Difference Between Notochord and Nerve Cord

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Key Difference - Notochord vs Nerve Cord

Chordates are more developed and advanced organisms with sophisticated cellular structures and metabolic pathways. They possess characteristic features that distinguish them from other organisms. These characteristic features mainly include the presence of a notochord and a nerve cord. The notochord and nerve chord involve providing distinct functions. Both structures extend from the neck up to the tail in the dorsal region of the body. **The notochord associates the skeleton system that provides attachment to skeletal muscles whilst the nerve cord mainly associates with the central nervous system**. This is the **key difference** between notochord and nerve cord.

What is Notochord?

Notochord can be defined as a longitudinal rod with high flexibility that primarily provides support to the body. In chordates, the major function of the notochord is to provide axial flexibility and support by providing sites for the skeletal muscles to attach. During embryonic development, the development of the notochord occurs simultaneously.

The vertebrate notochord plays many essential roles. The notochord assists the elongation of the embryo during embryo development. It is a source of midline signals that pattern the surrounding tissues. And also it works as a main skeletal element during embryonic development.

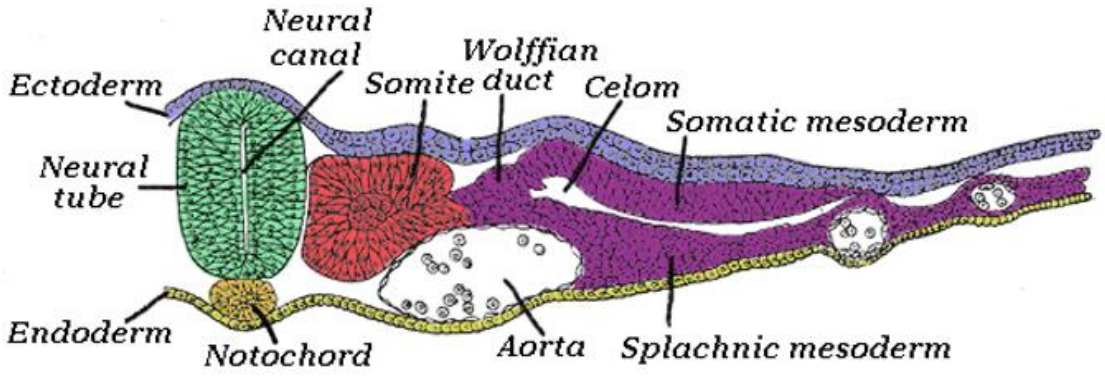

Figure 01: Notochord

At the stage of gastrulation, development of the notochord begins where it develops along with the formation of the neural plate. The notochord is derived from cells of the mesoderm. Therefore, it exists as a cartilaginous structure. Through development stages, the notochord develops permanently into the vertebral column of adults. The notochord is considered as an important structure since its surrounds and protects the nerve cord. The extension of the notochord occurs from the head up to the tail.

What is Nerve Cord?

By its definition, the nerve cord is a hollow fluid-filled structure, which is the dorsal tract of the nervous tissue. It is a characteristic feature of chordates. The nerve cord naturally develops in the brain and spinal cord of vertebrate organisms. In invertebrates, the nerve cord is present only in some phyla.

The nerve cord is an important structure of the central nervous system. It is present as a bundle of nerve fibers in a transverse plane with respect to the organism's longitudinal axis. But this typical structure slight deviates in chordates. The nerve cord is hollow and tubular that extends above the notochord and the gastrointestinal tract dorsally. In the context of invertebrates, the nerve cord is present as a solid double raw of nerves that is present ventrally. Another difference between chordate and non-vertebrate nerve cord is that the chordate nerve cord is formed as an invagination that occurs during embryonic development where the invertebrate, nerve cord does not go under such development.

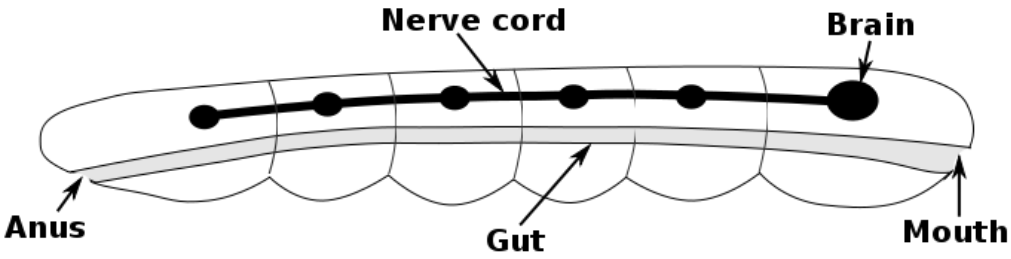

Figure 02: Nerve Cord

Therefore the nerve cord could be classified into two divisions, the ventral nerve cord and the dorsal nerve cord. The ventral nerve cord that runs ventrally below the gastrointestinal tract connects to the cerebral ganglia. Such nerve cords are present in phyla such as nematodes, annelids and arthropods including animals such as roundworms, earthworms and insects respectively. The dorsal nerve cord is a characteristic embryonic feature of chordates. The development of the chordate dorsal nerve cord begins from a late of dorsal ectoderm where it invaginates to form a fluid-filled hollow tube.

What are the Similarities Between Notochord and Nerve Cord?

- Both are rod-shaped structures that extend from the head (neck) to tail.
- Both are present in the dorsal region of the body.
- Both structures are characteristic features of chordates.

What is the Difference Between Notochord and Nerve Cord?

Notochord vs Nerve Cord	
The notochord is a longitudinal rod with high flexibility that primarily functions to support the body.	Nerve cord is a set of nerve fibers that extend the total length of the organism's body.
Occurrence	
Notochord can be seen in chordates.	Nerve cord is present in both vertebrates and invertebrates.
Structure	
The notochord is a rod-shaped structure that is made up of by the cells of mesoderm.	Nerve cord is a chain composed of ganglia.
Origination	
Notochord originates from mesoderm.	Nerve cord originates from ectoderm.

Summary - Notochord vs Nerve Cord

The notochord is a longitudinal rod present in chordates. The major function of the notochord is to provide axial flexibility and support by providing sites for the skeletal muscles to attach. During embryonic development, the development of the notochord occurs simultaneously. The notochord assists the elongation of the embryo during embryo development. The notochord is formed by the mesodermic cells. Nerve cord is a set of nerve fibers that extend to the total length of the organism's body. It could be classified into two groups; dorsal nerve cord and ventral nerve cord. The ventral nerve cord that runs ventrally below the gastrointestinal tract connects to the cerebral ganglia. The dorsal nerve cord is hollow and tubular that extends above the notochord and the gastrointestinal tract dorsally. Both notochord and nerve cord are characteristic features of chordates. This is the difference between notochord and nerve cord.

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