Cranial Nerves part 5

I

OLFACTORY

SPECIAL SENSE

Medial

OLFACTORY TRACTS

Lateral

NUCLEI

- Anterior olfactory (in posterior bulb)
- Anterior perforating substance & Uncus (both in the brain)

20 OLFACTORY NERVES

- Under surface of cribriform plate
- Upper med & lat nose

Crista galli

Olfactory bulb
II OPTIC NERVE

From the lateral geniculate bodies fibres pass in the optic radiations to the left and right occipital cortex where the images arrive inverted (upside down). To initiate rapid reflexes at brain stem level, the incoming fibres from the eye must connect to the mid brain which lies near the optic tracts. These fibres from each optic tracts synapse with both Edinger Westphal nuclei so that all reflexes are bilateral. Parasympathetics from the Edinger Westphal nuclei synapse in the ciliary ganglia and then supply the sphincter pupillae muscles for constricting the pupils.

G = Lateral geniculate body

III
Oculomotor
• Superior rectus
• Inferior rectus
• Medial rectus
• Inferior oblique

III, IV, VI
Somatic motor nerves to eye muscles

IV
Trochlear
(arises dorsally)
• Superior oblique

VI
Abducent
• Lateral rectus

Parasympathetic via ciliary ganglion
Sympathetic from cavernous sinus

Cavernous sinus
Superior orbital fissure
Tendinous ring
**Sensory:** Scalp, eye, upper face, sinuses (see above)

**Carries:** Parasympathetics via ciliary ganglion to eye for accommodation and pupil constriction (10 short ciliary nerves), via pterygopalatine ganglion for lacrimal gland.

**Sympathetics** via cavernous sinus to pupil for dilatation (2 long ciliary nerves)

**Main Branches:**
- Frontal
- Lacrimal
- Nasociliary

V carries all parasympathetics to their end organs
**Vc MANDIBULAR DIVISION OF TRIGEMINAL**

3 SENSORY BRANCHES OF VC (TRIGEMINAL) N ON FACE

**Sensory:** Lower face, hair temple, anterior 2/3 tongue (see above)

**Carries:** Parasympathetics via submandibular & otic ganglia to submandibular & sublingual glands, & parotid gland

**Taste:** Anterior 2/3 tongue

**Branchiomotor:** Muscles of mastication, tensors tympani & palati

**Main Branches:**
- Auriculotemporal
- Buccal
- Mental
- Lingual
- Muscular

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*V carries all parasympathetics to their end organs*
**VII FACIAL NERVE**

**Branchiomotor:** Muscles of facial expression, stapedius, posterior belly of digastric, stylohyoid, occipitalis

**Carries:** Parasympathetic in greater petrosal nerve to pterygopalatine ganglion then via Vb to “hay fever” glands & via Vb and Va to lacrimal gland.

Chorda tympani to submandibular ganglion and then to submandibular and sublingual glands via Vc

**Taste:** Via nervus intermedius from palate in greater petrosal nerve & from anterior 2/3 tongue via chorda tympani

**Sensation:** Small area in external ear and tympanic membrane

**Main branches:**
As above
- greater petrosal
- chorda tympani

V carries all parasympathetics to their end organs
**VIII VESTIBULOCOCHLEAR NERVE**

Facial nerve

To muscles of facial expression

**SPECIAL SENSE FOR HEARING & BALANCE**

**HEARING:**
From organ of Corti in cochlea
Hair cells to cell bodies in spiral ganglion (in modiolus)
To 2 cochlear nuclei - ventral & dorsal

**BALANCE:**
From semicircular canals, utricle & saccule
Cell bodies in vestibular ganglion in outer part of internal acoustic meatus
To vestibular nuclei - medial, lateral, superior, inferior
IX GLOSSOPHARYNGEAL NERVE

Parasympathetic
Branchiomotor
General sensory
Special visceral sensory

Lesser petrosal
Otic ganglion
Parotid gland
Middle ear
Stylopharyngeus
Tonsil
Pharynx & tongue
Taste (Post 1/3 tongue & oropharynx)
Baro- & chemoreceptors

SENSORY:
Oropharynx
Posterior 1/3 tongue
Tonsil
Middle ear
**VAGUS NERVE 1**

**Superior vagal ganglion** - cell bodies:
1. *Meningeal br.* Sensory to posterior cranial fossa
2. *Auricular br.* Sensory to external auditory meatus & part of eardrum (communicates with VII)

**Inferior vagal ganglion** - cell bodies:
1. *Special visceral afferent* (baroreceptors & taste)
2. *General visceral afferent* (detects stretch in heart, lungs, abdominal contents, pharynx & larynx)

**Recurrent laryngeal n.**
1. *Branchiomotor* to muscles of larynx & upper oesophagus
2. *Somatic sensory* to larynx below cords
3. *General visceral afferents* from larynx & pharynx for stretch

**Vagus** arises from 8-10 rootlets on medulla. Associated nuclei are:
1. **Dorsal nucleus of vagus.**
   *General visceral efferent (parasympathetic)* to smooth muscle of bronchi, heart, oesophagus, intestine to transverse colon.
   *General visceral afferent (sensory)* from above organs.
2. **Nucleus ambiguus.** *Branchiomotor* supply to striated muscle of palate, pharynx, larynx & upper oesophagus (these fibres originate from the cranial root of accessory).
3. **Nucleus solitarius.** *Sensory* for baroreceptors and taste.
4. **Spinal nucleus of trigeminal nerve.** All *somatic sensory* fibres in vagus end here.

**VAGUS NERVE 2**

**Pharyngeal br of vagus.**
*Branchiomotor* to pharyngeal plexus for muscles of pharynx & palate (excluding tensor palati).
*All these banchiomotor* fibres arise in the nucleus ambiguus & are “dumped” onto vagus (See large arrow opposite)

**Superior laryngeal n**
1. Internal br. *Somatic sensory* above cords. Small amount of *taste* in valleculae
2. External br. *Branchiomotor* to cricothyroid

**Inferior cardiac br** to deep & superficial cardiac plexuses *(parasympathetic)*

**Superior cardiac br** to deep cardiac plexus *(parasympathetic - mixes with sympathetic)*
XI ACCESSORY NERVE
(Accessory to vagus)

BRANCHIOMOTOR
Cranial root of accessory

Foramen magnum

Jugular foramen

Vagus

Spinal roots of accessory (C1-5)

SOMATIC MOTOR
Spinal roots to sternomastoid & trapezius
XII HYPOGLOSSAL NERVE

SOMATIC MOTOR

10-15 rootlets

Hypoglossal canal

Occipital artery

Int/ext carotid arteries

Lingual artery

Facial v

Hyoglossus

Tongue muscles

Superior root of ansa cervicalis

Thyrohyoid

Geniohyoid
Instant Anatomy

- Head/Neck
- Thorax
- Abdomen
- Arm
- Leg
# TONGUE - SENSATION & TASTE

## SUMMARY OF NERVE SUPPLY TO TONGUE

<table>
<thead>
<tr>
<th>SOMATIC SENSATION</th>
<th>TASTE</th>
<th>SECRETOMOTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANTERIOR 2/3</strong></td>
<td>Lingual (Vc)</td>
<td>Chorda tympani (VII)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(anterior lingual glands)</td>
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<tr>
<td><strong>POSTERIOR 1/3 + vallate papillae</strong></td>
<td>Glosso-pharyngeal (IX)</td>
<td>Glosso-pharyngeal (IX)</td>
</tr>
<tr>
<td><strong>VALLECUAE</strong></td>
<td>Glosso-pharyngeal (IX)</td>
<td>Internal branch of superior laryngeal nerve (X)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glosso-pharyngeal (IX)</td>
</tr>
</tbody>
</table>

Note: Sympathetic supply to tongue is from superior cervical ganglion via lingual artery