



Hour 2

NERVES AND REFLEXIVE SYSTEMS

Cranial nerves: Sensory, Motor and Both

1. Olfactory – sensory Smell
2. Optic – sensory retina
3. Oculomotor – motor medial recti inferior and superior recti and inferior oblique
4. Trochlear – motor superior oblique
5. Trigeminal – both sensory and motor
6. Abducens – motor lateral recti muscles
7. Facial – both motor facial expression and sensory taste
8. Vestibulocochlear - sensory inner ear balance
9. Glossopharyngeal – both motor tongue and salivary glands and sensory and taste
10. Vagus – both motor heart, lungs and sensory outer ear heart and trachea
11. Accessory Spinal – motor – head position, mastoid and trapezius muscles
12. Hypoglossal – motor tongue

I Olfactory Sensory

Essential oils

Aroma therapy



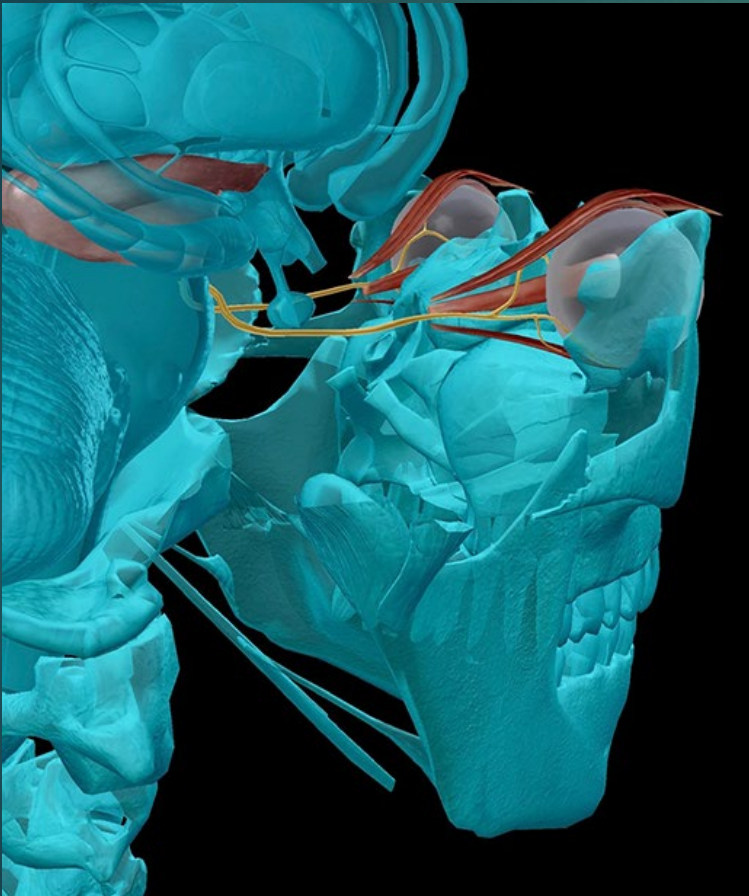
- ▶ The olfactory nerves are associated with the function of smell. The smell molecules in the nasal cavity trigger nerve impulses that pass along this nerve to the olfactory bulb, then on to **limbic areas**.
- ▶ The type of modality is sensory, of the special visceral sensory variety.

II Optic Nerve Sensory



- ▶ **Visual information from the retinas of the eyes is conveyed to the brain by the optic nerves at the back of the eye.**
- ▶ Both optic nerves from the eyes meet to form the optic chiasm. At the optic chiasm, signals from both fields of vision are sent to opposite sides of the brain via two separate optic tracts.
- ▶ These signals will then eventually reach the visual cortex at the occipital lobe of the brain.

III Oculomotor Motor



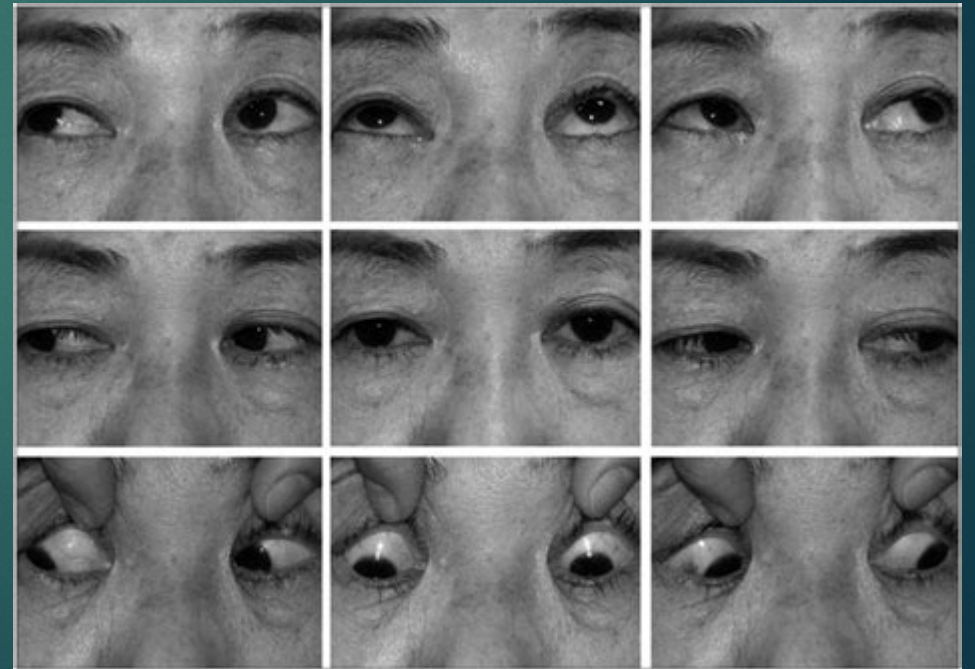
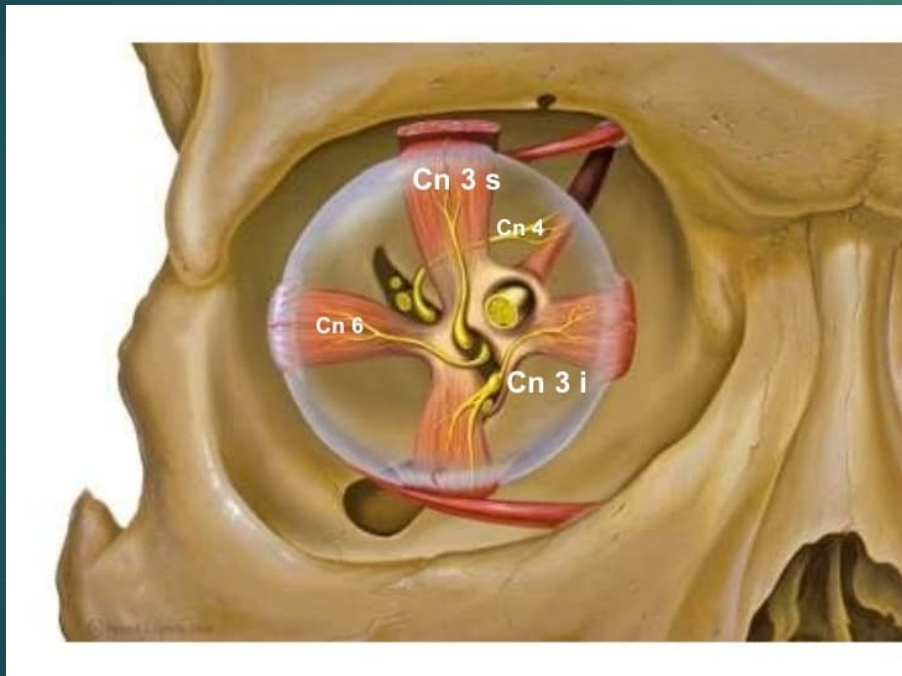
Movement especially saccades

- ▶ This nerve provides motor function to extraocular muscles: Medical. Inferior, superior rectus muscle, inferior oblique
- ▶ **Pupillary response responds to light, to dilate and constrict the pupils.**
- ▶ This nerve originates from the front of the midbrain, which is part of the brain stem, to the eye sockets.
- ▶ **It is both voluntary and autonomic movement of the eyes**

IV Trochlear Nerve - Motor

**Superior oblique muscles
downward, outward, and
inward eye movements**

The visual horizon

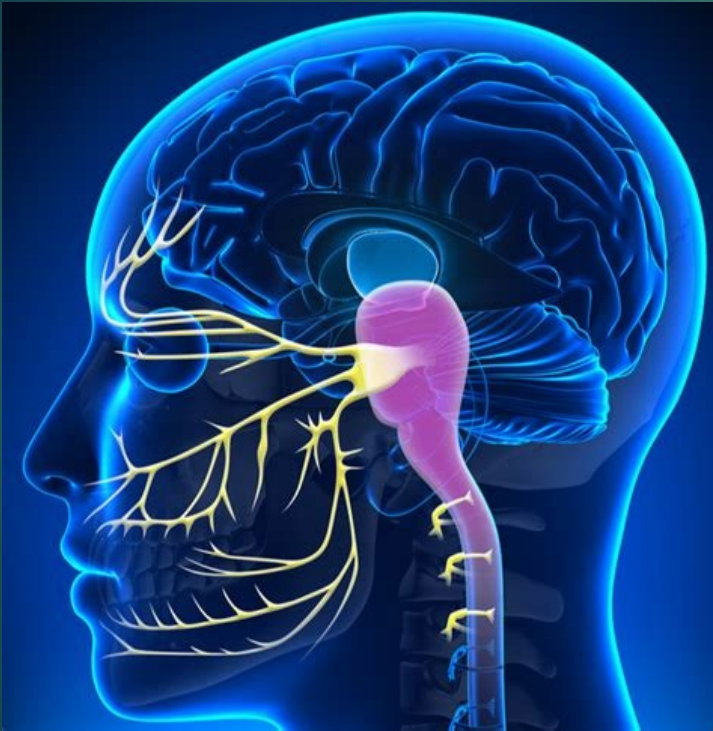


V Trigeminal

Both S&M

Largest Cranial Nerve

3 Branches



▶ Ophthalmic –

Sends pain information from the scalp and forehead and cornea

Blink voluntary and reflex upper eye lids

Impacts the pupil, and lateral recti

▶ Maxillary - sends information from the middle of the head, cheeks, **lower eye lids**, upper lip, and nasal cavity.

somatic sensory

▶ Mandibular - sends information from the lower parts of the head such as the tongue, lower lip, chin, and jaw. Trapezius muscle.

VI Abducens -Motor

Lateral rectus muscle. This muscle is responsible for outward eye movements

This nerve originates in the pons and travels to the eye socket

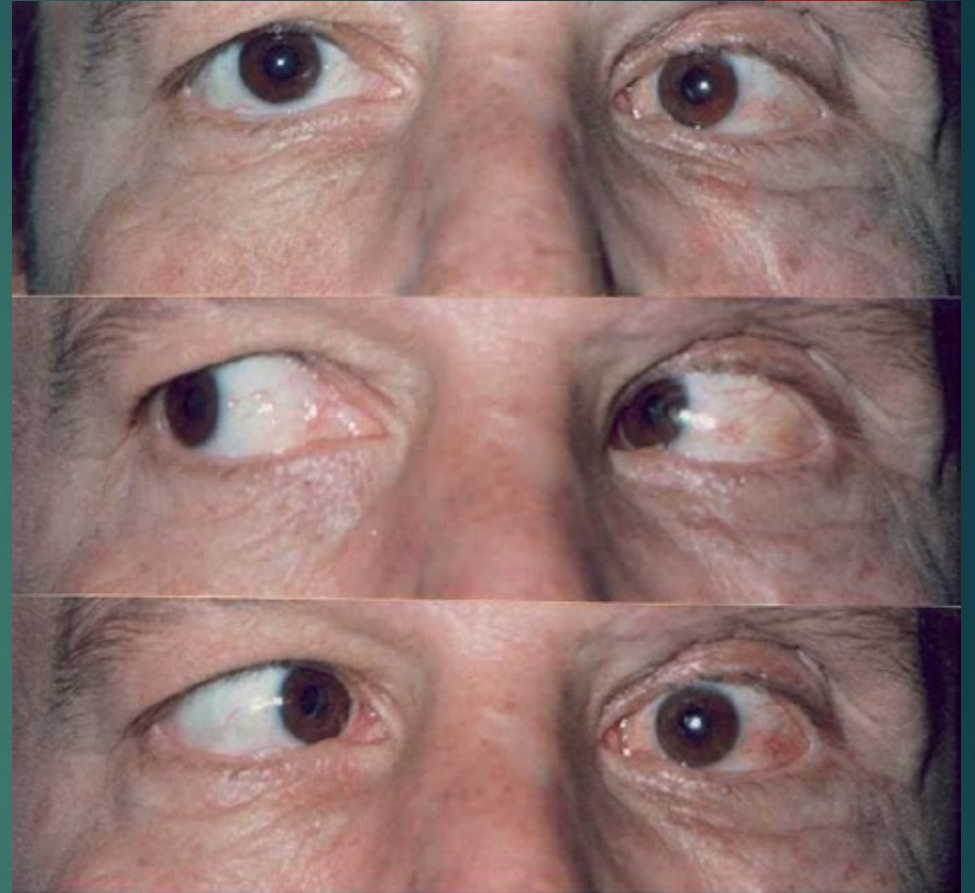
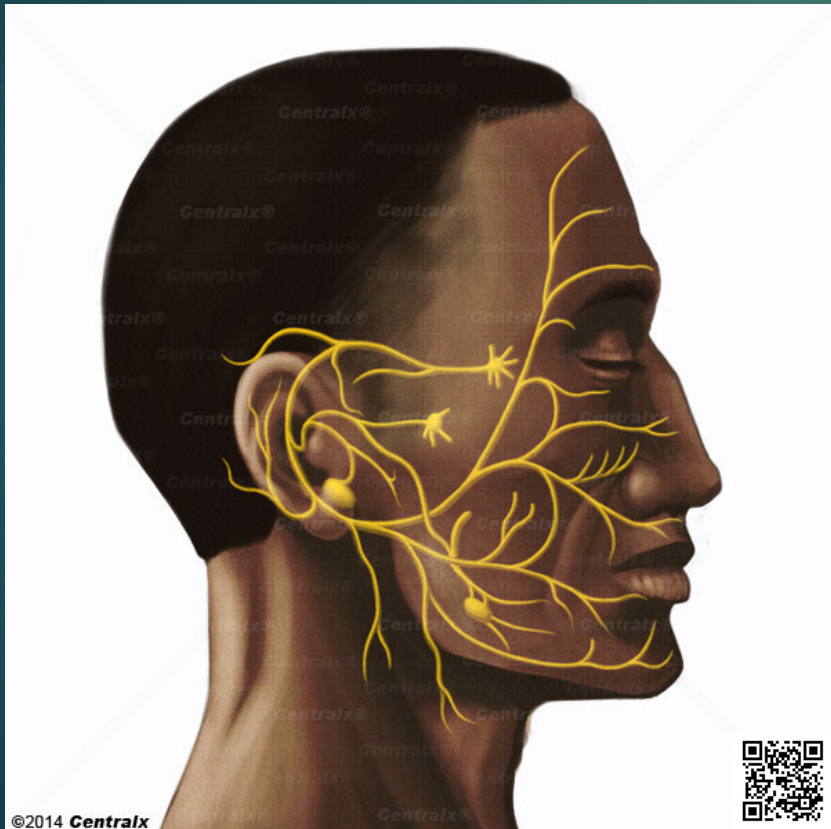
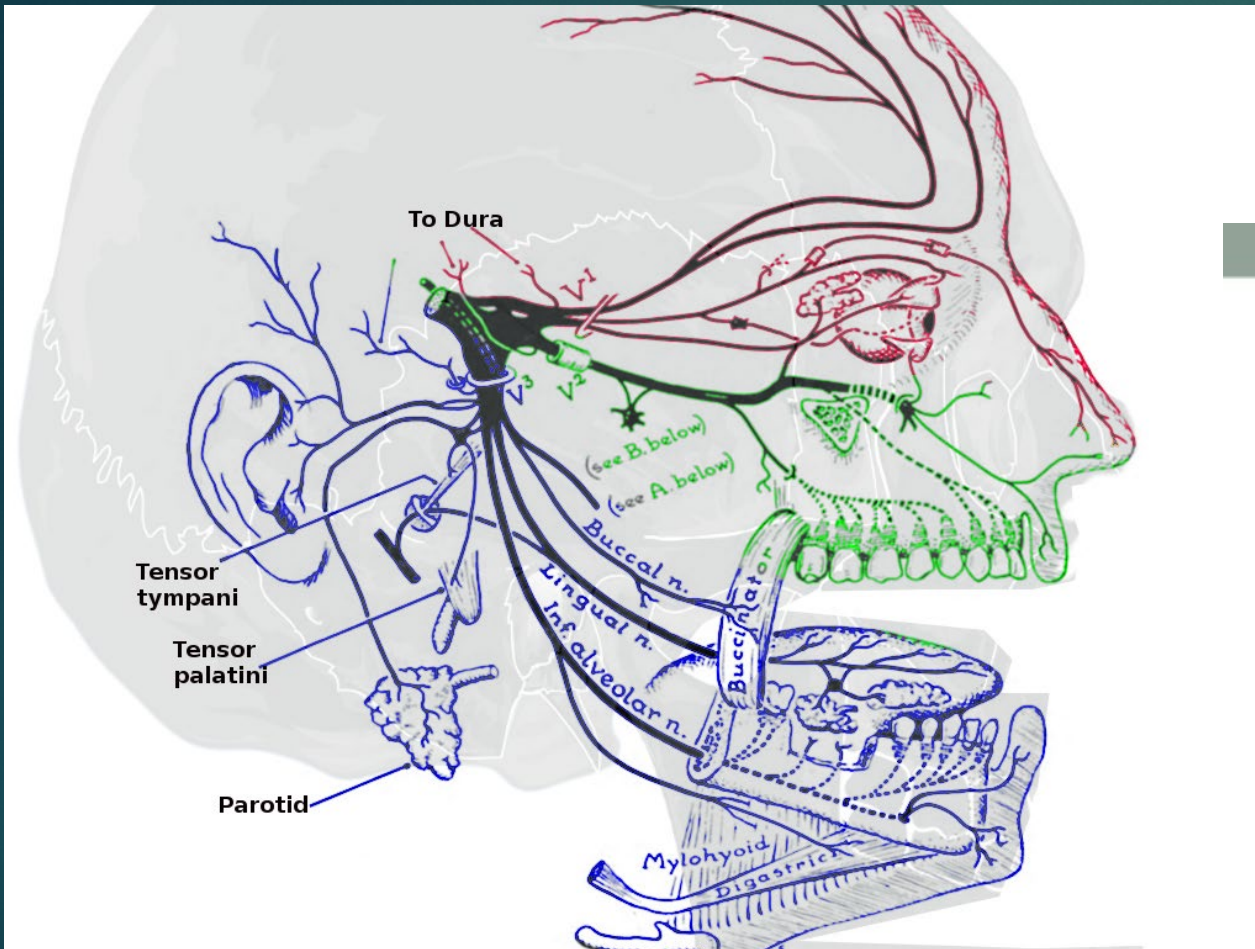


Figure 1: Left VI nerve (abducens) paresis or paralysis. Left esotropia

VII Facial Both M&S



- ▶ Sensory information from taste buds of the tongue, controlling muscle movements required for facial expressions,
- ▶ Both motor and sensory roots fuse together to form the facial nerve.
- ▶ The nerve is a mix of voluntary and visceral innervation. A mix of sensory and motor.
- ▶ Lightly stroking the face will trigger a parasympathetic response
- ▶ **lacrimal and mucous glands of the eyes, mouth, and nose**



Facial Nerve: Functional Components

Branchial motor
(special visceral efferent)

Supplies the muscles of facial expression; posterior belly of digastric muscle; stylohyoid, and stapedius.

Visceral motor
(general visceral efferent)

Parasympathetic innervation of the lacrimal, submandibular, and sublingual glands, as well as mucous membranes of nasopharynx, hard and soft palate.

Special sensory
(special afferent)

Taste sensation from the anterior 2/3 of tongue; hard and soft palates.

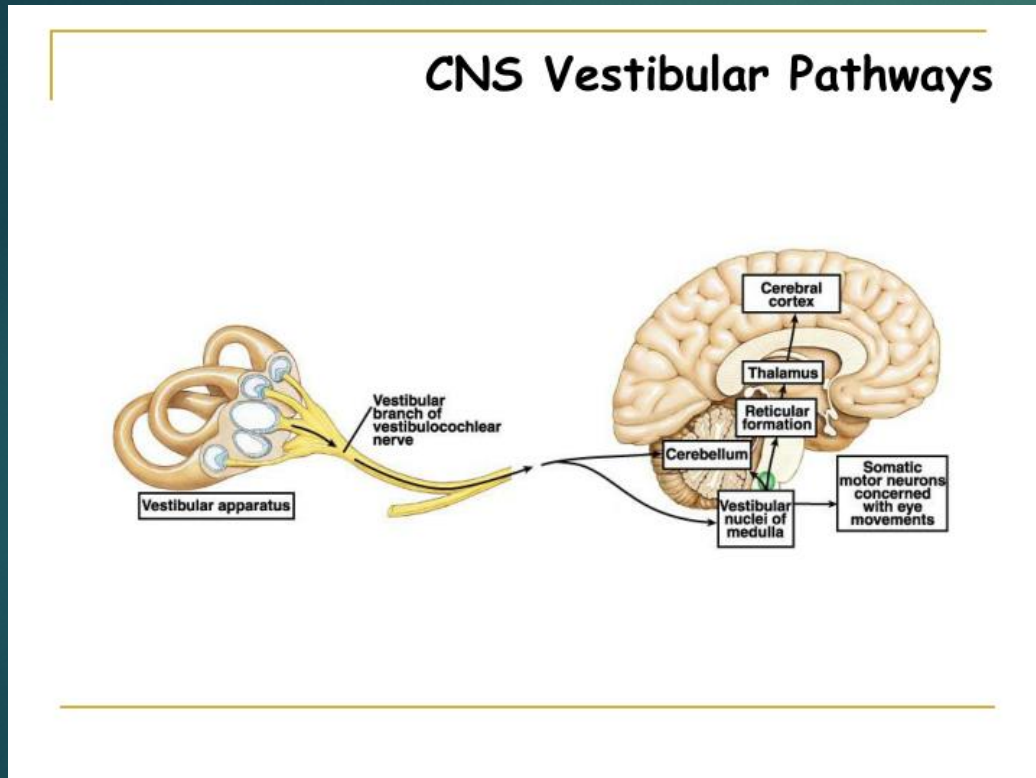
General sensory
(general somatic afferent)

General sensation from the skin of the concha of the auricle and from a small area behind the ear.

Light scrubbing of the eyelids stimulates a parasympathetic response and tear production

Light Stroking of the face promotes parasympathetic

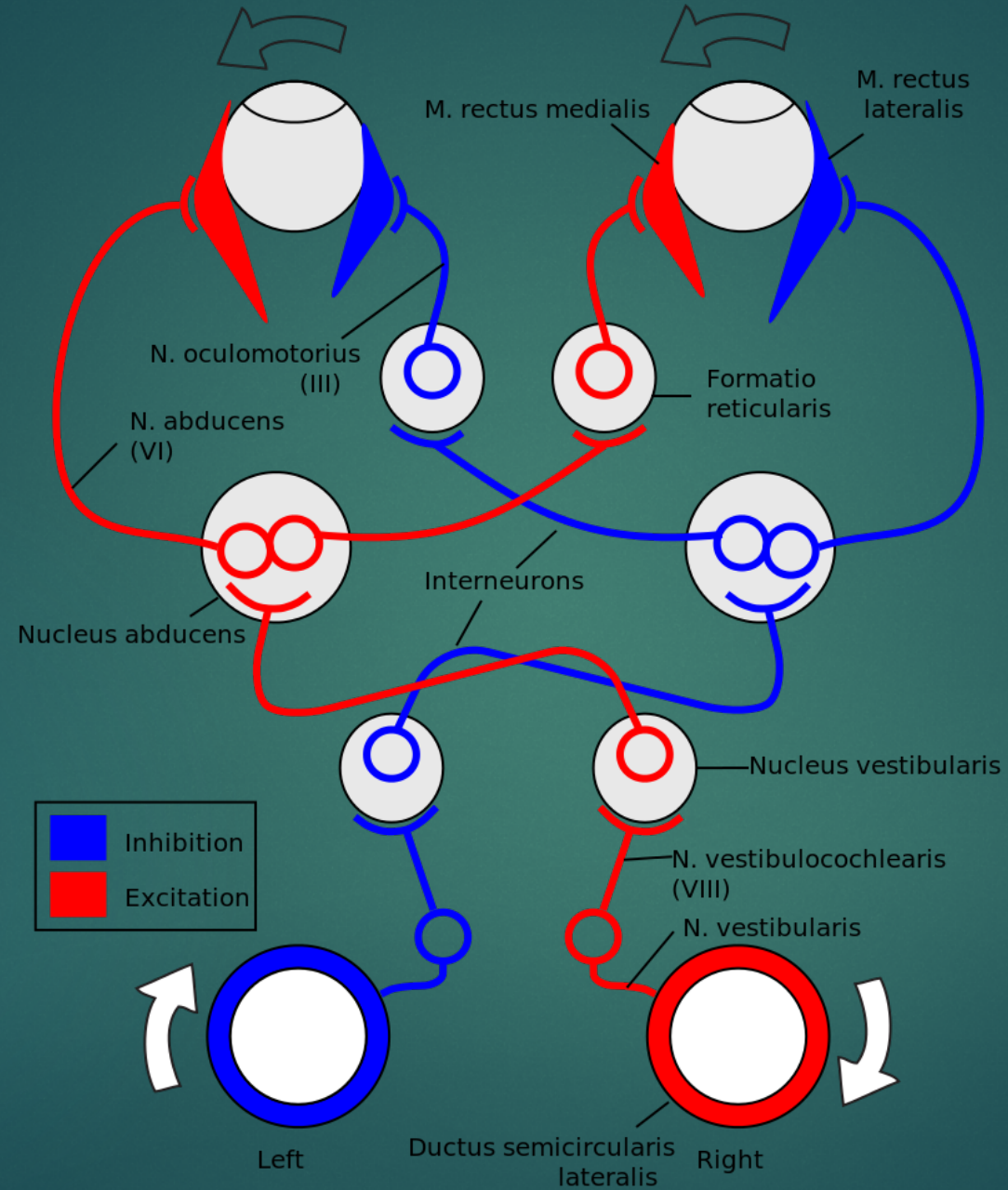
VIII Vestibulocochlear - Sensory



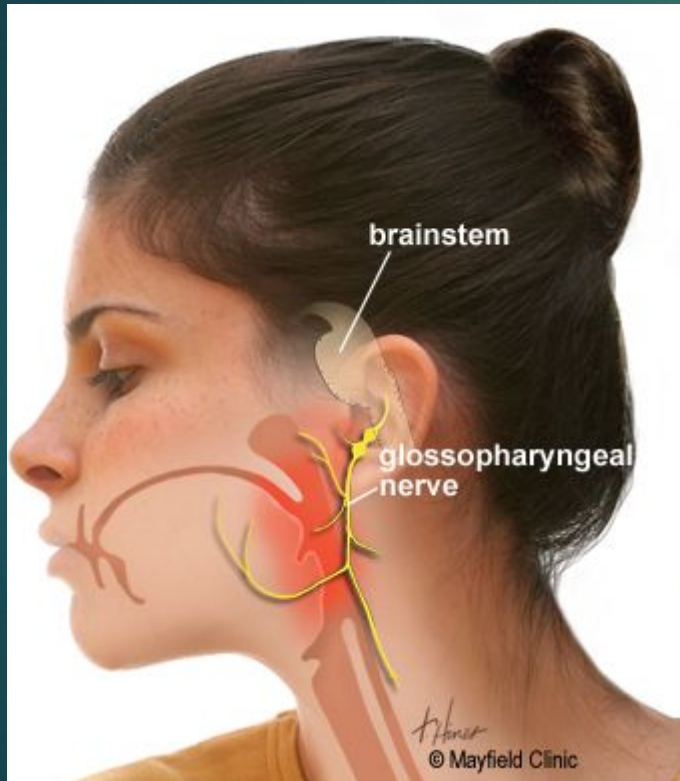
Mirror activities
Wide Binocular
Balance boards
RBB

- ▶ Two divisions: cochlear and vestibular.
- ▶ **Vestibular branch**
 - ▶ inner ear and about head orientation and balance
 - ▶ **Vestibulo-ocular reflex (VOR)** allows images on the retina to be stabilized when the head is turning by moving the eyes in the opposite direction
- ▶ **Cochlear branch**
 - ▶ sound and hearing signals from the ear, detecting vibrations from sound's volume and pitch.

VOR



IX Glossopharyngeal Both M&S



- ▶ This nerve sends sensory information from the external ear and middle ear cavity to the back part of the tongue and from the sinuses at the back of the throat
- ▶ This nerve also sends motor information from two salivary glands call parotid glands and movement from a muscle at the back of the throat called the stylopharyngeus
- ▶ Parasympathetic fibers

Chewing on straws
Sucking
Gargling
Vibration

X Vagus Motor Sensory and Autonomic

The Great Regulator



- ▶ The Vagus nerve has a variety of functions and is the longest and most branched of all the cranial nerves with sensory, motor, and autonomic fibers.
- ▶ It receives sensory information from the ear canal , the larynx and pharynx, information from the organs of the chest and trunk such as the heart and intestines, and a sense of taste from the root of the tongue
- ▶ Receives motor information from the smooth muscles of the throat

Vagus Nerve

Parasympathetic

Get you out of fight or flight

Things that decrease Vagal Tone

- TMJ aggravates the Trigeminal nerves that connect with the Vagus nerve
- Inflammation in the gut
- Stress (Cortisol)
- Pain

Things that Increase Vagal Tone

- Get the jaw right
- Splash cold water on your face
- Gargle
- Deep Breathing

Long loose body swings
Body ball and superman
Buzzing the lips
Swallowing, breathing

- ▶ **Eye contact**
- ▶ Speech
- ▶ Swallowing
- ▶ Facial expressions

- ▶ Lungs
- ▶ Heart
- ▶ Spleen
- ▶ Liver
- ▶ kidneys

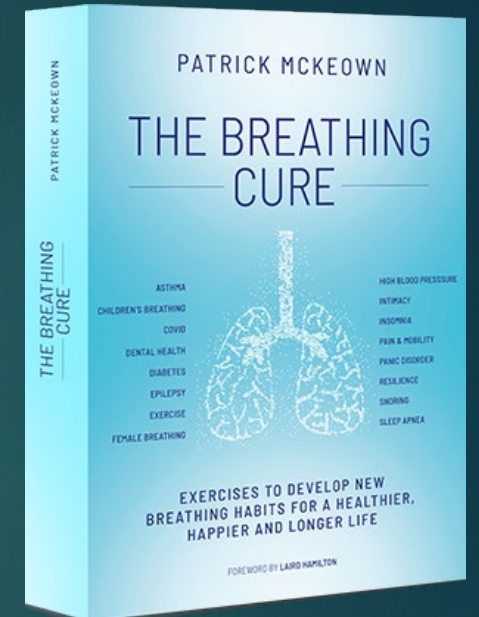
Breathe Through Your Nose

- ▶ Take the lightest quietest breath as possible from the diaphragm
 - ▶ Fast Breathing activates Fight or Flight (Over breathing)
- ▶ Moist warm air through the nose decreases inflammation
- ▶ Breathing at 6 breaths a minute optimizes the release and hydrolysis of acetylcholine
- ▶ Longer exhale than inhale increases the CO₂ so that O₂ is better released to the cells
- ▶ Hemoglobin carries the oxygen, needs CO₂ to release oxygen to the cells

Patrick McKeown

oxygenadvantage.com

International best-selling author of *The Oxygen Advantage* and creator and master instructor of the Oxygen Advantage® technique, Patrick McKeown is widely regarded as one of the world's leading breathing re-education experts



Orofacial Myology and mouth reflexes to stimulate the parasympathetic

orofacialmyologist.org

Tic tock

Buzzing the lips

Lip smack

Granma's surprise face

Blow air into the cheeks

Pet the tongue



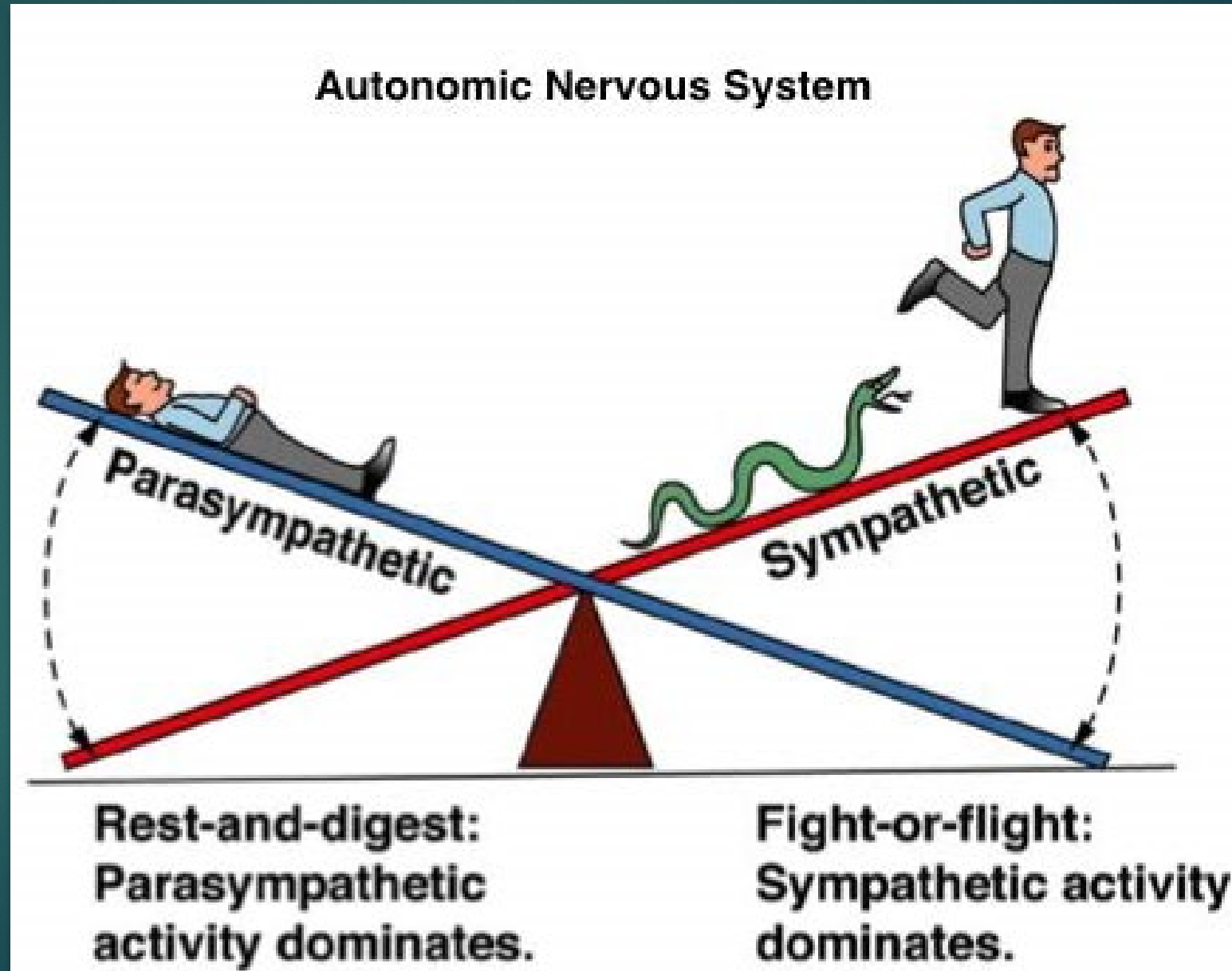


Vasovagal syncope (vay-zoh-VAY-gul SING-kuh-pee)

occurs when you faint because your body overreacts to certain triggers, such as **the sight of** blood or extreme emotional distress.

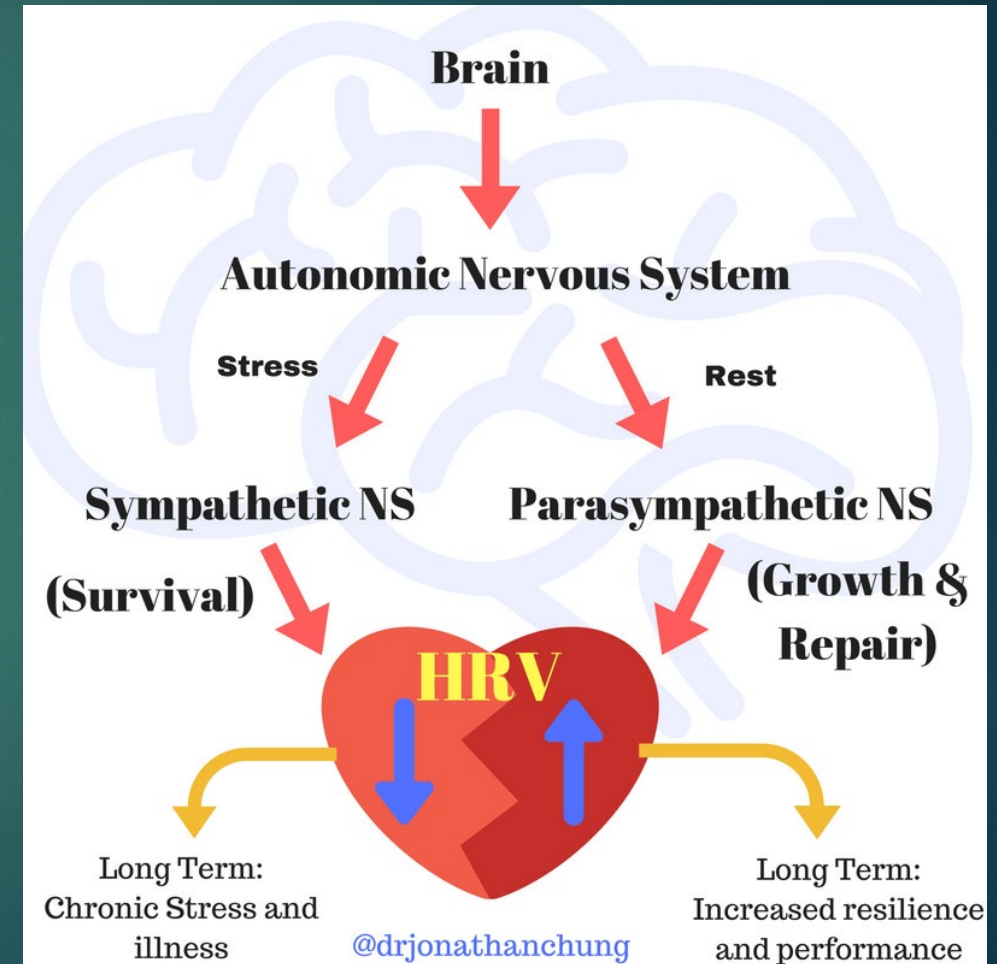
The vasovagal syncope trigger causes your heart rate and blood pressure to drop suddenly. That leads to reduced blood flow to your brain, causing you to briefly lose consciousness.

Vagus
nerve



Heart Rate Variability: A good way to assess ANS balance

- ▶ High HRV is associated with rest-and-digest, general fitness, and good recovery
- ▶ Low HRV is associated with fight-or-flight, stress, illness, or overtraining
- ▶ Breathing
- ▶ Meditation
- ▶ Move away from stress patterns



Physiological and pathological factors

Environmental factors

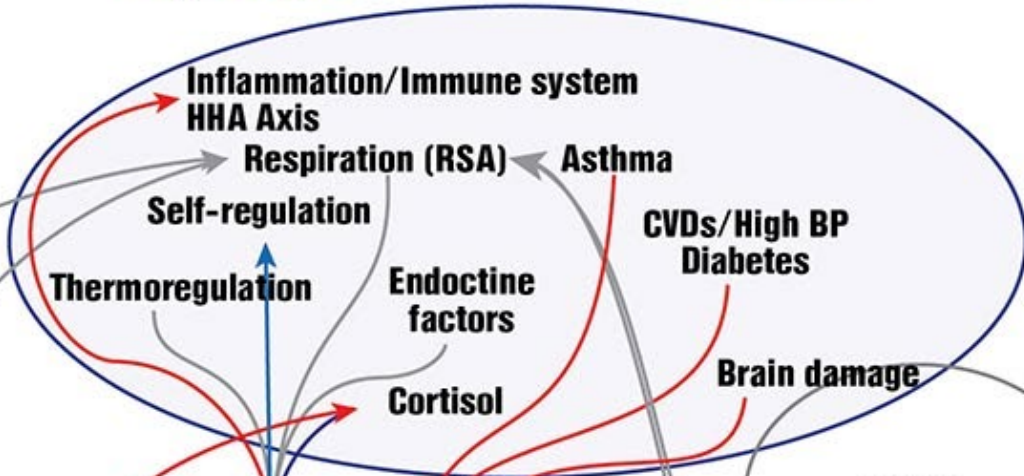
Work-related factors
(particulate matter, EMF, vibrating tools, psychosocial charge, fatigue, etc.)

Non-modifiable factors

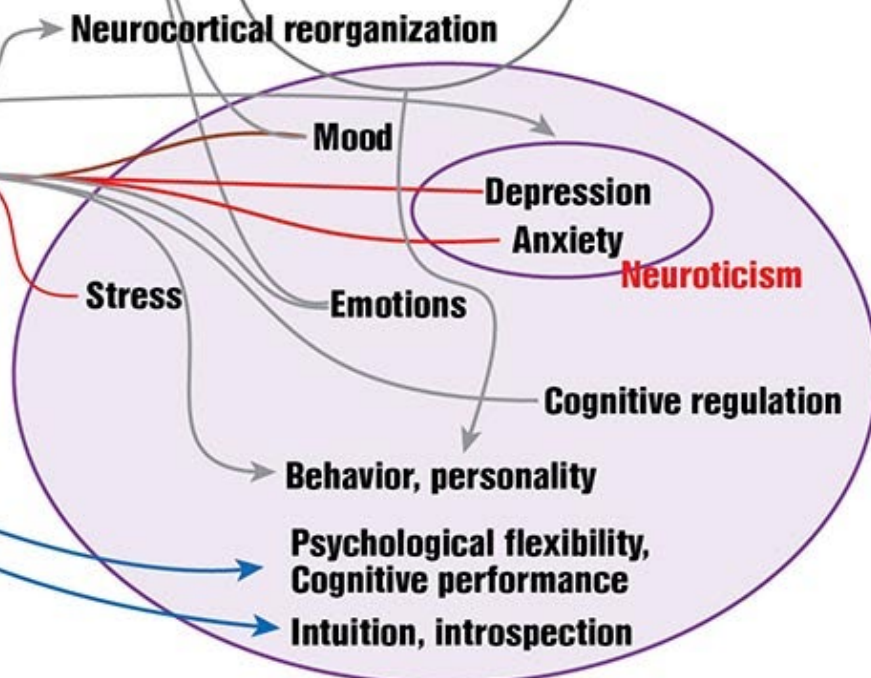
Age, Gender
Ethnicity

Posture
Exercises
Meditation
Tobacco, alcohol

Lifestyle factors



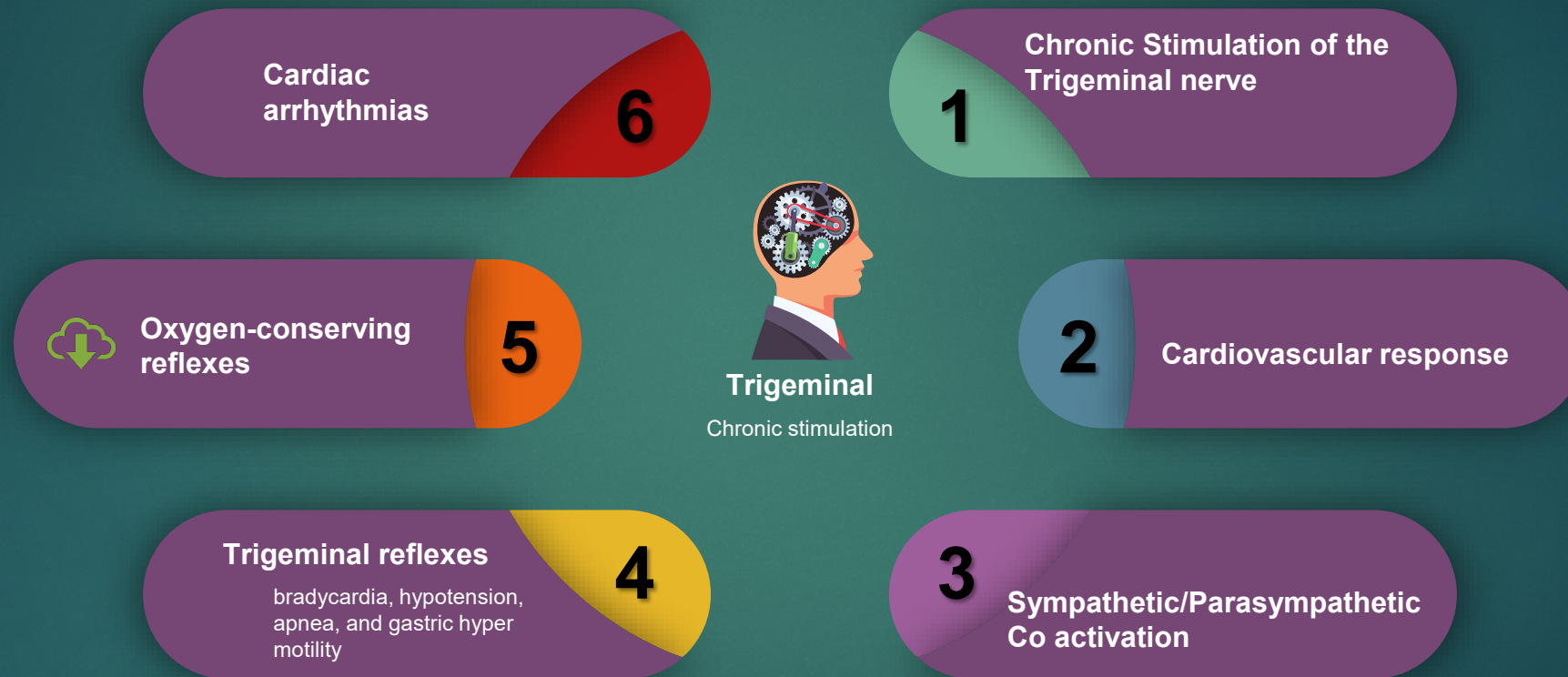
CNS



Neuropsychological factors

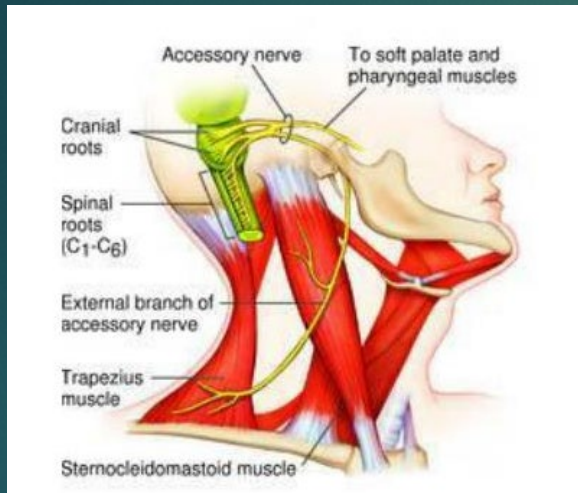
HRV

Chronic Stimulation of the Trigeminal Nerve = visual stress



XI -Spinal Accessory - Motor

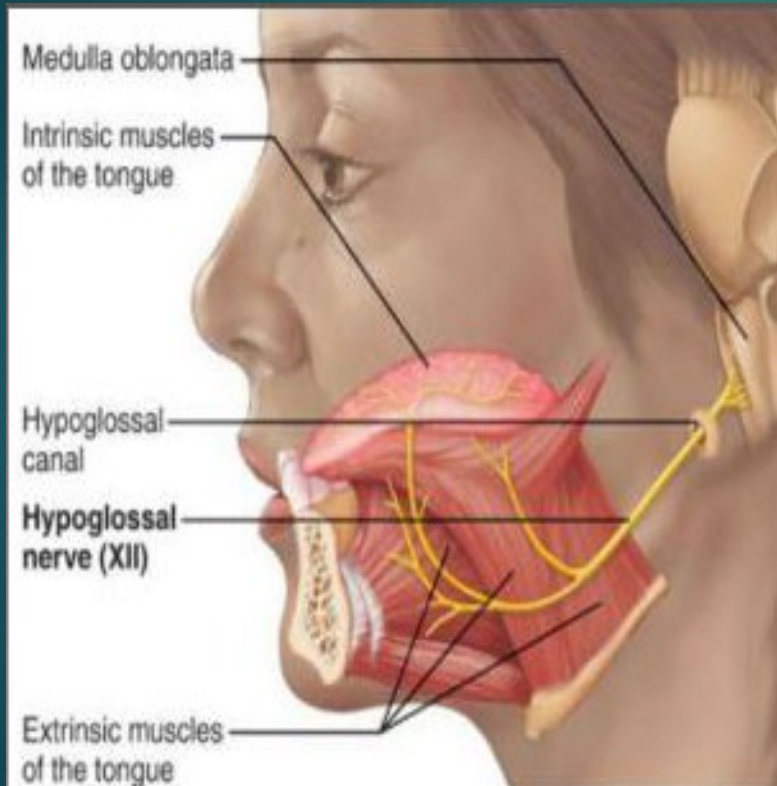
TO POSTURE THE HEAD SO
YOU CAN SEE



- Peripheral central activities
- Open and close – star fish
- Use tactile information for head position
- Shrugs
- Muscular Activation Techniques with vision leading

- ▶ motor functions to posture and move the head, neck, and shoulders.
- ▶ Stimulates the muscles of the larynx and pharynx for swallowing.
- ▶ **Movements of the head and shoulders are both voluntary and reflexive**
- ▶ **Connects to Vagus**

XII – Hypoglossal - Motor



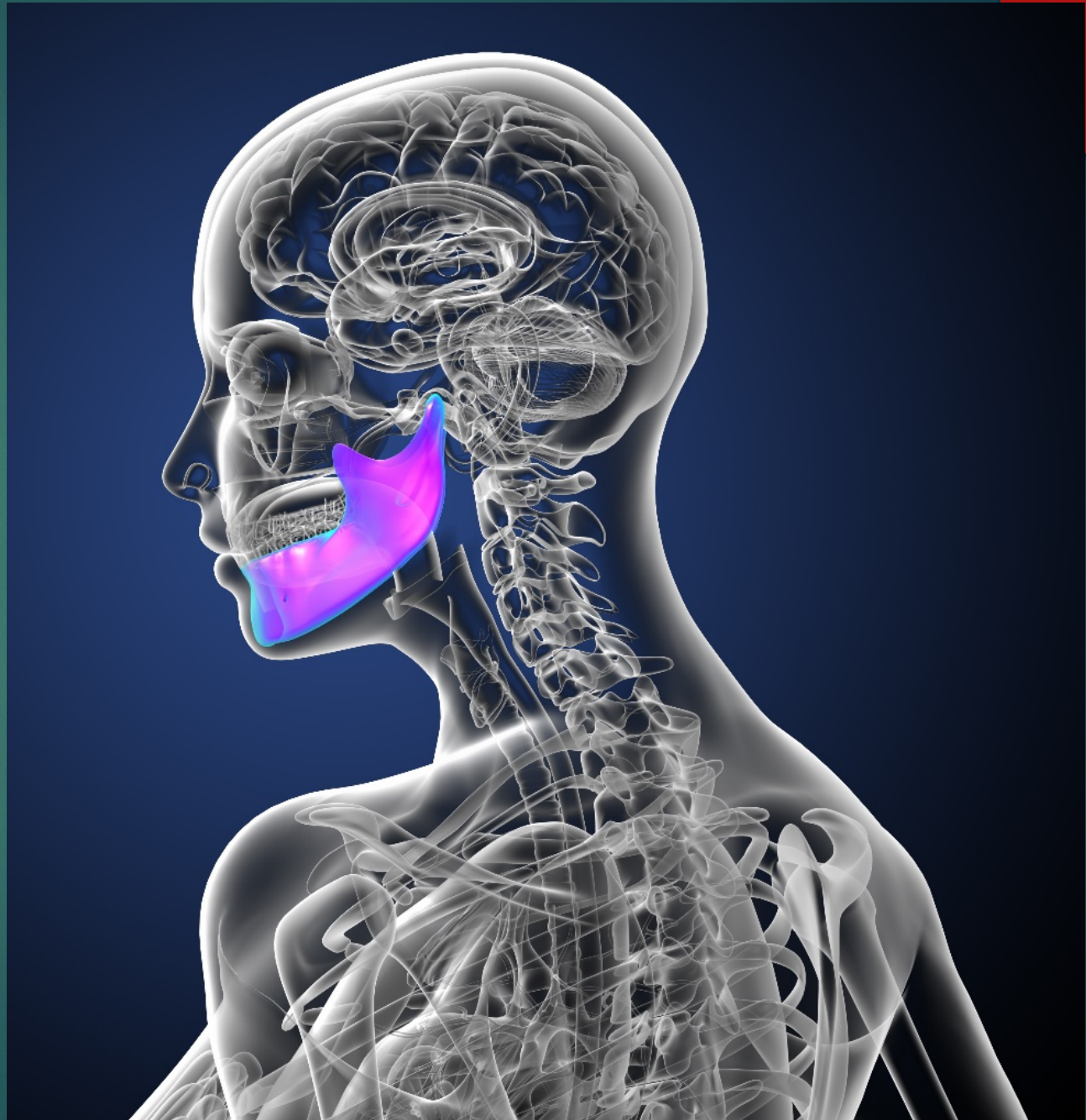
- ▶ The hypoglossal nerve is responsible for most of the movements in the tongue.
- ▶ speaking, chewing, and swallowing
- ▶ Gets its sensory information from Trigeminal Nerve. Closely linked with Vagus Nerve

See it Say it Do it (Lynn Hellerstein, O.D.
Speak out the sequence of actions
Sucking on a sucker
swallowing

TMJ-Axis-Atlas

Unusual palsies
with oral and
facial surgeries

NUCCA.ORG



The floor of the orbit is also the top of the mouth

