Cranial nerves: II, IV & VI

NEW YORK INSTITUTE OF TECHNOLOGY
College of Osteopathic Medicine

Paths and Functions of Somatic Afferents and Efferents of the Head and Neck

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Do.
Make.
Heal.
Innovate.
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Trochlear

Trochlear nerve (Fourth Nerve) Palsy

Small size of trochlear makes it susceptible to damage

Lesion produces weakness / paralysis of superior oblique

Unopposed muscles draw the affected eye up and in

This is an extreme example of trochlear nerve palsy. The effect is often more subtle than this.

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Don’t get hung up on the branching patterns!

For each nerve, answer these 3 questions

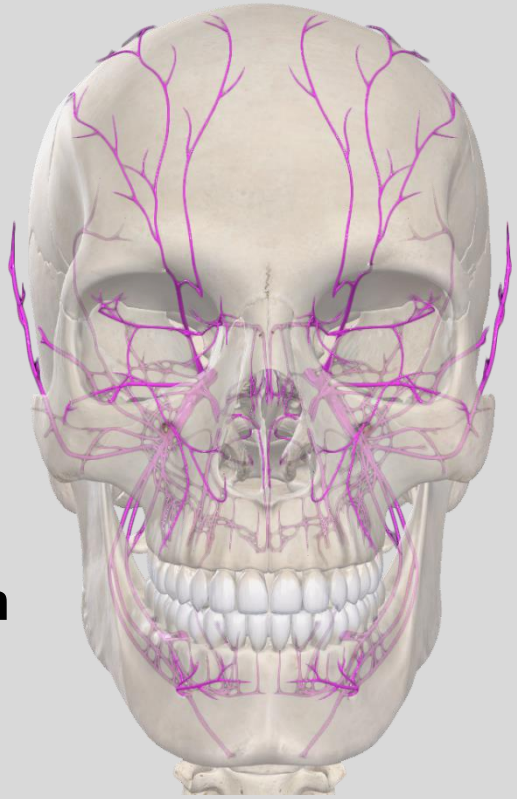
1. **What root / division is the nerve from?**
2. **Where does it exit the endocranium and skull?**
3. **What does the nerve innervate?**

Trigeminal

Trigeminal is the largest cranial nerve

It provides sensation to most of the head and neck

The name trigeminal, refers to the unique trifurcation taken off the brain



Latin: *trigeminus* = triplet

CN V_2 — Maxillary

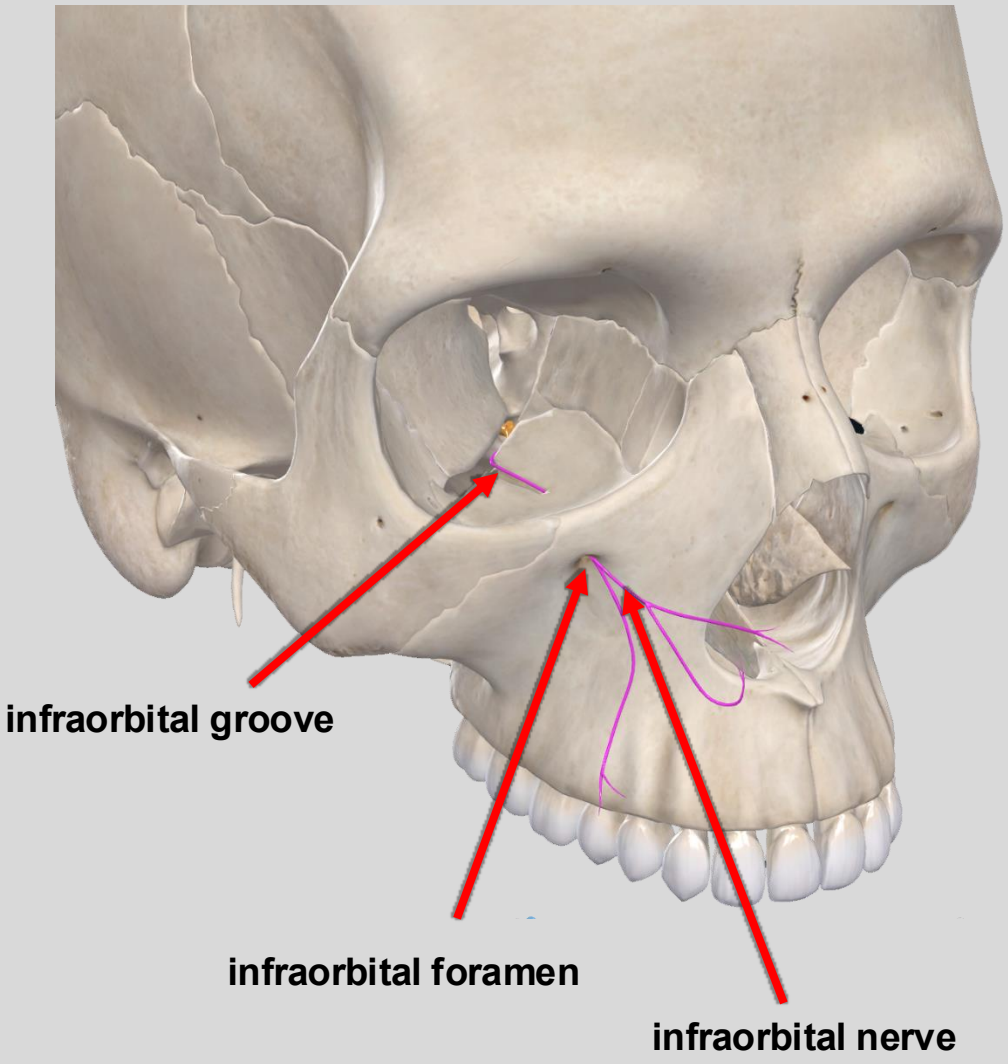
Infraorbital nerve

Courses in infraorbital groove

Exits skull from infraorbital foramen

Provides cutaneous innervation to

- Lower eyelid
- Lateral nose
- Upper lip



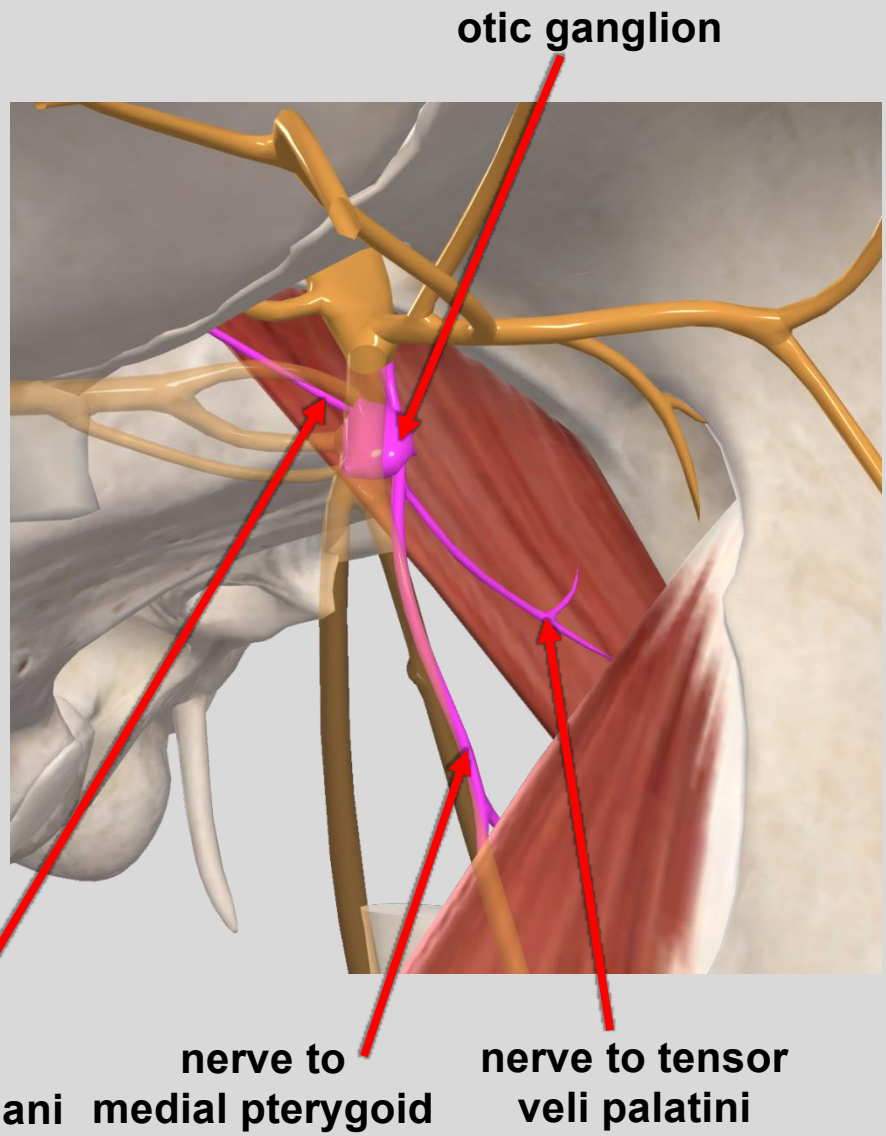
CN V_3 — Mandibular

3 nerves pass through otic ganglion

1. Nerve to medial pterygoid
2. Nerve to tensor veli palatini
3. Nerve to tensor tympani

These nerves *do not synapse* in the ganglion. They just pass through it

Otic and pterygopalatine ganglion are more important for autonomics (CN VII, CN IX)



CN V — Trigeminal

Clinical Correlates

Trigeminal neuralgia (tic douloureux)

Misfiring of one or more branches of trigeminal

Patients complain of acute, intense pain on face

Can be stimulated by a slight breeze

Most cases are idiopathic

Treatment varies from local anesthesia to nerve resection

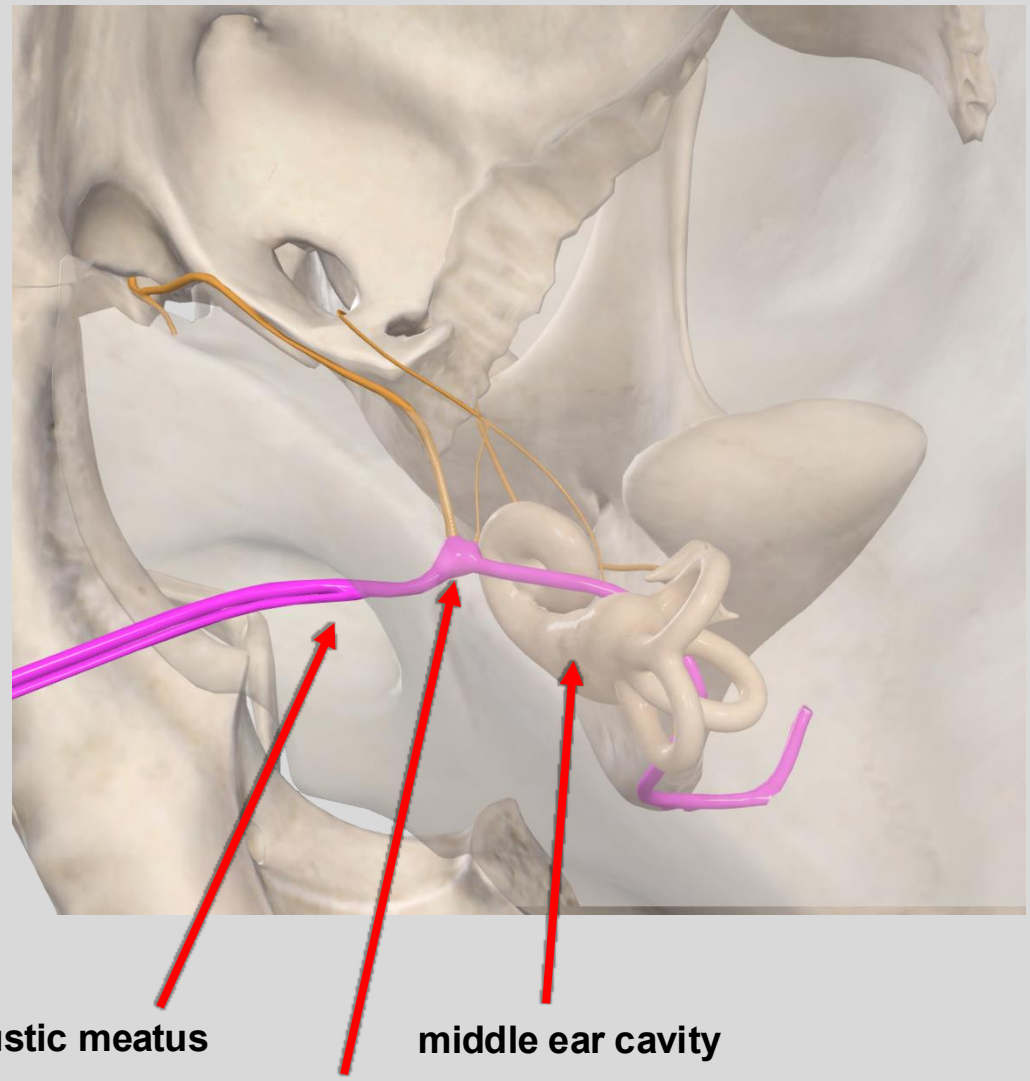
CN VII — Facial

Facial nerve takes the *longest intraosseous course* of any cranial nerve

Facial nerve travels through the facial canal

At geniculum, facial nerve expands into geniculate ganglion

Geniculate ganglion is important for the autonomic component of facial



Latin: genu = knee

CN VII — Facial

Clinical Correlate

Bell's Palsy

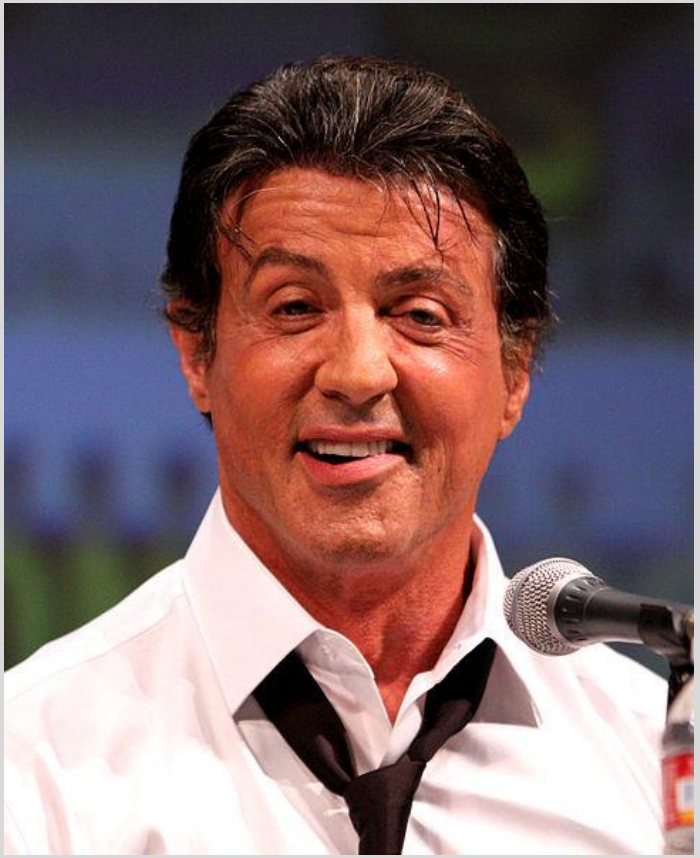
Lesion to one or more branches of parotid plexus

Causes partial / total paralysis of ipsilateral facial muscles

Most cases are idiopathic

Symptoms usually to resolve over weeks / months

Occasionally Bell's Palsy is permanent



Sylvester Stallone
(permanent partial Bell's Palsy)

Cranial nerves: IX, X, XI & XII

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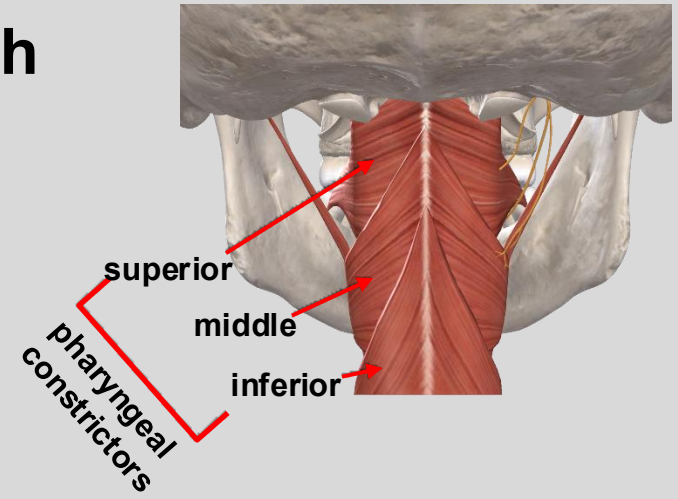
CN X — Vagus

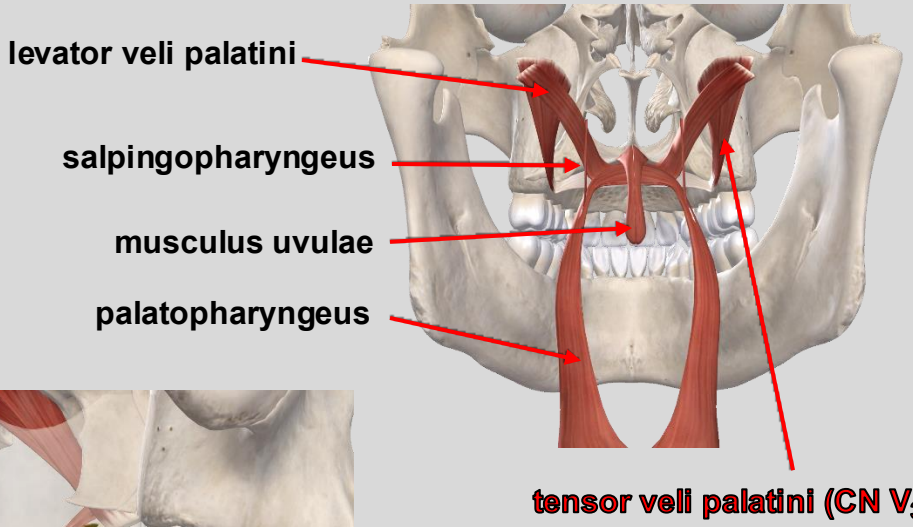
Pharyngeal Branch

The first branch off vagus as it descends

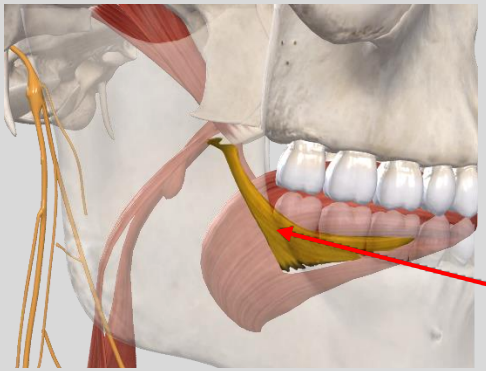
Provides the motor limb to the pharyngeal plexus



Motor innervation for most of the soft palate



Will innervate the palatoglossus muscle of the tongue



CN XII — Hypoglossal

Clinical Correlate

Hypoglossal lesion test (Genioglossus test)

Lesions to hypoglossal present as weakness or paralysis of most tongue muscles

A common test for hypoglossal damage is to have patient stick out tongue

Weakened / paralyzed genioglossus will present asymmetric activation

Results in the tongue deviating to the lesion side

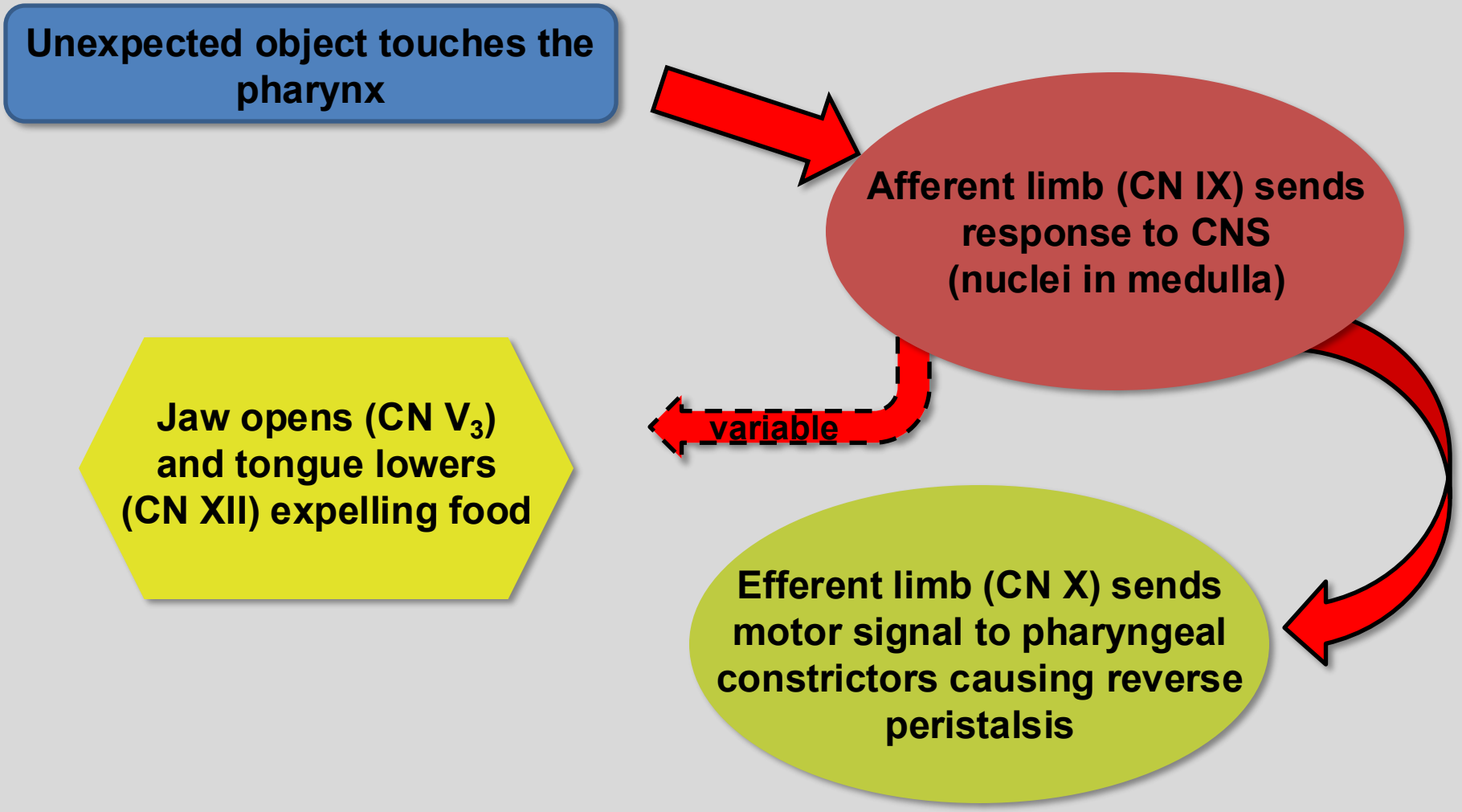
Most behaviours of the head and neck require cranial nerves to work together and with proper timing

Let's briefly compare two examples:

1. **Gag reflex**
2. **Deglutition (swallowing)**

Gag Reflex

Gag reflex contributions vary between individuals but stay consistent within individuals



37% of people lack an appreciable gag reflex