

RUHANI COLLEGE | REGISTERED MASSAGE THERAPY DIPLOMA

RU RMT 02 — ANATOMY & PHYSIOLOGY 01

QUIZ 2 — MYOLOGY FOUNDATIONS

Study Guide

Covers. Lectures 18, 19, and 20 only — introduction to myology; muscles of mastication and facial expression; the hyoid region.

Not covered. The muscles of the back, trunk, and spinal column taught on Day 13 are NOT on Quiz 2.

The quiz. 19% of the course grade. 40 marks. 40 minutes of writing. Day 13, Block 1 — the same block your assignment is due.

Outcomes. CLO 7 — muscle tissue types and foundational myology terminology. CLO 8 — origin, insertion, action, and functional role. CLO 9 — movement analysis.

Emphasis. Myology foundations 30%; muscles of mastication 25%; muscles of facial expression 20%; the hyoid region 25%.

How to use this guide

Read the topic, then close the guide and answer the review questions in writing from memory. Only then check the key. Recognising a correct answer when you see it is not the same skill as producing one under time pressure, and the assessment tests the second.

The answer key at the end gives the answer and then explains why it is the answer. Read the explanation even where you were right — the reasoning is what earns marks on the applied questions, and it is what you will still have in five years when the list has gone.

Each topic ends with a short "Where students lose marks" list. Those are not generic study tips; they are the specific errors this cohort makes every intake. If you recognise yourself in one, fix it now rather than on the paper.

This is a study guide. It is not an assessment document and nothing in it is graded.

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- . Answer key and discussion

Topic 1. Muscle Tissue

You met the three muscle tissue types once already, on Day 5, alongside the four primary tissue types. This is the same material asked in more detail.

The three types

Skeletal muscle. Striated. Voluntary. Attached to the skeleton. Cells are long, cylindrical, and multinucleated. This is the tissue this course is about.

Cardiac muscle. Striated. Involuntary. Found only in the heart wall. Cells are branched, have one nucleus, and are joined end to end by intercalated discs.

Smooth muscle. Non-striated. Involuntary. Found in the walls of hollow organs and blood vessels. Cells are spindle-shaped with a single nucleus.

Two questions separate all three: is it striated, and is it voluntary? Skeletal is the only one that is voluntary. Cardiac is the only one that is striated AND involuntary. Smooth is the only one that is neither striated nor voluntary.

Characteristics of skeletal muscle

Excitability. The capacity to respond to a stimulus.

Contractility. The capacity to shorten and generate force.

Extensibility. The capacity to be stretched.

Elasticity. The capacity to return to resting length after being stretched.

Extensibility and elasticity are a pair and are easily confused. Extensibility is being stretched; elasticity is coming back.

Where students lose marks

- Grouping cardiac with smooth because both are involuntary, and thereby ignoring striation.
- Reversing extensibility and elasticity.
- Forgetting that skeletal muscle cells are multinucleated — a detail that distinguishes them from both other types.

Review questions — Topic 1

Answer these from memory, in writing, before you check the key. Recognising an answer is not the same as producing one.

- 1.1. Which muscle tissue is striated and involuntary, and where is it found?
- 1.2. Which characteristic of skeletal muscle describes its ability to return to its original length after being stretched?
- 1.3. Give two structural features that distinguish skeletal muscle cells from cardiac muscle cells.

Topic 2. Attachments: Tendon, Aponeurosis, Origin, and Insertion

The definition of origin taught here is not the one most students arrive with. Read this topic carefully.

Connective tissue attachments

Tendon. A cord-like band of dense regular connective tissue attaching muscle to bone.

Aponeurosis. A flat, sheet-like tendon. It attaches muscle to bone or to another muscle, and spreads the pull over a broad area rather than concentrating it at a point. The palmar aponeurosis is the worked example.

Ligament. Attaches bone to bone. It is not a muscle attachment, and it appears as a distractor.

Origin and insertion

Origin. The MORE FIXED or more stable of a muscle's two attachments.

Insertion. The MORE MOBILE of the two attachments.

Notice what these definitions do not say. They do not say proximal and distal. Origin is often the proximal attachment, and that is a useful rule of thumb, but it is not the definition — and the difference matters, because the roles can reverse.

When the usual insertion becomes the fixed point, the usual origin becomes the thing that moves. The suprahyoid muscles are the clearest example in this quiz: with the mandible fixed, they elevate the hyoid; with the hyoid fixed, they depress the mandible. The muscle has not changed. What changed is which end was held still.

Where students lose marks

- Defining origin as "the proximal attachment." This is the single most common error in the topic and it is not accepted.
- Describing an aponeurosis as a kind of ligament, or a ligament as a muscle attachment.
- Treating origin and insertion as permanent labels rather than as a description of what is fixed in a given movement.

Review questions — Topic 2

Answer these from memory, in writing, before you check the key. Recognising an answer is not the same as producing one.

- 2.1. Define origin and insertion, and state one circumstance in which the roles reverse.
- 2.2. What does an aponeurosis do that a cord-like tendon cannot?
- 2.3. Why is "origin is the proximal attachment" not an acceptable definition?

Topic 3. Types of Muscular Action

Eccentric contraction is the highest-yield idea in this lecture. It is also the one most often described wrongly.

Concentric. The muscle develops tension and SHORTENS. It is producing the movement. Lifting a weight.

Eccentric. The muscle develops tension and LENGTHENS under load. It is controlling and decelerating the movement, not producing it. Lowering a weight slowly.

Isometric. The muscle develops tension and does NOT change length. No joint movement occurs. Holding a weight still; standing upright.

The word to keep out of your description of an eccentric contraction is "relaxing." The muscle is working hard. If it relaxed, the weight would drop. What distinguishes eccentric work is that the external load exceeds the force the muscle produces, so the muscle lengthens while still developing tension — which is exactly why it can lower a load under control.

Isometric work is invisible, which is why it is underestimated. Postural muscles work isometrically for hours, and a therapist standing at a table is doing isometric work in the legs and trunk throughout a treatment.

Where students lose marks

- Describing eccentric contraction as the muscle "relaxing," or as gravity doing the work.
- Assuming that if no movement occurs, no muscle is working. That describes isometric contraction, in which a great deal of work occurs.
- Forgetting that concentric, eccentric, and isometric are descriptions of what the muscle is doing, not of what the person is doing.

Review questions — Topic 3

Answer these from memory, in writing, before you check the key. Recognising an answer is not the same as producing one.

- 3.1. A person lowers a heavy box slowly and with control. What are the elbow flexors doing, and what type of contraction is that?
- 3.2. Distinguish an isometric contraction from muscular relaxation.
- 3.3. Give one example each of a concentric, an eccentric, and an isometric contraction from everyday activity.

Topic 4. Roles of Muscles and Leverage

Roles are relative to the movement. They are not permanent labels attached to particular muscles.

The four roles

Agonist (prime mover). The muscle chiefly producing the movement.

Antagonist. The muscle opposing the agonist. It controls and decelerates the movement rather than fighting it.

Synergist. A muscle assisting the agonist, often by cancelling an unwanted secondary action.

Fixator (stabilizer). A muscle holding the agonist's origin steady so that the agonist can act efficiently.

Change the movement and the roles change. In elbow flexion, biceps brachii is the agonist and triceps brachii is the antagonist. In elbow extension, triceps is the agonist and biceps is the antagonist. The same two muscles, opposite labels — because the labels describe the movement, not the muscles.

This is why an examination question will always specify the movement before asking for a role, and why an answer such as "biceps is the agonist" with no movement named earns nothing.

Leverage

Fulcrum. The joint.

Lever. The bone.

Effort. The force supplied by the muscle.

Resistance (load). The body part being moved, plus any external load.

Lever classes are distinguished by the arrangement of those four elements. What matters for this quiz is that you can identify which anatomical structure plays each role, and that you understand mechanical advantage: a longer effort arm makes a movement easier; a longer resistance arm makes it harder but produces more speed and range at the far end.

Where students lose marks

- Treating agonist and antagonist as fixed properties of particular muscles.
- Naming a role without reference to a movement.
- Confusing the fulcrum with the muscle. The fulcrum is the joint; the muscle supplies the effort.
- Describing the antagonist as "the muscle that stops the movement." It controls and decelerates; it does not prevent.

Review questions — Topic 4

Answer these from memory, in writing, before you check the key. Recognising an answer is not the same as producing one.

- 4.1. Name the four roles a muscle can play during a movement.
- 4.2. Give one movement in which biceps brachii is the agonist and one in which it is the antagonist.
- 4.3. In the lever systems of the body, which anatomical structure is the fulcrum, and which supplies the effort?
- 4.4. What does a fixator do?

Topic 5. Muscles of Mastication

Four muscles. Three of them close the jaw. One does not, and that one is the examination item.

Every origin and insertion in this topic was a bony landmark you learned in the skeletal strand. If a landmark is insecure, go back to it before trying to learn the muscle.

The four

Temporalis. Origin: temporal fossa and temporal lines. Insertion: coronoid process and anterior border of the ramus of the mandible. Action: elevates AND RETRACTS the mandible. Palpable on your own temple during a light clench.

Masseter. Origin: zygomatic arch. Insertion: angle and lateral surface of the ramus of the mandible. Action: elevates the mandible, powerfully. Palpable on your own cheek during a light clench.

Medial pterygoid. Origin: medial surface of the lateral pterygoid plate of the sphenoid. Insertion: medial surface of the ramus and angle. Action: elevates; assists protraction and lateral deviation. Not palpable.

Lateral pterygoid. Origin: greater wing and lateral pterygoid plate of the sphenoid. Insertion: neck of the mandible and the articular disc of the temporomandibular joint. Action: PROTRACTS the mandible; assists depression; lateral deviation. Not palpable.

The two things to hold

First: temporalis and masseter both elevate, so elevation cannot separate them. Only temporalis retracts. That is the discriminator.

Second: the lateral pterygoid is the odd one out of the four. The other three close the jaw; the lateral pterygoid protracts it and assists opening. It is routinely missed precisely because it is taught inside a group whose defining action it does not share.

A useful pairing: the medial pterygoid and the masseter form a sling around the ramus of the mandible — the medial pterygoid on the inner surface, the masseter on the outer. Together they produce powerful elevation.

Where students lose marks

- Conflating temporalis and masseter because both elevate. Retraction separates them.
- Missing the lateral pterygoid's protraction role because it sits in a group of elevators.
- Reversing the medial and lateral pterygoids. Medial is on the medial surface of the ramus; lateral attaches to the neck of the mandible and the articular disc.
- Assigning the masseter's origin to the temporal fossa, which is the temporalis.

Review questions — Topic 5

Answer these from memory, in writing, before you check the key. Recognising an answer is not the same as producing one.

- 5.1. Which action distinguishes the temporalis from the masseter?
- 5.2. State the origin and insertion of the masseter.
- 5.3. Which muscle of mastication protracts the mandible and assists in opening the jaw, and why is this significant?
- 5.4. The medial pterygoid and the masseter are described as forming a sling. Explain what this means and what it produces.

Topic 6. Muscles of Facial Expression

These muscles break the rule you just learned about origins and insertions. That is the point of the topic.

The defining feature

The muscles of facial expression insert into the SKIN and superficial fascia of the face rather than into bone. They do have bony origins — so it is wrong to say they have no origin — but their insertion is soft tissue, and that single fact has consequences.

Because there is no bony insertion and no joint crossed, the action of a facial muscle cannot be stated as a movement at a joint in the way it can for a typical skeletal muscle. The muscle moves skin. That is why facial expression is possible at all, and why the classical origin–insertion–action model fits these muscles poorly.

By region

Scalp. Occipitofrontalis — elevates the eyebrows and wrinkles the forehead.

Orbit. Orbicularis oculi — closes the eyelids.

Mouth. Orbicularis oris — closes and purses the lips. Zygomaticus major — draws the angle of the mouth superolaterally, the muscle of smiling. Zygomaticus minor and levator labii superioris — elevate the upper lip. Depressor anguli oris — draws the angle of the mouth inferiorly. Mentalis — elevates and protrudes the lower lip. Buccinator — compresses the cheek against the teeth.

Neck. Platysma — tenses the skin of the neck and draws the angle of the mouth inferiorly.

Buccinator sits awkwardly. It is a muscle of facial expression by grouping, but it acts on the oral cavity and assists chewing by keeping food between the teeth. Both classifications are defensible; know that it is taught in the facial expression group.

The way to learn this topic is not by list. Perform the expression in a mirror, then name the muscle that produced it. The names are largely descriptive once you know the region.

Where students lose marks

- Saying these muscles "have no origin." They have bony origins; it is the insertion that is unusual.
- Attempting to state a facial muscle's action as a joint movement. There is no joint.
- Confusing orbicularis oris with orbicularis oculi. Oris is the mouth, oculi is the eye.
- Assigning buccinator to the muscles of mastication in an examination that has grouped it with facial expression.

Review questions — Topic 6

Answer these from memory, in writing, before you check the key. Recognising an answer is not the same as producing one.

- 6.1. What structural feature distinguishes the muscles of facial expression from most other skeletal muscles?
- 6.2. Explain why the classical origin–insertion model describes these muscles poorly.
- 6.3. Name two muscles of facial expression and state one action of each.
- 6.4. What does the buccinator do, and why is its classification ambiguous?

Topic 7. The Hyoid Region

One bone with no bony articulation, held in place by two opposing muscle groups. The concept is more useful than any single muscle.

The hyoid bone

The hyoid has a body and greater and lesser horns. Its defining feature is that it articulates directly with NO other bone. It is suspended in the anterior neck by muscles and ligaments, and it is held in position by the balanced pull of the suprahyoid group above and the infrahyoid group below.

The suprahyoid group — above the hyoid

Mylohyoid. Mylohyoid line of the mandible to the body of the hyoid and a median raphe. Elevates the hyoid and the floor of the mouth; depresses the mandible when the hyoid is fixed.

Geniohyoid. Inferior mental spine of the mandible to the body of the hyoid. Elevates and draws the hyoid anteriorly; depresses the mandible when the hyoid is fixed.

Stylohyoid. Styloid process of the temporal bone to the body of the hyoid. Elevates and retracts the hyoid.

Digastric. Two bellies joined by an intermediate tendon. Posterior belly from the mastoid notch; anterior belly from the digastric fossa of the mandible. Elevates the hyoid; depresses the mandible.

The infrahyoid group — below the hyoid

Sternohyoid. Manubrium and medial clavicle to the body of the hyoid. Depresses the hyoid.

Omohyoid. Superior border of the scapula to the hyoid, by way of an intermediate tendon. Depresses and retracts the hyoid. The second two-bellied muscle of the region.

Sternothyroid. Manubrium to the oblique line of the thyroid cartilage. Depresses the larynx and thyroid cartilage.

Thyrohyoid. Oblique line of the thyroid cartilage to the body and greater horn of the hyoid. Depresses the hyoid; elevates the larynx when the hyoid is fixed.

The concept

The two groups are an opposing pair with a floating bone between them. Suprahyoids pull up; infrahyoids pull down. Either group can fix the hyoid so that the other can act on the mandible or the larynx. That reciprocal arrangement makes the hyoid a mobile anchor, and it is what permits the coordinated hyoid movement of swallowing and speech.

The practice consequence: in a forward head posture, the resting length of these muscles changes. That is the link worth carrying out of this topic.

Safety

The anterior neck is instructor-demonstrated on a model only. You do not palpate a partner's anterior neck in this course. Watch the hyoid move during a swallow; do not feel for it on anyone else.

Where students lose marks

- Believing the hyoid articulates with the mandible or the skull. It articulates with nothing.
- Answering a positional statement — "one is above and one is below" — when asked for the functional relationship. That restates the names.
- Confusing thyrohyoid with sternothyroid. Both involve the thyroid cartilage: thyrohyoid runs cartilage to hyoid; sternothyroid runs sternum to cartilage. Read the direction.
- Forgetting that the omohyoid, like the digastric, has two bellies and an intermediate tendon.

Review questions — Topic 7

Answer these from memory, in writing, before you check the key. Recognising an answer is not the same as producing one.

- 7.1.** What is unique about the hyoid bone, and what holds it in position?
- 7.2.** Explain the functional relationship between the suprahyoid and infrahyoid groups.
- 7.3.** When the hyoid is fixed by the infrahyoid muscles, what will contraction of the suprahyoid muscles do?
- 7.4.** Apart from the digastric, which muscle of the hyoid region has two bellies joined by an intermediate tendon?
- 7.5.** Distinguish the thyrohyoid from the sternothyroid.