Miraculous Our Sensory World: How Do Four Anatomical Structures of Skeletal, Muscular, Nervous and Sensory Systems Work Together to see, smell, smile and taste?

Module 3-Muscular System

In the last module, we learned about the bones of the skull which set the rocky topography of the cephalic region. Overlaying this rocky terrain and attached to it is the movable vegetation, or your skeletal muscles. They are responsible for the facial expression, visual, food processing and communicating system systems. As we start at the superior-most region of the head, we see the **epicranius** with both its **frontal and occipital bellies**. Accordingly, these muscles are named after the bones from which they originate from. This muscle functions to move the scalp. Raise your eyebrows and take note that this is due to the pulling action of the frontal belly of the epicranius.

As we move anteriorly toward the face, we come across several muscles that are involved in making our facial expressions. Blink your eyes. This movement is due to the **orbicularis oculi**, which is attached to both the frontal and maxillary bones of the skull. This muscle also allows for squinting and drawing the eyebrows inferiorly. Let's move into the orbital cavity. Look around without moving your head. Look to your left and right. You are using your **lateral rectus** and **medial rectus** muscles that lie lateral and medial to the eye, respectively. Look up and down. You are using your **superior rectus** and **inferior rectus** muscles, which lie superior and inferior to the eye, respectively. When we up and down in a diagonal motion, we are using our superior oblique and inferior oblique muscles, which lie superior and inferior to the eye, respectively, and at an angle to the midline of the eye and optic nerve.

Let's continue moving inferiorly to the muscles that control mouth and lip movement. We start at muscles superior to the mouth and lateral to the nose with the **levator labii superioris**, which originates from the zygomatic and maxilla bones. This muscle functions to raise and furrow the upper lip. Lateral to this muscle lie the **zygomaticus minor** and **zygomaticus major** muscles. Both of these muscles originate from the zygomatic bone and function to raise the corners of the mouth. Smile! You just used your zygomaticus muscles. Lateral and inferior to the zygomaticus muscles and lateral to the mouth is the **risorius**. This muscle functions to tense our lips and draw them laterally. Think about all the half-smiles you give people during the day, and you'll find that this motion is due to the risorius. Deep to the risorius and zygomaticus muscles is the **buccinator**, which originates from the maxilla and mandible bones and forms the lateral walls of your oral cavity. Compress your cheeks to make a fish face. This motion is controlled by the buccinators. Moving inferior and lateral to the lips is the **depressor anguli oris**, which originates from the mandible. This muscle draws the corners of the mouth inferiorly and laterally. Think of this muscle the next time you frown at someone. Moving medially, we next come to the **depressor labii inferioris**, which also originates from the mandible. When a child draws their lips inferiorly to pout, they are using this muscle. Moving medial from the depressor labii inferioris is the **mentalis**, which also originates from the mandible. Not only does this muscle allow you to pout, it also functions to wrinkle the chin. Centered between all of the mucles that move the lips lie your **orbicularis oris**, which allows us to close, purse

and protrude the lips. The next time you pucker up to kiss someone, think of this muscle.

One last facial motion we make involves the **platysma**, which inserts onto the mandible. When we tense our neck, when we are disgusted by something, we use the platysma.

Now let's cover the muscles that move our mouth and tongue when we eat. We start with the **masseter**, which is superficial to the oral cavity, originates from the zygomatic arch and inserts on the mandible. This muscle is the prime mover of the lower jaw for you to close your jaw to chew. Superior to the masseter and originating from the temporal bone is the **temporalis**, which, along with the masseter functions to close the jaw during chewing. As we move deep into the oral cavity, we find two muscles that insert on and promote side-to-side movement of the mandible. These are known as the **lateral pterygoid** and **medial pterygoid** muscles. The medial pterygoid originates from the sphenoid, maxilla, and palatine bones, while the lateral pterygoid originates from the sphenoid bone. Staying inside our oral cavity, we find three muscles that move the tongue. The **genioglossus** originates from the mandibular symphysis of the mandible bone and functions to protract the tongue forward. When you stick your tongue out at someone, you're using your genioglossus. The **hyoglossus** originates from the hyoid bone and functions to depress the tongue inferiorly in the oral cavity. The **styloglossus** originates from the styloid process of the temporal bone and functions to retract and elevate your tongue. Feel the roof of your mouth. You are using your styloglossus to do this.

OK, we've chewed our food. But we still need to swallow it. This action requires several muscles located deep to your platysma. These muscles are either located superior to the hyoid bone (suprahyoid muscles) or inferior to the hyoid bone (infrahyoid muscles). We start with the more superficial suprahyoid muscles. The **mylohyoid** originates from mandible and inserts onto the hyoid bone. Lateral to the mylohyoid lies the **stylohyoid**, which originates from the styloid process of the temporal bone and inserts onto the hyoid bone. As we move deep to the mylohyoid, we find the **digastric**, which has two bellies that originate from the mandible and insert through a connective tissue loop on the hyoid bone. These two bellies give the digastric muscle a "V" shape under the chin. All suprahyoid muscles function to elevate the hyoid bone during swallowing. Now let's move to the infrahyoid muscles. We start with the **sternohyoid**, the medial-most and superficial muscle that originates from the sternum and inserts on the hyoid bone. Lateral to the sternohyoid is the **omohyoid**, which originates from the scapula and inserts on the hyoid bone. Deep to the sternohyoid lies the medial **thyrohyoid**, which originates from the thyroid cartilage of the larynx (or voicebox) and inserts on the hyoid bone. Lastly, we see the **sternothyroid**, which is lateral to the thyrohyoid, which originates from the sternum and inserts on the hyoid bone. All infrahyoid muscles function to depress (or lower) the hyoid bone during swallowing.

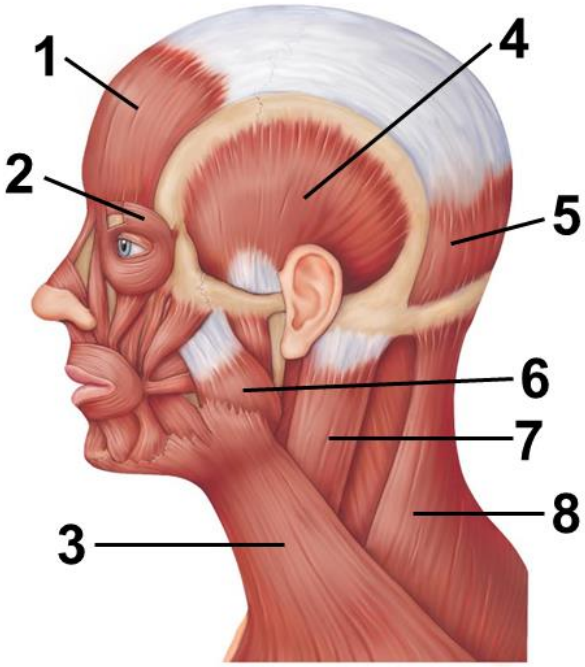
Finally, we get to the muscles that move our whole head. One of these muscles, the **sternocleidomastoid**, originates from the sternum and clavicle and inserts on the mastoid process of the temporal bone. Another, the **trapezius**, originates from the occipital bone of the skull and several vertebrae and inserts on the scapula and clavicle. Move your head in all directions (left, right, up, down, and in several combinations), and you'll know the sternocleidomastoid and trapezius are involved in these motions.

A. Muscle naming characteristics: Match the description to the muscle characteristic in the middle column.

Muscle naming characteristic	Match the description	Description/Purpose
1. Rectus 2. Major 3. Minor 4. Transversus 5. Oblique 6. Levator 7. Depressor 8. Orbicularis 9. Platy		A. Smaller muscle B. Flat muscle C. Depresses / Lowers a body part D. Muscle runs perpendicular to midline E. Circular; orb-like F. Muscle runs parallel to midline G. Raises / Elevates a body part H. Larger muscle I. Muscle runs diagonal to midline

B. Anatomical Structure: Using the Word Bank, identify the muscles numbered 1-8.

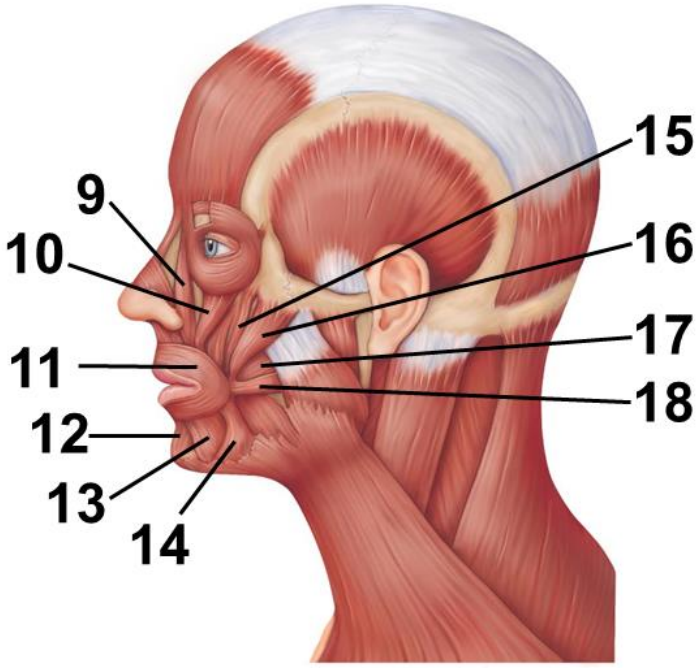
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____



Word Bank:

a. Epicranius, Frontal Belly	d. Orbicularis oris	g. Sternocleidomastoid
b. Epicranius, Occipital Belly	e. Masseter	h. Trapezius
c. Orbicularis oculi	f. Platysma	

C. Using the Word Bank, identify the muscles numbered 9-18.



9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

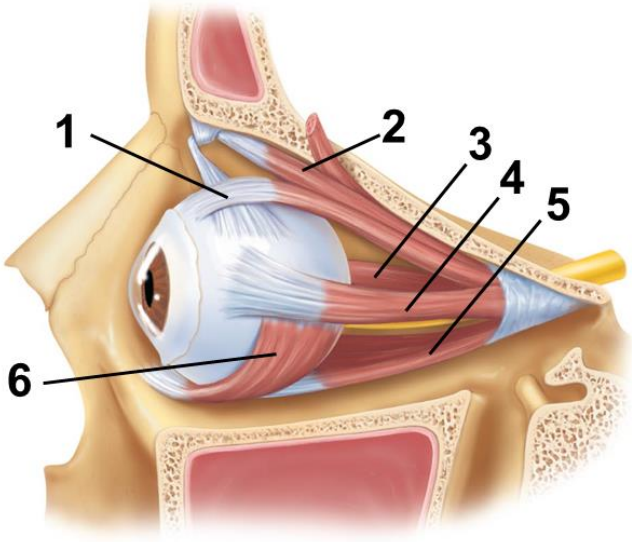
17. _____

18. _____

Word Bank:

a. Buccinatot b, Depressor labii inferiorios c. Depressor labii oris
d. Lavator labii superioris e. Mentalis f. Nasalis
g. Orbicularis oris h. Risorius i. Zygomaticus major
j. Zagomaticus minor

Using the Word Bank, identify muscles, numbered 1-6, which are involved in eye ball movement:



1. _____

2. _____

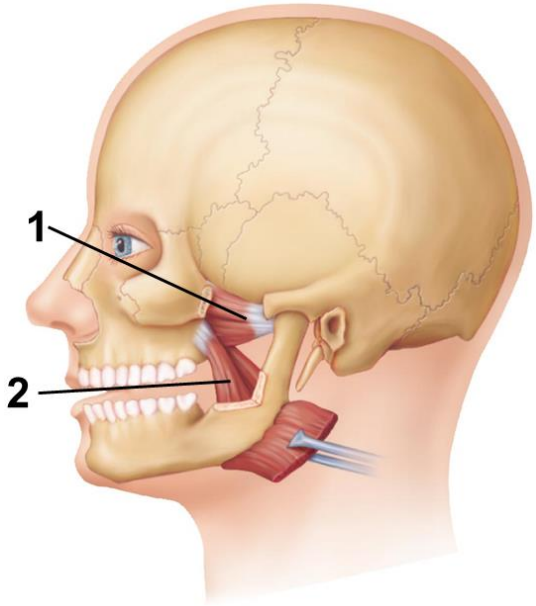
3. _____

4. _____

5. _____

6. _____

Word Bank:



a. Infereior oblique	b. Inferior rectus	c, Lateral rectus
d. Medial rectus.	e. Superior oblique	f. Superior rectus

Using the Word Bank, match muscles numbered 1-2, which are involved in moving the mandible during chewing:

1. _____

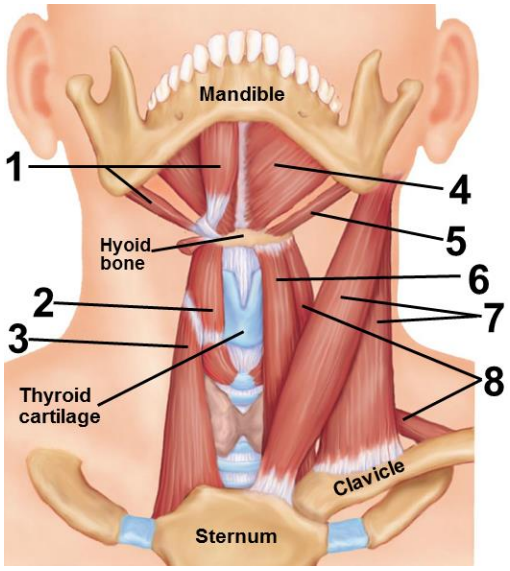
2. _____

Word Bank:

a, Lateral pterygold
b. Medial pterygold

Using the Word Bank, match muscles that move your tongue and aid in swallowing:

1. _____
2. _____
3. _____
4. _____

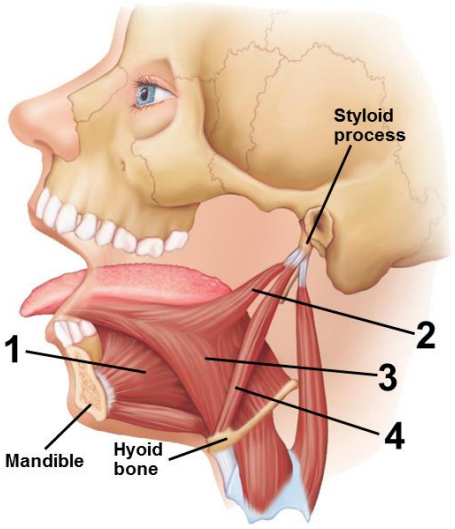


Word Bank:

a. Genioglossus b. Hyoglossus c. Styloglossus
d. Stylohyoid

Using the Word Bank, match muscles, numbered 1-9, that aid in swallowing and moving your head (Deeper muscles are on left side of image and more superficial muscles are on the right):

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____



Word Bank:

a. Digastric	b. Omohyoid	c. Mylohyoid
d. Sternodeidomastoid	e. Sternohyoid	f. Sternothyroid
g. Stylohyoid	h. Thyrohyoid	

C. Critical Thinking

1. Think about when you are talking to someone. How many muscles are you using to move your lips? Which muscles are you using?

2. We just learned a lot about muscles and what they move. We also learned that they are attached to bones. Bones have both openings and projections. What type of structures of bones are our muscles attached to? What are they not attached to?

3. The zygomaticus major and minor are lateral and superior to your lips. What bone are they attached to? Based on their position with respect to the lips, what do they cause the lips to do?

4. Many of the bones that we learned about are named from the bones that they are attached. However, this is not the case for the mentalis. What is the characteristic that the mentalis muscle is named?

5. When you are craning your neck back to look at a plane flying overhead, you are using your trapezius muscle. What bone of this skull is this muscle attached to, and which way is it pulling this bone when you are looking up in the sky?

6. Do you think skeletal head muscles need nerve impulse to do their job? If, yes, can you tell me what are the names of nerves which tell the muscles do their job?

19. Muscular System Module Review Questions

1. The Stylohyoid is a(n) _____ muscle that functions to:

   A. Infrahyoid; Elevate the hyoid bone during swallowing
   B. Suprahyoid; Elevate the styloid process during swallowing
   C. Suprahyoid; Elevate the hyoid bone during swallowing
   D. Suprahyoid; Depress the hyoid bone during swallowing

2. When we eat, we are constantly moving our cheeks, tongue, and mandible. This involves a number of muscles. Which of the following grouping of muscles is correct for moving the cheeks, tongue and mandible?

   A. Platysma, Buccinator, Oribularis Oris, Lateral pterygoid; Omohyoid
   B. Buccinator, Lateral pterygoid; Superior pterygoid; Genioglossus; Masseter
   C. Masseter; Buccinator; Risorius; Styloglossus; Omohyoid
   D. Buccinator; Temporalis; Styloglossus; Genioglossus; Medial pterygoid

3. Turn your head and your eyes to the right and look to the right. These movements involve the:

   A. Sternocleidomastoid, lateral rectus of the right eye, and medial rectus of the left eye
   B. Sternocleidomastoid, medial rectus of the right eye, and lateral rectus of the left eye
   C. Sternocleidomastoid, superior rectus of the right eye, and inferior rectus of the left eye
   D. Sternocleidomastoid, lateral pterygoid of the right eye, and medial pterygoid of the left eye

4. Muscles have both origins, which serve as the stationary bone that muscles don't move, and insertions, which are the bones that muscles do move. For the sternocleidomastoid, its origins are the _____ and _____ bones and its insertion is the _____ bone.

   A. Clavicle; Sternum; Occipital
   B. Clavicle; Sternum; Temporal
   C. Clavicle; Hyoid; Temporal
   D. Hyoid; Mandible; Occipital