



MED437
KING SAUD UNIVERSITY



Cranial Nerves 11th & 12th

Lecture (9)

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هذا العمل مبني بشكل أساسي على عمل دفعة ٤٣٦ مع المراجعة والتدقيق وإضافة الملاحظات ولا يغني عن المصدر الأساسي للمذاكرة

- **Important**
- **Doctors Notes**
- Notes/Extra explanation

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

■ Objectives

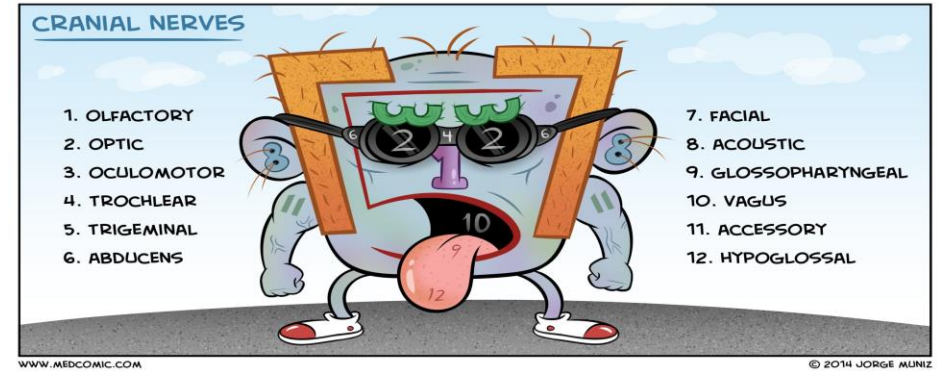
At the end of the lecture, students should be able to:

- ✓ List the nuclei related to accessory and hypoglossal nerves in the brain stem.
- ✓ Describe the type and site of each nucleus.
- ✓ Describe site of emergence and course of accessory and hypoglossal nerves.
- ✓ Describe important relations of accessory and hypoglossal nerves in the neck.
- ✓ List the branches of accessory and hypoglossal nerves.
- ✓ Describe the main motor effects in case of lesion of accessory and hypoglossal nerves.

EXTRA Mnemonics And Pictures To Help Memorize The Cranial Nerves



07:32



ON OCCASION OUR TRUSTY TRUCK ACTS FUNNY, VERY GOOD VEHICLE ANYHOW

O O T T A F V G V A H-

olfactory, optic, oculomotor, trochlear, trigeminal, abducens, facial, vestibulocochlear, glossopharyngeal, vagus, accessory, hypoglossal

CRANIAL NERVE MNEMONIC

S = Sensory M = Motor B = Both

- | | | |
|--------------------|------------|-----------|
| O Olfactory | O On | S Some |
| O Optic | O Old | S Say |
| O Oculomotor | O Olympus | M Marry |
| T Trochlear | T Towering | M Money |
| T Trigeminal | T Tops | B But |
| A Abducens | A A | M My |
| F Facial | F Finn | B Brother |
| A Acoustic | A And | S Says |
| G Glossopharyngeal | G German | B Big |
| V Vagus Nerve | V Viewed | B Brains |
| S Spinal | S Some | M Matter |
| H Hypoglossal | H Hops | M More |

I Olfactory Smell	II Optic Vision	III Oculomotor Upward Medial Downward Up In
IV Trochlear Down and In	V Trigeminal Touch Forehead and Cheek Clench Teeth	VI Abducens Look Side to Side
VII Facial Taste for the Anterior 2/3 of Tongue Smile	VIII Acoustic Hearing Equilibrium	IX Glossopharyngeal Posterior 1/3 of the Tongue Speech
X Vagus Defecation Slowed Heart Rate	XI Spinal Accessory Shoulder Shrug	XII Hypoglossal Tongue Movement



11th Cranial Nerve - Accessory (XI)

○ Type: **Motor**

Has two parts (roots)*:

- Cranial part

carries fibres that originate in the caudal part of nucleus ambiguus.*

- Spinal part

arises from motor neurones in ventral horn of the spinal gray matter at levels C1-C5 (spinal nucleus)**

○ Foramen of exit from skull: Jugular foramen.
(then separate again)

*remember its gives 9th, 10th & now 11th

**supplying the stylohyoid muscle

* يختلف هذا العصب بأنه الوحيد بين الباقيين إلي يأخذ من جزئيين

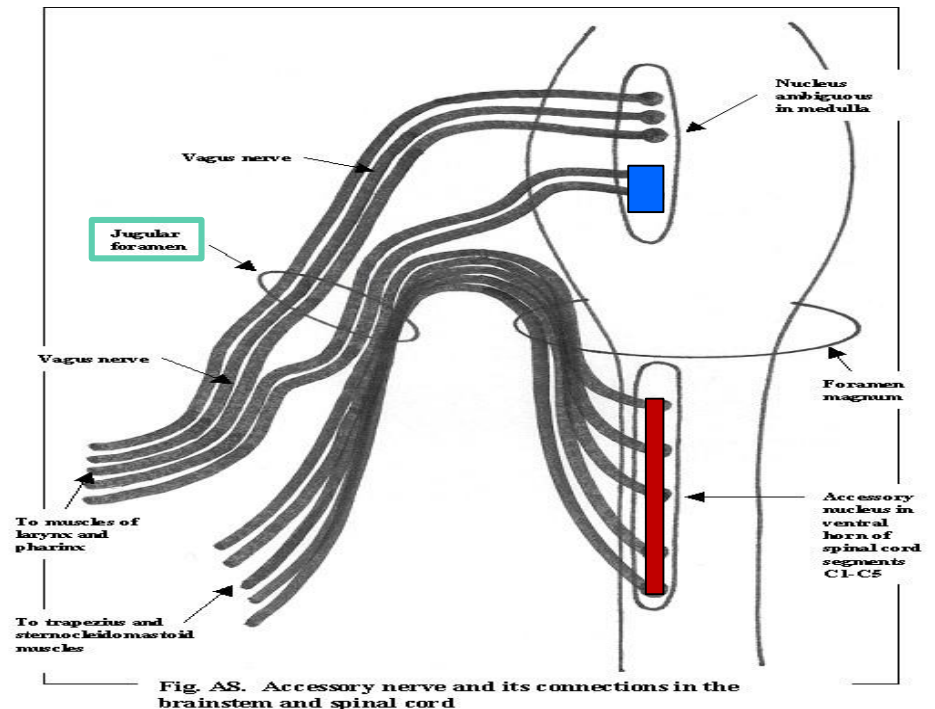
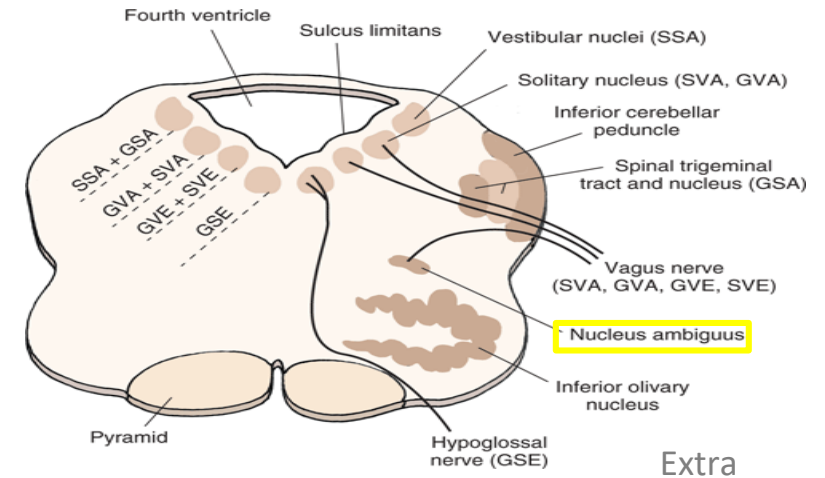
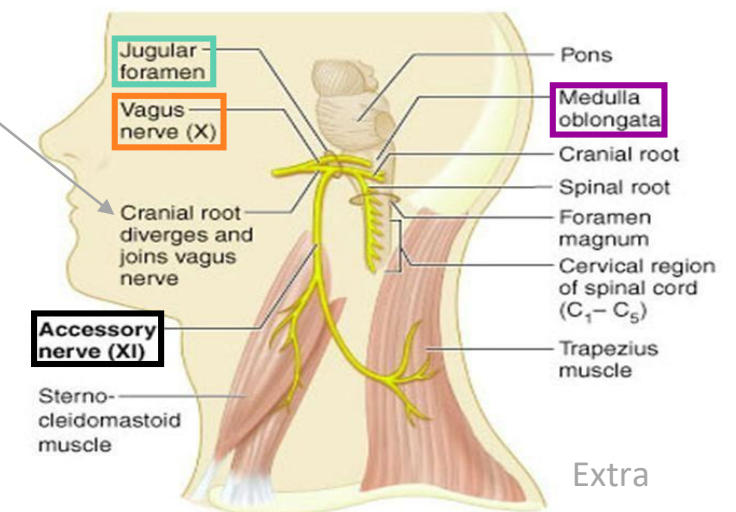
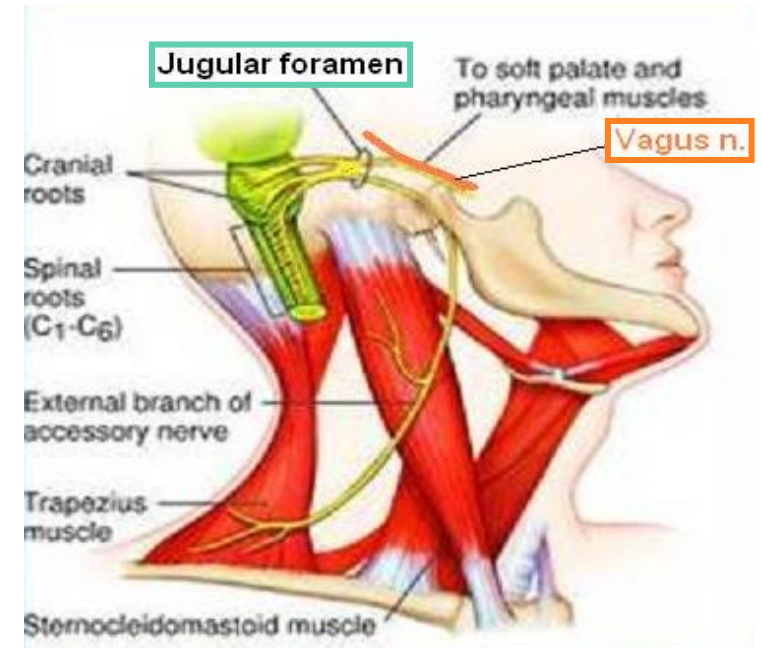


Fig. AS. Accessory nerve and its connections in the brainstem and spinal cord

11th Cranial Nerve - Accessory (XI) Cranial Part

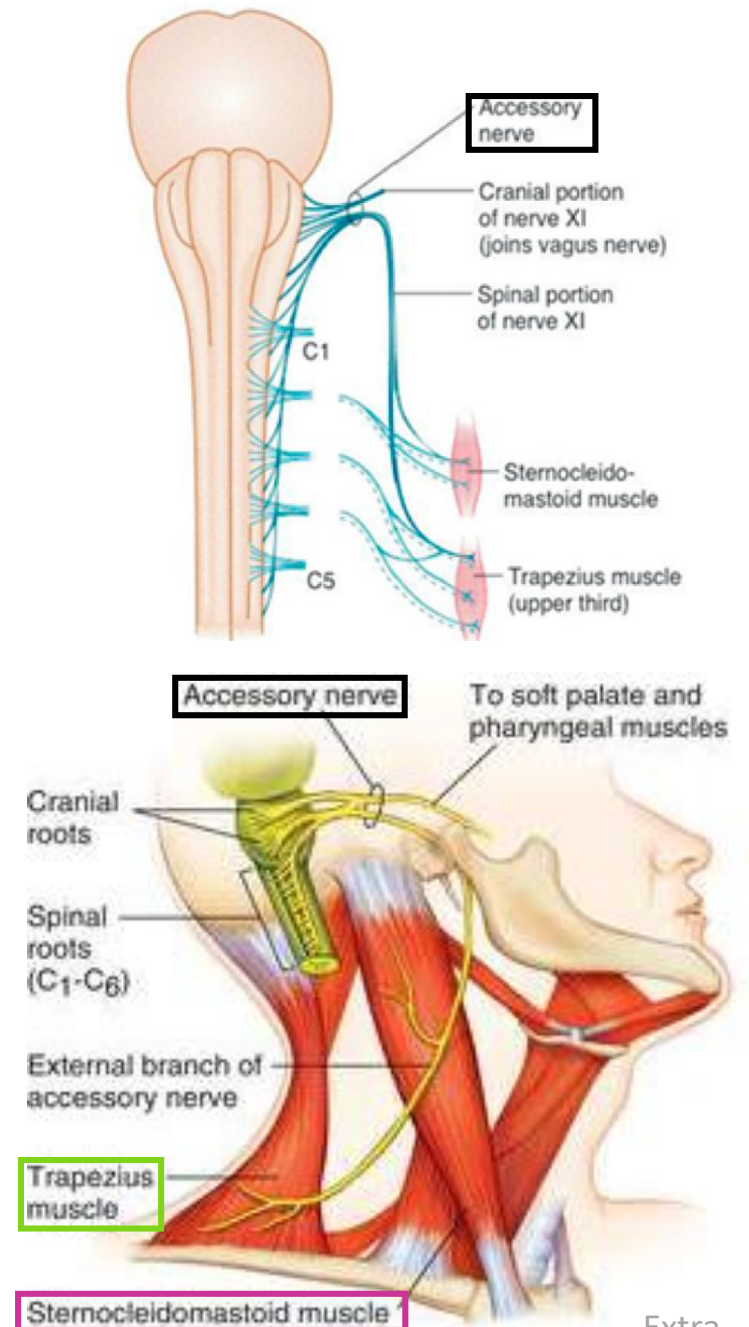
- Emerges from lateral aspect of the medulla as a linear series of rootlets caudal to rootlets of the vagus nerve. “to form pharyngeal plexus (its formed of 9th, 10th, 11th & 1stXC)”
- At the side of medulla it joins the spinal root briefly.
- It separates once again as the nerve leaves the cranial cavity through the Jugular foramen.
- At the level of jugular foramen these fibres join the vagus nerve and distribute with it to muscles of the soft plate, esophagus, pharynx and larynx.



11th Cranial Nerve - Accessory (XI) Spinal Part

- The axons leave the cord via series of rootlets, emerge laterally midway between the dorsal and ventral roots of the spinal nerves.
- Courses rostrally and enter the cranial cavity* through the **foramen magnum**, and joins the cranial root briefly
- Separates once again as the nerve leaves the cranial cavity through the **Jugular foramen** “**then descend to the posterior triangle of neck**”
- Supplies the sternomastoid (Anterior) and trapezius (Posterior) muscles

*It is the only nerve that enters the cranial cavity, all others exit.

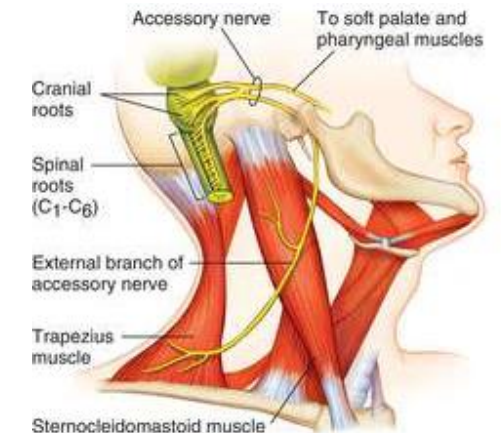
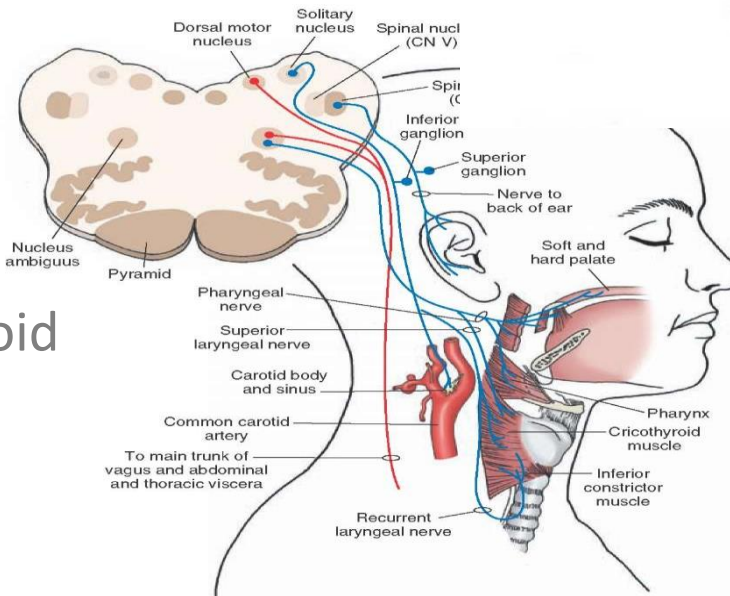
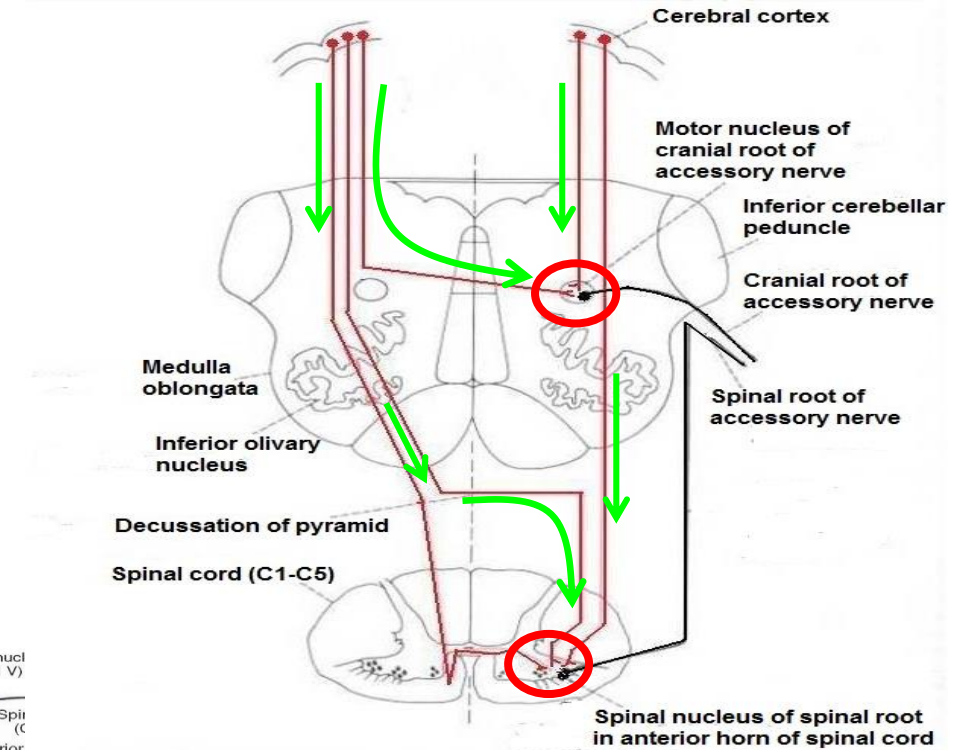


11th Cranial Nerve - Accessory (XI)

- The nucleus ambiguus and the spinal nucleus receive **bilateral corticonuclear or corticospinal fibers** (from both cerebral hemispheres).

Functions:

- Movements of the soft palate, larynx, pharynx (**cranial part**).
- Controls the movements of neck (**spinal part**) “via the sternomastoid and trapezius muscles”.



11th Cranial Nerve - Accessory (XI)

Injury of Spinal Root

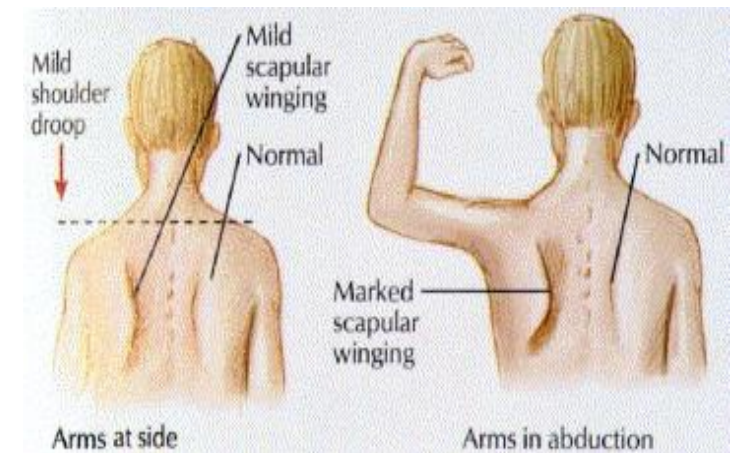
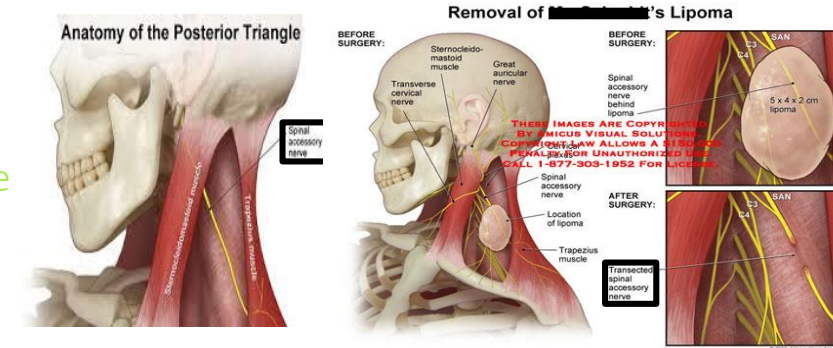
*any damage to cranial part will damage also the vagus which will damage the pharyngeal plexus

○ Causes:

- Because of the relatively superficial position of the nerve in the **posterior triangle**, it may be damaged by penetrating trauma as stab wounds.
- It is considered the most commonly iatrogenically* injured nerve as during removal of malignant lymph nodes in the posterior triangle.

○ Manifestations

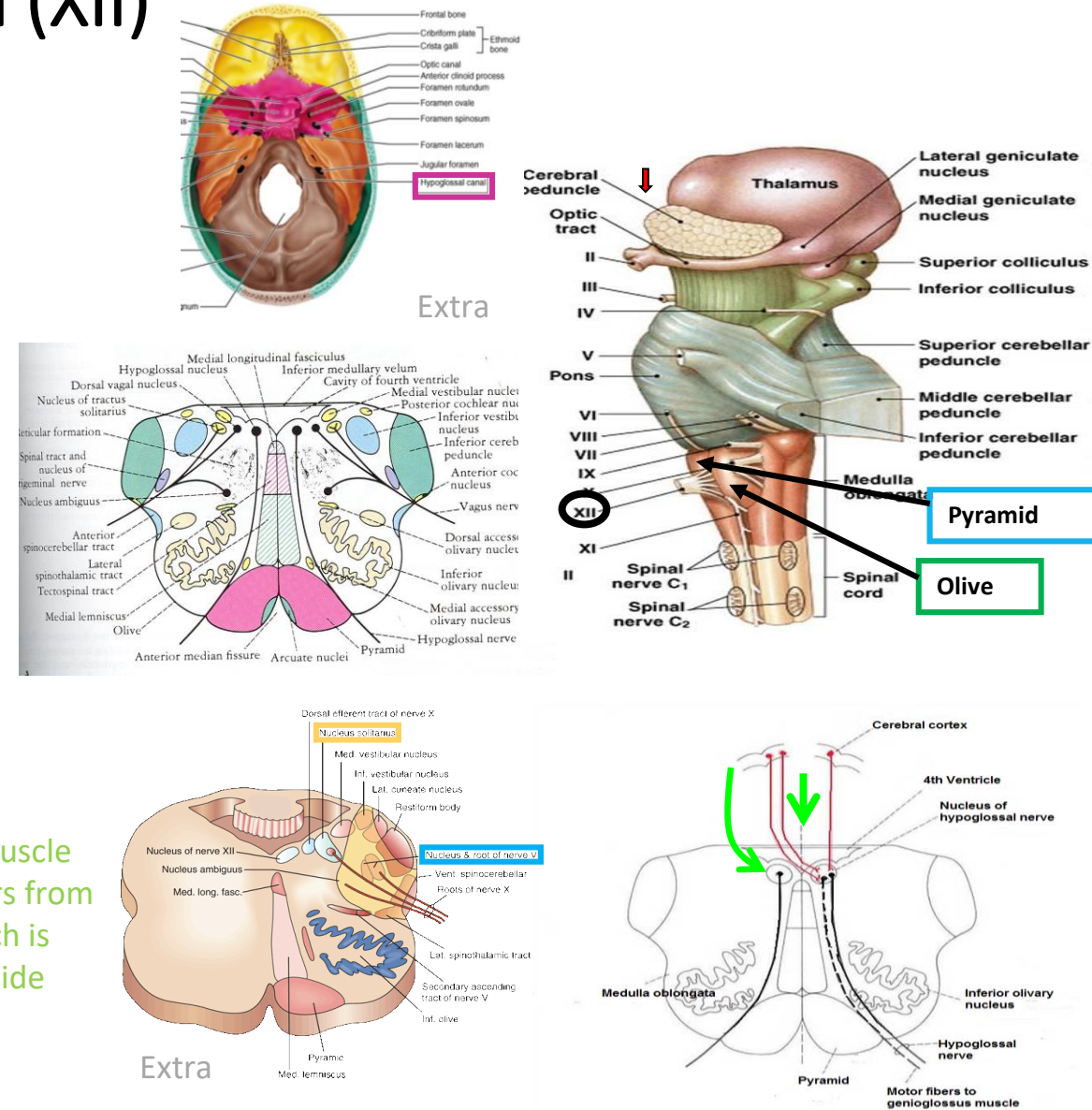
- It produces atrophy and weakness of **trapezius**.
- Unilateral paralysis of trapezius is evident by (1) inability to elevate & (2) retract the shoulder, (3) difficulty in elevating the arm & (4) Winging of scapula* . * induced inadvertently by a physician or surgeon or by medical treatment or diagnostic procedures
- Drooping of the shoulder is an obvious sign of injury of nerve
- **If the cranial root is also injured:** the lesion also causes difficulty in swallowing and speech & Inability to turn head “paralysis to mastoid muscle”



Some references say injury of spinal part of accessory nerve will lead to winging of scapula (which is what **Dr. Jameela** said) but according to **Dr. Essam** only partial depression of angle of scapula because serratus anterior is still working.

12th Cranial Nerve - Hypoglossal (XII)

- Type: **Motor** * The most medial nucleus
- Origin: **Hypoglossal nucleus** of the medulla (in the floor of 4th ventricle)*
- The fibers emerge from the anterior surface of the medulla oblongata through the **sulcus between the pyramid and the olive.**
- Foramen of exit from skull: **Hypoglossal canal**
- The hypoglossal nucleus receives **corticospinal** fibers from **both** (bilateral) cerebral hemispheres **EXCEPT** the region that supplies **genioglossus**** muscle (receives contralateral supply only)
- Also receives afferent fibers from **nucleus solitarius** and **trigeminal sensory nucleus.**



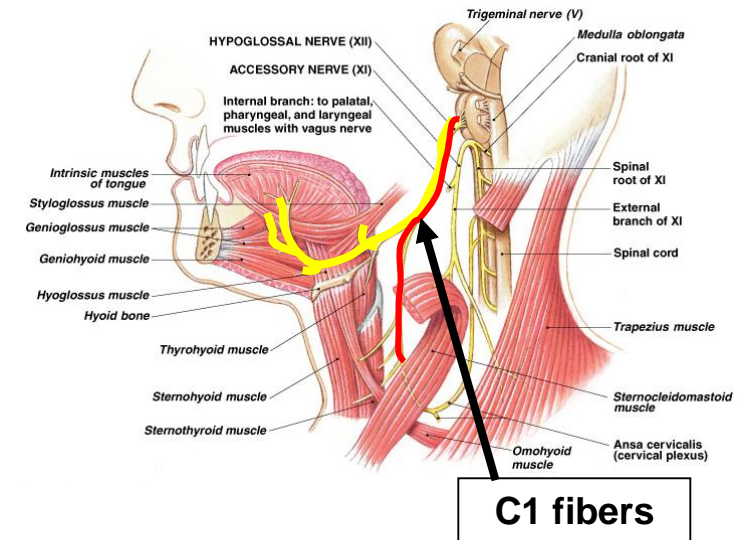
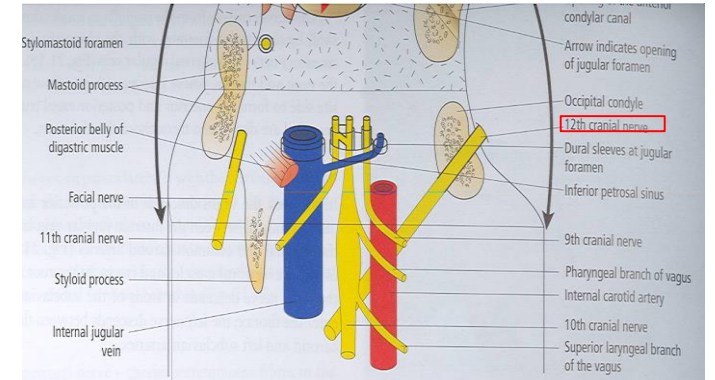
** The only muscle that take fibers from one side, which is the opposite side

12th Cranial Nerve - Hypoglossal (XII) Course

- The nerve courses downward with cervical neurovascular bundle (**internal carotid artery, internal Jugular vein, vagus nerve**)
- Then curves forward behind mandible to supply the tongue.
- During its initial course, it carries **C1 fibers*** which leave in a branch to take part in the formation of **ansa cervicalis**** (a loop of nerves supplying neck muscles)

*الـ hypoglossal nerve يعتبر زي التاكسي لـ c1 فايبرز بس ترتبط معاه ويوصلها وبعدين يتركها وتتفصل عنه وترتبط مع فايبرز أخرى
عشان يكوّنوا (Ansa cervicalis)

**C1, C2 & C3 يغذون infrahyoid muscle



12th Cranial Nerve - Hypoglossal (XII) Function

1. Supplies motor innervation to all of the muscles of the **tongue**
Except the palatoglossus (which is supplied by the vagus nerve).

So, it Controls the movements and shape of the tongue during speech and swallowing

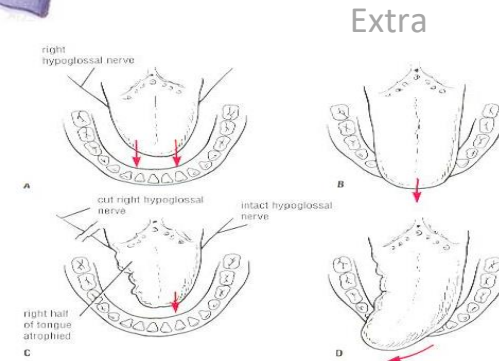
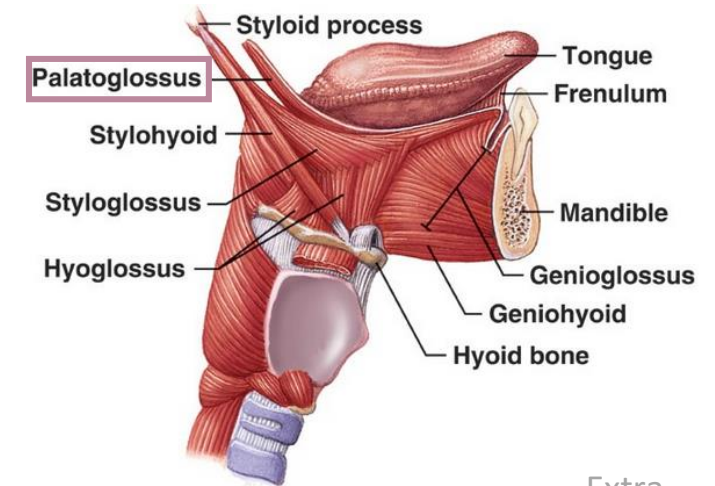
2. Carries proprioceptive afferents from the tongue muscles.

*just carries because its PURE MOTOR

Lesion

Manifestations of Lesion of the nerve (LMN): **UMN: spastic paralysis**
LMN: flaccid paralysis

- Loss of tongue movements
- Difficulty in chewing and speech
- The tongue paralyses, atrophies, becomes shrunken and furrowed on the affected side (LMN paralysis)
- On protrusion, tongue **deviates to the affected side.** **“normally it’s in the middle”**
If both nerves are damaged, person can’t protrude tongue.



*مثلا في الصورة؛ اللسان منحرف إلى الجهة اليسار، معناته اللي تأثر هو left hypoglossal nerve، ولو النيرف في الجهتين تأثر الشخص ما يقدر يمد لسانه لبرا

	Nerve	Type	Origin		Foramen of Exit	Function	Injury
IX	Spinal accessory	motor	Cranial Part	Nucleus Ambiguus	Jugular foramen	Movement of the soft palate, larynx & Pharynx	Trapezius atrophy & weakness
							Trapezius paralysis
							Shoulder dropping
			Spinal Part	C1-C5 (Spinal nucleus)		Movement of the neck	Speech & swallowing difficulty
							Inability to turn head
XII	hypoglossal	motor	Anterior surface of Medulla (hypoglossal nucleus)		Hypoglossal canal	Motor to all tongue muscles except palatoglossus	loss of tongue movement
						Speech & swallowing	Speech & chewing difficulty
							Tongue paralysis
						Carries afferents from tongue muscles	Tongue deviation on protrusion to affected side

MCQs

(1) The Accessory Nerve exit from which foramen in the skull?

- A) Foramen ovale
- B) Foramen Lacerum
- C) Jugular Foramen
- D) Foramen Magnum

(2) The spinal part of Accessory Nerve supplies which muscles?

- A) Sternomastoid & Trapezius
- B) Serratus anterior & Trapezius
- C) Sternomastoid and scalene
- D) Sternomastoid and omohyoid

(3) Which of the following nerve commonly injured during removal of malignant lymph nodes in the posterior triangle?

- A) Cranial root of Accessory Nerve
- B) Hypoglossal Nerve
- C) Spinal root of Accessory Nerve
- D) Vagus Nerve

(4) Hypoglossal Nerve is a?

- A) Motor type
- B) Sensory Type
- C) Both of them
- D) Non of them

(5) The fibers emerge from the _____ Surface of the medulla oblongata through the sulcus _____?

- A) Anterior , between the pyramid and the olive
- B) Anterior , anterior median fissure
- C) Posterior , between the pyramid and the olive
- D) Posterior , anterior median fissure

(6) The Hypoglossal Nerve supplies motor innervation of all the muscle of the tongue except?

- A) superior longitudinal
- B) The palatoglossus
- C) Styloglossus
- D) A&B

(7) The function of accessory cranial nerve is?

- A) Movements of the tongue
- B) Controls the movements of the neck
- C) Movements of the hard palate
- D) Carries proprioceptive afferents from the tongue muscles

(8) The hypoglossal nucleus of the medulla locate in which ventricle?

- A) The 2nd Ventricle
- B) The 3rd Ventricle
- C) The top of 4th Ventricle
- D) The floor of 4th Ventricle


(9) Cranial part carries fibers that originate from the?

- A) Caudal part of nucleus ambiguus
- B) Cranial part of nucleus ambiguus
- C) Mesencephalic nucleus
- D) Edinger-Westphal nucleus

(10) If the tongue is deviated to the left side that means?

- A) Right hypoglossal nerve injury
- B) Left hypoglossal nerve injury
- C) Both A&B
- D) Non of the above

Answers



(1) C

(2) A

(3) C

(4) A

(5) A

(6) B

(7) B

(8) D

(9) A



(10) B

A 12 year boy came to the ER with difficulty in chewing and speech

(1) Which Nerve is most likely affected?

The hypoglossal nerve

(2) The tongue shrunken and furrowed in which side?

The effected side

(3) Which nerve injury produces atrophy and weakness of trapezius?

Injury of Accessory (XI) 11th Cranial Nerve “Spinal Root”



Good luck
Special thank for team436 ❤️

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- References:
 1. Girls' & Boys' Slides
 2. Greys Anatomy for Students
 3. TeachMeAnatomy.com

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