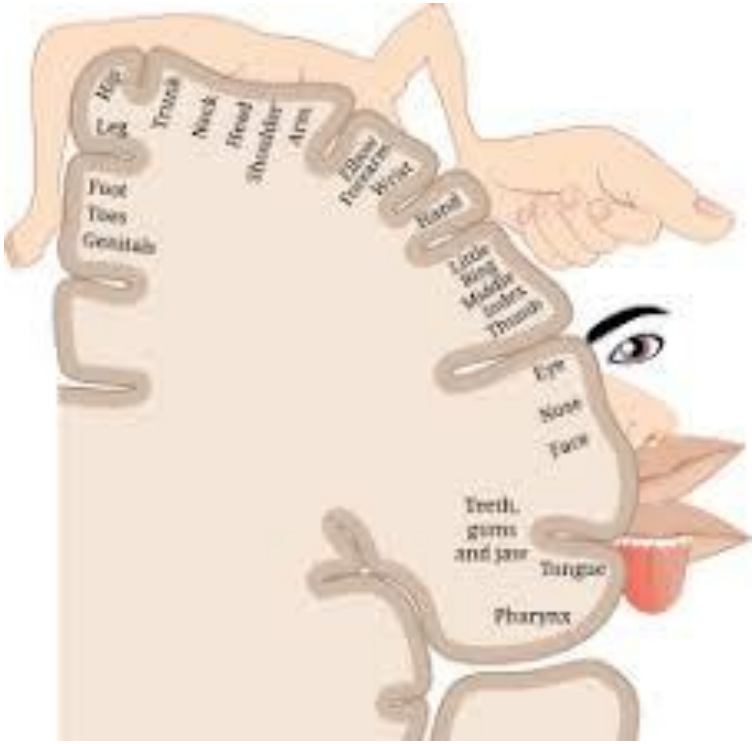
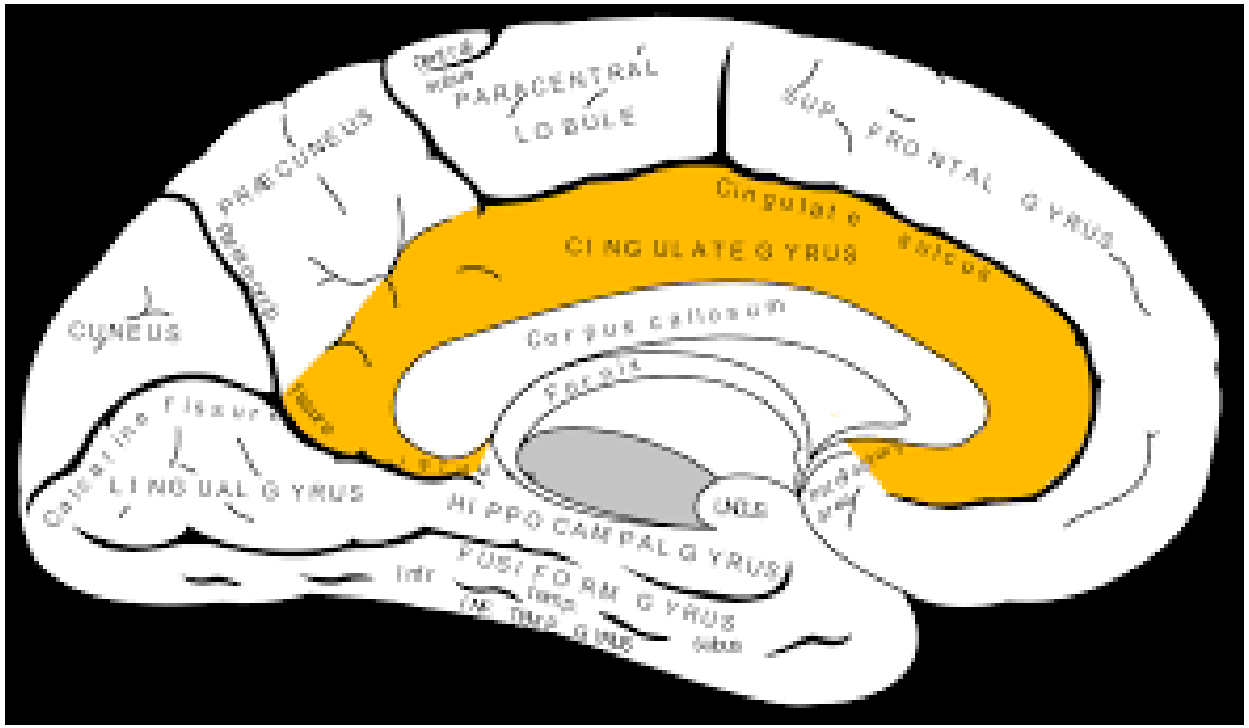
Primary sensory cortex



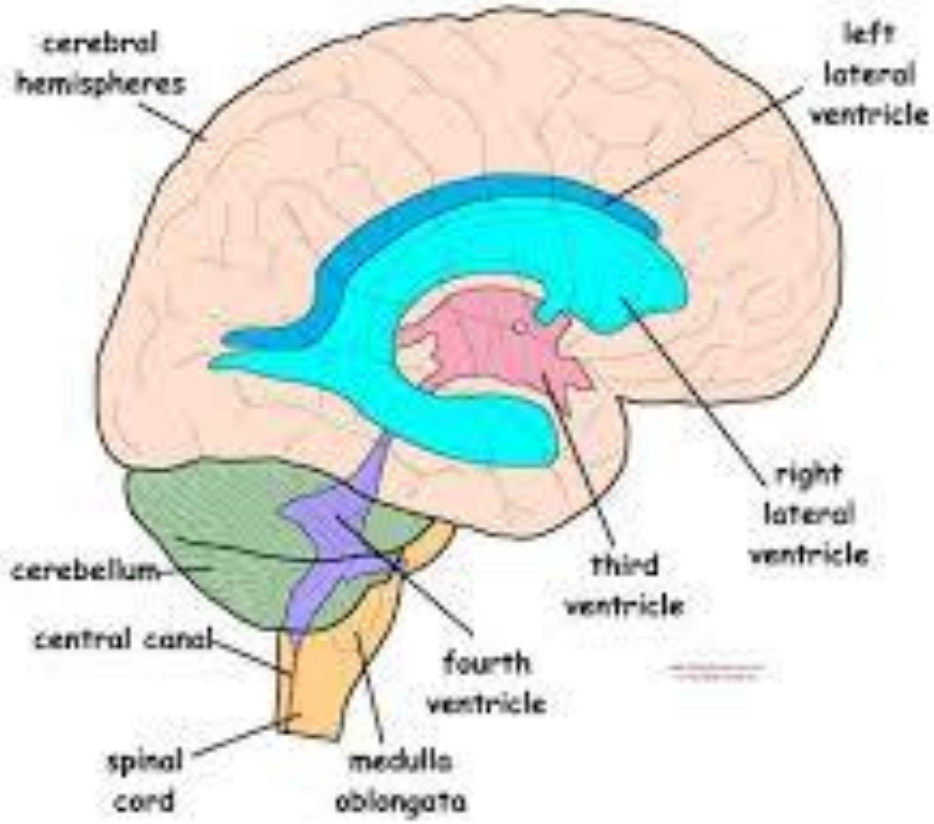
Functional areas

- Cingulate gyrus- part of “limbic system”; involved with emotion and memory



Ventricular system of brain

- Cavities within brain and spinal cord
- Produce CSF (cerebro-spinal fluid)
- Functions:
  - shock absorption
  - support
  - maintain constant environment
  - nutrients
  - waste removal

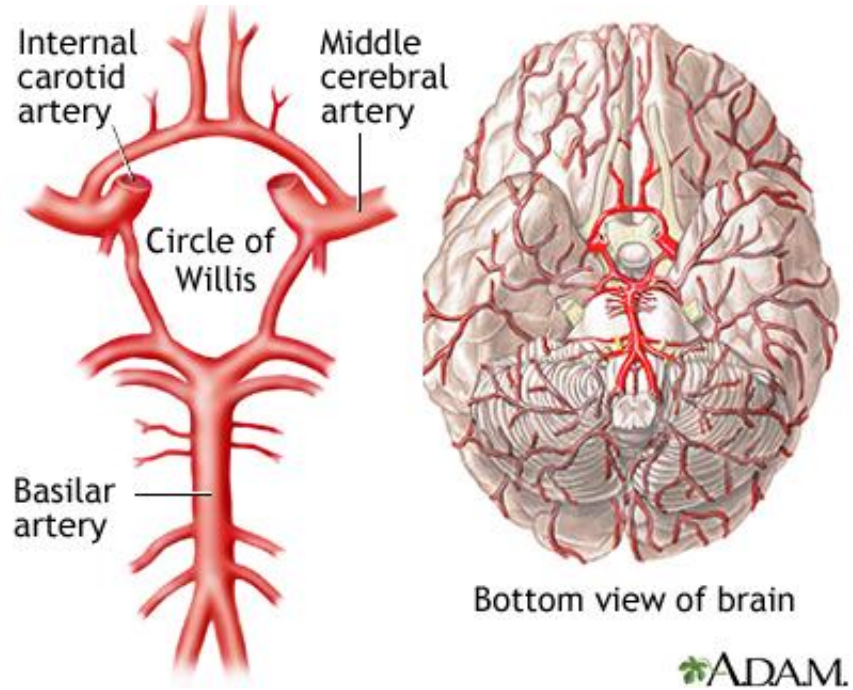


Hydrocephalus

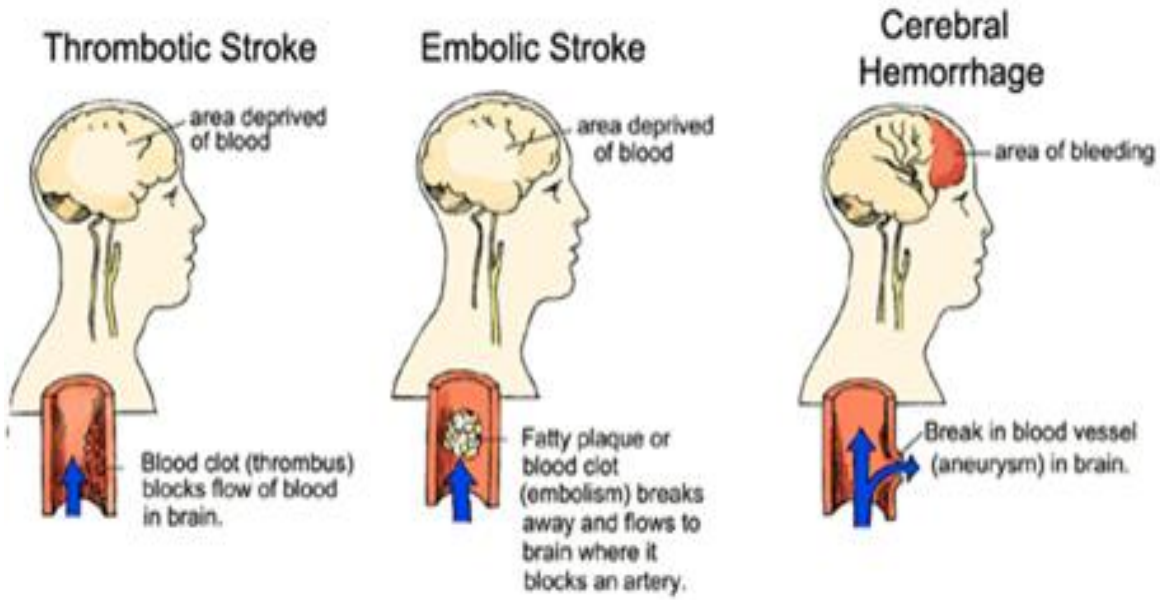
- Blockage of ventricular system
- May be treated with a shunt (tube) into heart or abdominal cavity

Blood supply of brain

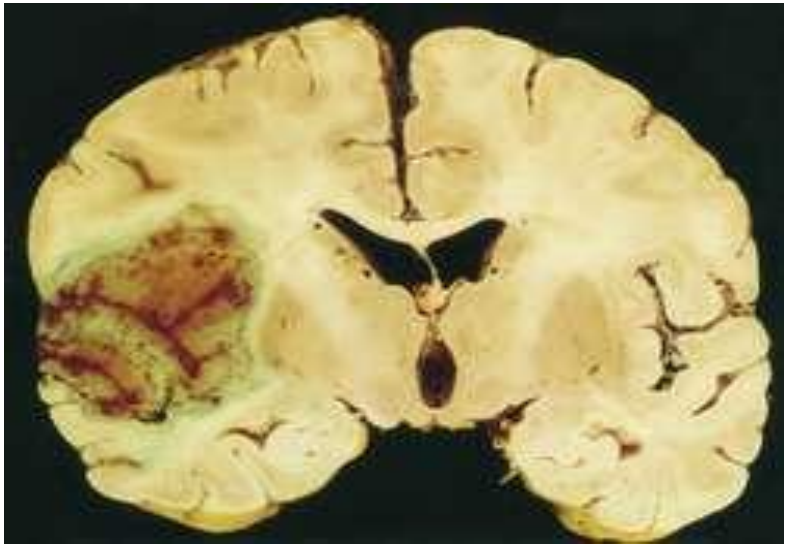
- 2 x internal carotid arteries at front of neck
- 2 x vertebral arteries at back of neck
- Form a “ring” of vessels (**Circle of Willis**)
- Lots of branches in brain



Stroke



- Blockage or bleed in an artery in the brain
- Different types
- Effects depend on location and duration of injury
- Variable outcome



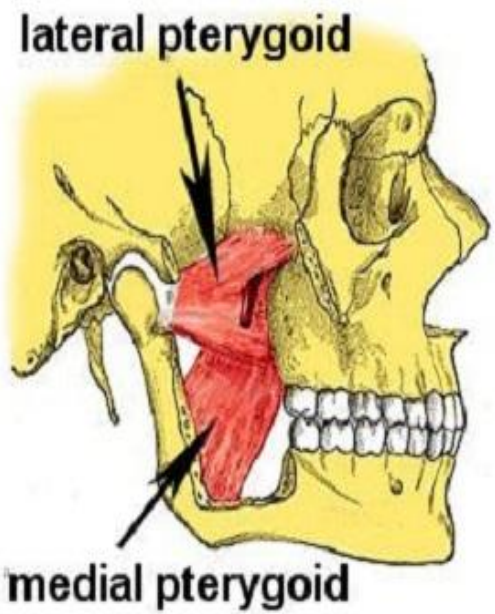
Stroke

- Each side of the brain mainly controls the **opposite** side of the body

- Often leads to facial or limb weakness on 1 side (usually the opposite side of the brain injury)

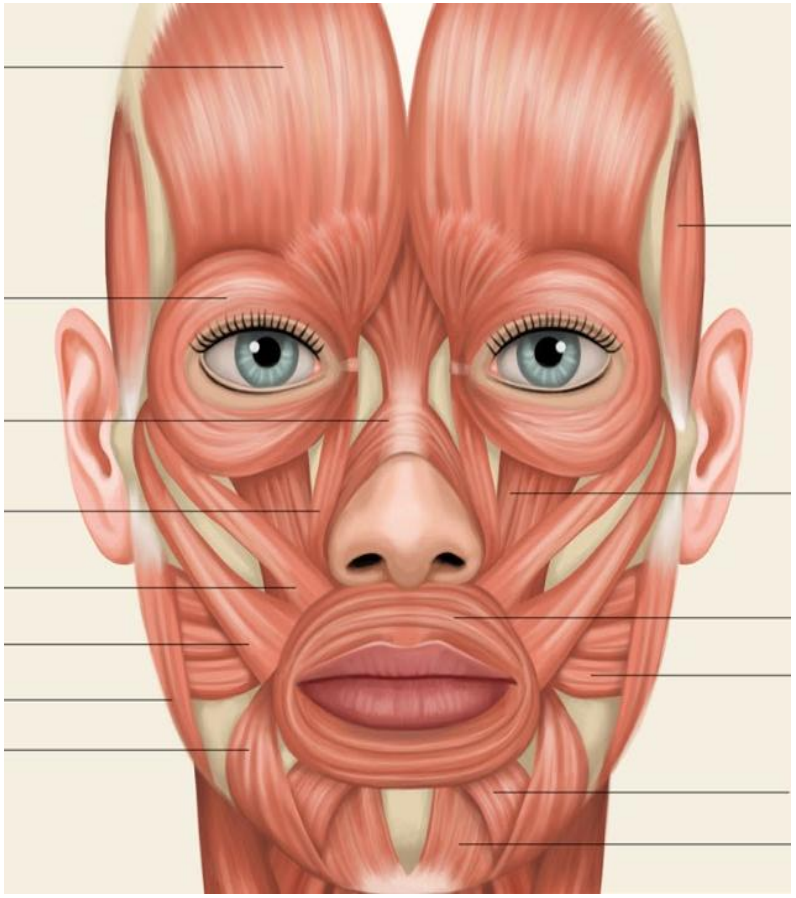
Muscles of face and jaws

- **Muscles of mastication (chewing)**
- Muscles of facial expression
- Supra-hyoid muscles
- Infra-hyoid muscles
- Muscles supporting head e.g. sternocleidomastoid



Muscles of facial expression

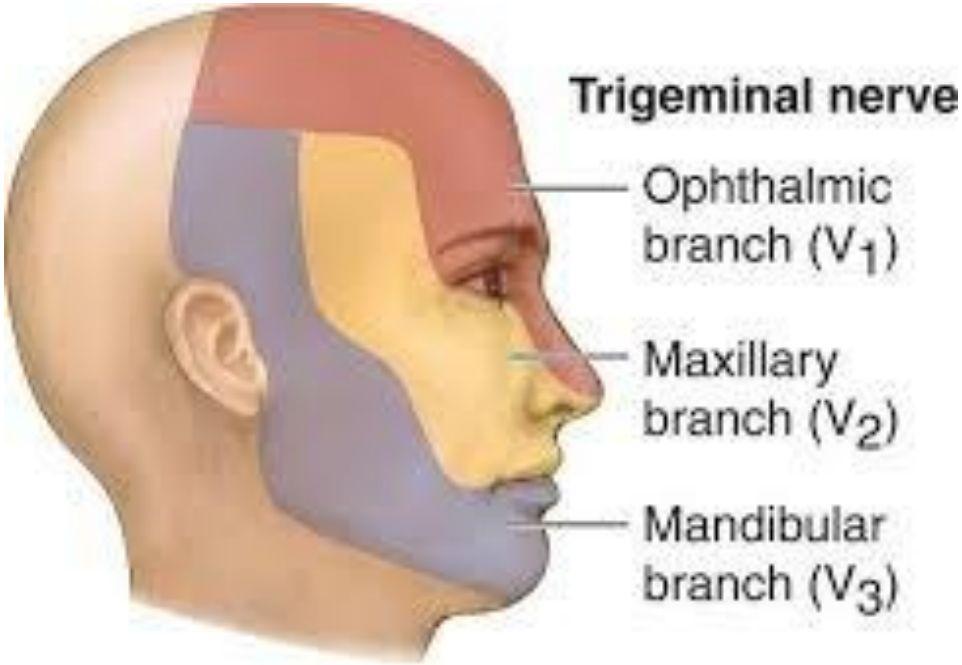
- Orbicularis oculi
- Orbicularis oris
- Buccinator
- Facial nerve (7th cranial nerve) controls



Sensory nerve supply to face

- 5th Cranial nerve
- Trigeminal nerve

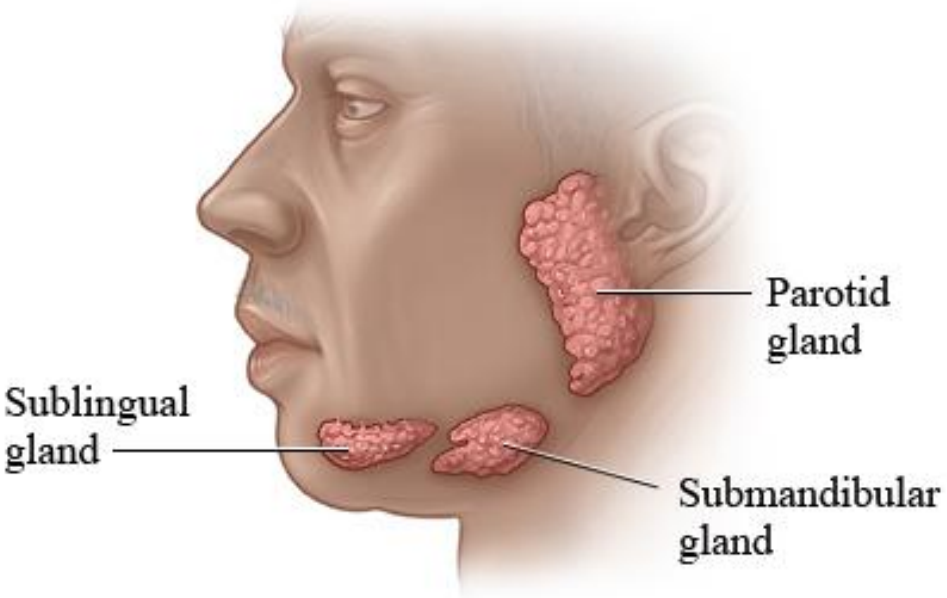
- 3 branches:
  - ophthalmic
  - maxillary
  - mandibular



Sensory distribution of trigeminal nerve

Salivary Glands

- Parotid
- Submandibular
- Sublingual
- Minor salivary glands



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Functions of saliva

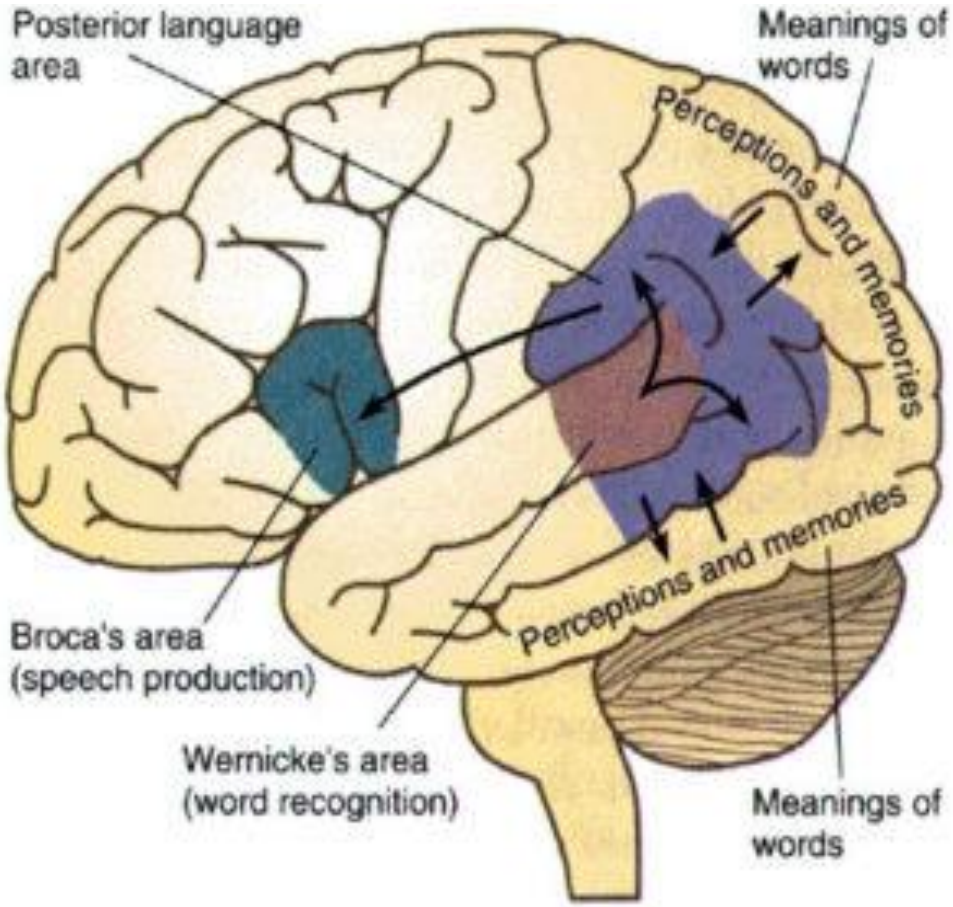
- Maintains pH and **buffers** acidity (important for teeth)
- **Digestion** – amylase
- **Antibodies** – fights infection
- Mucus- **lubrication**- aids with speech, swallowing, denture wear, taste etc

Dry mouth (xerostomia)

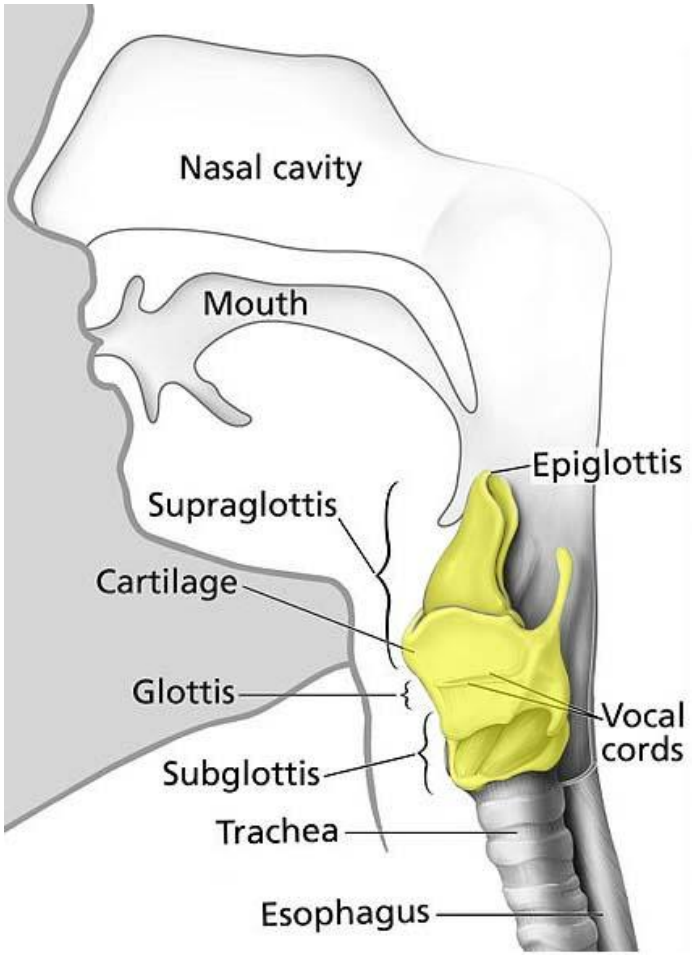
- Causes:
  - Drugs
  - Radiotherapy
  - Sjogren's syndrome
- Effects:
  - Caries
  - Infections e.g. Candidal
  - Speech, taste, swallowing, denture wear

Speech

- Brain:
  - Broca's area
  - Wernicke's area
  - stroke can cause speech issue (e.g. dysphasia)
- Larynx:
  - vocal cords
  - recurrent laryngeal nerve
- Muscles:
  - facial expression
  - tongue
  - neuromuscular problems can affect speech (e.g. dysarthria)

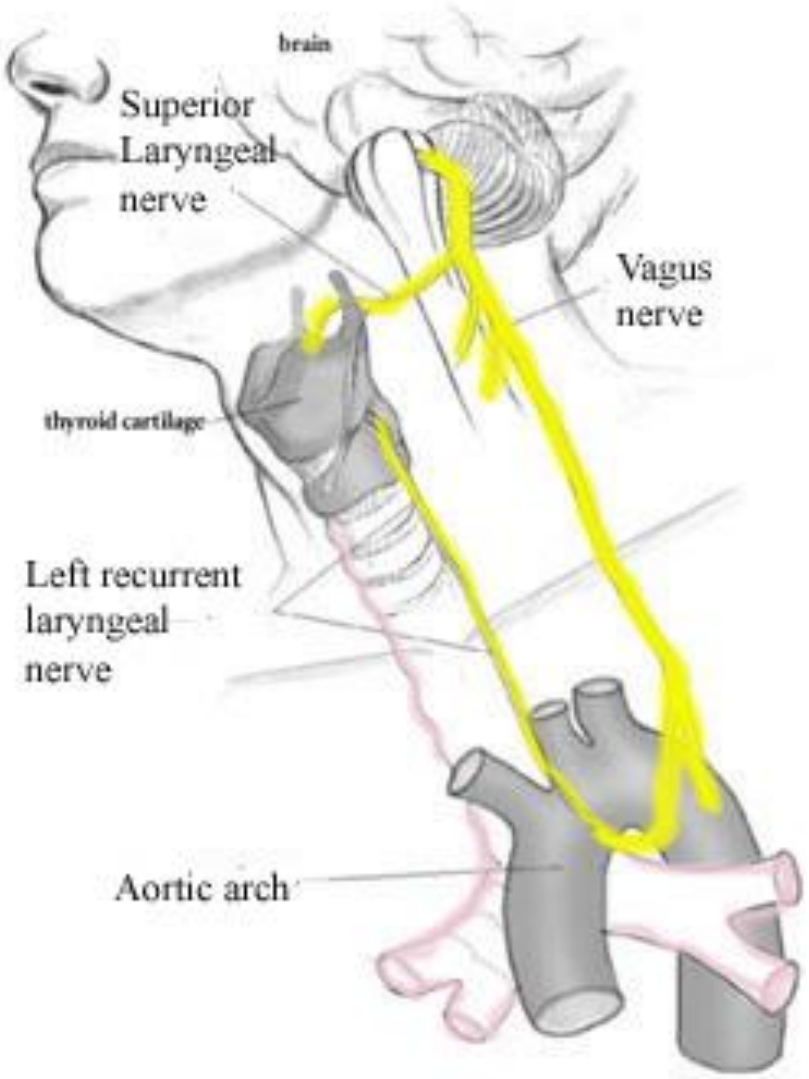


Vocal cords in larynx



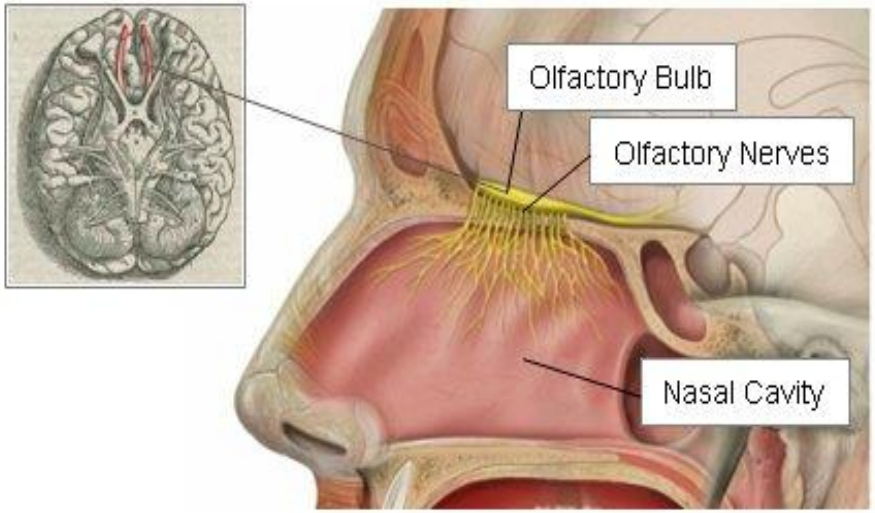
Recurrent laryngeal nerve

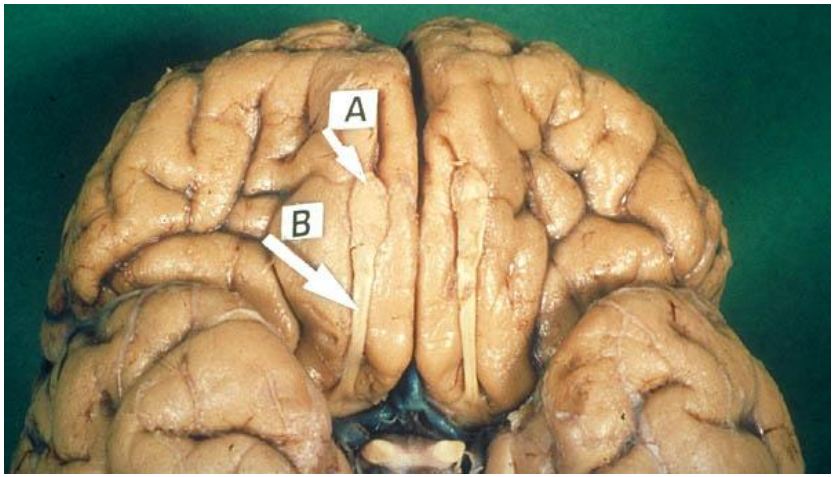
- Branch of vagus (10th cranial nerve)
- Unusual pathway: loops down into thorax and back up to larynx
- Pressure can affect function, eg lung cancer can cause hoarseness



Olfaction (smell)

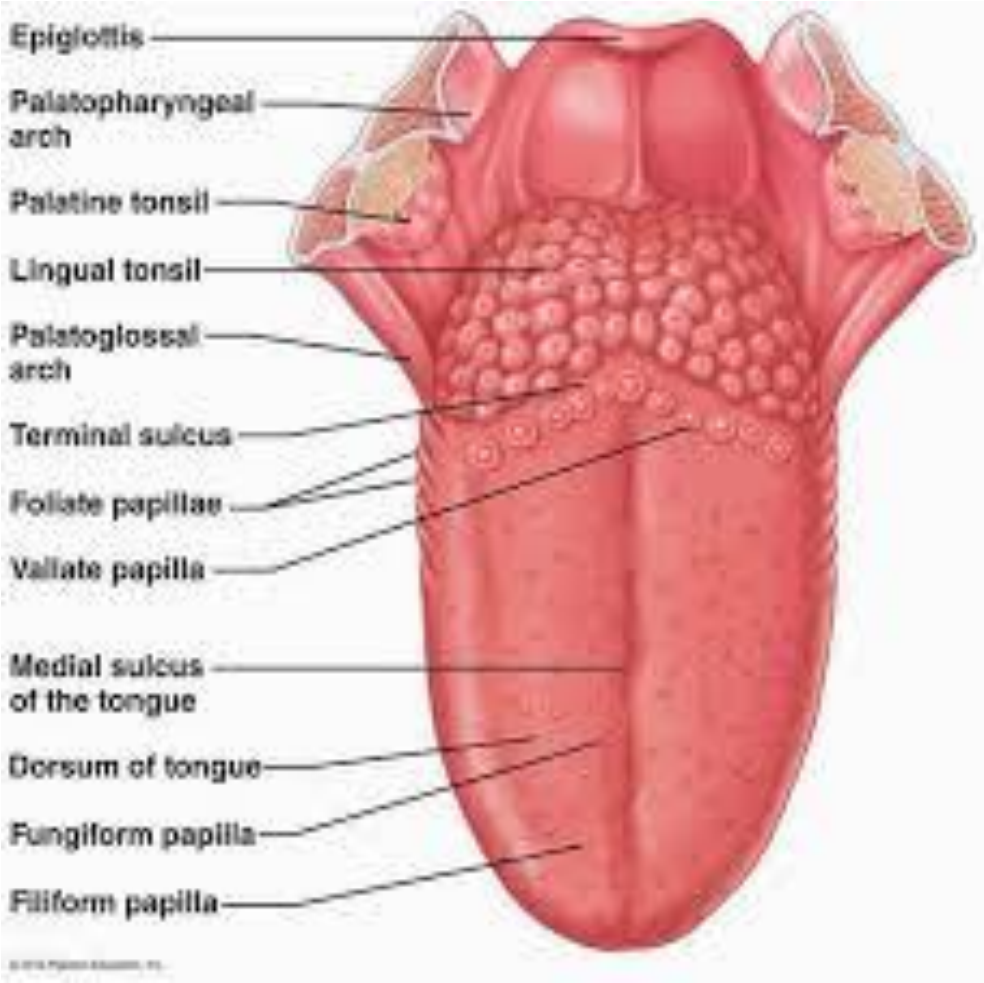
- **olfactory** nerves (1st cranial nerve) in roof of nasal cavity
- Chemoreceptors
- contributes to “taste”
- affected by head injury and respiratory infections





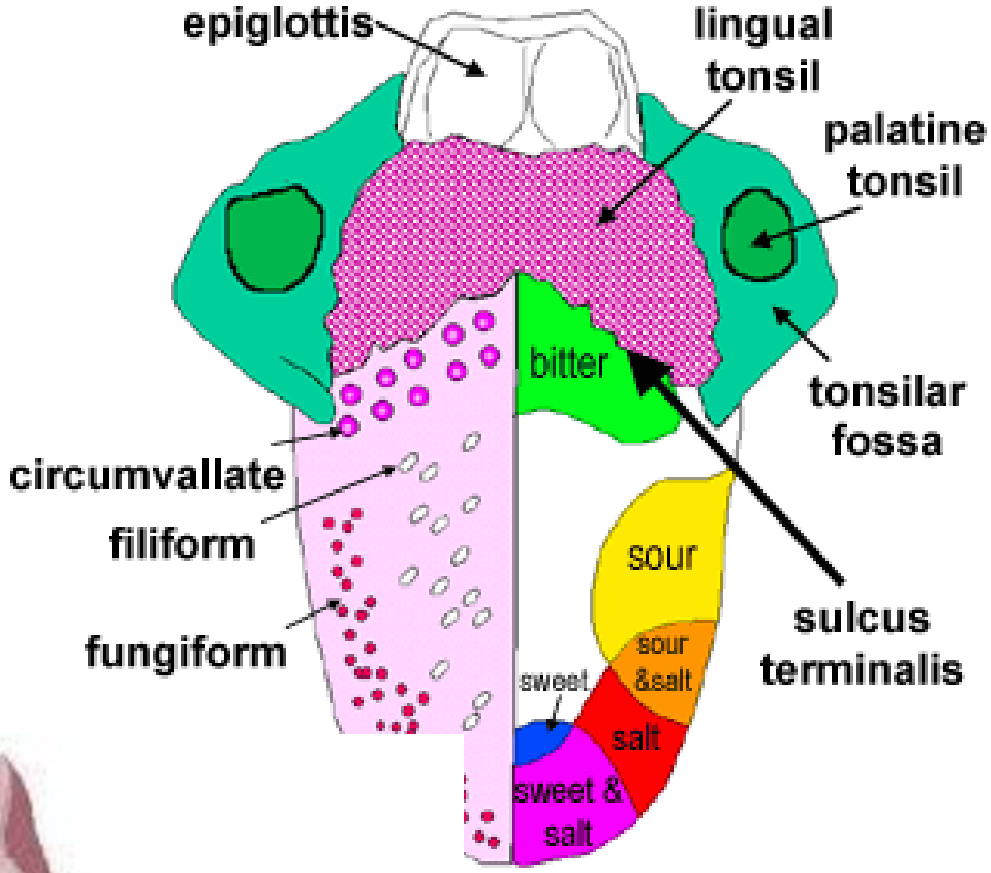
Sensory innervation of tongue

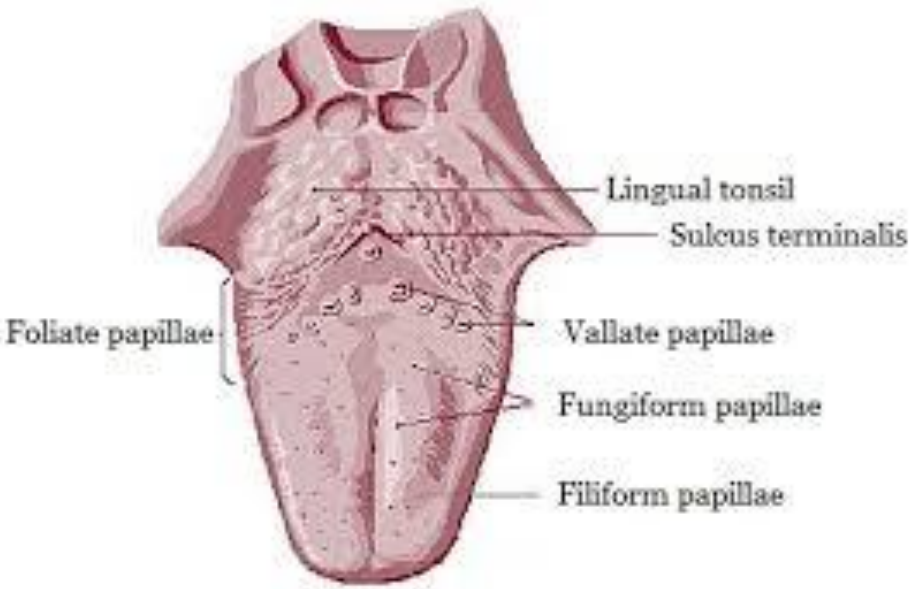
- Anterior 2/3:
  - General sensation: **lingual nerve** (trigeminal 5th cranial nerve)
  - Taste- **chorda tympani-** facial 7th cranial nerve)
- Posterior 1/3:
  - General sensation AND taste: **glossopharyngeal** 9th cranial nerve



Taste

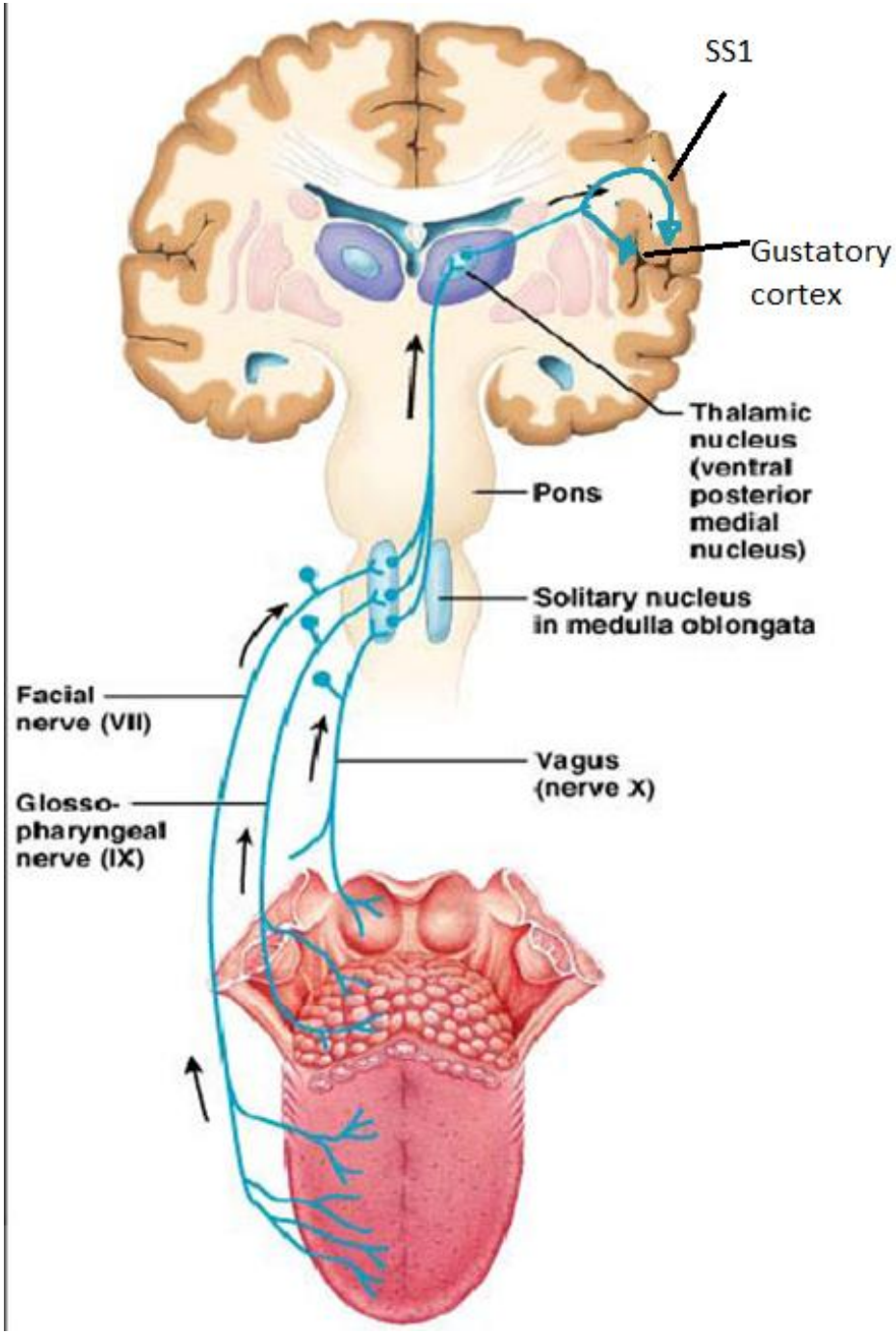
- chemoreceptors concentrated in different regions of tongue
- sweet
- salty
- sour
- bitter
- umami





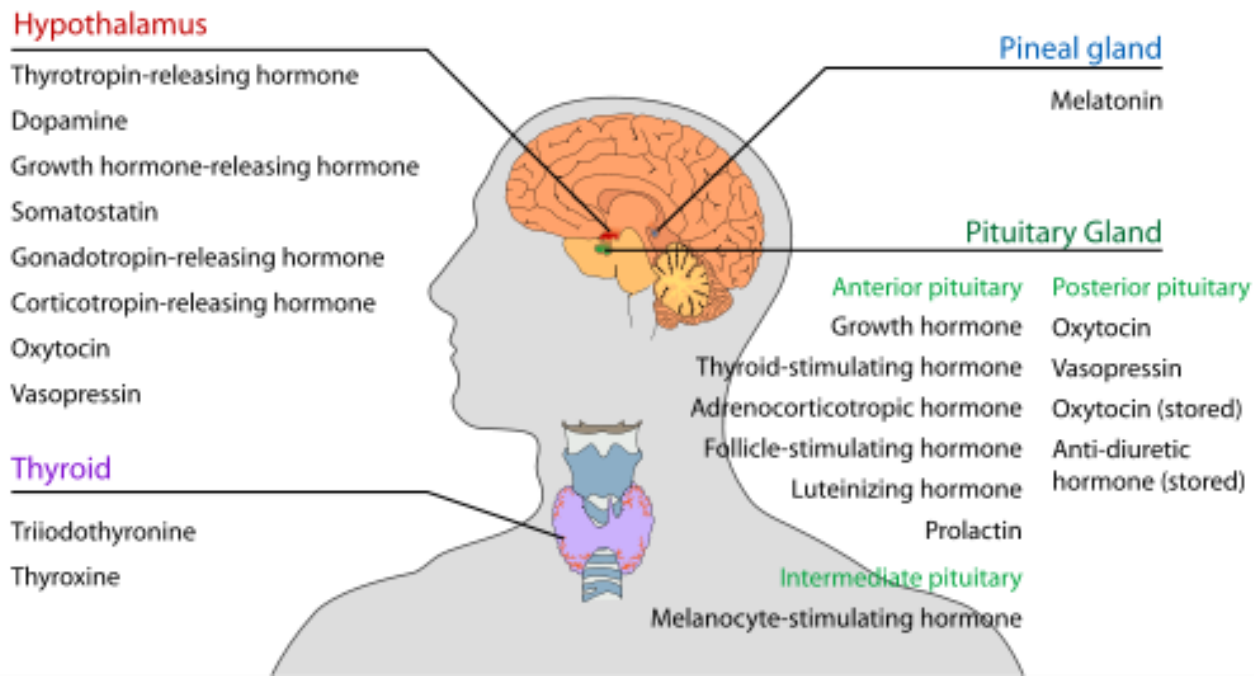
Taste pathway in brain

- tongue
- brainstem
- thalamus (“gateway”)
- gustatory centre in “insula” region of brain



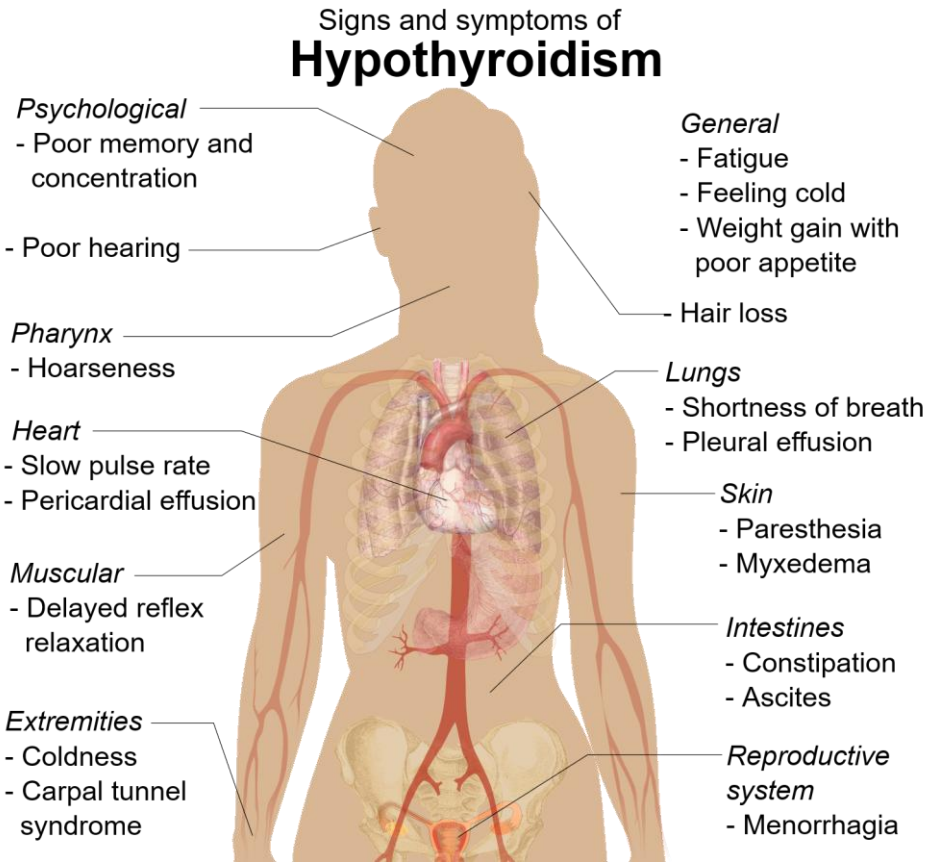
Endocrine Glands in the head and neck

- Hypothalamus (usually considered part of brain)
- Pituitary (directly attached to brain)
- Thyroid
- Pineal



Thyroid gland

- controls metabolic rate
- “butterfly” shaped
- can produce too little (Hypothyroidism) or too much (Hyperthyroidism)
- may be associated with swelling (goitre)
- Parathyroid glands attached to the back- helps regulate blood calcium levels



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