Unit 2: Tissues

Lesson 7: *Muscle tissue (Part 1)*

Activity 1 (20'): Muscle tissue introduction

 Watch the following video https://www.youtube.com/watch?v=rMcg9YzNSEs first individually and then in pairs answer these questions

1. How many muscles are there in a human body?
2. What are the main functions of the muscular system?
3. How are nervous tissue and muscle tissue interrelated, and why are they important to animals?
4. What are the major properties of muscle tissue?
5. What is the difference between involuntary and voluntary muscles?

Activity 2 (30'): Types of muscle tissue

Step 1 (15'). Read the text.

Text adapted from https://www.kenhub.com/en/library/anatomy/types-of-muscle-cells

Muscle cells, known as myocytes, are the cells that form muscle tissue. There are 3 types of muscle cells in the human body: cardiac, smooth, and skeletal. Cardiac and skeletal myocytes are also known as muscle fibers because of their fibrous and long shape.

Smooth muscle is made up of cells that contain a single nucleus. The cells adhere together and are connected by specialized cell junctions: gap junctions. The cells are spindle shaped, and they have a central nucleus. Their appearance is not striated, because the two contractile proteins actin and myosin are randomly arranged.

Smooth muscles have many functions since they cover internal organs, such as the digestive tract in which they move food along it, or pulling hair erect in response to temperature changes or fear. Moreover they are found around ducts or blood vessels, lying within the basement membrane. When smooth cells contract, they squeeze the ducts, allowing to expel the contents.

The smooth muscle contraction is slow and with low force. All cells within a whole smooth muscle mass contract together. The autonomic nervous system, hormones and local metabolites can influence its contraction. Since it is not controlled consciously, it is an involuntary muscle.

Cardiac muscle shows some characteristics of both skeletal and smooth muscle. Like skeletal muscle, cardiac muscle produces strong contractions, but it has continuous contraction like smooth muscle. The rate and force of contraction is not subject to voluntary control, but is influenced by the autonomic nervous system and hormones.

Cardiac muscle looks striated like the skeletal muscle since its arrangement of contractile proteins. The fibers of cardiac muscle branch at the ends to form connections with multiple adjacent cells, resulting in a complex, three-dimensional network. Cardiac muscle fibers are long cylindrical cells with one or two nuclei. The nuclei are centrally situated like that of smooth muscle.

Cardiac muscle sarcoplasm has a lot of mitochondria since a lot of energy is required to permits the heart to work.
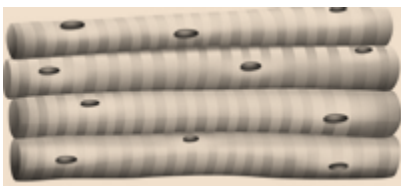
Skeletal muscle cells make up the muscle tissues connected to the skeleton and are important in locomotion, but is also found in organs such as the globe of the eye and the tongue.

It is under our control thus is a voluntary muscle. Skeletal muscle is specialized for rapid and forceful contraction of short duration.
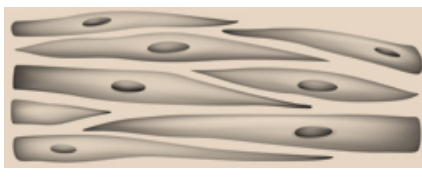
The terms used to describe the components or structures of skeletal muscle cells are: sarcolemma that is the plasma membrane of skeletal muscle; sarcoplasm which is its cytoplasm; the sarcoplasmic reticulum is the endoplasmic reticulum.

Each muscle cell is defined by a sarcolemma and many nuclei are arranged around the edge within a cross section of the sarcoplasm. A large number of longitudinal myofibrils, groups of arranged contractile proteins, occupy most of the center space. They also contain many mitochondria, since they need a lot of energy.
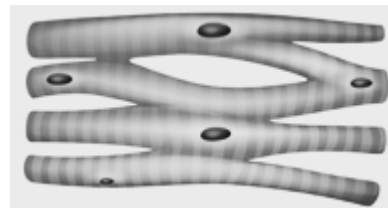
Step 2 (15'): In pairs, label the images and complete the grid

A:_____   B:_____   C:_____

Images modified from "https://kidsbiology.com/human-biology/types-of-muscles/"

Muscle type	Striated	Cardiac	Smooth
Location			
Function			
Voluntary/Involuntary mode			
Shape and characteristics			
Contraction mode			

Assessment

Each completed box is 1 pt.

15 pt= 9 grade
13-14 pt= 8.5
12 pt= 8
11pt= 7.5
10pt =7
9 pt= 6
6-8pt= 5
3-5pt= 4.5
0-3pt= 4