

PALPATION



**WHEN WE DEVELOP THE
SKILL TO PALPATE
EFFICIENTLY, OUR HANDS
CAN BECOME THE GREATEST
DETECTIVES.**

PALPATION FOUNDATION:

- Palpation is a cumulative skill and is a combination of science and art. Its purpose is to be able to efficiently identify dysfunctional structures through the means of touch so as we can add an intervention and facilitate a healing process strategically.
- Palpation involves understanding the anatomy, being able to project it onto your target area through your mind's eye.
- Use bony landmarks to identify your target structure.
- Have the patient activate the tissue to confirm you have accurately located it.
- Be gentle, controlled and deliberate when pressing to depth.

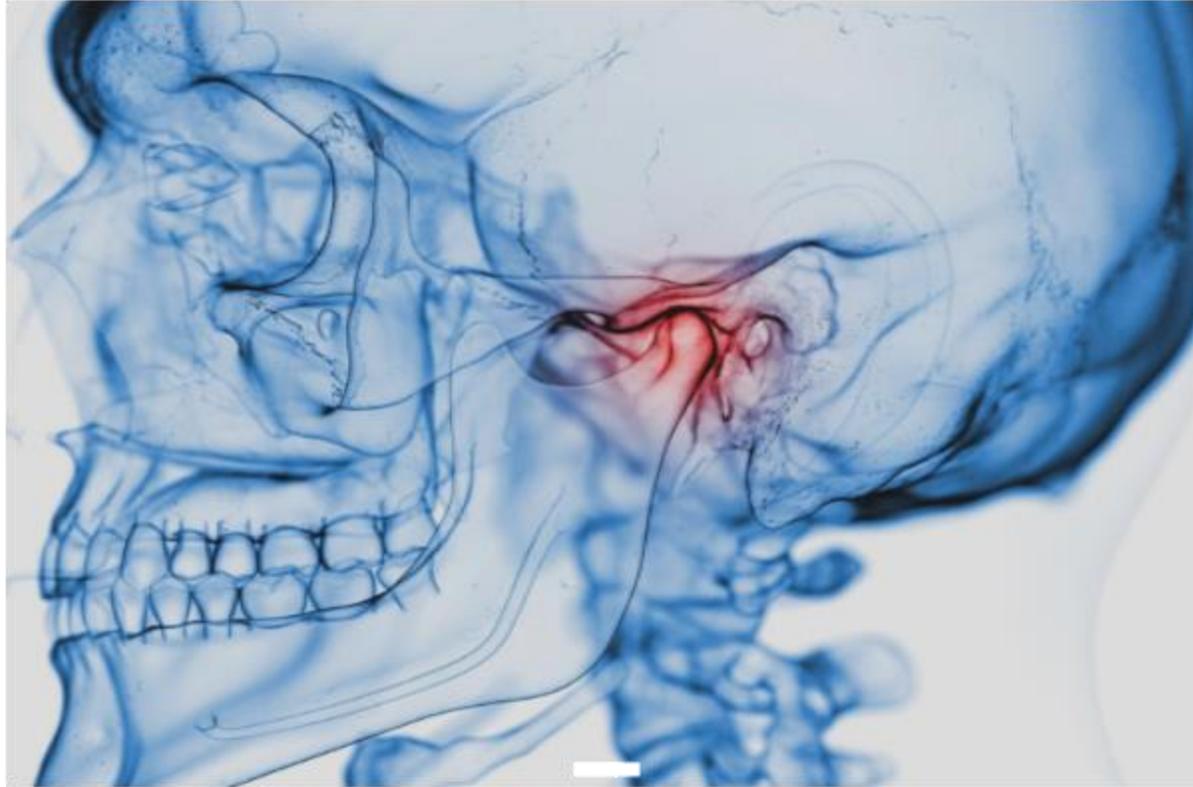
PALPATION



WHEN WE DEVELOP THE SKILL TO PALPATE EFFICIENTLY, OUR HANDS CAN BECOME THE GREATEST DETECTIVES.

PALPATION FOUNDATIONS:

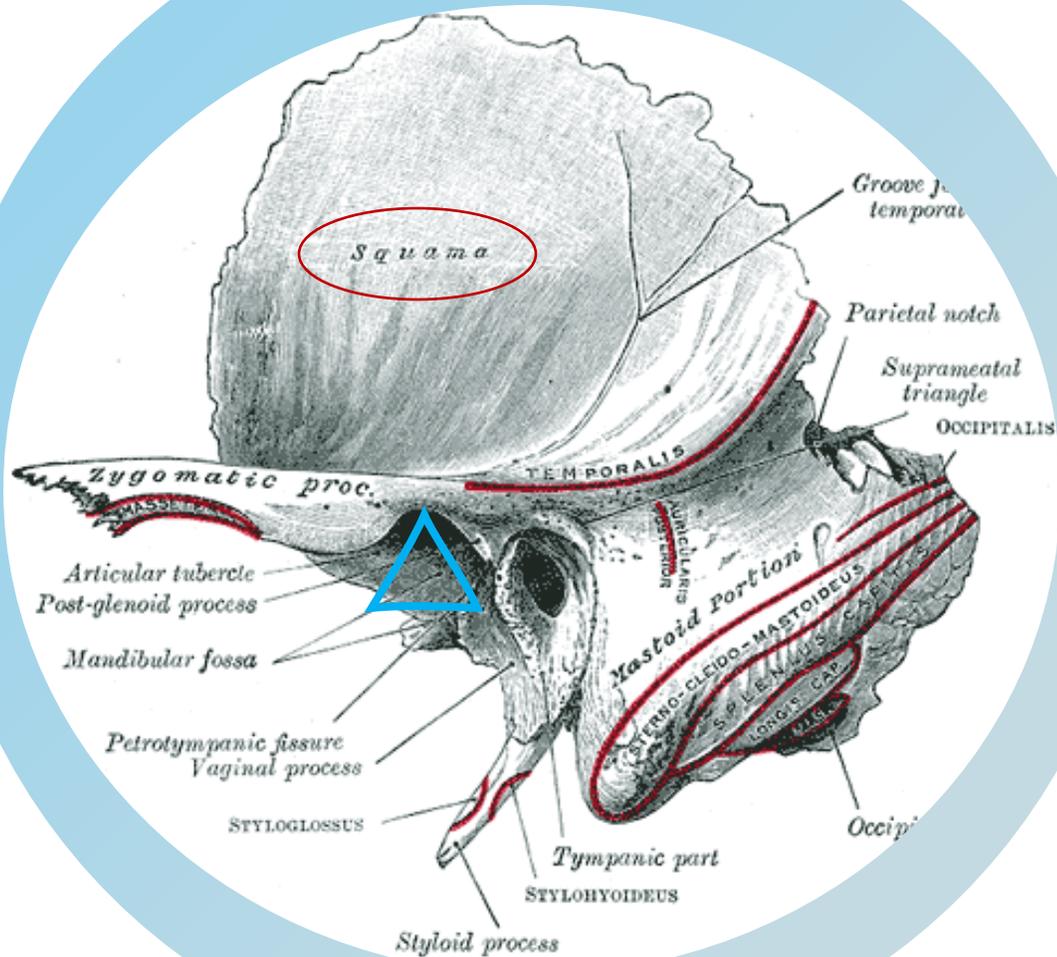
- Visualize an image of the target tissue overlaying where you are palpating.
- DO NOT rush or press too hard. When we press too deeply too quick, we can lose the tactile feedback as the tissue can react to the pressure.
- Use your fingertips and they have the most sensory receptors and can provide greater feedback.
- Techniques
 - Rolling
 - Strumming
 - Compressing
- Adding passive and active movement can provide great benefit too.



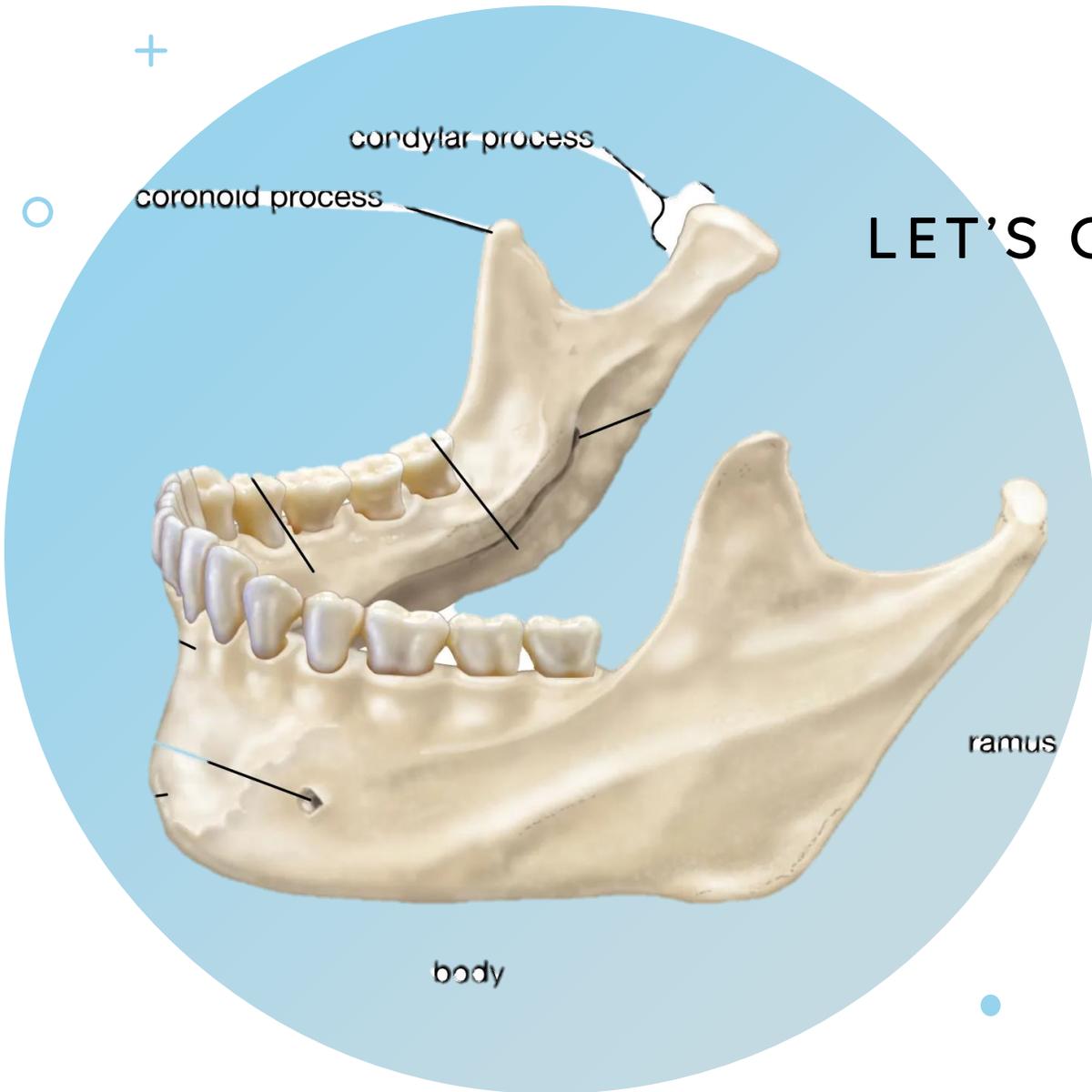
TEMPOROMANDIBULAR JOINT (TMJ)

DARREN O ROURKE LIC.AC, R.HERB, NMPT

LET'S GET FAMILIAR WITH THE JOINT



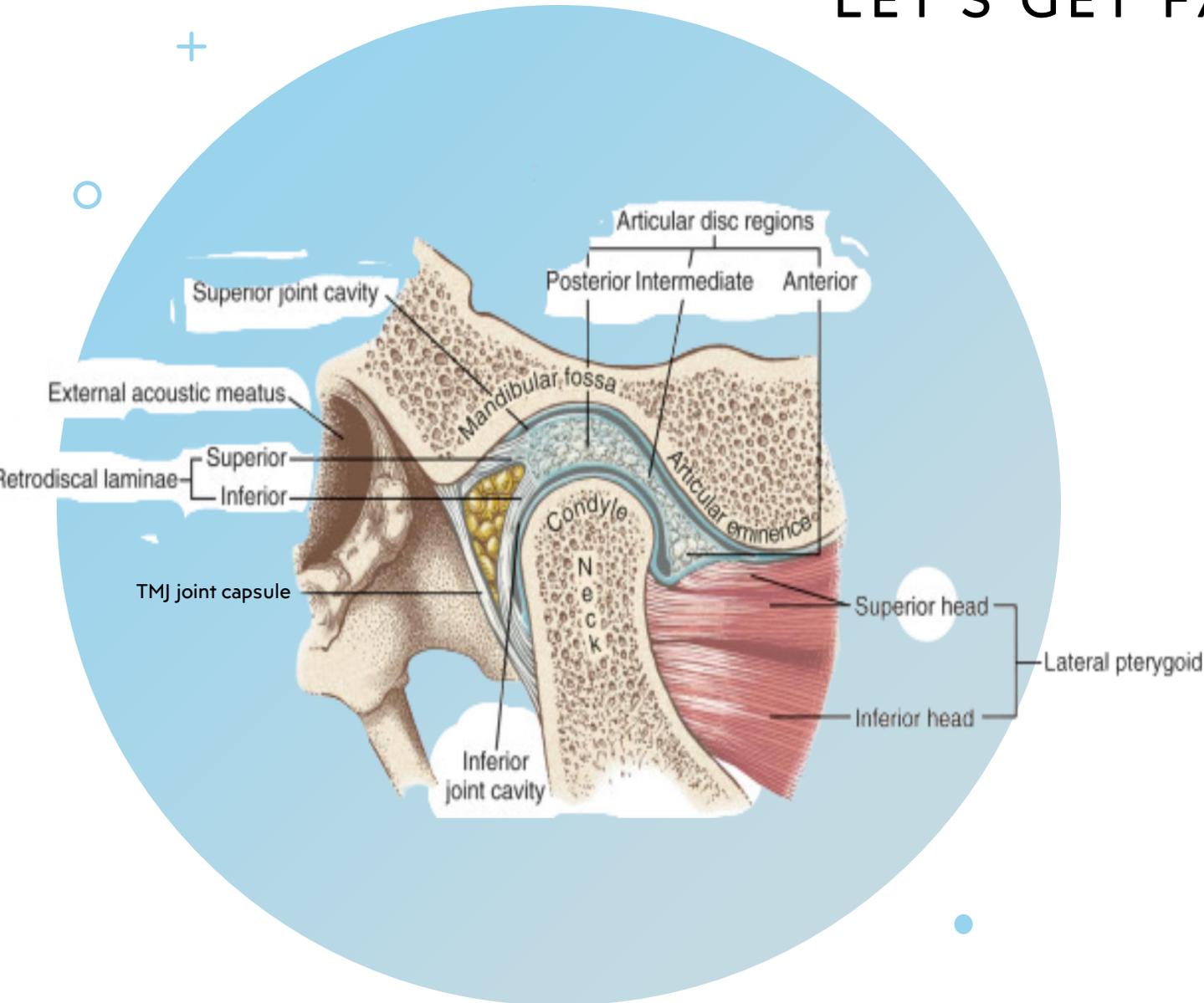
- The temporomandibular joint (TMJ) is a diarthrodial joint.
- The TMJ is composed of a synovial cavity, articular cartilage and capsule that all cover the same joint.
- The cranial surface of the TMJ consists of the squama area of the Temporal bone. Where it becomes the Glenoid Fossa.
- The posterior area of the fossa is known as the Posterior Articular Ridge.
- Although the temporal bone is an intricate piece of the TMJ it is not a movable piece, it facilitates the condylar process of the mandible which acts as the fulcrum point of TMJ mechanics.



LET'S GET FAMILIAR WITH THE JOINT

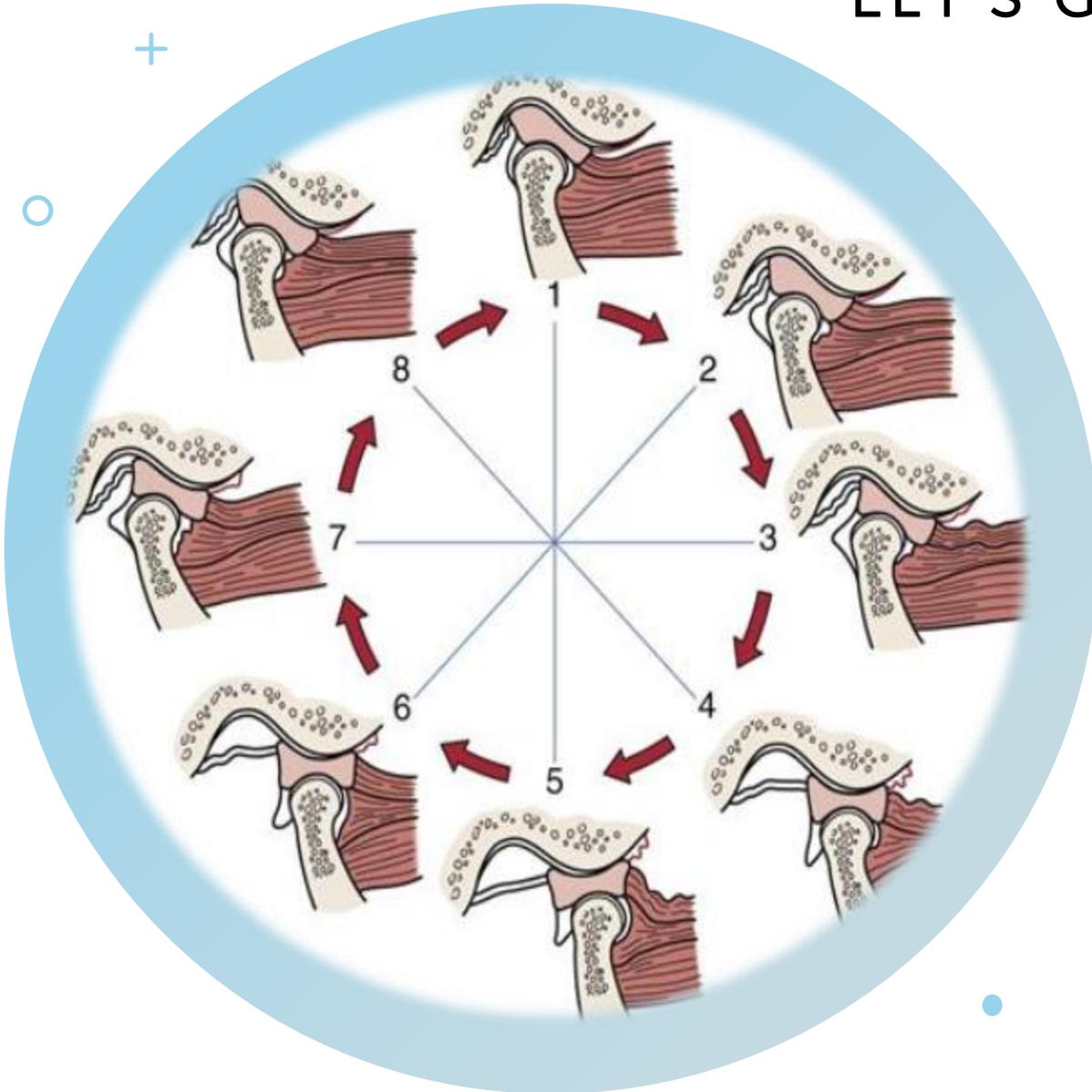
- The condylar process are the are the only point of axis to facilitate movement of the mandible.
- The coranoid process purely acts as an attachment point for the Temporalis muscle.

LET'S GET FAMILIAR WITH THE JOINT



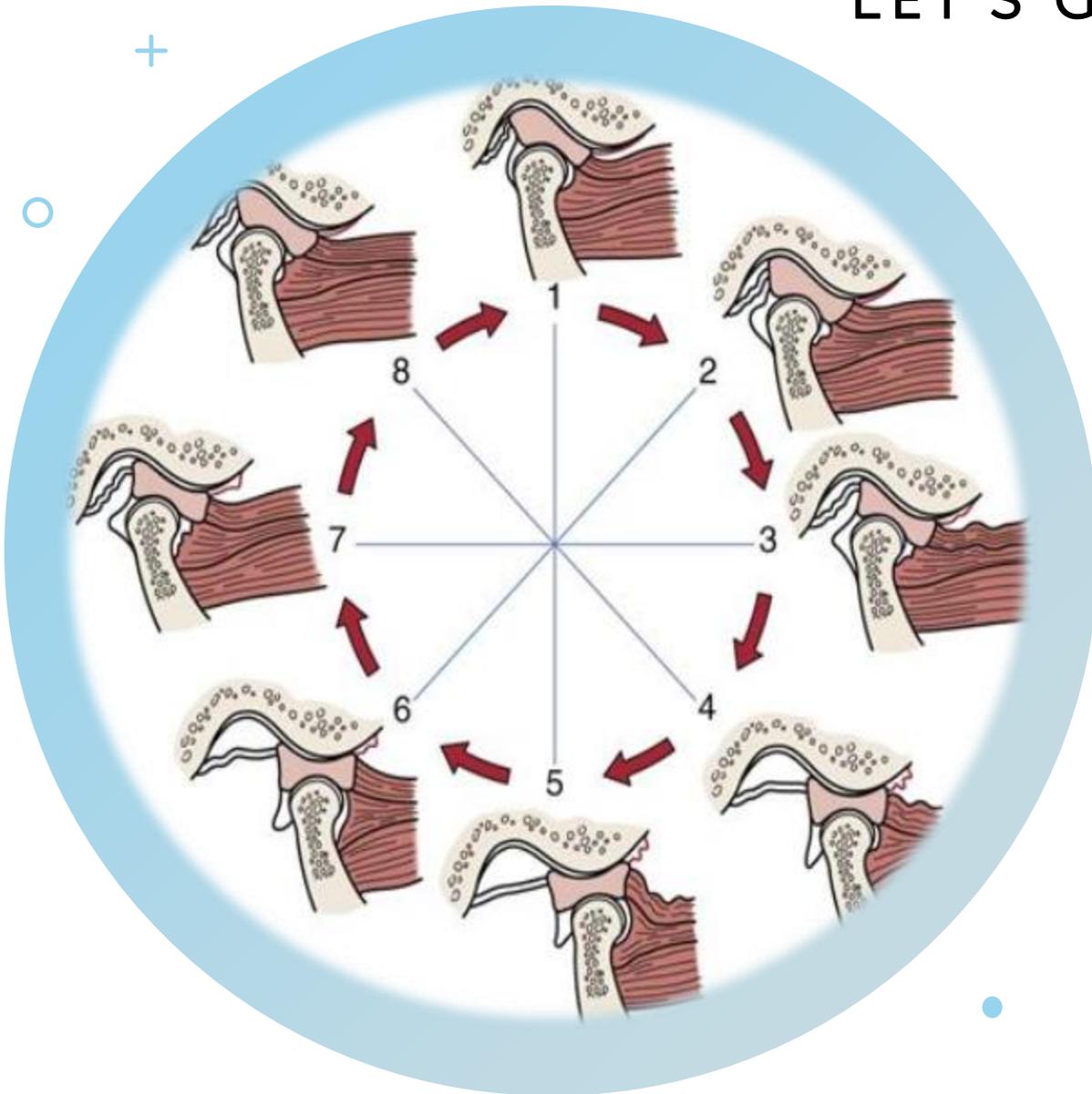
- The Articular disc of the TMJ.
- The articular disc sits in between the superior and the inferior joint cavity.
- The mandibular condyle is made up with fibrocartilage, which makes it unique compared to most bones at synovial joints being made with hyaline cartilage. This is to add extra protection and durability due to the high level of repetitive use and load tolerance that's placed on the joint. Some sources estimating it can be used up to 6000 times per day.
- The superior head of the lateral pterygoid attaches directly into the articular disc.

LET'S GET FAMILIAR WITH THE JOINT



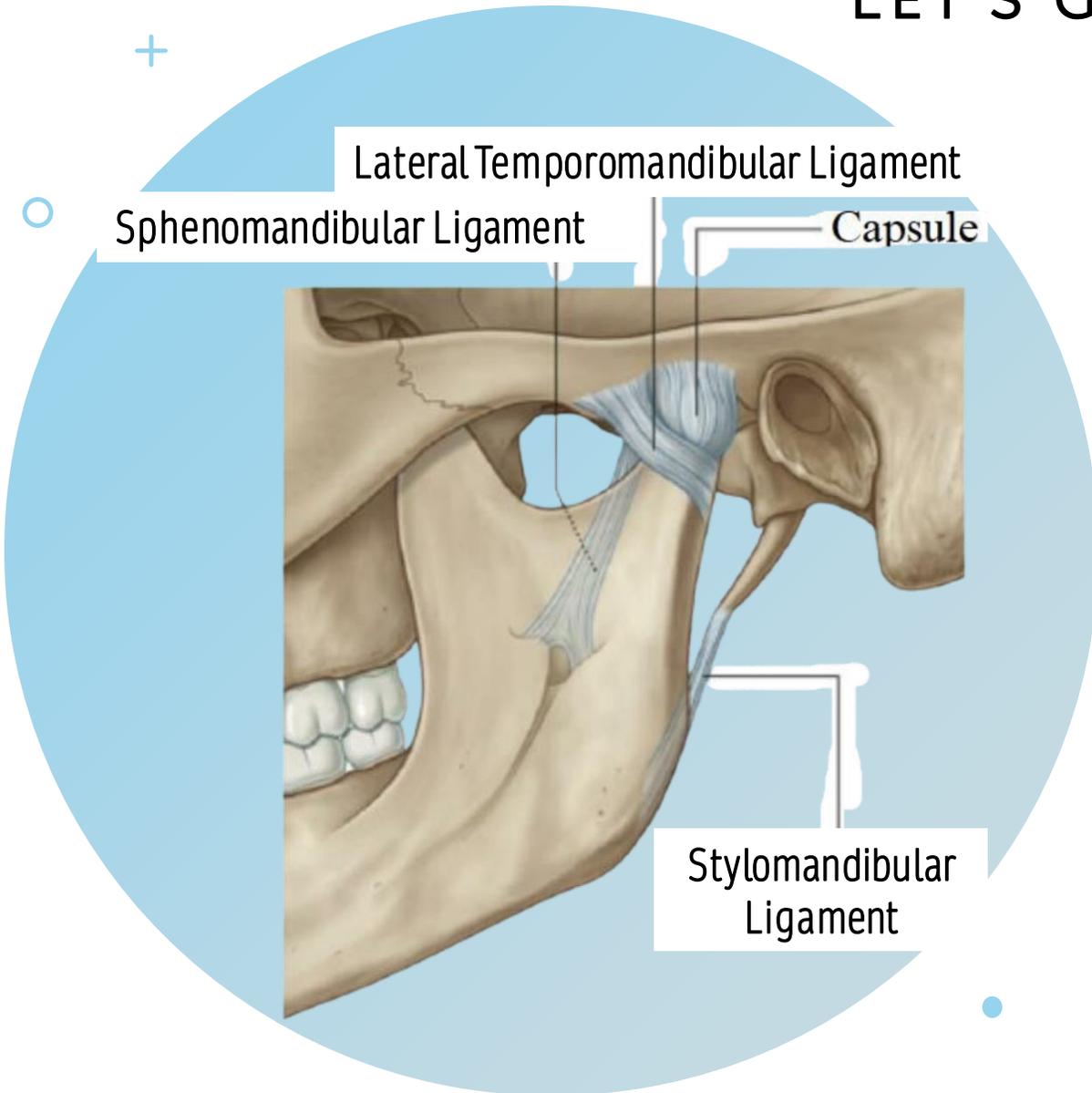
- The upper portion is in contact with the post-glenoid process, its function is to prevent the disc from slipping during the opening of the mouth while the lower portion of the disc is tasked with avoiding excessive rotational movements of the disc relative to the mandibular condyle.
- The anterior portion of the articular disc is in contact with, the joint capsule, articular eminence condyle of the upper area of the lateral pterygoid muscle while the posterior portion of the articular disc relates to: bilateral retro discus tissue (behind the condyle), glenoid fossa, condyle, temporal bone

LET'S GET FAMILIAR WITH THE JOINT



- The medial and lateral aspect of the cartilaginous disc is attached to the condylar formation of the mandible.
- The edges of the disc partly fuse with the fibrous capsule that surrounds the joint.
- Several ligaments manage the TMJ forces and send multiple proprioceptive stimulants. That proprioception of the joint is provided by multiple inputs such as:
 - The joint capsule.
 - The muscles of mastication.
 - Skin receptors.
 - Receptors within the ligaments.

LET'S GET FAMILIAR WITH THE JOINT



- Sphenomandibular Ligament (SML)

Attaches from the spine of the sphenoid bone and the lingula of the mandible.

Its function is to protect the TMJ from excessive translation of the condyle after 10 degrees of opening the mouth.

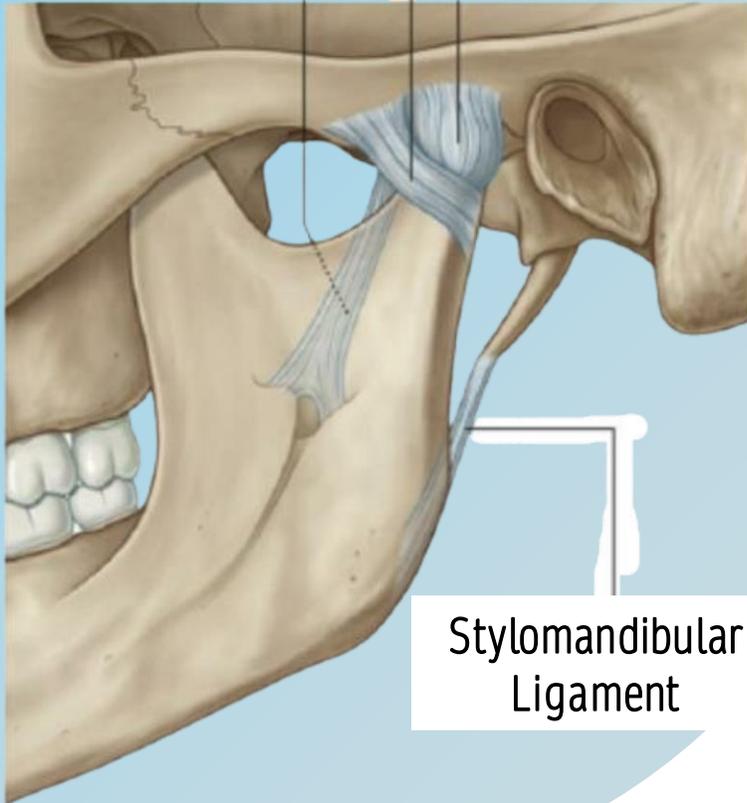
- Stylomandibular Ligament (STML)

Extends from the styloid process of the temporal bone, to the angle of the mandible between the attachments of the masseter and medial pterygoid.

Its function is to limit and protect against excessive protrusion and provides an attachment site to the styloglossus muscle.

LET'S GET FAMILIAR WITH THE JOINT

Lateral Temporomandibular Ligament
Sphenomandibular Ligament



Stylomandibular
Ligament

- Lateral Temporal Ligament

It attaches and runs from the articular tubercle of the temporal bone, where it crosses the joint and attaches into the lateral and posterior surfaces of the neck of the condylar process of the mandible.

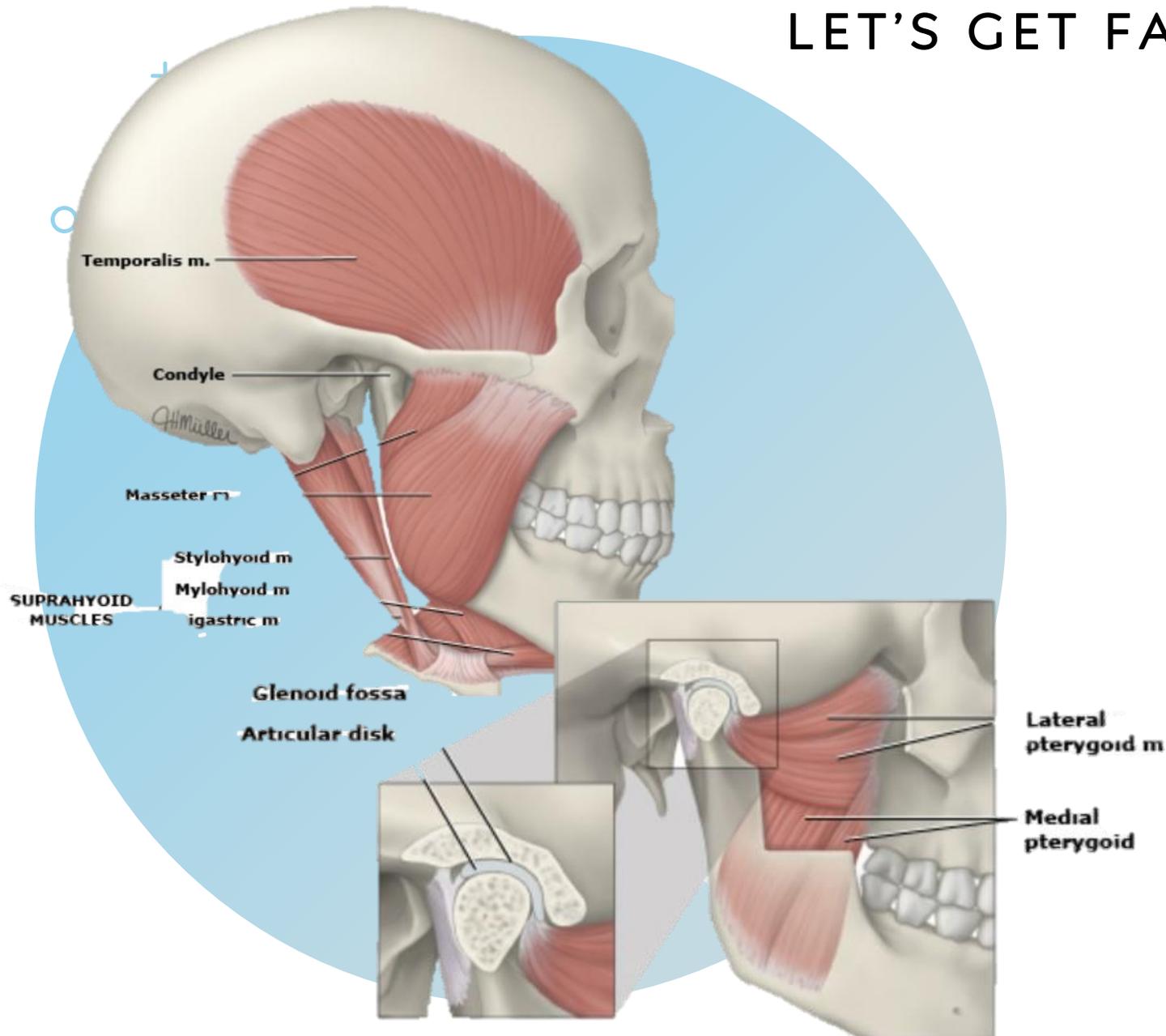
Its role and purpose is to prevent posterior displacement of the mandibular condyle and initiates the forward movement of the articular disc when the mandible is fully depressed.

- Articular Capsule

The capsule surrounds the entire TMJ. The fibers of the inferior portion are tight and connect the condyle of the mandible to the articular disc, and the superior fibers are looser and attach the articular disc to the temporal bone. It's supported by the lateral ligament too.

Its role is to keep the joint sealed, provide stability and it's enriched with proprioceptive nerve ending to provide information back to the CNS.

LET'S GET FAMILIAR WITH THE JOINT

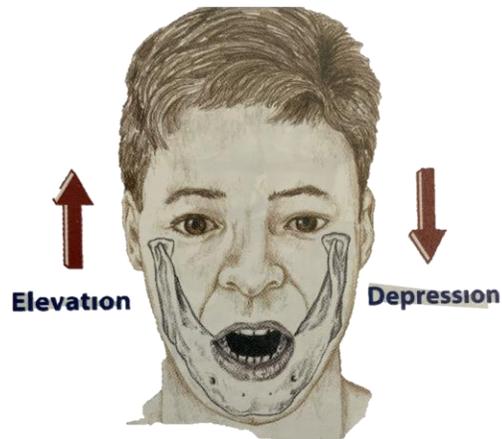


- There are four major muscle directly involved with movement of the TMJ.

1. Temporalis
2. Masseter
3. Medial Pterygoid
4. Lateral Pterygoid

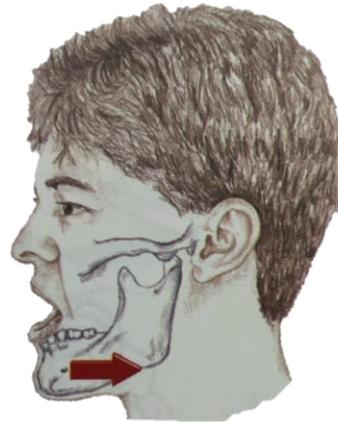
Although the TMJ is at its core a hinged joint. Due to the make up of it and the alternating activation patterns facilitated by these tissues, the joint can access a wider range of movements than typical hinged joints making it more accurately known as a ginglymoarthrodial joint.

ANATOMY OF THE TMJ



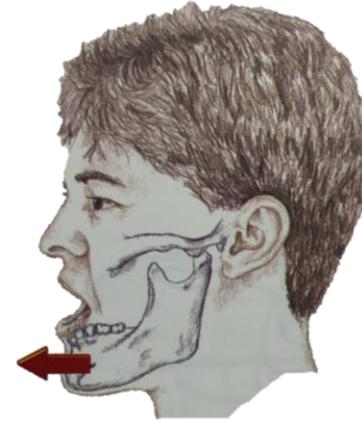
DEPRESSION & ELEVATION OF MANDIBLE

- Masseter
- Temporalis
- Medial Pterygoid
- Geniohyoid
- Mylohyoid
- Digastric
- Platysma (assists)



RETRACTION OF MANDIBLE

- Temporalis
- Digastric



PROTRACTION OF MANDIBLE

- Lateral Pterygoid
- Medial Pterygoid
- Masseter (assists)



DEVIATION OF MANDIBLE

- Temporalis
- Digastric

ASSESSMENT



OBSERVE



MEASURE

- Temporalis
- Digastric



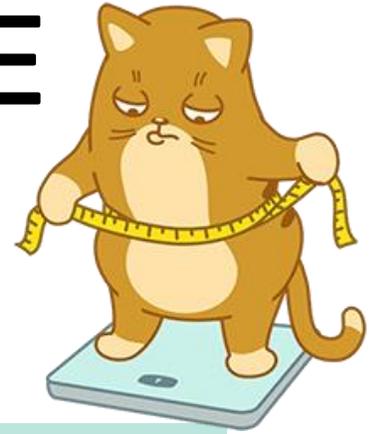
PALPATE



TREAT



OBSERVE AND MEASURE



OBSERVE

- Splitting the face up into thirds from top to bottom we are looking for symmetry or deviation away from that.
- Muscle Bulk comparing one side to the other. Looking for tone and size.
- Observing jaw movements through all its planes.
 - Quality of movement.
 - Available range of movement. (repeat 2/3 times to induce some fatigue)
 - Is there any deviation away from midline.

MEASURE

- Take objective range of motion measurements whether it's a ruler or specific disposable tools.
- The normal range of opening is considered to be from 40mm – 60mm measuring with 0 being the bottom of the front tooth to bottom lip.
- A normal ratio for other planes is considered to be a 4 to 1 to 1 ration. Example, if opening is 40 lateral movement should be 10 and so should protraction.



PALPATE AND TREAT



PALPATE

- Palpating the joint, bony landmarks and soft tissues are key in this process.
- Bring the joint through its ranges passively and note any differences if there is any, and note the quality of the feeling of the movement.
- Palpate around the bony landmarks, the joint, and the soft tissues gathering feedback of any tenderness, pain or referred pain in the process.

TREAT

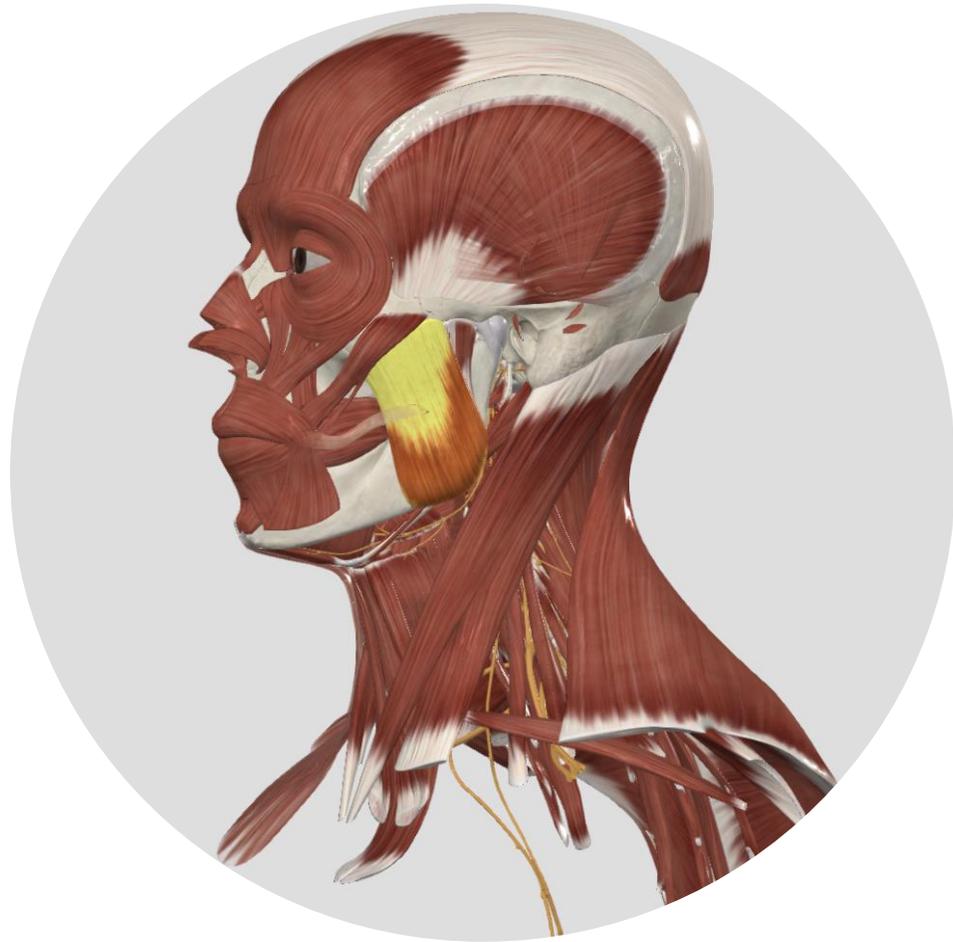
- Based off the cumulative information that's been gathered you can now implement a clinically rationalised intervention.
- Needle the myofascial trigger points.
- Apply and manual techniques that are applicable to your treatment strategy.
- Soft tissue Release, (use gloves if intra oral).
- Joint mobilisations.

MASTICATION

- MASTICATION IS A SENSORY-MOTOR ACTIVITY IN ORDER TO PREPARE FOOD FOR SWALLOWING. IT IS A COMPLEX MECHANISM AND REQUIRES A RHYTHMIC OF THE JAW IN DIFFERENT AUTOMATED DIRECTION THAT MAY BE ALSO BROUGHT UNDER CONSCIOUS CONTROL AND IS REGULATED BY THE LOWER BRAINSTEM. 

MUSCLES OF MASTICATION

- THE MUSCLES OF MASTICATION ARE ASSOCIATED WITH MOVEMENTS OF THE JAW (TEMPOROMANDIBULAR JOINT). THERE ARE FOUR MUSCLES:
- MASSETER
- TEMPORALIS
- MEDIAL PTERYGOID
- LATERAL PTERYGOID
- THE MUSCLES OF MASTICATION DEVELOP FROM THE FIRST PHARYNGEAL ARCH. THEY ARE THEREFORE INNERVATED BY A BRANCH OF THE TRIGEMINAL NERVE (CN V), THE MANDIBULAR NERVE.
- (NB: NOTE THAT ALL THE MUSCLES MENTIONED HERE ARE BILATERAL STRUCTURES).



MASSETER

ANATOMY

- The masseter muscle has a direct contact with the articular disc through its perimysium.
- It has two portions to it, a superficial and a deep layer.
- It originates at the zygomatic arch and attaches into the angle and ramus of the mandible.
- The innervation of it is via the masseteric branch of the trigeminal nerve.

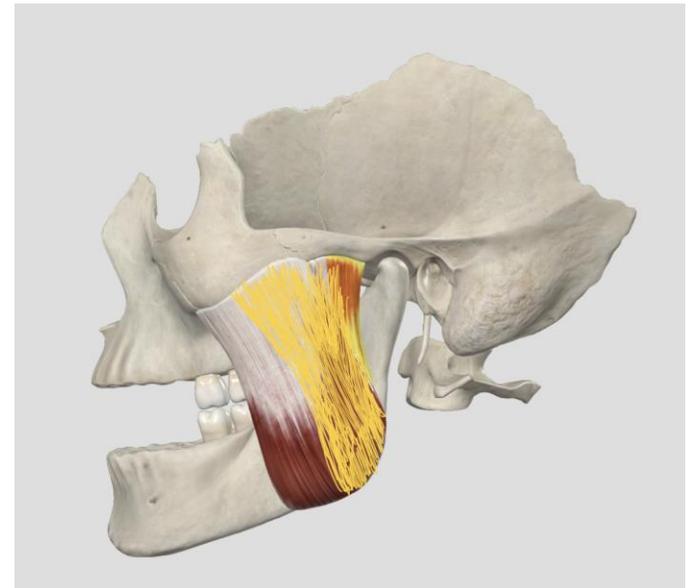
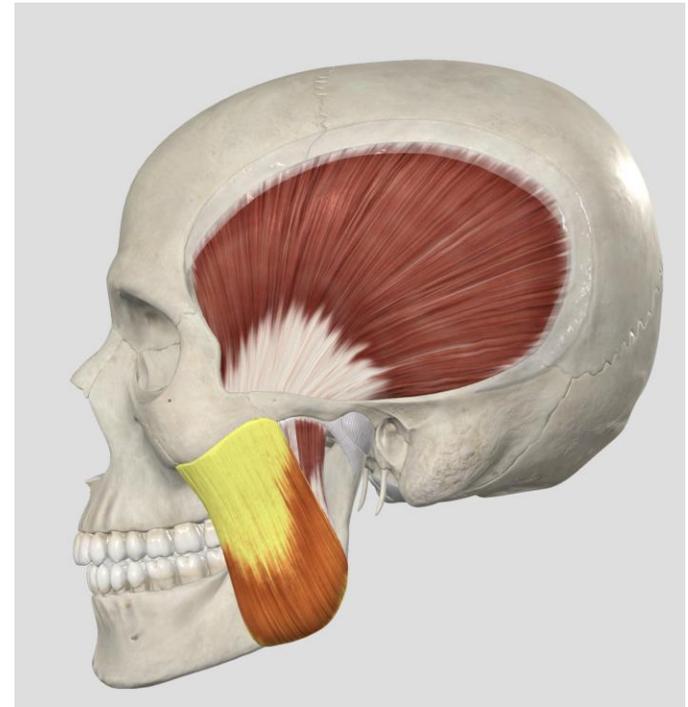
ACTION

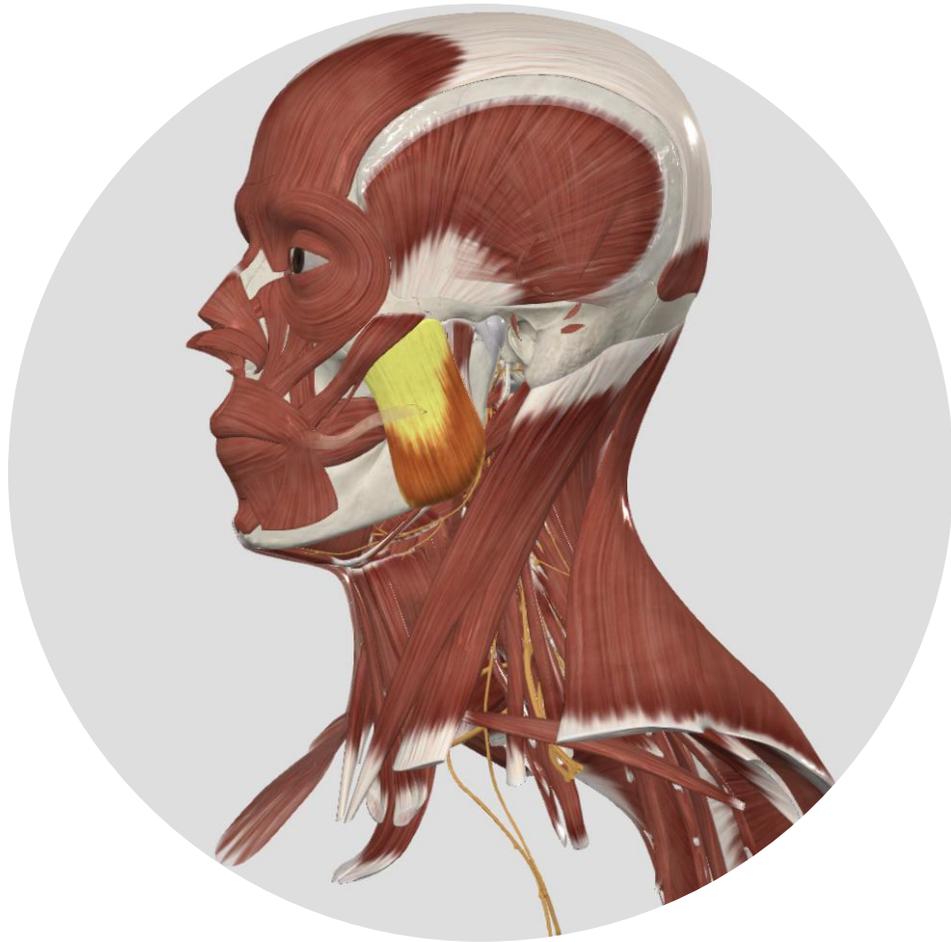
- Its primary role is to elevate the jaw and assists with protraction.
- The pound for pound strongest muscle in the body relative to its size.
- It's the primary chewing muscle.

THE MASSETER

FORCE GENERATION

- The mandibular positioning in the medial-lateral or anterior-posterior combined with generation of high forces during a protruded jaw position for incision or a lateral to medial power stroke requires the ability to activate distinct combinations of muscle patterns to accomplish the required task.
- Anteriorly directed bite forces has the highest relative muscle activation while the posterior deep muscle region has the most active compartment during different motor tasks, so the deep posterior region is most active during parafunctional activities.
- Generating a whopping average of between 300-600 Newtons in healthy adults at that posterior region.





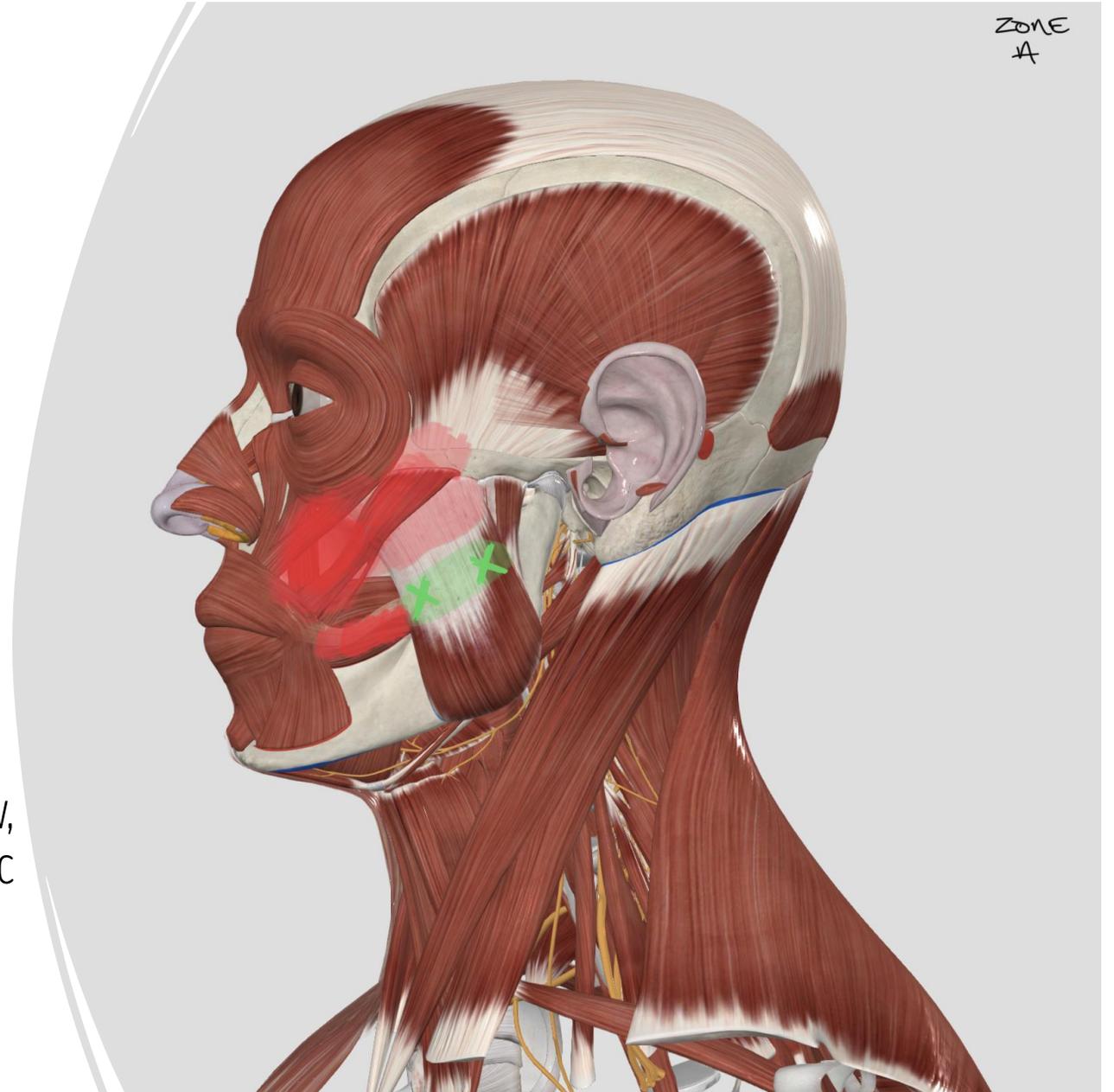
MASSETER

TRIGGER POINTS

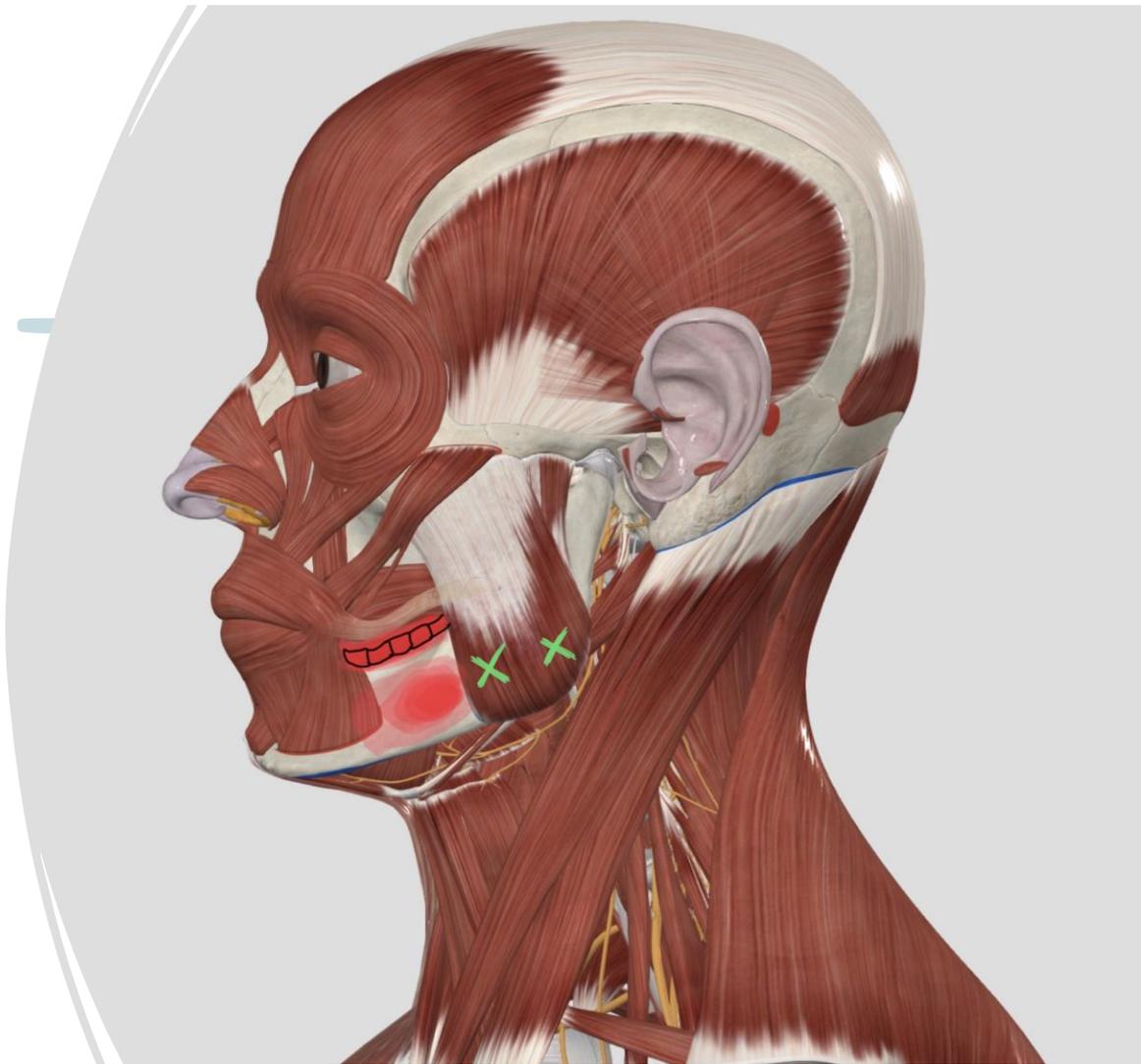
- There are four common pain referral patterns from TrP in the masseter.
- The masseter will commonly refer pain into the cheek, jaw and TMJ on the affected side.
- Some patients can report tooth ache and even tinnitus.
- Needle angle can be perpendicular, obliquely and transverse. It's possible and advisable to pick the tissue up when and where possible to needle here.
- Be cautious not to needle too deeply through the jaw and into the gum.
- Needle depth should be between 1cm-1.5cm depending on patient size and angle of needling.

THE MASSETER SUPERFICIAL LAYER

- Easily palpable tissue, Ask your Patient to clench their jaw to feel it activate.
- Always rely on palpation and not the X's as Trigger points can form anywhere within the tissue, and the X is just a representation of the region they are commonly found in.
- More commonly pain is referred to the lower jaw, molar teeth region, directly into the TMJ, and arc across the temple and above the eye on the affected side.

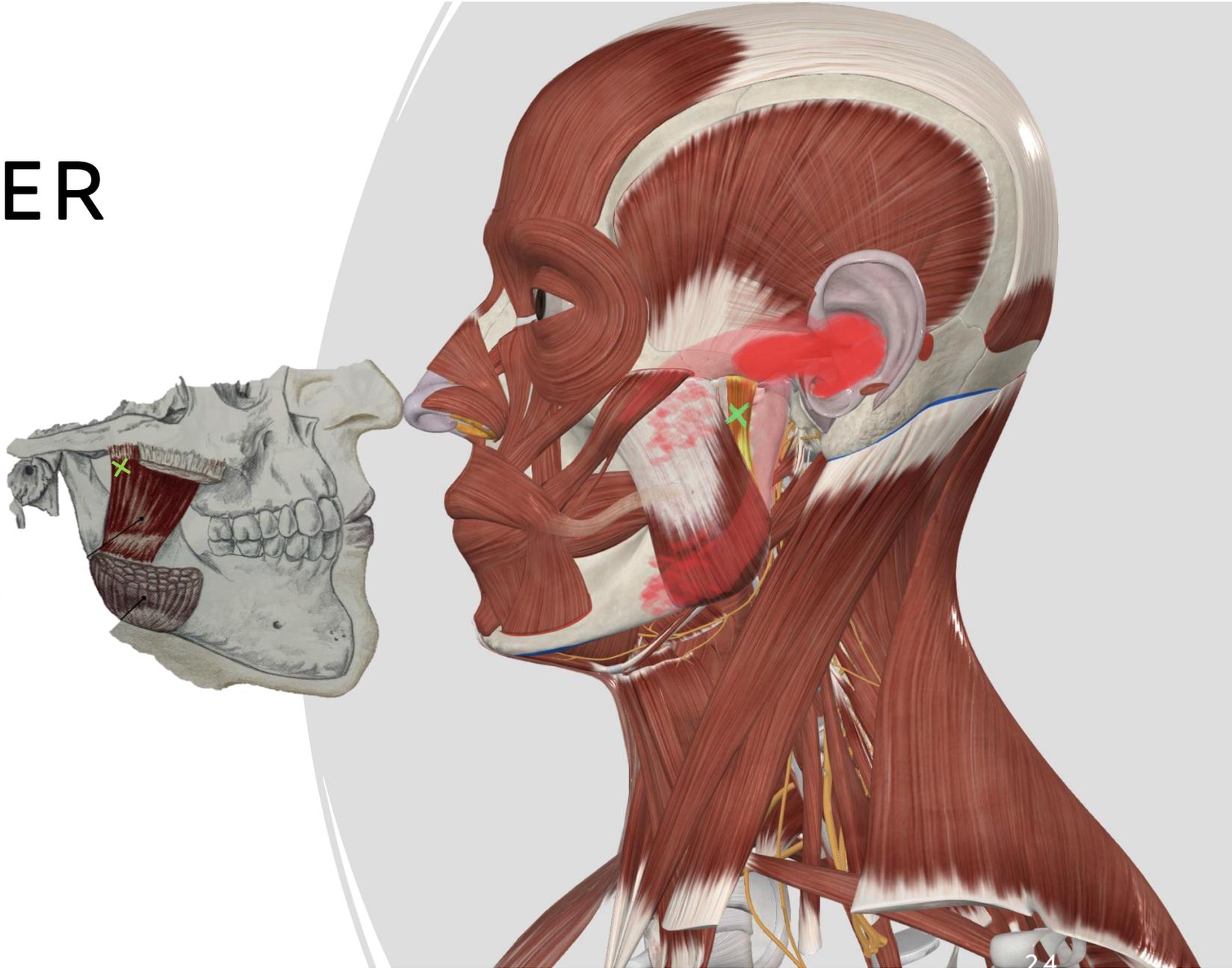


THE MASSETER SUPERFICIAL LAYER



THE MASSETER DEEP LAYER

- Pain can spread diffusely into the mid-cheek, the area of the lateral pterygoid and into the TMJ.
- Trigger points found close to the posterior zygomatic attachment may refer pain deep into the ear, this may also cause tinnitus that can be reproduced when pressure is applied to this TrP.
- This is commonly described as a “low roaring”.





TEMPORALIS

ANATOMY

Originates from the temporal Fossa of the skull, travels down the zygomatic process and attaches into the coronoid mandibular process, where it also contacts the articular disc anteriorly.

ACTION

It elevates and protrudes the mandible

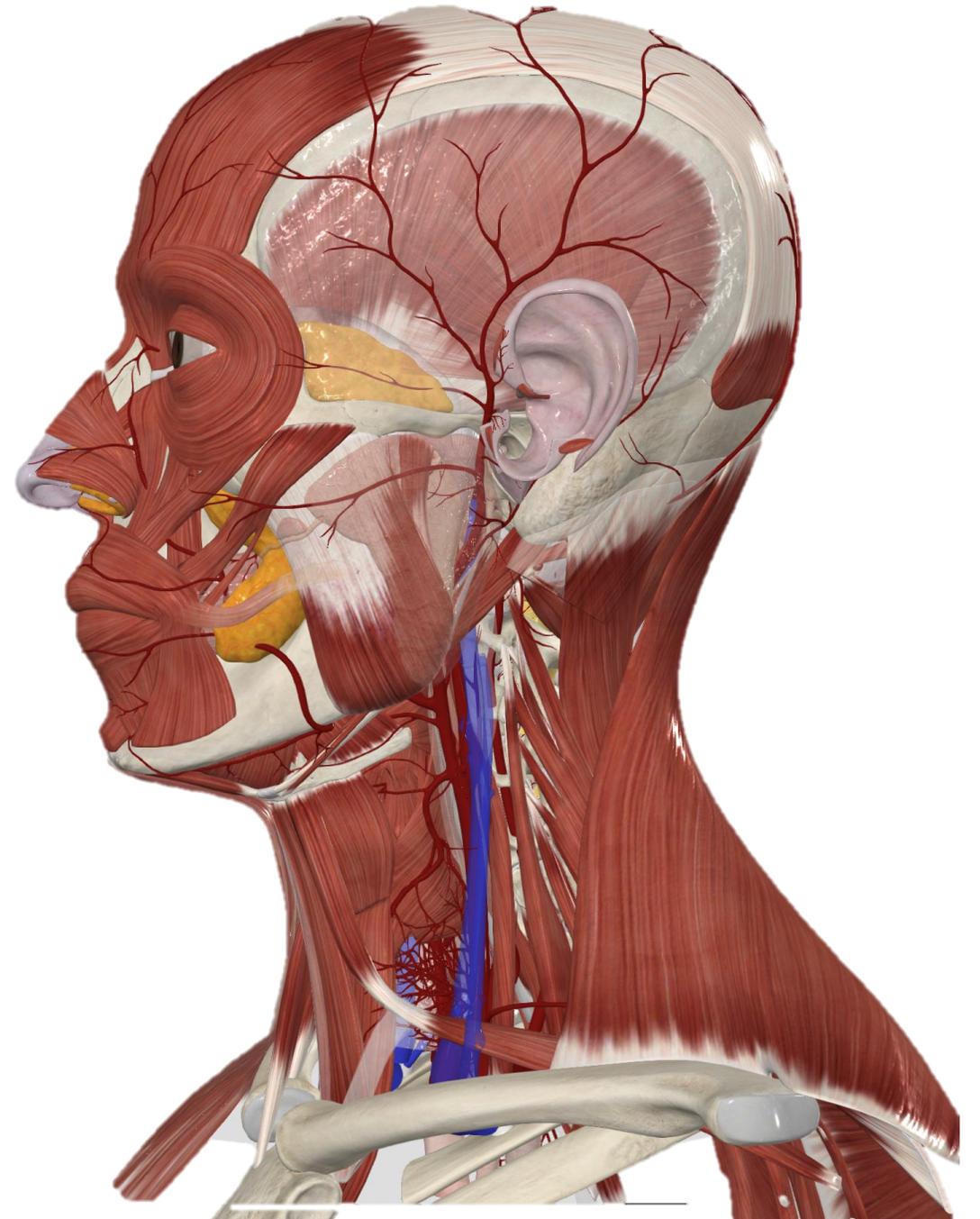
TRIGGER POINTS

Temporalis has four common referral patterns that have been documented that form in alternate locations of the muscles tissue going from anterior to posterior.

People with TRPs here can also commonly complain with headaches also.

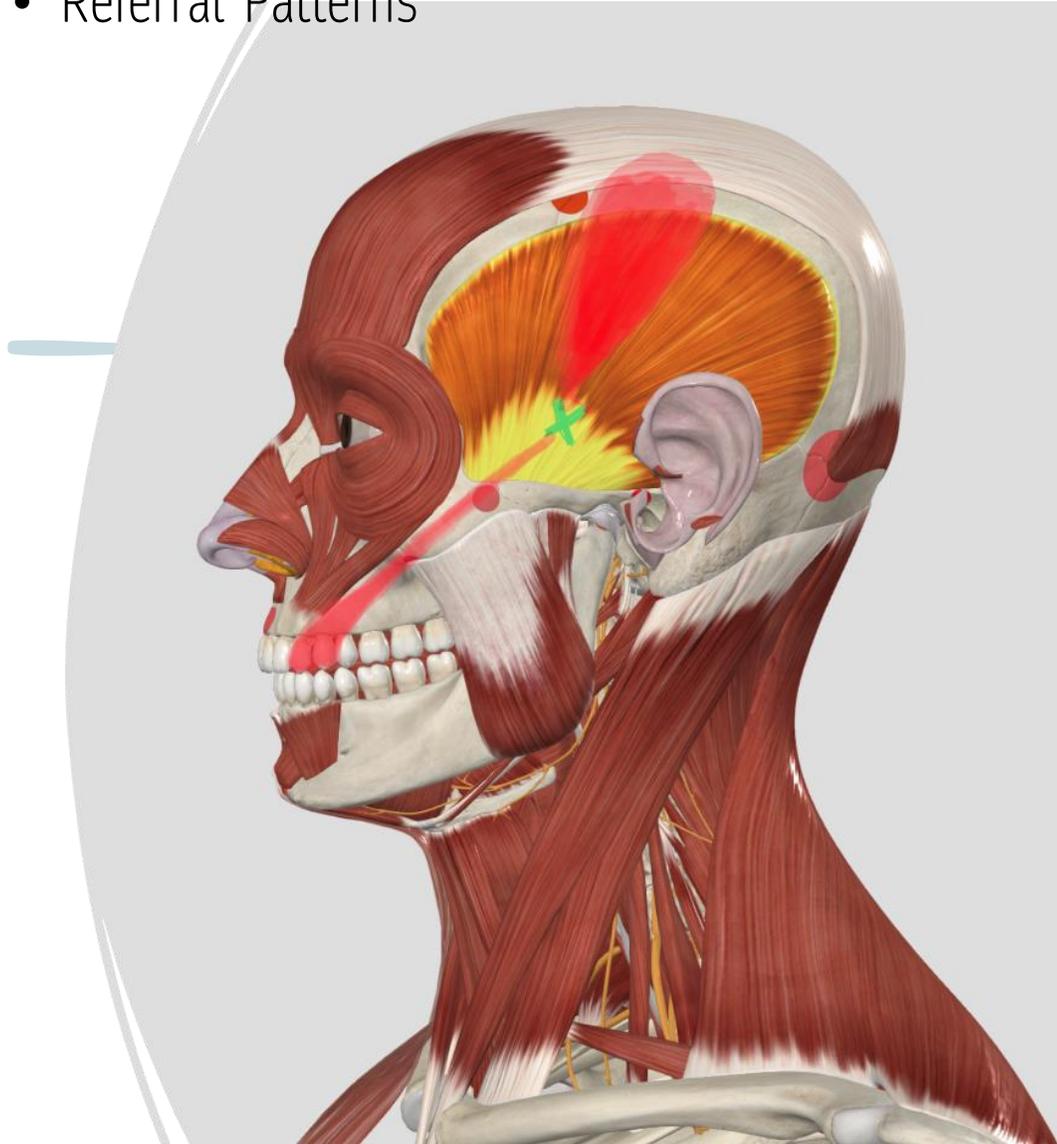
TEMPORALIS

- Be aware of the path of the temporal artery and be cautious when needling not to puncture the vessel.
- Palpation must lead your needling application, thread the needle oblique to transverse going from cross fiber to along fiber.
- Needle depth 1-2cm and .25/.30 guage
- Following are the commonly seen patterns associated with Temporalis.



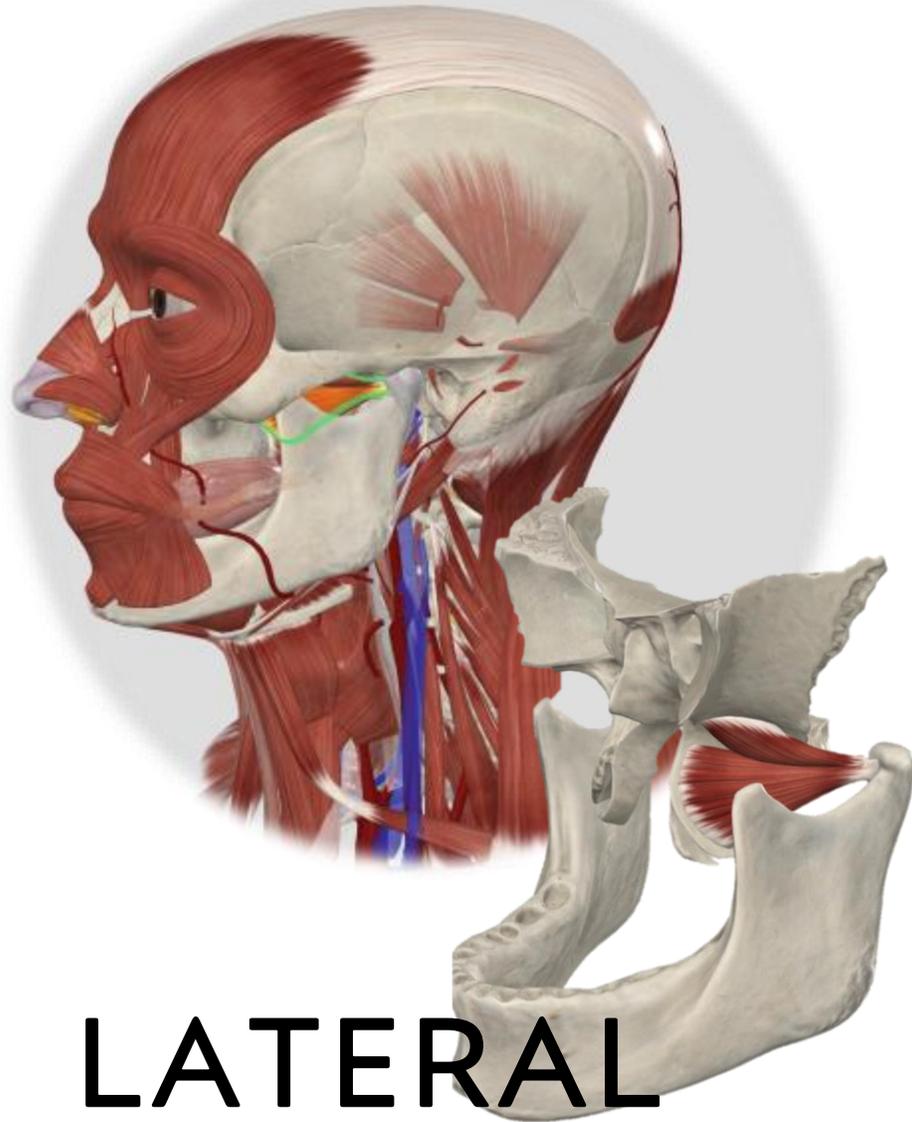
TEMPORALIS

- Referral Patterns



TEMPORALIS





LATERAL PTERYGOID

ANATOMY

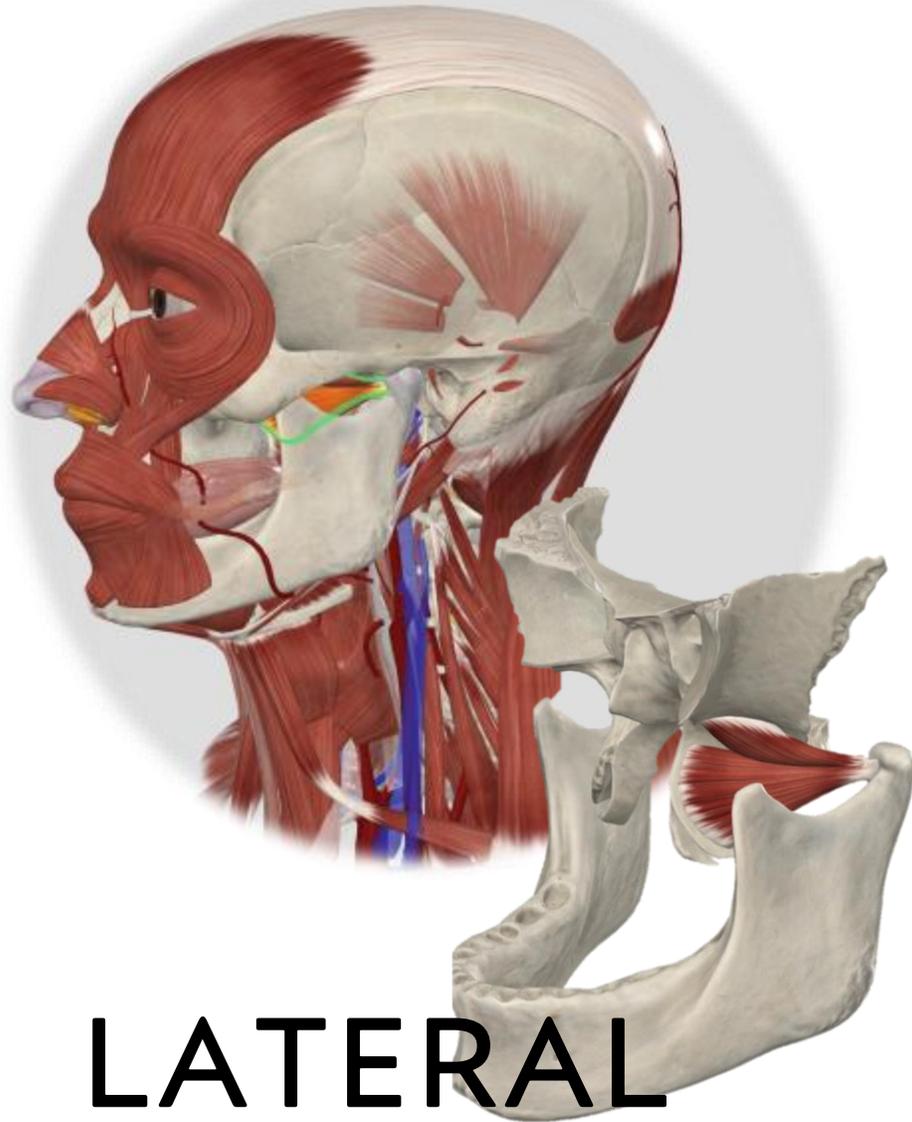
There's a superior and inferior portion with this muscle. This muscle comes from the lateral pterygoid plate of the sphenoid bone, and attaches into the articular disc and the fibrous capsule of the TMJ.

INNERVATION.

Is the lateral pterygoid nerve which comes from the trigeminal nerve via the mandibular nerve.

ACTION

With bilateral contraction it protracts the mandible and with unilateral contraction it laterally translates the mandible to the opposite side.



LATERAL PTERYGOID

ANATOMY

The anatomy of this muscle means that we have to work through the window of the TMJ or go intra-orally. Both can be beneficial.

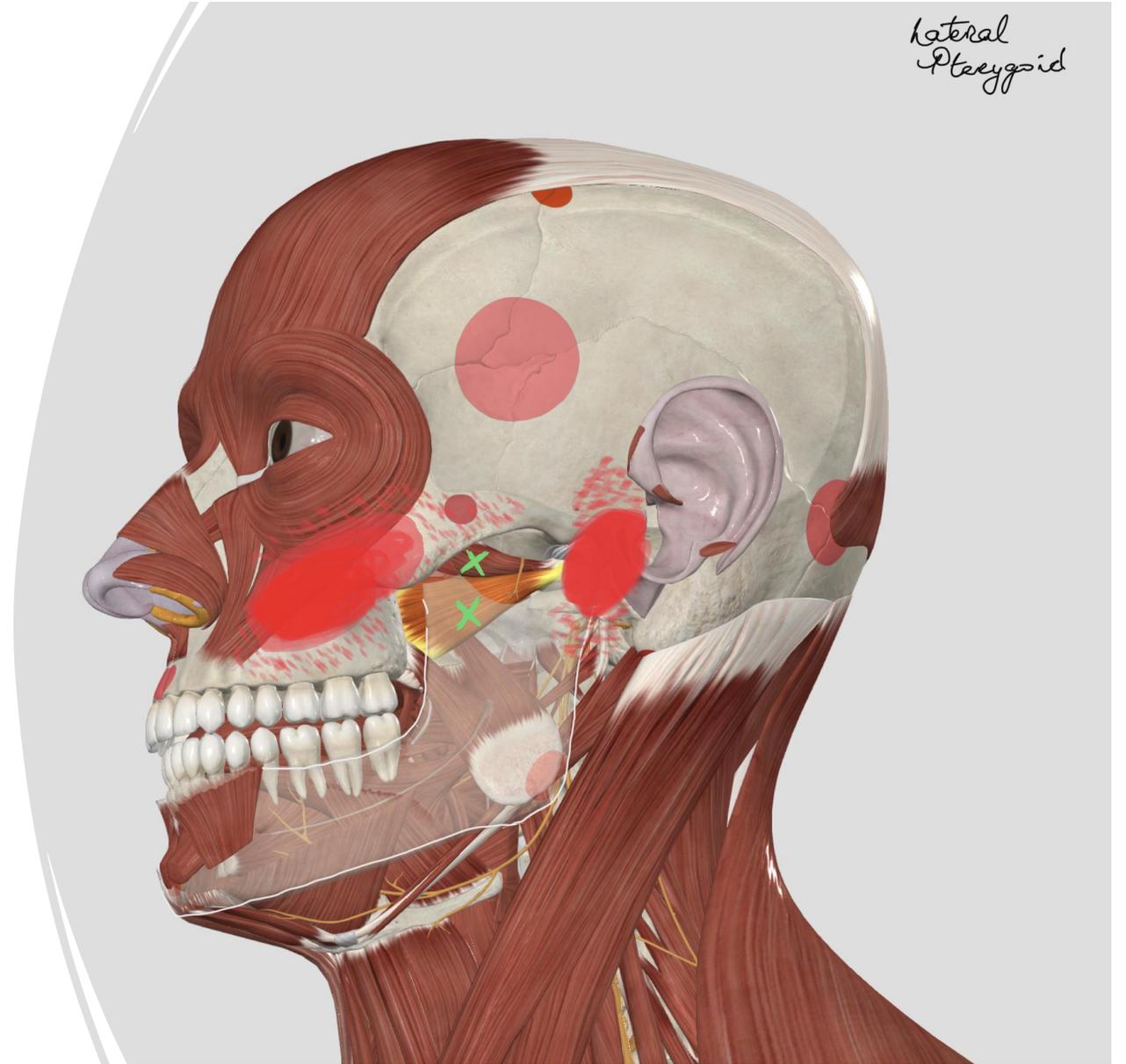
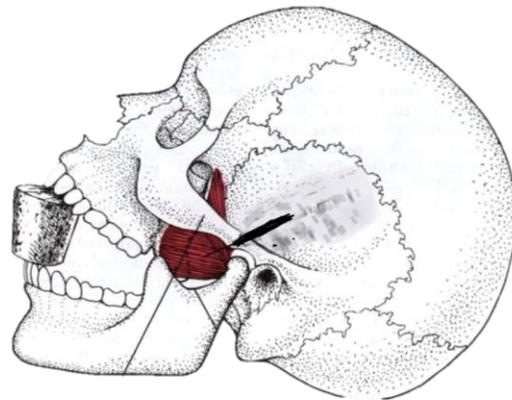
TRIGGER POINTS

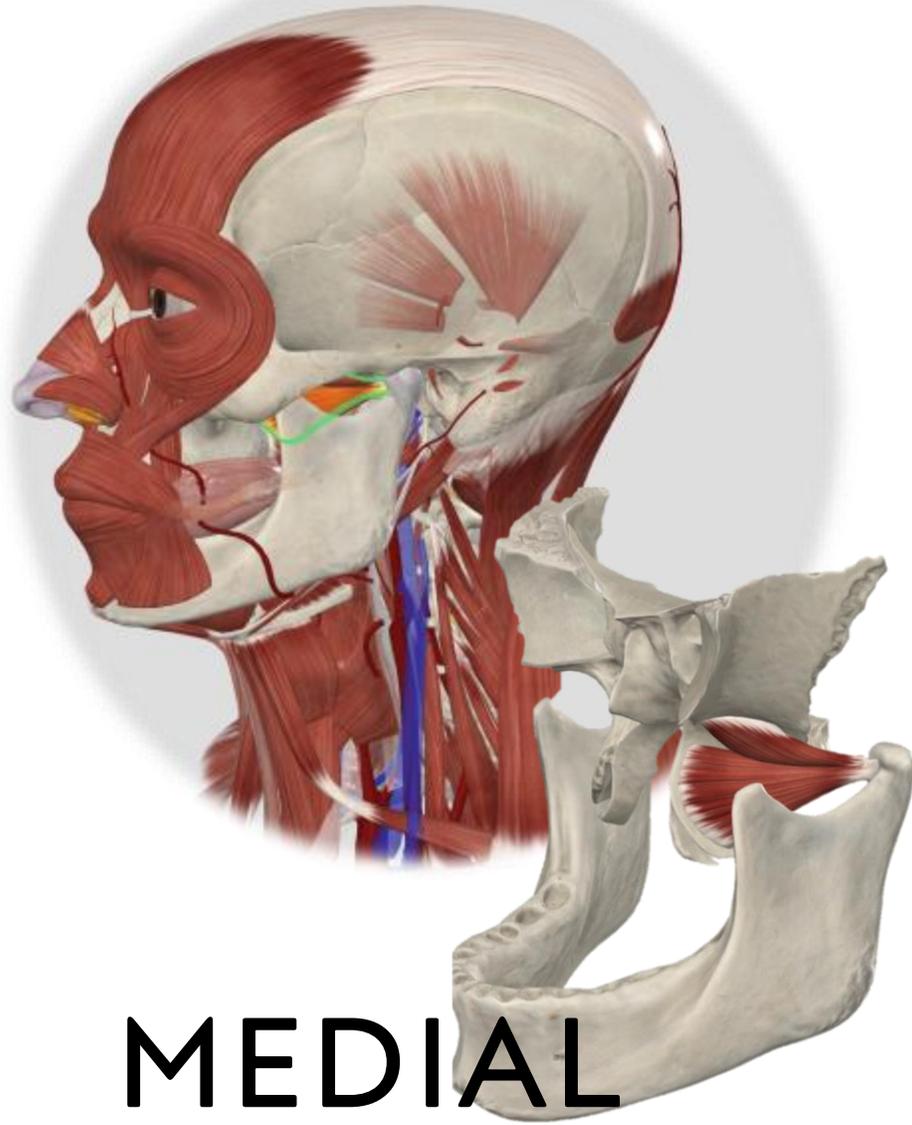
The location of this muscle makes it difficult to palpate to confirm the presence of TrP. Use clinical judgement from the information gathered to decide to treat or not.

To needle this muscle, rotate the patients head to one side. Identify the TMJ accurately, from there move anterior into the “hole” and needle into the lateral pterygoid 1cm -1.5cm

LATERAL PTYERYGOID

- To access the inferior head of the lateral pterygoid you can get the patient to open their mouth and place a tool in place to hold the mouth open and needle the inferior head.





MEDIAL PTERYGOID

ANATOMY

This muscle comes from the medial surface of the lateral pterygoid plate of the sphenoid bone. It attaches into the medial surface of the ramus of the mandible.

INNERVATION.

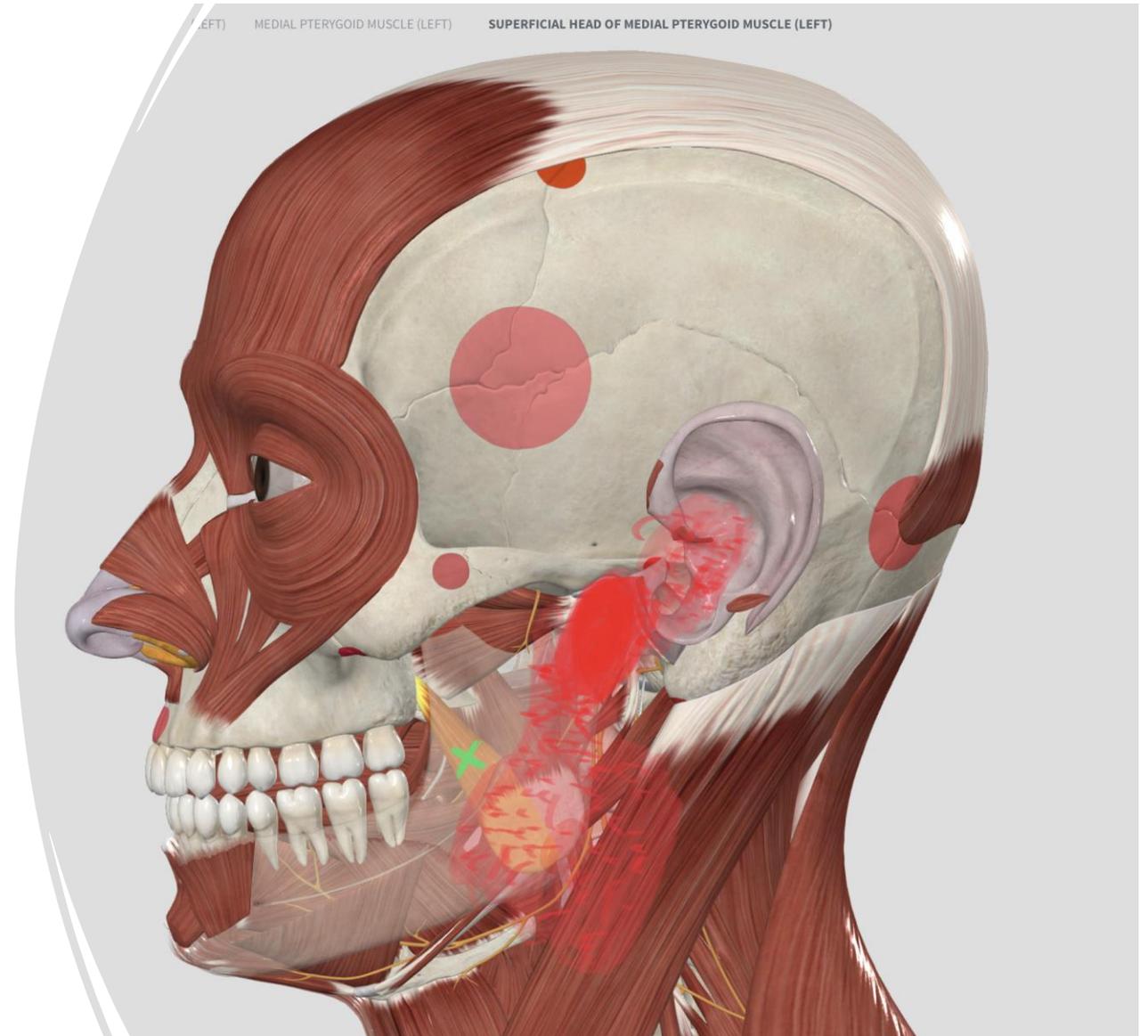
Is from the trigeminal nerve via the mandibular nerve.

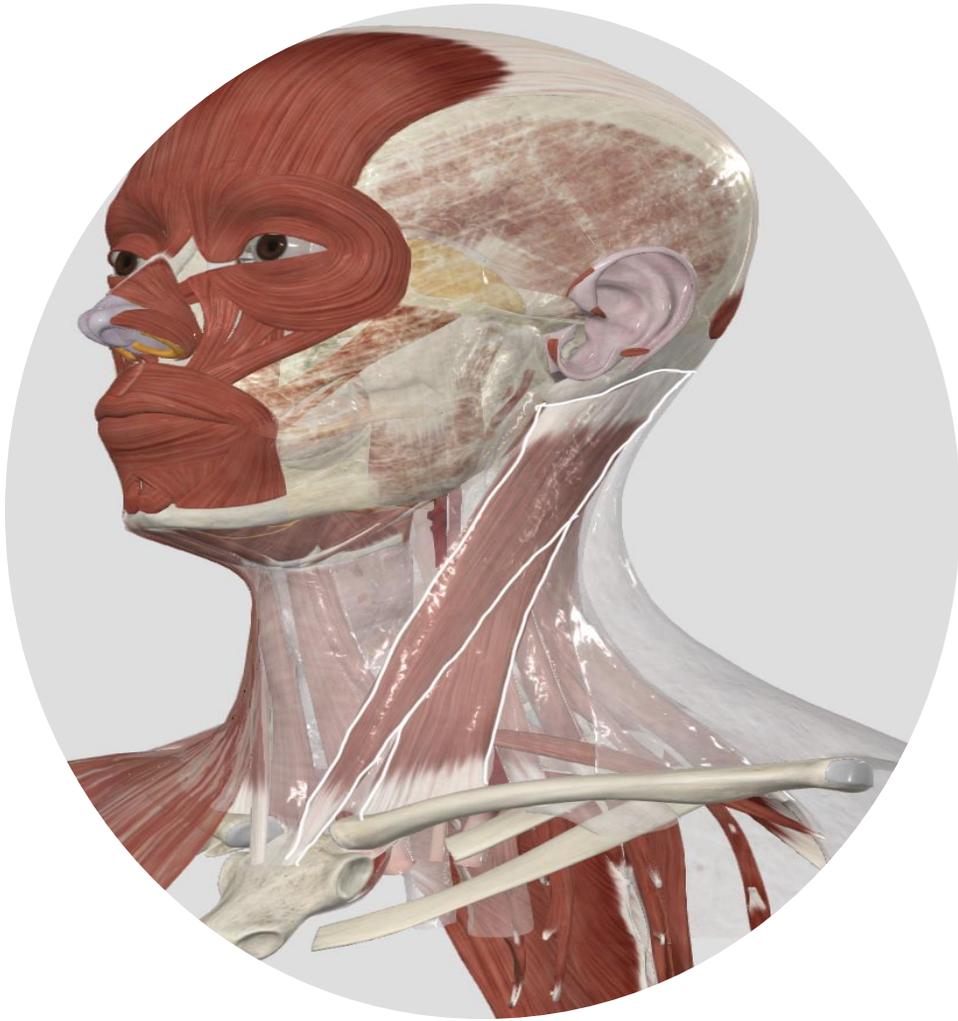
ACTION

With bilateral contraction it protracts the mandible and assists with elevation, and with unilateral contraction it laterally translates the mandible to the opposite side.

MEDIAL PTERYGOID

- Due to the location of this tissue the patient will have to be needed with their mouth open similarly to that of the inferior fibers of the lateral pterygoid.





ANATOMY

The SCM has 2 heads, the sternal head originates at the anterior surface of the manubrium and attaches into the lateral surface of the mastoid process. The clavicular head originates from the superior surface of the medial third of the clavicle and attaches into superior nuchal line of the occipital bone.

INNERVATION.

Accessory Nerve

ACTION

Lateral head flexion, cervical rotation and cervical spinal flexion.

— STERNOCLEIDOMASTOID

STERNAL HEAD SCM

- Trigger points normally form in a few areas along the path of this muscle.
- Can mimic trigeminal facial neuralgia but the differing factor is true trigeminal nerve pain won't have sternal pain.
- Unilateral deafness without tinnitus has been documented as being a symptom associated with TrP here.



CLAVICULAR HEAD SCM

- Trigger points normally form in a few areas along the path of this muscle.
- TrP in the clavicular division can have a hard effect on proprioception in functional posture and give rise to spatial disorientation. Patients have complained of postural dizziness and even a minority of vertigo.
- The SCM is safe to needle all along with a pincher grip.
- Needle depth can be 1cm – 2cm needling cross fibrous with pincher grip avoiding the external jugular vein.

