# Respiratory System

SCRUBS

STUDENT COLLABORATIVE RESOURCES FOR UNDERSTANDING AND BRODY SUCCESS

Ryan Dickerson, Brody School of Medicine 2025

Resources Used

BSOM Coursepack

# *Mission Statement*

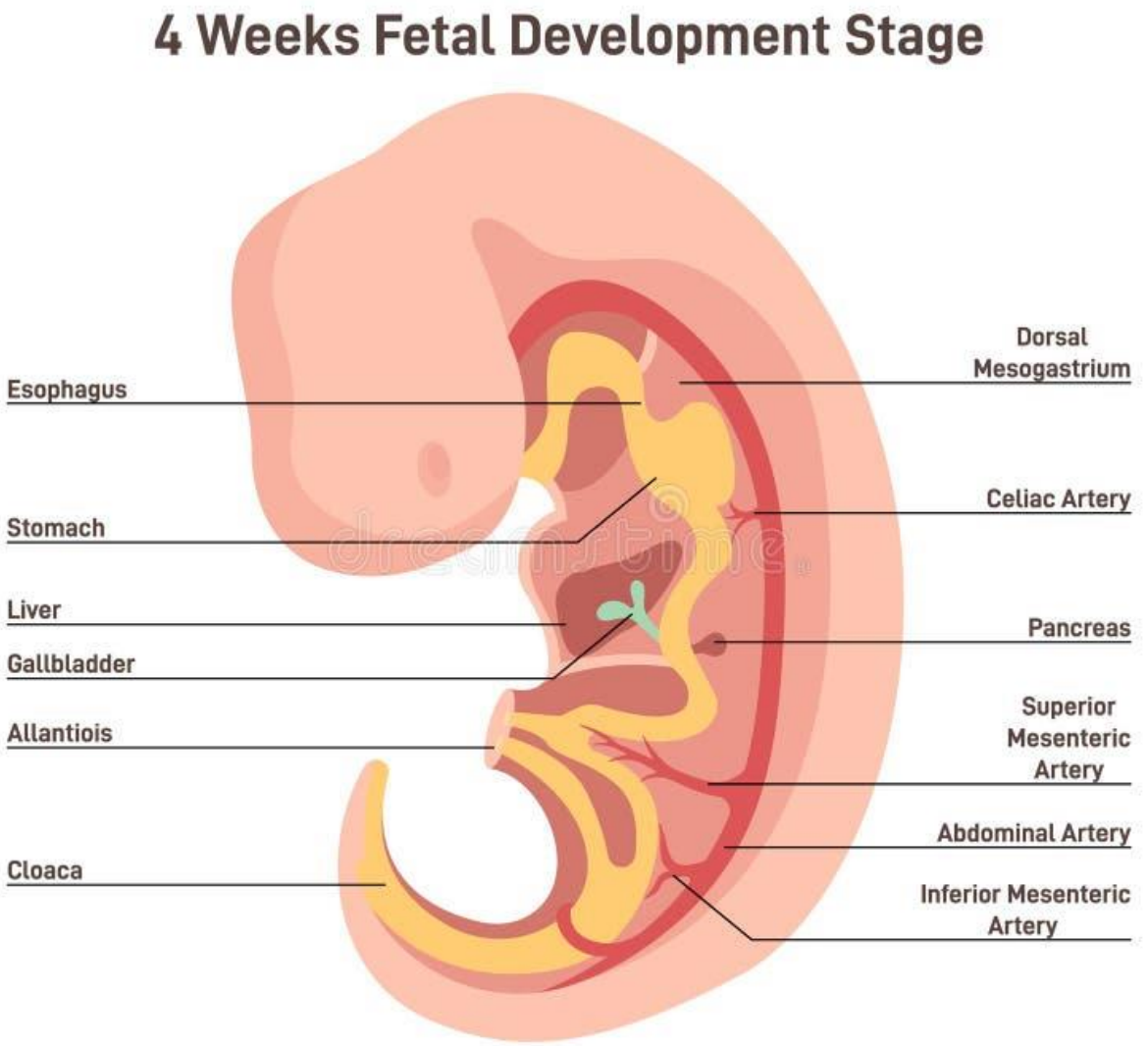
**SCRUBS** is a student-driven initiative that aims to develop supplemental recourses for current and future cohorts that will pass through Brody. Members of **SCRUBS** participate in a variety of sub-committees working to create resources for students, by students. These resources aim to offer unique perspectives from students that have walked in the same shoes, developing resources that we wish we had been exposed to during our time in the course.

The hope is this organization will become a staple of the Brody student body, exemplifying the unique collaborative community that Brody offers. If this is a mission that aligns with your goals and you have the desire to help those that will come behind you, as well as a goal to leave your mark on Brody as a whole, we invite you to join the team!

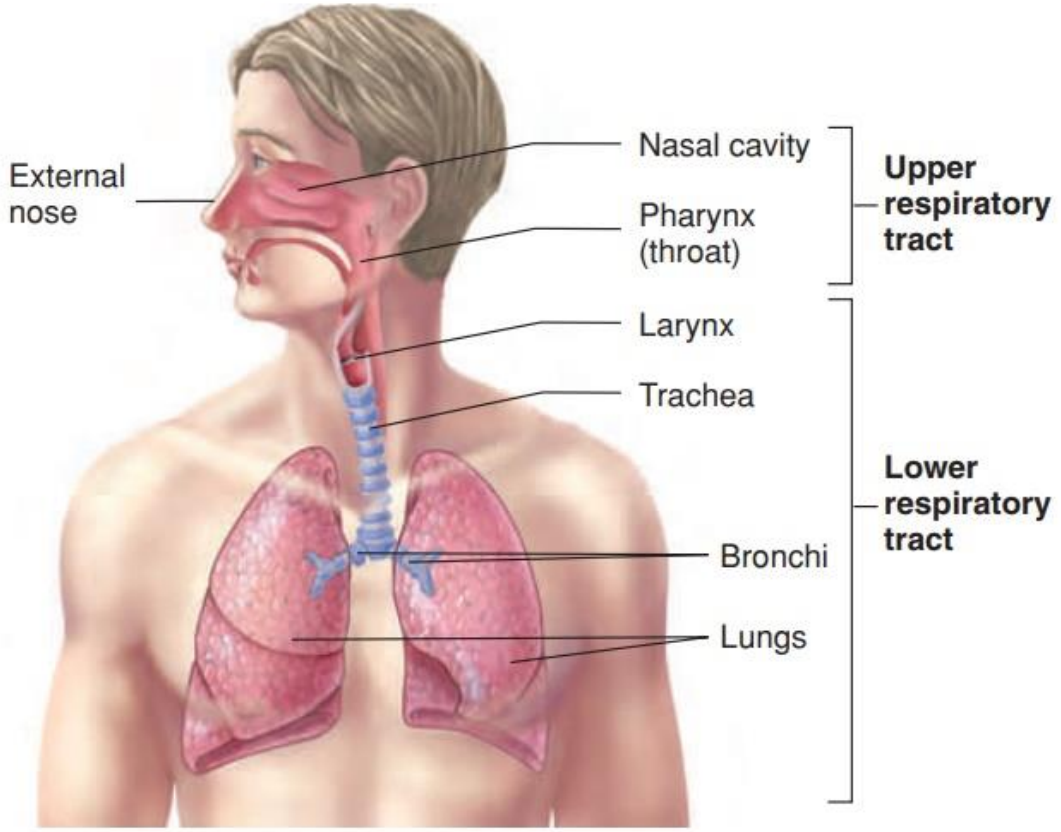
# *Disclaimer*

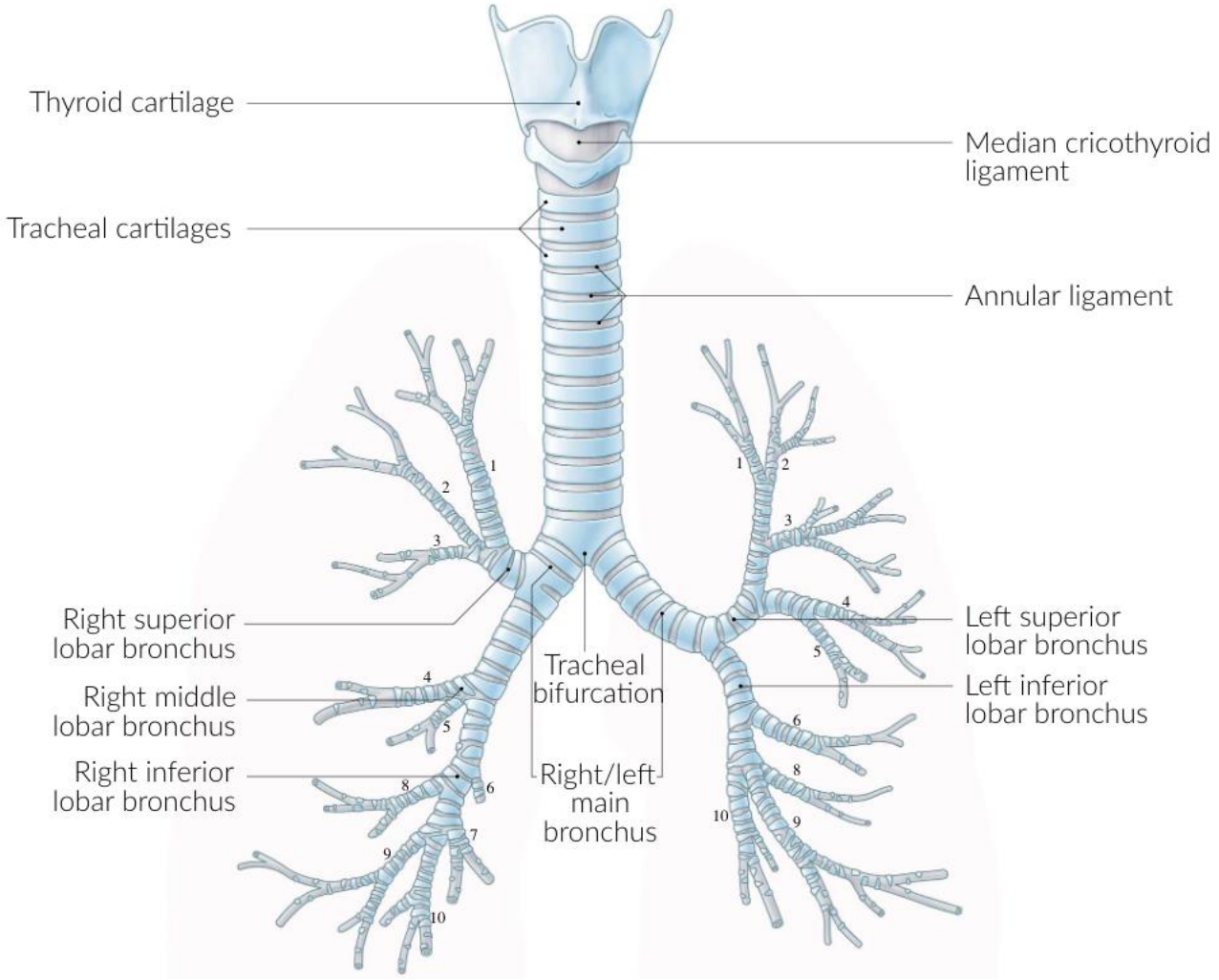
The resources that are included in this document are made by students and not the faculty. As such, there is the possibility for errors in our development, although this is mitigated via a team approach to development with multiple stages of vetting. If there is a contradiction with the coursework presented within your course, please go by the course documents. Additionally, **SCRUBS** aims to supply ***supplemental recourses***, however these are in no way replacements to the instruction of the Brody faculty. Use these recourses as a supplement, but not as your primary source for course material.

# Snapshot – Development During the 4th -5th Weeks

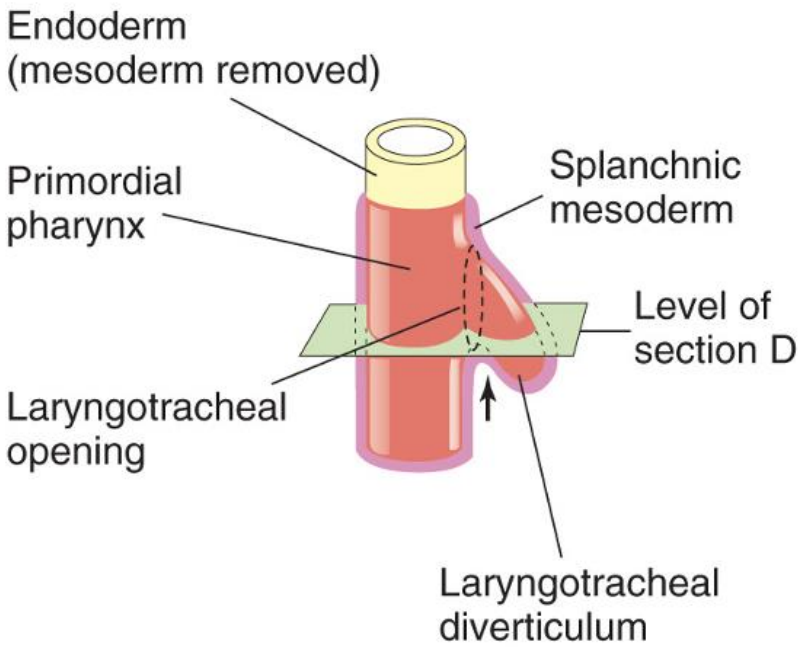


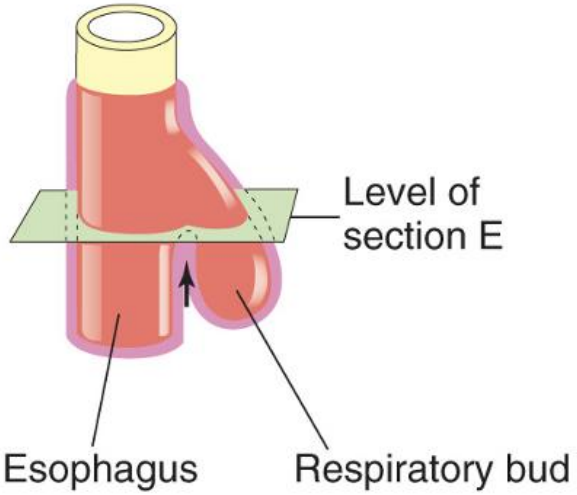
# Adult Respiratory System Anatomy



# Laryngotracheal Groove and Lung Bud Formation



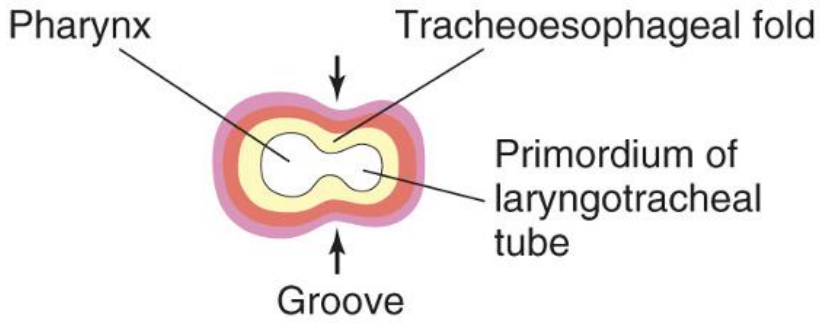



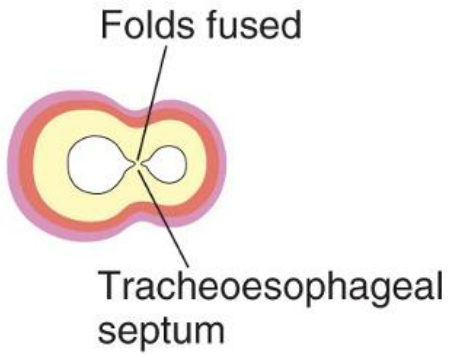

**Laryngotracheal Groove** - Endoderm

- Develops from anterior wall of foregut

**Lung Bud**

- Elongation of the groove
- Grows into the surrounding splanchnic mesoderm

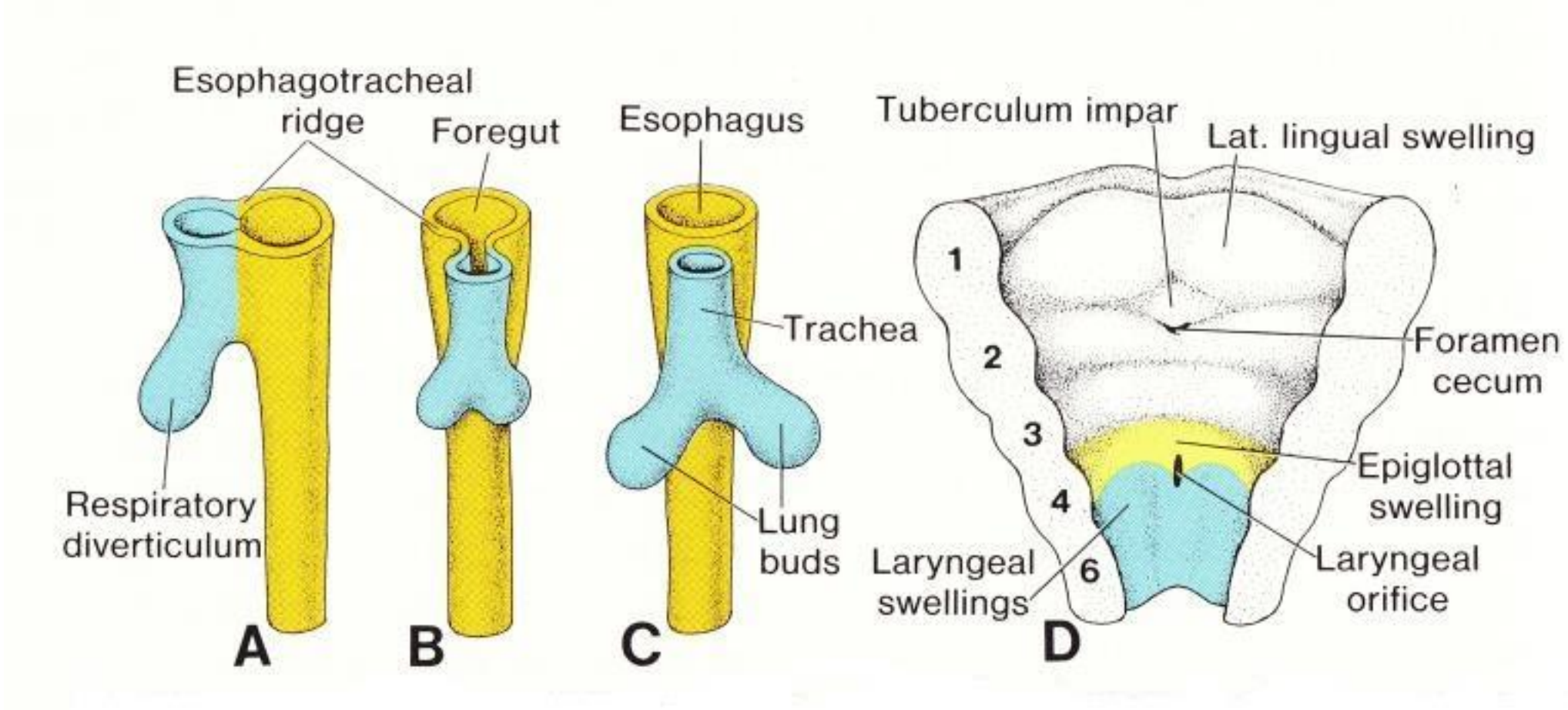



Note – Superiorly the pharynx combines both the respirtory and digestive systems

Separation of these two systems occurs via the tracheoesophageal septum

# Region of Lung Bud Development




**Association with Pharyngeal Arches**

The respiratory diverticulum occurs between the 4th and 6th pharyngeal arches.
This is why these arches contribute to formation of the laryngeal cartilage

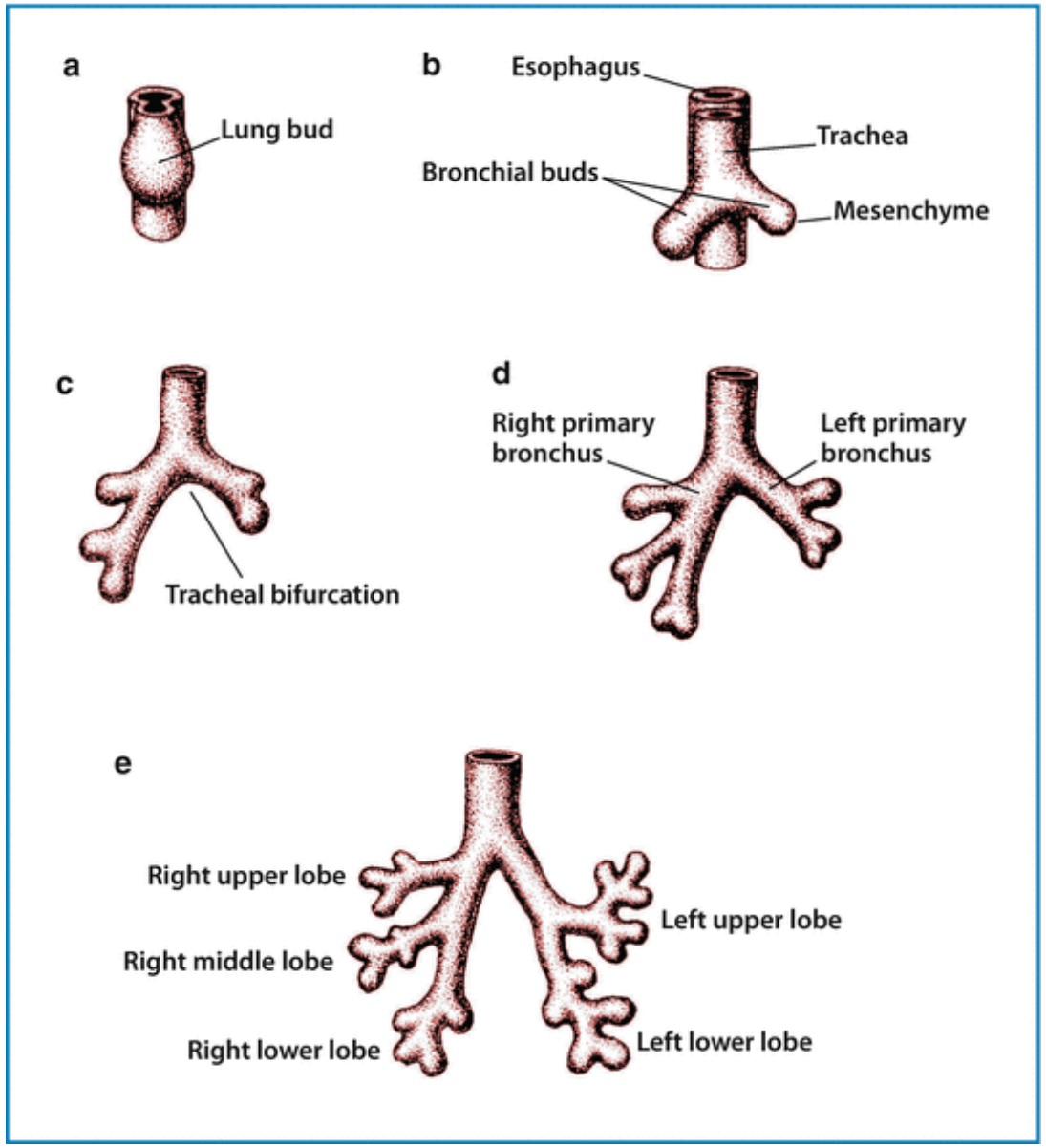
# Bronchial Buds, Primary, Secondary, Tertiary Bronchi

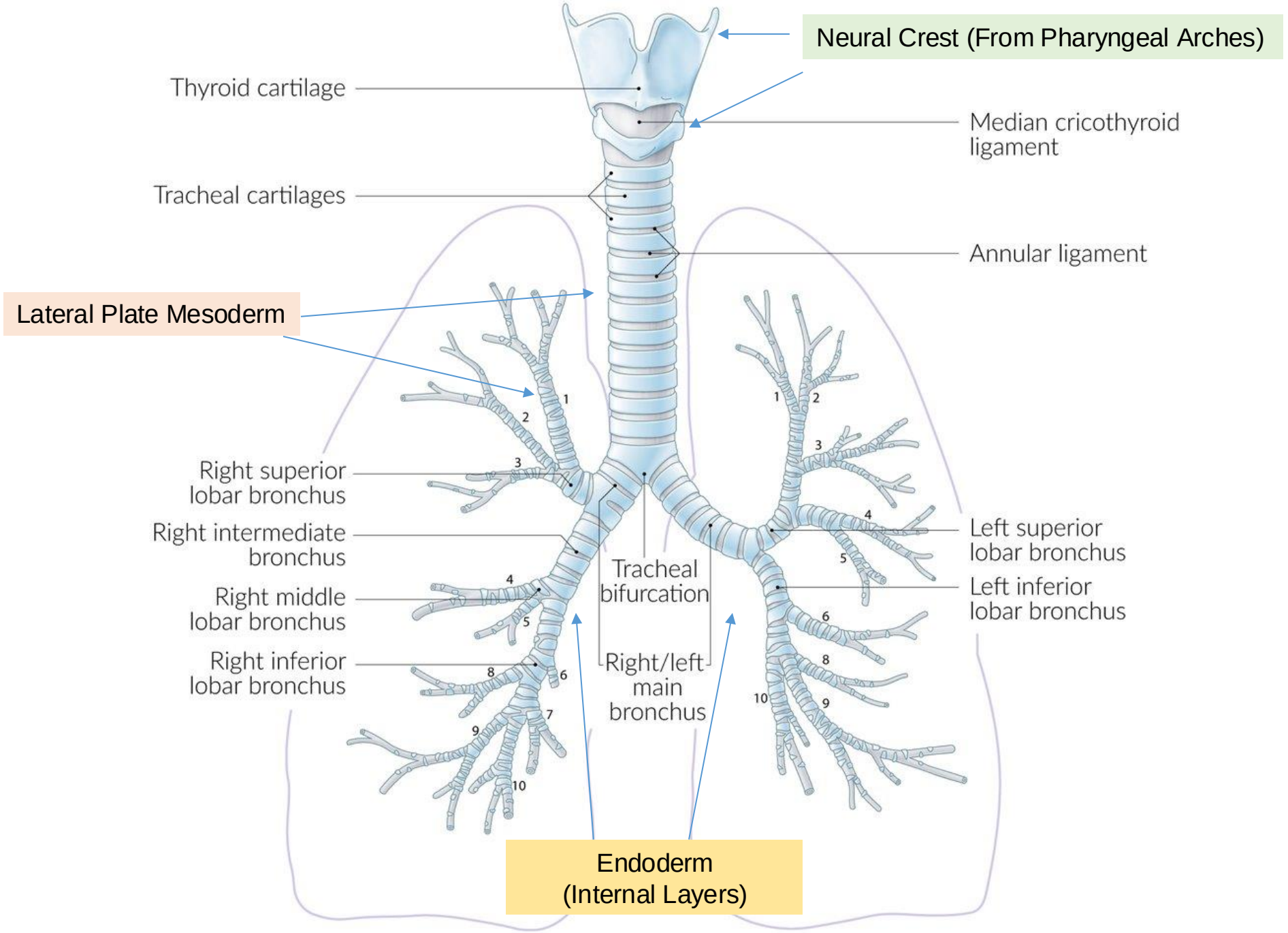
**Bronchial Buds – 4th week**

**Primary Bronchi – 4th week**

**Secondary (lobar) Bronchi – 5th Week**

**Tertiary (Segmental) Bronchi – 7th week**




Neural Crest (From Pharyngeal Arches)
Thyroid cartilage
Median cricothyroid ligament
Tracheal cartilages
Annular ligament
Lateral Plate Mesoderm
Right superior lobar bronchus
Right intermediate bronchus
Right middle lobar bronchus
Right inferior lobar bronchus
Tracheal bifurcation
Right/left main bronchus
Left superior lobar bronchus
Left inferior lobar bronchus
Endoderm (Internal Layers)

# Summary of Development

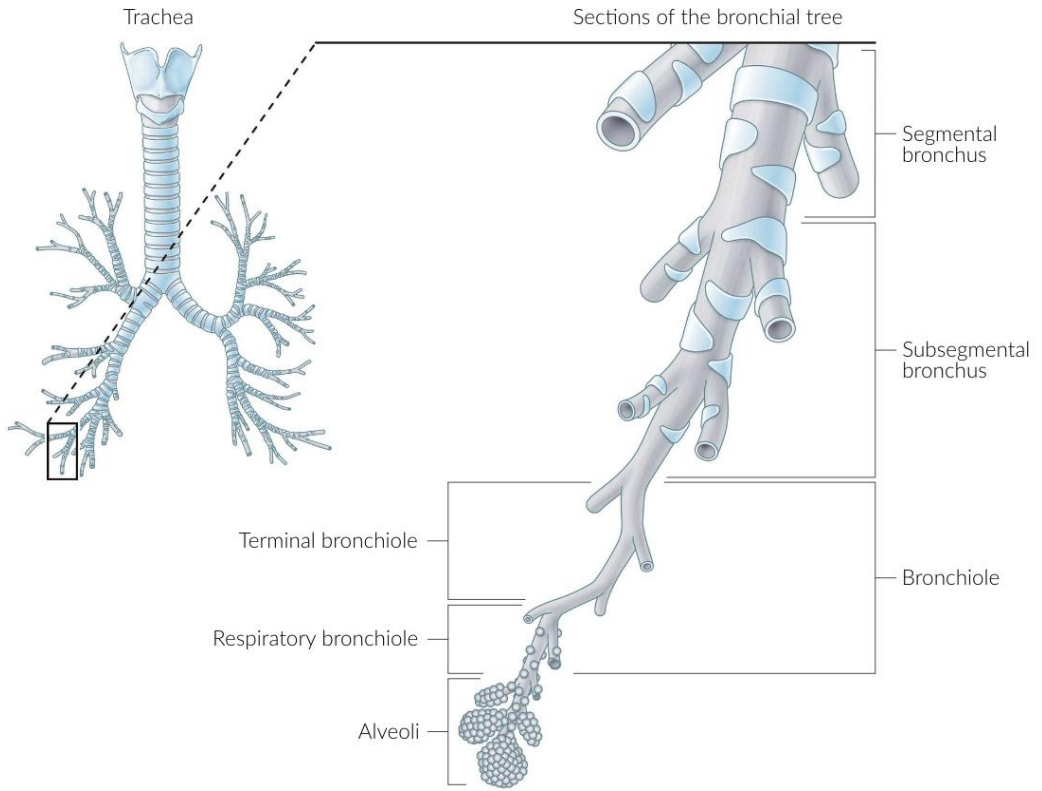
**1) Laryngotracheal Groove Forms**
- Anterior to the foregut, *endoderm*

**2) Lung Bud Form and Expand**
- Inferior elongation of groove
- Expand into the splanchnic mesoderm

**3) Bronchial Buds Form**
- Inferolateral to lung buds
- Enlarge to form the *primary bronchi*

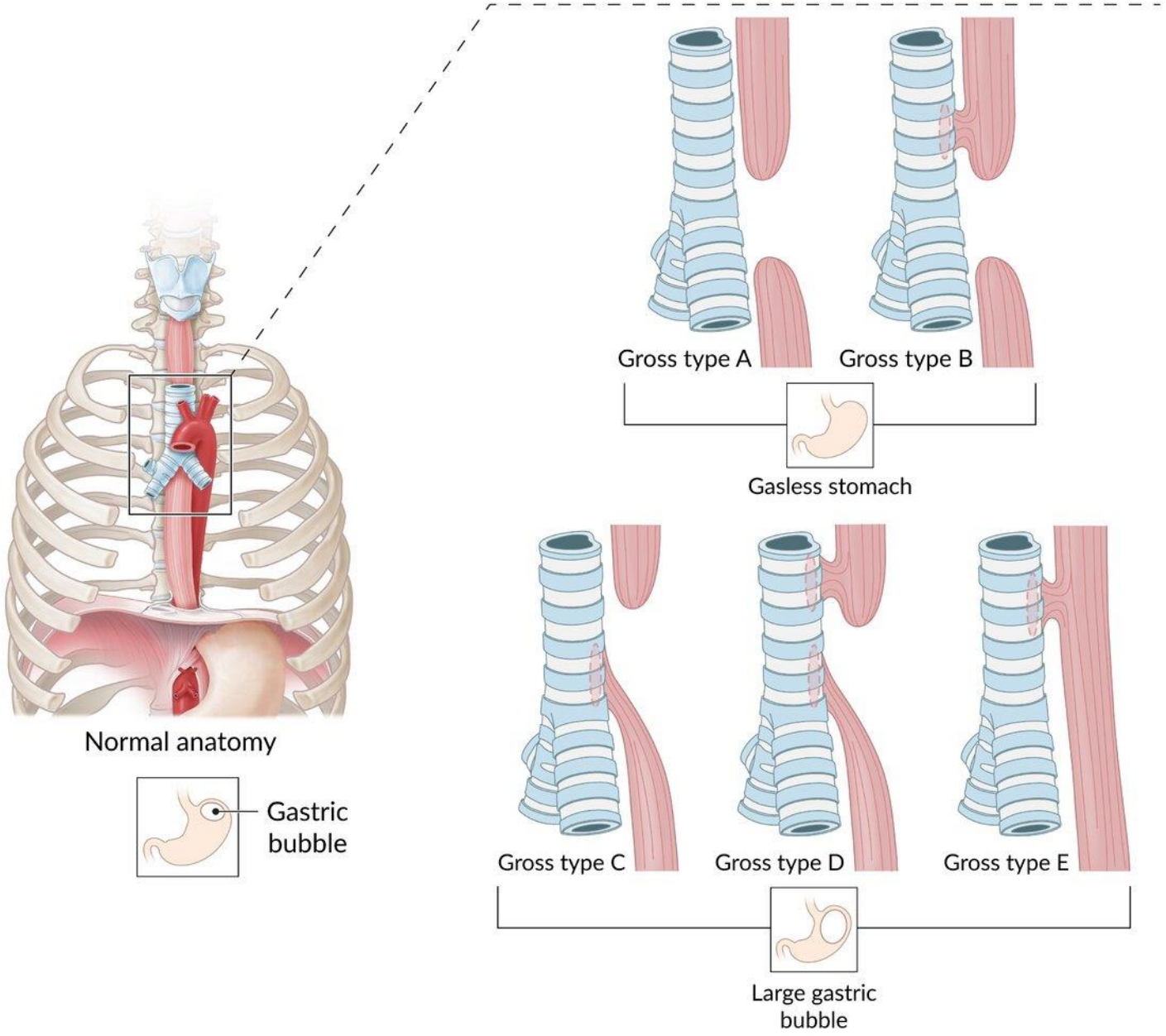
4) **Primary Bronchi Divide into Secondary, then Tertiary bronchi**
- 5th week – Secondary (Lobar) Bronchi
- 7th week – Tertiary (Segmental) Bronchi, *10 right, 8 Left*
- Additional mesenchyme forms bronchopulmonary segments

| Germ Layer | Derivatives |
|---|---|
| Neuroectoderm (Neural Crest) | Laryngeal Cartilage |
| Mesoderm (Lateral plate: Splanchnic mesoderm) | Cartilage, connective tissue, smooth muscle of trachea and bronchi, connective tissue of lungs |
| Endoderm | Epithelial Lining of trachea, bronchi, and lungs |



# Clinical Anatomy

# Esophageal Atresia and Tracheoesophageal Fistulas




**Symptoms of Esophageal Atresia and TE Fistulas**

**Prenatal**

1) Polyhydramnios (excess amniotic fluid)

   Normally, fetus will swallow excess amniotic fluid. Unable to do so in this case as the path does not go to the GI system

**Postnatal**

1) Regurgitation after feeds
2) Abdominal distention (air in the stomach)
3) Gastric bubble on imaging