ORGANOGENESIS
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M.SC SEMESTER III CC 02

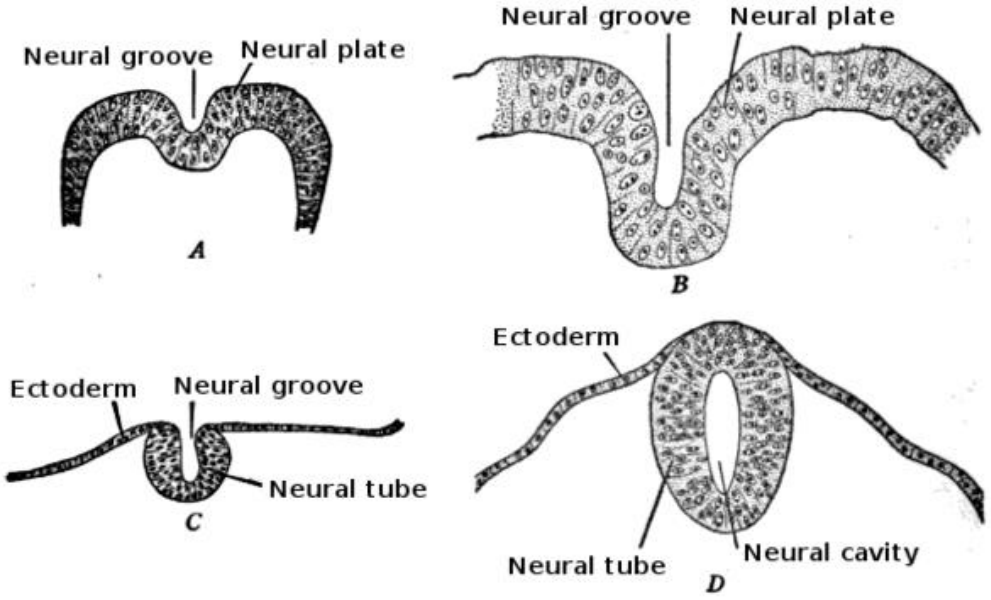
Organogenesis is the phase of embryonic development that starts at the end of gastrulation and continues until birth. During organogenesis, the three germ layers formed from gastrulation: the ectoderm, endoderm, and mesoderm form the internal organs of the organism.

The cells of each of the three germ layers undergo differentiation, a process where less-specialized cells become more-specialized through the expression of a specific set of genes. Cell differentiation is driven by cell signaling cascades. Differentiation is influenced by extracellular signals such as growth factors that are exchanged to adjacent cells which is called juxtracrine signaling or to neighboring cells over short distances which is called paracrine signaling. Intracellular signals consist of a cell signaling itself (autocrine signaling), also play a role in organ formation. These signaling pathways allows for cell rearrangement and ensures that organs form at specific sites within the organism. The organogenesis process can be studied using embryos and organoids.

Organs produced by the germ layers

The endoderm is the inner most germ layer of the embryo which gives rise to gastrointestinal and respiratory organs by forming epithelial linings and organs such as the liver, lungs, and pancreas. The mesoderm or middle germ layer of the embryo will form the blood, heart, kidney, muscles, and connective tissues. The

ectoderm or outermost germ layer of the developing embryo forms epidermis, the brain, and the nervous system.



Mechanism of organ formation

While each germ layer forms specific organs, that the germ layers cannot form their respective organs without the cellular interactions from other tissues. In humans, internal organs begin to develop within 3–8 weeks after fertilization. The germ layers form organs by three processes: folds, splits, and condensation. Folds form in the germinal sheet of cells and usually form an enclosed tube which you can see in the development of vertebrates neural tube. Splits or pockets may form in the germinal sheet of cells forming vesicles or elongations. The lungs and glands of the organism may develop this way.

A primary step in organogenesis for chordates is the development of the notochord, which induces the formation of the neural plate, and ultimately the neural tube in vertebrate development. The development of the neural tube will give rise to the

brain and spinal cord. Vertebrates develop a neural crest that differentiates into many structures, including bones, muscles, and components of the central nervous system. Differentiation of the ectoderm into the neural crest, neural tube, and surface ectoderm is sometimes referred to as neurulation and the embryo in this phase is the neurula. The coelom of the body forms from a split of the mesoderm along the somite axis.