

Advanced Biology

Advanced Biology Sample Lab Report

The following lab report was submitted from a student in our Apologia Online Academy class.

A Closer Look at Cancellous and Compact Bone Tissue

By Svieta

Advanced Biology Experiment 4.2

I. Introduction:

The skeletal system is one of the eleven organ systems of the human body. It provides the human body with support, protection, movement, storage of minerals, and the manufacturing of blood cells. Bones composed of connective tissue make up the contents of the skeletal system. Since tissues belong to the microscopic world, scientists must utilize the microscope in order to study them. The purpose of this experiment is to explore two types of bone tissue: cancellous bone tissue and compact bone tissue. When viewed under the microscope, cancellous bone tissue will appear spongy, while compact bone tissue will appear dense.

II. Materials

- Microscope (American Optical Corporation)
- Prepared slide: bone marrow, red (Nature's Workshop Plus!)
- Prepared slide: dried human bone tissue (Nature's Workshop Plus!)

III. Procedure

1. The red bone marrow slide was placed under the microscope.
2. The slide was viewed under magnifications of 40x, 100x, and 400x, accordingly.
3. Under 400x magnification, the observations were recorded via a drawing.
4. The red bone marrow slide was removed from the microscope ledge and replaced by the dried human bone tissue slide.
5. This slide was viewed under magnifications of 40x, 100x, and 400x, accordingly.
6. Under 400x magnification, the observations were recorded via a drawing.
7. Everything was put away.

Advanced Biology

IV. Results:

The red bone marrow slide was a cross section of cancellous bone, so the tissue resembled a sponge – soft looking tissue with hollows all throughout the cross section. On this slide, the following structures were observed: bone marrow cells (red dots), osteocytes (purple blobs), lacunae (white circles), and the trabeculae which is the matrix of the cancellous bone (pinkish). The dried human bone tissue slide contained compact bone tissue. On this slide, the following structures were observed: osteons (cylinders), lacunae (black ovals), the canaliculi (the hair-like extensions of the lacunae), the central canal (tubes projecting from osteons), the concentric lamellae (tissue inside osteons), and the interstitial lamellae (tissue between osteons).

V. Discussion

Cancellous bone tissue and compact bone tissue vary in makeup, but together they unite in forming a strong, healthy skeleton. Cancellous (or spongy) bone attains its name through the lattice work of its trabeculae and hollows. The pink tissue in the slide was the trabeculae – the matrix of cancellous bone tissue. Trabeculae exist at the end of long bones (bones that are longer than they are wide, like the femur) because that is where bone growth occurs. In the slide, the red dots represented the bone marrow cells and blood vessels found in the hollows of cancellous bone tissue. Although no blood cells exist in the matrix of cancellous bone tissue, red bone marrow produces all the blood cells that the body requires in order to remain healthy (Hart). The blood vessels also bring oxygen and nutrients to the bone cells. Three types of cells exist in the trabeculae: osteoblasts, osteocytes, and osteoclasts. Although only the osteocytes were viewed under the microscope, all three types of cells shall be discussed. Osteoblasts are bone-forming cells, thus they reside on the edge of cancellous bone. When osteoblasts fully surround themselves with extracellular material, they become osteocytes (Shannon and Yunis). The purple blobs on the slide are the osteocytes. Once fully surrounded by bone tissue, osteocytes no longer produce bone matrix, instead they sense when bone is damaged, or being subjected to shock (Chesnutt). These cells also notify other cells what to do in regards to the growth of the trabeculae. Communication of cells occurs through the extensions of the osteocytes called processes. These processes live in tiny microscopic canals called canaliculi (Shannon and Yunis). The white circles on the slide represent lacunae which are empty spaces in which osteocytes house themselves. The last cell type in the trabeculae is the osteoclast. Osteoclasts are large, multinucleated cells that are responsible for breaking down old or damaged bone tissue. Cancellous bone is vital to the skeletal system because it contains red bone marrow which produces the body's greatest blood supply.

In contrast, compact bone attains its name from its tightly-packed osteons. The cylinder-like structures on the slide were the osteons. Similar to trees, osteons have growth rings called lamellae. As compact bone grows, it forms new lamellae around the old lamella. When the lamellae of different osteons get very close together, they

Advanced Biology

fuse forming the extremely dense tissue that compact bone is known for (Phenix). This dense tissue provides the human body with compressive strength, a strength that bears weight. There are two types of lamellae in compact bone tissue: concentric lamellae and interstitial lamellae. Concentric lamellae is tissue found inside osteons, while interstitial lamellae is tissue found between the osteons. The tubes projecting from each osteon are central (or Haversian) canals which contain blood vessels and nerves. These vessels bring blood to the interior spongy bone and to the cells living inside the compact bone (Phenix). Just like in cancellous bone, compact bone also contains osteocytes which are housed in lacunae. On the slide, the lacunae are represented by black ovals. The canaliculi are the hair-like extensions of the lacunae which contain the processes used for communication between cells. Compact bone provides strength and support for the body. In conclusion, the porous substance of cancellous bone supplies the skeletal system with red bone marrow; while the dense substance of compact bone supplies the skeletal system with compressive strength.

VI. References

Chesnutt, Betsy. "Trabeculae of Bone: Definition and Function." Study.com. 2003-2016. Web. Oct. 28, 2016. <http://study.com/academy/lesson/trabeculae-of-bone-definition-function.html>

Hart, Karen. "Histology Photomicrographs." Peninsula College. 2006-2010. Web. Oct. 28, 2016. <http://www.eugraph.com/histology/crtbone/spongbo.html>

Phenix, Sarah. "Compact Bone: Definition, Structure, and Function." Study.com. 2003-2016. Web. Oct. 28, 2016. <http://study.com/academy/lesson/compact-bone-definition-structure-function.html>

Shannon and Yunis, Marylin M. and Rachael L. Exploring Creation with Advanced Biology 2nd Ed. The Human Body. /Anderson, IN.: Apologia Educational Ministries, Inc., 2013. Print.

Unique solution ID: #1162

Author: Sue

Last update: 2018-03-08 16:09