

A Comparative Study on Cortical and Cancellous Bones

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INTRODUCTION

In most vertebrate animals, a bone is a rigid tissue that includes parts of the skeleton. Bones protect the body's various organs, produce red and white blood cells, store minerals, improve body structure and support, and allow mobility. Bones have a unique internal and external structure that comes in a range of shapes and sizes. They're light but strong, but they're effective for a range of elements.

Osseous tissue (bone tissue) is a type of specific connective tissue that is a hard tissue. Internally, it contains a honeycomb-like structure that aids in bone stiffness. Different types of bone cells make bone tissue. Osteoblasts and osteocytes have a role in the production and mineralization of bone, while osteoclasts play a role in bone tissue resorption. The lining cells that form a protective layer on the bone surface are modified (flattened) osteoblasts.

Bone tissue is made up of two forms of mineralized tissue: cortical bone and Cancellous bone. Bone marrow, endosperm, periosteal, nerves, blood vessels, and cartilage are among several forms of tissue present in bones.

There are approximately 300 bones in the human body at birth; many of those fuse together during development, leaving a total of 206 different bones in the adult, not including numerous small seamed bones. The femur, or thighbone, is the largest bone in the body, whereas the stapes, or middle ear bone, is the smallest.

Bone is not uniformly solid; alternatively, it is composed of a flexible matrix (30%) and bound minerals (70%) which are intricately weaved and constantly modified by a group of different bone cells. Bones are relatively hard and strong while being lightweight due to their unique composition and design.

The elastic fibers, also known as ossein, make up 90% to 95% of the bone matrix, with the remainder being broken substance. Collagen's rigidity improves fracture resistance. The binding of an inorganic mineral salt, calcium phosphate, in a chemical arrangement known as calcium

hydroxyapatite strengthens the matrix. Bone mineralization is just what provides bones their strength. Special bone cells known as osteoblasts and osteoclasts actively create and modify bone throughout life. The tissue is weaved into two main patterns within a single bone, known as cortical and cancellous bone; each has its own appearance and characteristics.

Cortical bone, also called as compact bone since it is generally denser than cancellous bone, makes up the hard outer layer of bones. It is important for the hard external part (cortex) of bones. The cortical bone, which accounts for 80% of the total bone mass in an adult human skeleton, gives bone its smooth, white, and solid appearance. It helps bones perform their primary activities, which include maintaining the full body, protecting organs, supplying mobility levers, and collecting and distributing chemical elements, mainly calcium.

It is made up of a number of tiny columns known as pain or Haversian systems. Multiple layers of osteoblasts and osteocytes surround a central canal called as the Haversian canal in each column. The osteons are linked by Volkmann's canals, which are at right angles to each other. The columns are metabolically active, and the nature and location of the cells within the osteon will vary as bone is reabsorbed and created. A periosteal protects the outside surface of cortical bone and an endosperm protects the inner surface. The endosperm is the fibrous link that covers the cortical and cancellous bones. The osteon is the primary morphologic unit of cortical bone.

Cancellous bone, also called as trabecular or spongy bone is an open cell porous network that composes the interior tissue of the skeletal bone. Cancellous bone is less dense and has a larger surface-area-to-volume ratio than cortical bone. It becomes weaker and more flexible as a consequence of this. It is also suitable for metabolic activities such as the exchange of calcium ions due to its larger surface area. Cancellous bone was mostly frequently seen near joints, at the ends of long bones, and in the interior of vertebrae. Cancellous bone is vascular and contains red bone marrow, which is where hematopoiesis (the production of blood cells) actually occurs.

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