Brainstem and Cranial Nerves II

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Nerves covered in other lectures

- 1 Olfactory
- 2 Optic
- 3,4,6 Extraocular eye muscles
- 8 Vestibulo-cochlear

- 5 Motor and Sensory to the face and muscles of mastication (sensory, motor and mesencephalic nucleus for proprioception)

A reminder about embryology
Nerves run from 1 to 12

Facial Nerve (a)
- The nerve of the second arch
  - Contributes to ear formation
  - Tongue formation
  - Facial musculature migrates up over first arch
- A mixed (sensory and motor) cranial nerve
- Sensory from the ear
- Special sensory from the tongue

Facial Nerve (b)
- Motor to the muscles of facial expression, stylohyoid, posterior belly of digastric and stapedius (to dampen loud sounds), all attached to structures derived from the second pharyngeal arch.
Facial Nerve (c)

- Viscero-motor (parasympathetic) to
  - pterygopalantine ganglion
    - the glands of the mucosa of the nose and palate
    - the lacrimal gland
- submandibular ganglion
  - submandibular and sublingual salivary glands
- otic ganglion
  - parotid gland

Innervation of the tongue
Clinical Evaluation

• “Upper Motor Neuron”
  – cortex controls lower opposite face
  – forehead and eye closure dual consensual reflexes

• “Lower Motor Neuron”
  – all muscles on one side affected
  – taste affected

7th nerve damage

• Bell’s palsy
  – pain around ear
  – no sensory impairment
  – complete palsy
  – rapid recovery (2-8wks)
  – Entrapment in facial canal after infection?
  – steroids in severe cases where taste affected

Other 7th nerve lesions

• Ramsay-Hunt syndrome
  – Herpes Zoster of 7th nerve
  – very severe pain in ear
  – vesicles
  – poor recovery

• Hemifacial spasm
  – irritation of nerve by blood vessel?
**Glossopharyngeal Nerve (9)**

- Nerve of the third pharyngeal arch
- Somatic motor to stylopharyngeus
- Visceral motor to parotid via otic ganglion
- Special sense to the posterior 1/3 of the tongue
- Sensory to posterior pharynx, soft palate, post. 1/3 of the tongue, tympanum, etc.
- Sensory from Carotid sinus (pressure) and carotid body (pCO₂)
- Important for swallowing reflex.

**Vagal Nerve (10)**

- "The wanderer" cf "vagrant" nerve of 4th Arch
- Motor to all smooth muscle
- Secretory to all glands
- Afferent from all mucous surfaces in the gut and its derivatives as far as the splenic flexure
- Motor to all muscles of the larynx, pharynx and palate (except stylopharyngeus and tensor veli palatini)
- Taste from a few taste buds on the epiglottis
- Inhibits cardiac muscle
- Sensory to the outer ear drum, external auditory meatus and behind the auricle
Accessory Nerve (11)

- Motor nerve to the sternocleidomastoid muscle and trapezius
- A somitic, spinal nerve that re-enters the foramen magnum to look like a cranial nerve. ("accessory" to the vagus)
- Has both spinal and brainstem origins
- Damage leads to trouble turning the head
Hypoglossal Nerve

- Motor nerve supplies occipital somite derivatives
- Intrinsic and extrinsic muscles of the tongue
- Leaves the brainstem above the olive as a series of small rootlets
- Damage leads to deviation of the tongue towards the effected side

Spinal cord pattern modified in the rhombencephalon

Brain section from spinal cord
**Brain section from mesencephalon**

- III nerve fibres

**Brain section from rhombencephalon**

- metencephalon
  - pons and cerebellum
- myelencephalon
  - brainstem/SC junction

- The special visceral afferents and efferents migrate out to form the nucleus Solitarius and nucleus ambiguus

**Rhombencephalon**