



BONE MARROW

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Academic Year
2019-2020

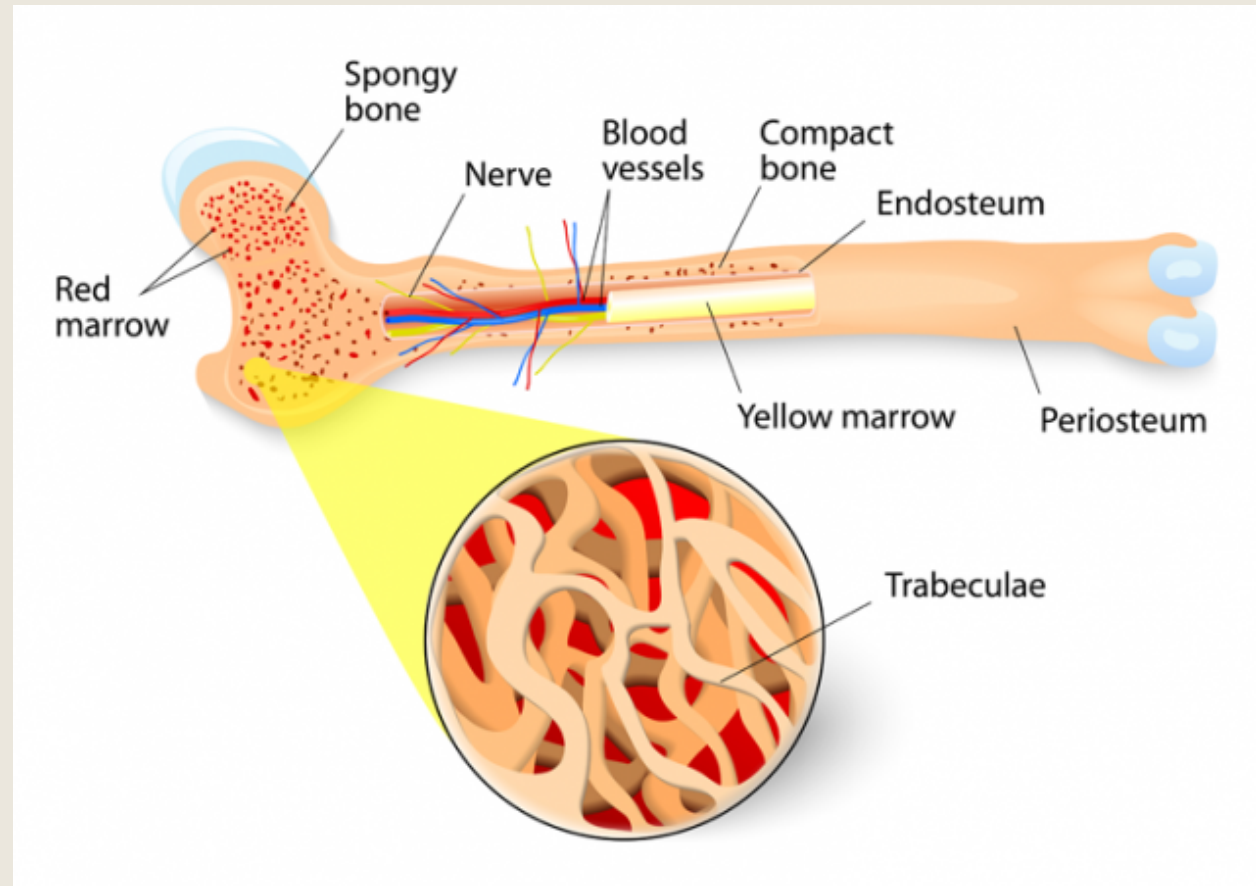
OBJECTIVES

1. Define bone marrow
2. Illustrate where the bone marrow is found
3. Describe the components of bone marrow
4. Describe the types of bone marrow
5. Explain the functions of bone marrow



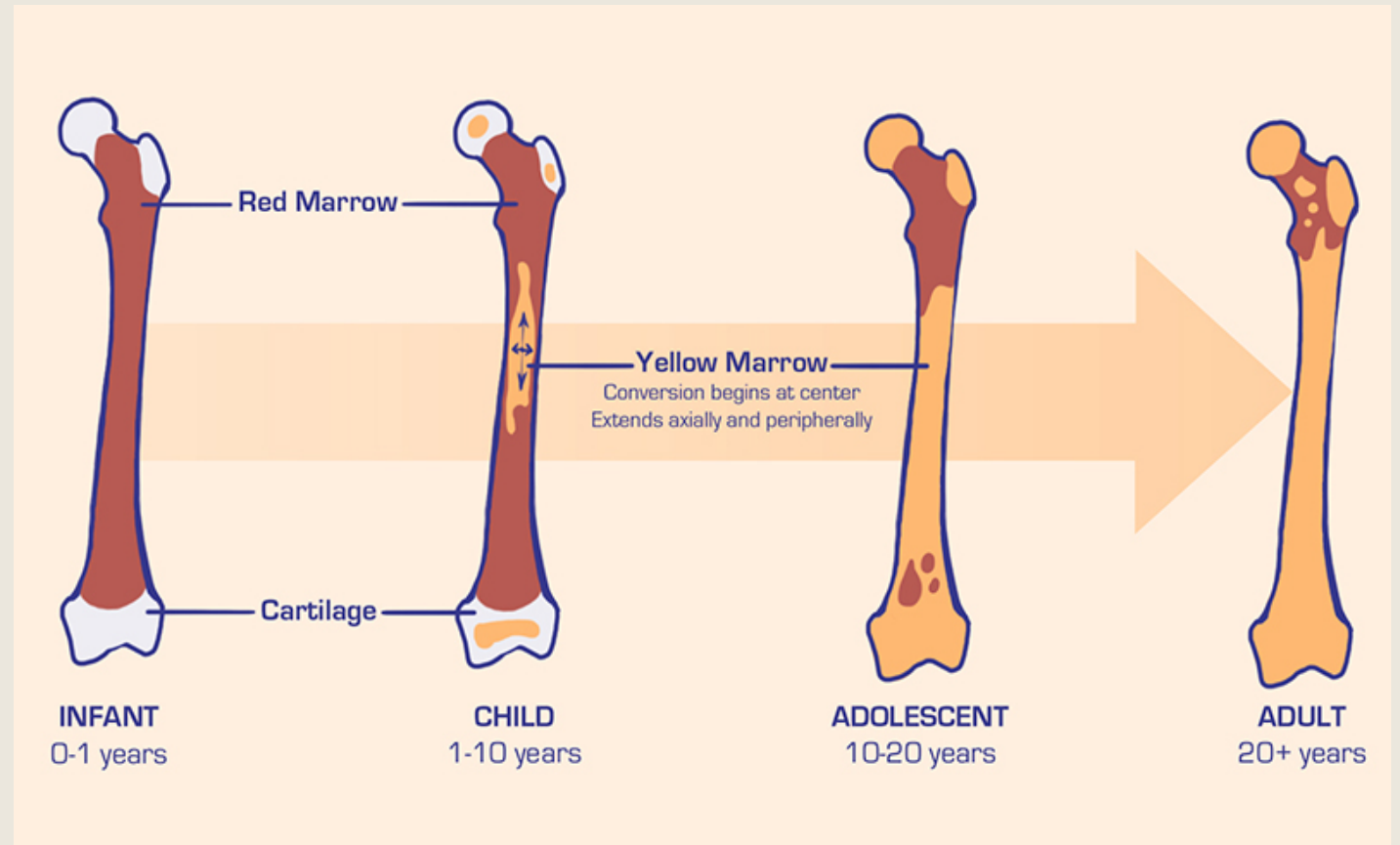
What is Bone Marrow?

- Bone marrow, also called myeloid tissue, is the soft, highly vascular and flexible connective tissue within bone cavities which serve as the primary site of new blood cell production or hematopoiesis.

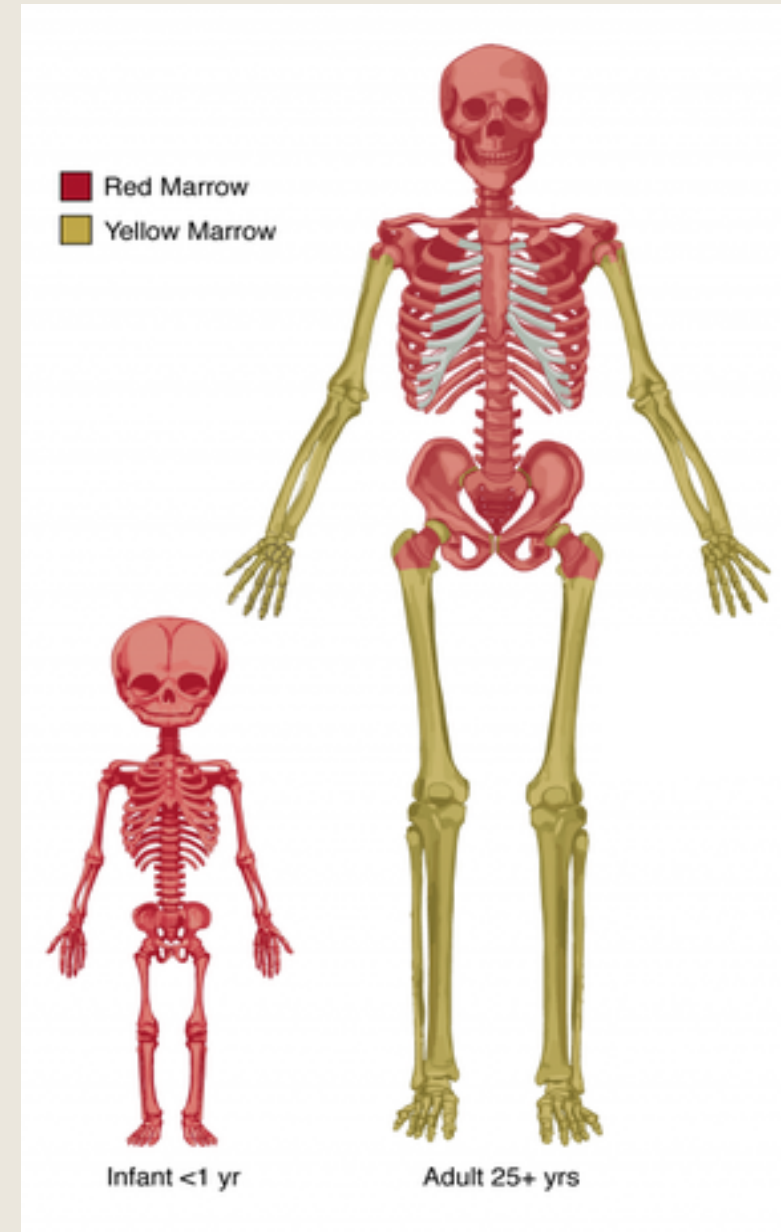


Where is the Bone Marrow found?

- In a newborn baby's bones exclusively contain hematopoietically active "red" marrow, and there is a progressive conversion towards "yellow" marrow with age.



- In adults, red marrow is found mainly in the central skeleton, such as the pelvis, sternum, cranium, ribs, vertebrae and scapulae, and variably found in the proximal epiphyseal ends of long bones such as the femur and humerus.



What are the components of Bone Marrow?

- The bone marrow is composed of both cellular and non-cellular components and is structurally divided into vascular and non-vascular regions.
- The non-vascular section of bone marrow is composed of hemopoietic cells of various lineages and maturity, packed between fat cells, thin bands of bony tissue (trabeculae), collagen fibers, fibroblasts and dendritic cells. This is where hematopoiesis takes place.
- The vascular section contains blood vessels that supply the bone with nutrients and transport blood stem cells and formed mature blood cells away into circulation.
- Ultrastructural studies show hemopoietic cells cluster around the vascular sinuses where they mature, before they eventually are discharged into the blood.
- Lymphocytes are found surrounding the small radial arteries, whereas most immature myeloid precursors are found deep in the parenchyma.

What are the types of Bone Marrow?

- Red bone marrow

In adults, red marrow is confined mostly to skeletal system bones. They contain hematopoietic stem cells that produce two other types of stem cells: myeloid stem cells and lymphoid stem cells. These cells develop into red blood cells, white blood cells, or platelets.

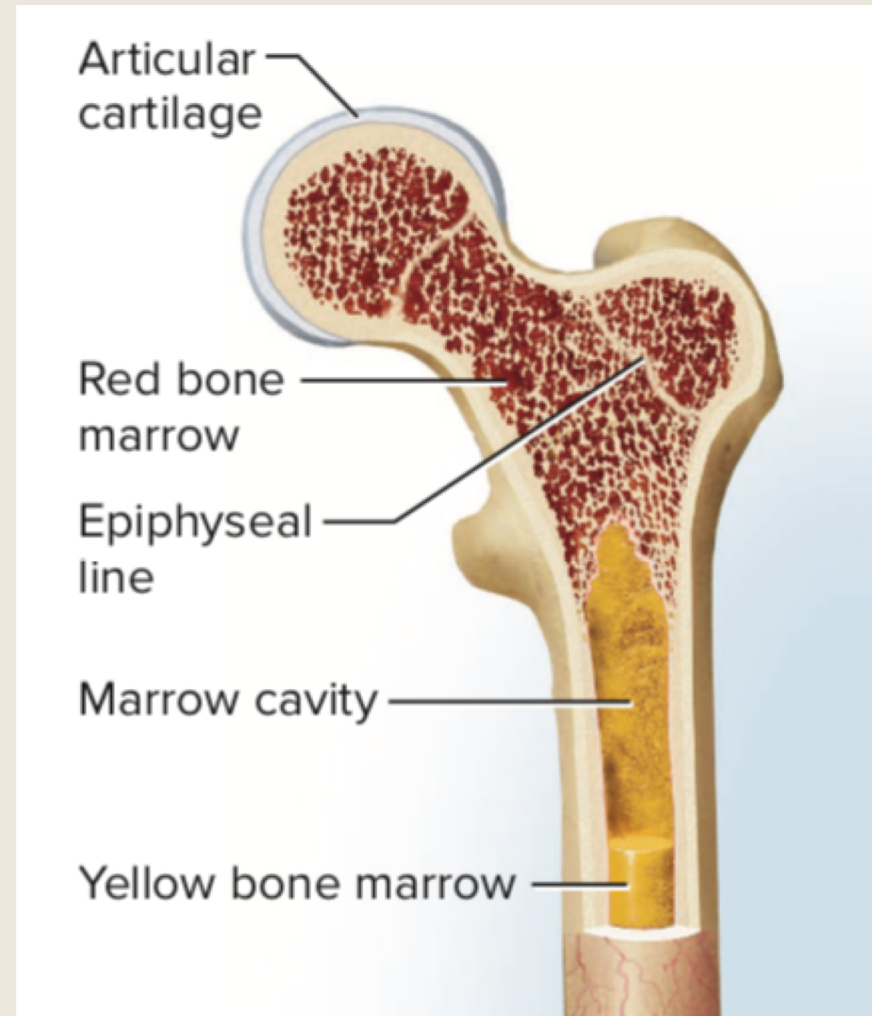
Red bone marrow produces all red blood cells and platelets in human adults and around 60 to 70 percent of lymphocytes. Other lymphocytes begin life in the red bone marrow and become fully formed in the lymphatic tissues, including the thymus, spleen, and lymph nodes.

Together with the liver and spleen, red bone marrow also plays a role in getting rid of old red blood cells.

- Yellow bone marrow

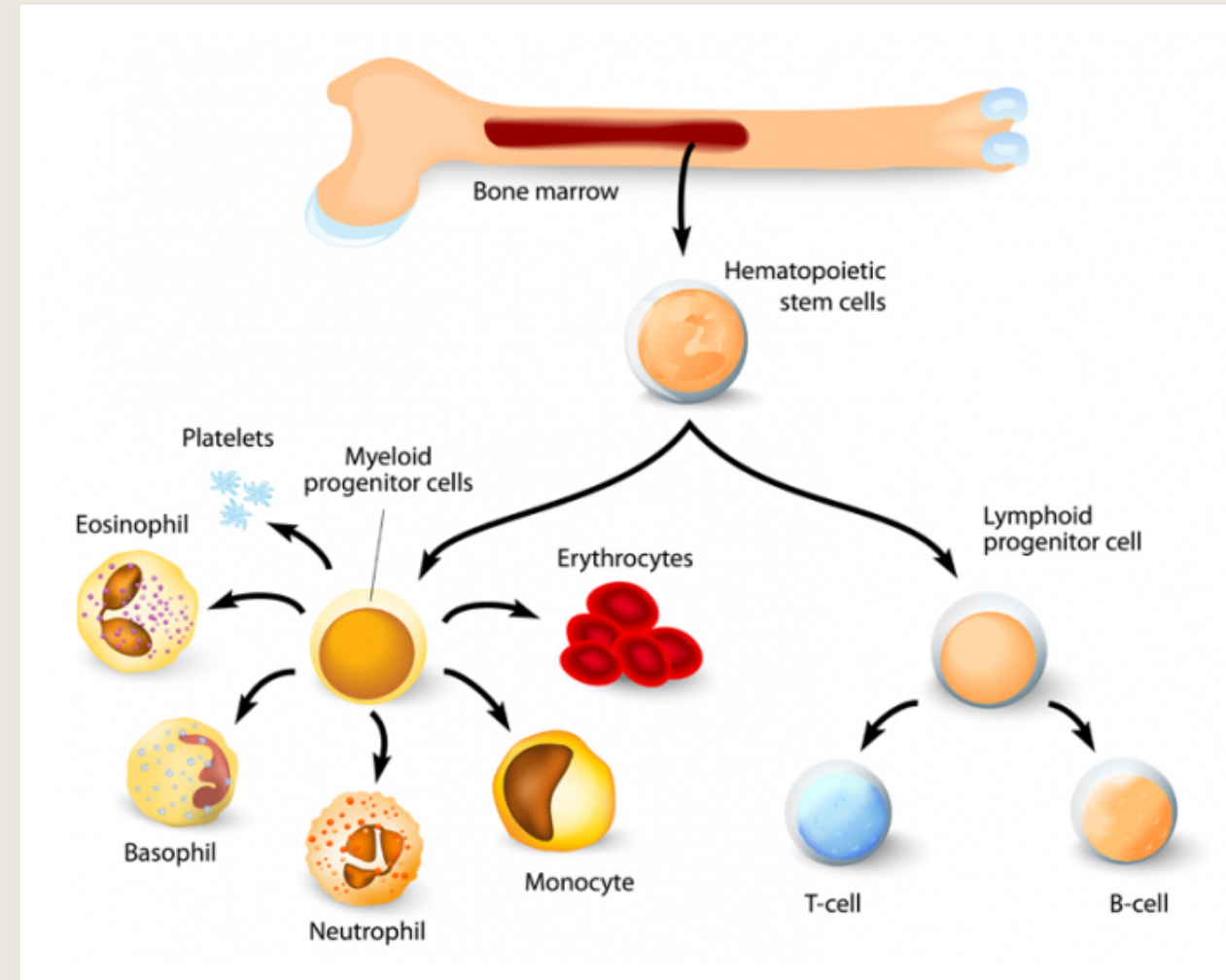
Yellow bone marrow mainly acts as a store for fats. It helps to provide sustenance and maintain the correct environment for the bone to function. However, under particular conditions, such as severe blood loss or fever, the yellow marrow may revert to red marrow.

Yellow marrow tends to be located in the central cavities of long bones, and is generally surrounded by a layer of red marrow with long trabeculae (beam-like structures) within a sponge-like reticular framework.

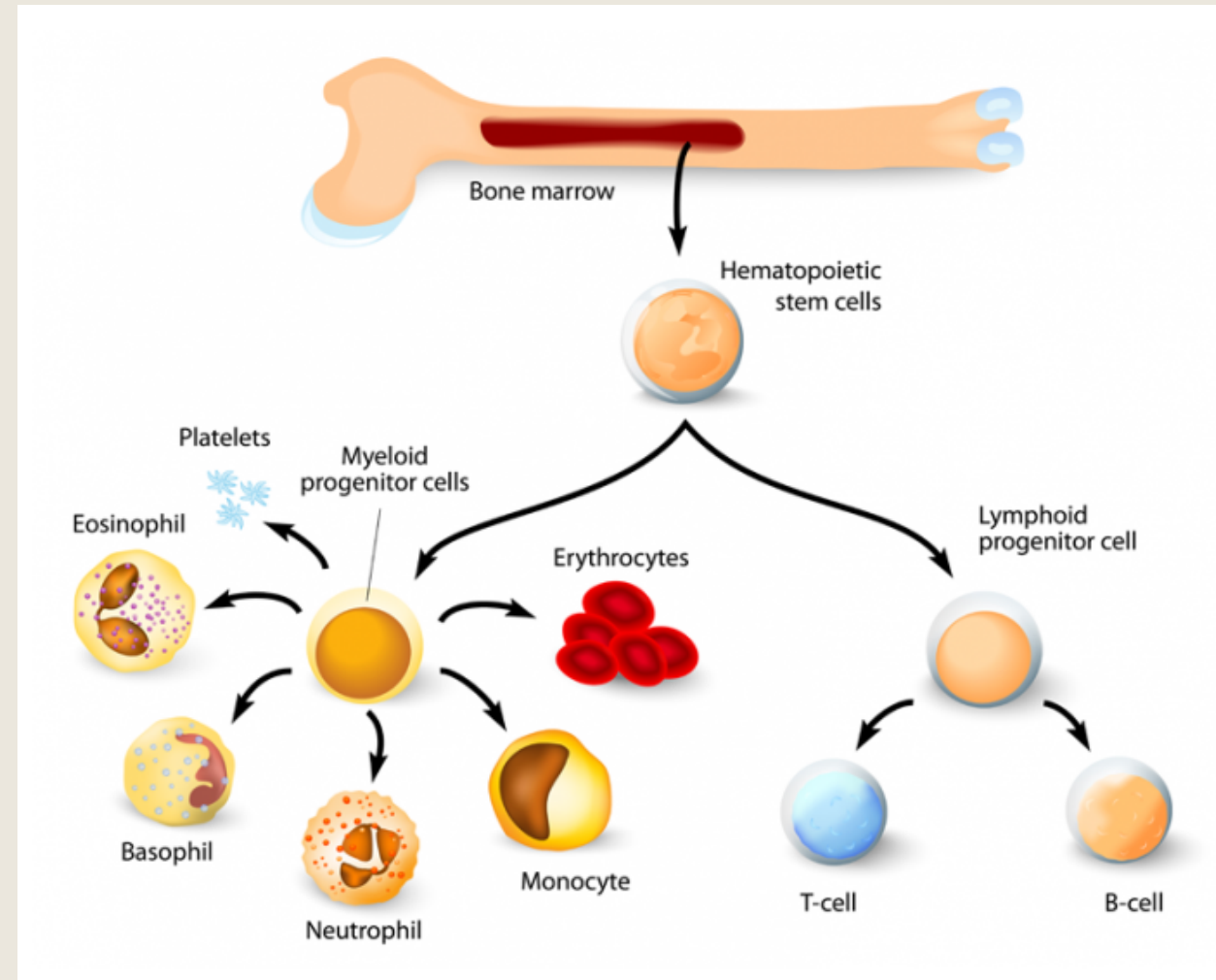


What are the functions of Bone Marrow?

- The bone marrow gives rise to all of the lymphoid cells that migrate to the thymus and mature into T cells, as well as to the major population of conventional B cells.
- B cells mature in the bone marrow and undergo selection for non-self before making their way to the peripheral lymphoid tissues.



- Since the bone marrow constitutes of the hemopoietic cells derived from multipotential stem cells, they not only give rise to all of the lymphoid cells found in the lymphoid tissue, but also to all of the cells found in the blood.
- Platelets, which are crucial for the blood clotting process, are formed from bone marrow just like other blood cells.
- Yellow marrow is actively involved in lipid storage.



In Summary

- Bone marrow is the soft, gelatinous tissue that fills the cavities of the bones. Bone marrow is either red or yellow, depending upon the preponderance of hematopoietic (red) or fatty (yellow) tissue.
- The bone marrow is divided into vascular and non-vascular regions, the non-vascular region is where hematopoiesis takes place, and the vascular region contains blood vessels that supply the bone with nutrients and transport blood cells into circulation.
- Red bone marrow is where red blood cells, platelets, and most white blood cells are produced.
- Yellow marrow is actively involved in lipid storage.

REFERENCE

1. <https://microbenotes.com/bone-marrow-types-structure-and-functions/>
(Time of Access: 8/4/2020)
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Thank You

