**OKUNGBOWA FAITH**

**18/MHS03/011**

**ANATOMY**

**ANA 206**

**DEVELOPMENT OF THE LUNGS.**

## Phases of development

### Embryonic

The embryonic phase takes place between the third and sixth week of gestation. The development of the lungs begins during the third week, with the appearance of a respiratory diverticulum (lung bud) as an outgrowth from the ventral wall of the foregut. The lung bud expands in a ventral and caudal direction, invading the mesenchyme surrounding the foregut. Soon after, the lung bud, being initially in open communication with the foregut, becomes separated from it eventually forms the [esophagus](https://www.kenhub.com/en/library/anatomy/esophagus).

Concurrently, the distal end of the lung bud bifurcates into the right and left primary bronchial buds, whereas the proximal end (stem) forms the trachea and [larynx](https://www.kenhub.com/en/library/anatomy/larynx). By the fifth week of gestation, the primary bronchial buds form three secondary bronchial buds on the right side and two on the left, foreshadowing the primordial lobes of the lungs. Each secondary bronchial bud gives rise to ten tertiary bronchial buds on both sides, demarcating the end of the embryonic phase.

### Pseudoglandular

The pseudoglandular phase takes place during between the sixth and sixteenth week of gestation. The respiratory tree undergoes twelve to fourteen more generations of branching, resulting in the formation of terminal bronchioles. This passageway will be lined with a specific type of respiratory [epithelium](https://www.kenhub.com/en/library/anatomy/overview-and-types-of-epithelial-tissue), simple columnar epithelium (ciliated) transitioning to simple cuboidal epithelium (some cilia).

### Canalicular

The canalicular phase takes place during the sixteenth and twenty-eighth week of gestation. Each terminal bronchioles further divide into respiratory bronchioles, which become surrounded with an increase in vascularization. Subsequently, the lumens of the respiratory bronchioles become enlarged as a result of the thinning of their epithelial walls. This process sets up the differentiation of specialized cell types associated with the lungs.

### Saccular

The saccular phase takes place between the twenty-eighth and thirty-sixth week of gestation. The respiratory bronchioles give rise to a final generation of terminal branches. These branches become invested in a dense network of capillaries, forming the terminal sacs (primitive alveoli) that are lined with type I and type II alveolar cells.Type I alveolar cells (type I pneumocyte) are branched cells which are the gas exchange surface in the alveolus. Type II alveolar cells act as the ‘caretaker’ by responding to damage of the type I cells. Type II alveolar cells do this by dividing and acting as a progenitor cell for both type I and type II cells. In addition, they synthesise, store and release pulmonary surfactant into the alveolar hypophase, where it acts to optimise conditions for gas exchange. Although gas exchange is possible at this point, it is very limited as the alveoli are still immature and few in numbers. In fact, the formation of the terminal sacs continues during fetal and postnatal life. Prior to birth, there are approximately twenty million to seventy million terminal sacs, whereas the total number in a mature lung is approximately three-hundred to four-hundred million.

### Alveolar

The alveolar phase is characterized by the maturation of the alveoli, a process that takes place during the end of fetal life and many years after birth.

## Lungs

During the development of the respiratory tree, the primordial lungs expand into the pericardioperitoneal canals of the body cavity. At this stage, these canals are in open communication with the [peritoneal](https://www.kenhub.com/en/library/anatomy/the-peritoneum) and pericardial cavities; they lie on each side of the foregut and are gradually filled by the expanding lungs.

Soon after, the pleuroperitoneal and pleuropericardial folds separate the pericardioperitoneal canals from the peritoneal and pericardial cavities, respectively. This results in the formation of the [pleural cavity](https://www.kenhub.com/en/library/anatomy/the-pleural-cavity). The visceral pleura derives from the mesoderm that lines the outside of the lungs, whereas the parietal pleura derives from the somatic mesoderm that lines the body wall.Note that because the lung bud is an outgrowth of the foregut, the lungs are composed of endodermal and mesodermal tissues. The endoderm gives rise to the mucosal lining of the bronchi and the epithelial cells of the alveoli. The mesoderm (middle layer of an embryo) helps give rise to the remaining components of the lungs. Specifically, the splanchnopleuric mesoderm, gives rise to: the vasculature, [connective tissue](https://www.kenhub.com/en/library/anatomy/overview-and-types-of-connective-tissue), muscle, and cartilage associated with the bronchi, and the pleura of the lungs.

**ROTATION OF THE STOMACH AND THE FORMATION OF THE OMENTAL BURSA.**

The stomach is located between the esophagus and small intestine .the longitudinal rotation of the stomach involves a 90 degree clockwise rotation resulting in the right side of the stomach becoming posterior oriented and left side of the stomach facing interiorly

The stomach subsequently rocks on its longitudinal axis causing the pylorus to shift to right and the cardiac orifice to shift to the left

During rotation

· The cranial end moves to the left and slightly the left and slightly downward

· The caudal end moves to the right and upward

After rotation

Stomach assumes its final position with its long axis running from above left to below right

During the rotation one side of the stomach grows faster than the other forming the greater and lesser curvatures of the stomach

Formation of the omental bursa

Begins as small isolated clefts in the dorsal mesogastrium that soon join to form single cavity. Rotation of the stomach pulls the dorsal mesogastrium to the left thus enlarging the cavity

The bursa expands transversely cranially and lies between the stomach and posterior abdominal wall

The superior part of the bursa is cut off as the diaphragm develops inferiorly it persists as the superior recess of the omental bursa

The inferior part grows within the 4-layered greater omentum forming the inferior recess of the omental bursa

The inferior recess later on closes down because of fusion of the layers of the greater omentum

**Development of the esophagus**

In early embryogenesis, the esophagus develops from the endodermal primitive gut tube. The ventral part of the embryo abuts the yolk sac. During the second week of embryological development, as the embryo grows, it begins to surround parts of the sac. The enveloped portions forms the basis for the adult gastrointestinal tract. The sac is surrounded by a network of viteline artery ,over time these arteries consolidate into the three main arteries that supply the developing gastrointestinal tract; the celiac artery, superior mesenteric artery and inferior mesenteric artey.The areas supplied by these artery are used to define the midgut,hindgut and foregut

The surrounded sac becomes the primitive gut. Section of this gut begin to differentiate into the organ of the gastrointestinal tract such as the esophagus, stomach and intestine. Thes esophagus develops as part of the foregut tube. The innervations of the esophagus develops from the pharyngeal arches