



Embryology

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Overview

Embryology is the branch of biology that focuses on the study of embryos and their development. In the medical field, this branch narrows to the study of the development of human embryos, with the objective of finding the root causes of congenital abnormalities.

For optimal understanding, the student needs to be familiar with the components of the cell, the cell cycle, cell division, gene expression, genome replication, the differences between diploid and haploid cells, and the process of fertilization. Basic knowledge of human anatomy is also required.

Throughout the development process, a multiplicity of genes and structures interact in a harmonious manner in order to develop a human fetus. This process progresses by stages and requires the expression of the right genes at the right place and the right time.

During development, these processes may be hindered, resulting in structural or functional abnormalities in the fully developed child. There are many examples of abnormalities, such as atrial septal defects (ASD), a communication between the atria caused by nonclosure of the foramen ovale, and syndactyly, the joining of two fingers due to inadequate apoptosis of cells in between the digits when these were differentiating.

In order to make an adequate diagnosis, the competent physician must be aware of the most prevalent genetic abnormalities in his or her area of work, and be familiar with the typical clinical presentation of the most common genetic syndromes.

Topics

Early Development and the Organogenic Period	07 Videos
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Development of the Abdominopelvic Region	14 Videos
Conception, Implantation and Fetal Development	20 Videos



Early Development & the Organogenic Period

- Introduction and Early Development
- Fertilization to Bilaminar Embryo
- Gastrulation and the Trilaminar Embryo
- Ectoderm Derivatives and Neurulation
- Mesoderm Derivatives: Paraxial and Intermediate Mesoderm
- Mesoderm Derivatives: Lateral Plate Mesoderm and Body Wall
- Endoderm Derivatives and Gut Tube

Development of Musculoskeletal System & Skin

- Development of the Vertebrae
- Limb Development and Muscle Migration
- Development of the Limb Bones
- Signals Responsible for Limb Growth
- Development of Skin and Associated Glands
- Development of Hair and Nails
- Development of Teeth

Development of the Nervous System, Head, & Neck

- The Neural Tube and Neural Crest Cells
- The Neural Tube and Ventricular System
- Development of Spinal Cord and Brainstem
- Malformations in Cerebellar Development
- Development of the Midbrain and Thalamus

- Development of Cerebral Cortex
- Development of Eye
- Development of Ear
- Ossification of Skull
- Development of Sutures and Fontanelles
- Malformations in Skull Development
- Pharyngeal Arches
- Development of Tongue and Thyroid Gland
- Pharyngeal Grooves and Pouches

Development of Thoracic Region and Vasculature

- Early Development of the Heart
- Formation of the Right and Left Atria
- Atrial Septal Defects
- Formation of AV Canals
- Separation of Ventricles
- Formation of the Outflow Tracts
- Development Defects of Conotruncal Ridges
- Shunts Present in Congenital Heart Diseases
- Aortic Arches and Large Arteries: Introduction
- Aortic Arches: Morphologic Changes
- Recurrent Laryngeal Nerves and Anomalies of Arterial Development
- Formation of the Large Veins
- Development of the Subcardinal Anastomosis
- Fetal circulation and Transition to Mature Circulation
- Upper Airway Development
- Tracheal Development

- Development of Larynx and Large Airways
- Development of Small Airways and Lungs
- Derivatives of Lateral Plate Mesoderm: Body Wall and Cavities
- Formation of Diaphragm: Separating Peritoneal and Pericardial Cavities
- Separating the Pericardial and Pleural Cavities

Development of the Abdominopelvic Region

- Early Gastrointestinal Development
- Esophagus, Stomach Dilation and Rotation, Duodenal Development
- Liver, Gall Bladder, Pancreas and Spleen Development
- Migration of Foregut Organs and Mesenteries
- Development of the Midgut
- Separation of Cloaca Into Urogenital Sinus and Rectum
- Derivatives of the Intermediate Mesoderm: Kidneys and Suprarenal Glands
- Development of the Kidneys and the Adrenal Glands
- Partitioning and Malformations of the Urogenital Sinus
- Development of the Indifferent Gonad and Ducts
- Ovaries and Paramesonephric Ducts
- Testes and Mesonephric Ducts
- Development of External Genitalia
- Hormonal Effects on External Genitalia

Conception, Implantation & Fetal Development

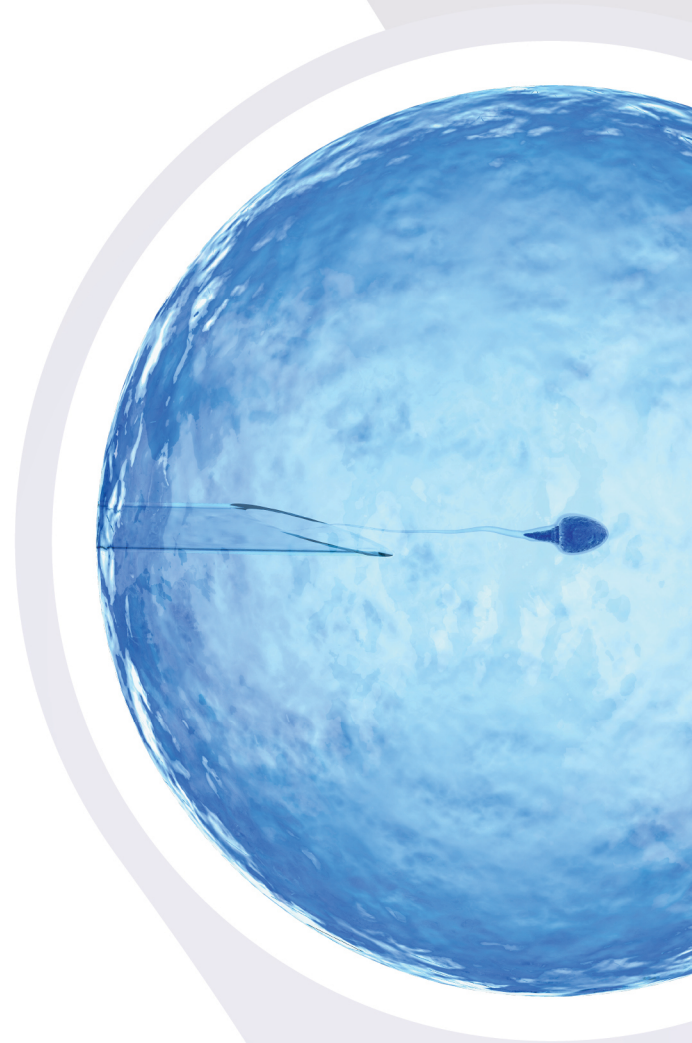
- Germ Cells, Mitosis and Meiosis
- Chromosomal Abnormalities: Trisomy 21, Trisomy 18 and Trisomy 13

- Chromosomal Abnormalities: Turner Syndrome, Klinefelter Syndrome, Trisomy X and XYY, Mosaics, Chimeras and Structural Defects
- Spermatogenesis
- Oogenesis
- Ovarian Cycle, Ovulation and Uterine Changes
- Fertilization and Implantation
- Infertility Treatments
- Implantation and Trophoblast
- Placenta and Fetal Membranes
- Abnormalities of the Amnion, Placenta, and Umbilical Cord Part 1
- Abnormalities of the Amnion, Placenta, and Umbilical Cord Part 2
- Twinning and Fetal Membranes
- Timeline of embryonic development: Weeks 1 and 2
- Timeline of embryonic development: Weeks 3 and 4
- Timeline of embryonic development: Weeks 5 and 6
- Timeline of embryonic development: Weeks 7 and 8
- Fetal Period: First Trimester

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