

Chest Cavity and Lungs Lab Guide

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Lab Summary

Learn chest anatomy from chest wall to lung including breast structure and its important relationships to muscle, lymphatics and nerves. The structure of the rib cage along with its external and external architecture are presented. Pleural, lungs and their connections are taught.

Dissection List

Chest Plate Removal, Lung Removal, Lung Dissection

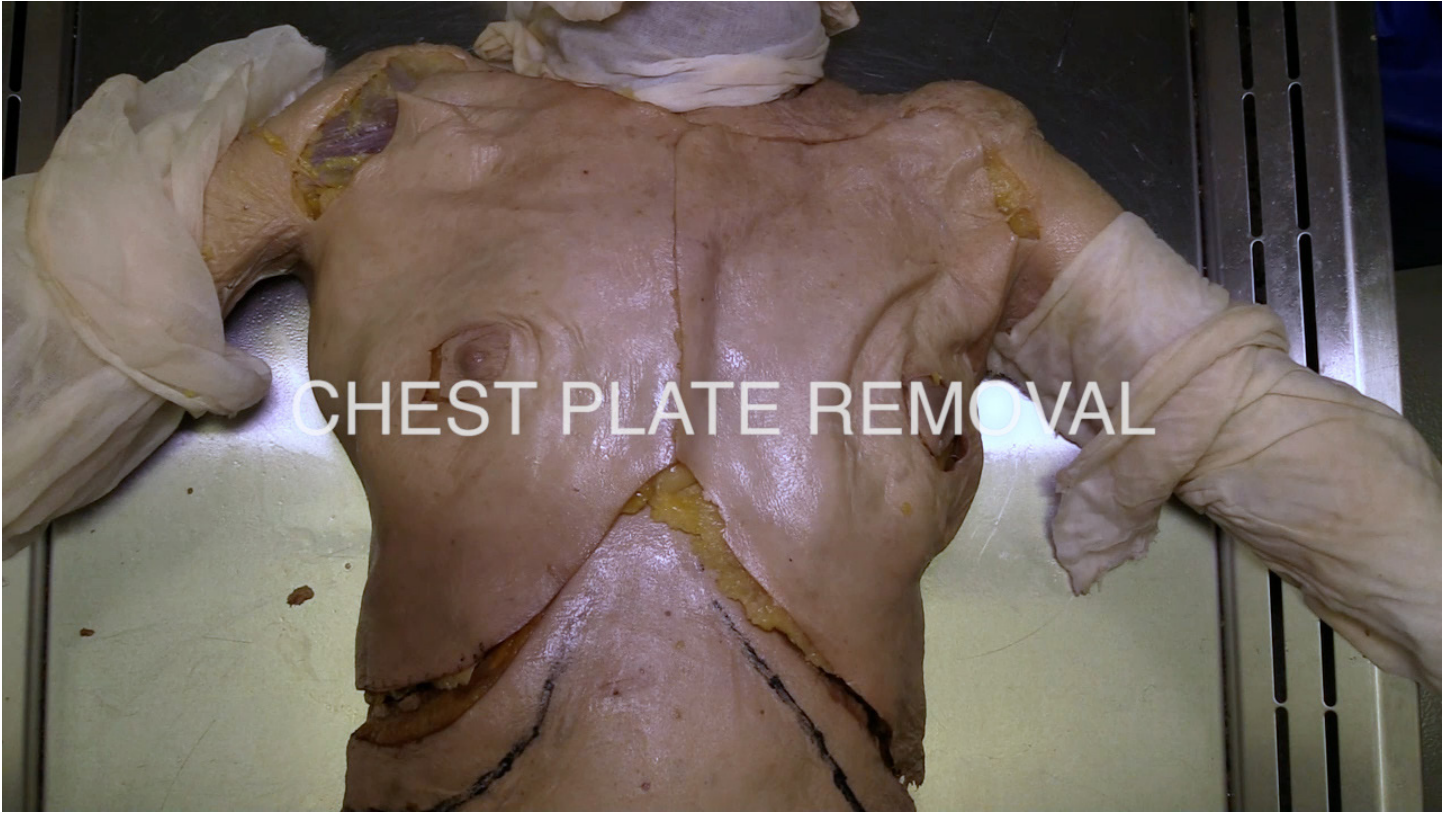
Lab Objectives

- 1) Describe and demonstrate on your donor the pleural recesses (costodiaphragmatic, costomediastinal). Also be able to describe their surface landmarks.
- 2) Describe / diagram / demonstrate on your donor the relationship of the main structures at the hilus of the lungs.
- 3) Describe the positions of the lobes of the lung and the bifurcation of the trachea and their relationships to the surface landmarks.
- 4) Describe the course and position of the internal thoracic (mammary) artery.
- 5) Describe the lobes and fissures of the lungs.
- 6) Describe the course of and branches of the vagus and phrenic nerves near the hilus of the lung.
- 7) Describe the relationship between the branching of pulmonary arteries, veins and bronchi.

Chest Cavity and Lungs Key Structures

| | |
|--|---|
| Aortic arch | Pectoralis minor |
| Ascending aorta | Pericardium |
| Axillary lines: anterior, mid, posterior | Phrenic nerve |
| Azygos vein | Pleural recesses |
| Breast | Pleuroscopy |
| Bronchoscopy | Pulmonary artery and vein |
| Carina | Pulmonary trunk |
| Costal margin | Sternal angle |
| Costal, mediastinal and diaphragmatic pleura | Sternum |
| Diaphragm | Superior vena cava (SVC) |
| Ductus arteriosus | Thoracic aorta |
| Epiglottis | Tracheal ring |
| Hilus | Trachealis muscle |
| Horizontal and oblique fissures | Upper, middle and lower lobes of the lung |
| Internal thoracic (mammary) artery | Vagus nerve (X) |
| Intercostal muscles | Vestibular fold |
| Left recurrent laryngeal nerve | Visceral pleura |
| Ligamentum arteriosum | Vocal fold |
| Lingula | |
| Lobar bronchus | |
| Mainstem bronchus | |
| Manubrium | |
| Oblique fissure | |
| Parietal pleura | |
| Pectoralis major | |

1) Chest Plate Removal



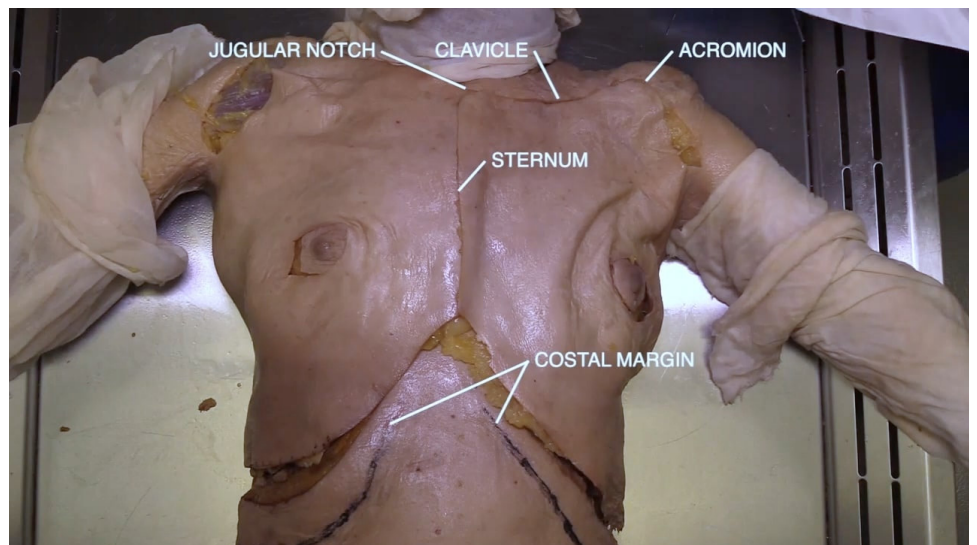
Use the following content as an additional guide alongside the Chest Plate Removal video.

1.1) Exposing the Chest

Remove the chest plate by incising skin and **superficial fascia** in the midline along the length of the **sternum**.

Incise around the nipple to leave it in place attached to the chest wall.

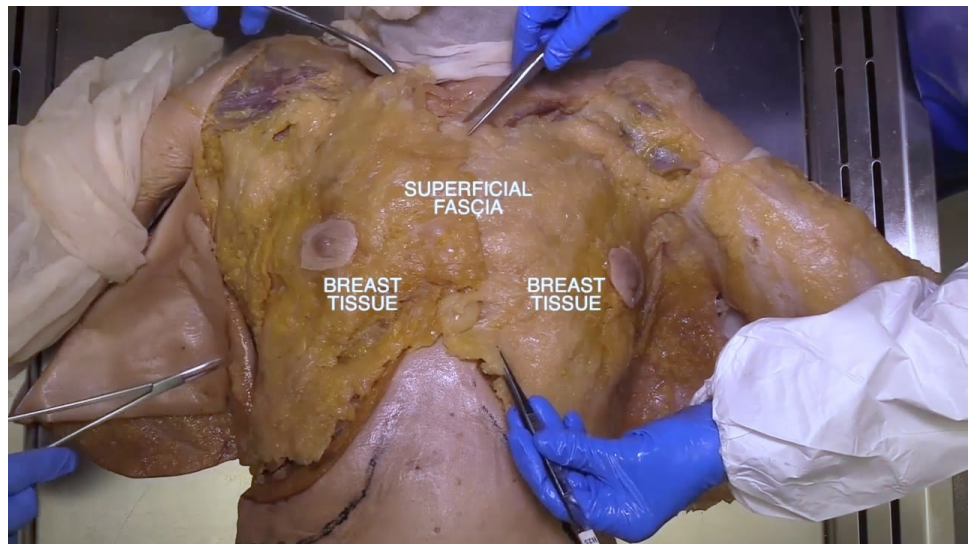
Make lateral incisions just below clavicles extending inferior to axilla to posterior axillary line. Inferiorly, make lateral incisions along the **costal margin** to the posterior axillary line.



1.1a) Skin incisions

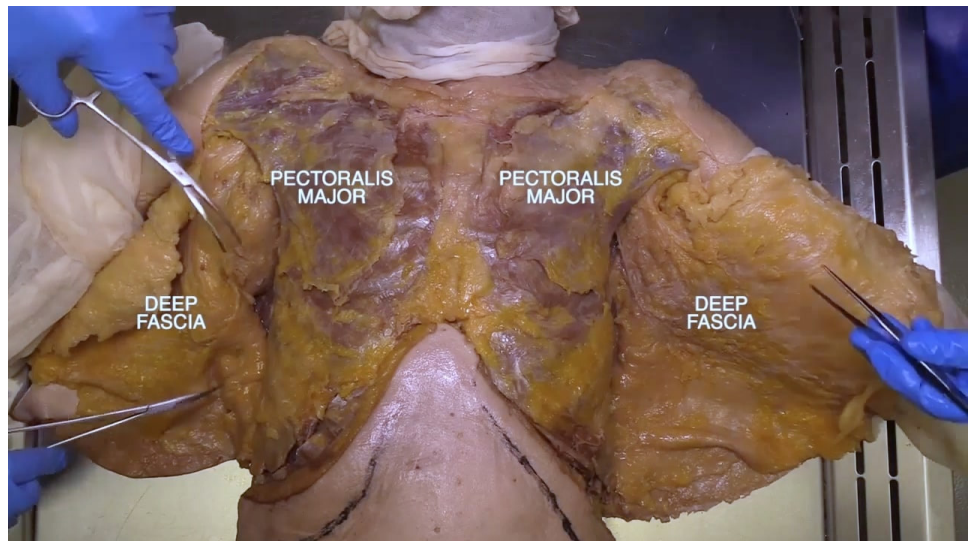
1.2) Superficial Fascia, Pectoralis Major

If you have a female donor, examine the extent of **breast** tissue. Note the breast is superficial to the **pectoralis major** and extends to axilla.



1.2a) Superficial fascia and breast

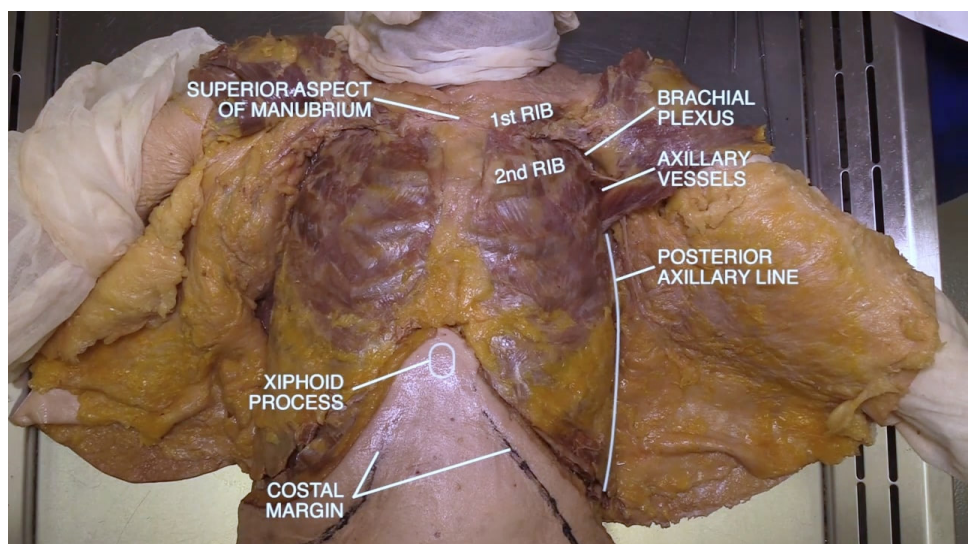
Divide the clavicular and sternal attachments of the pectoralis major muscles. Reflect these muscles laterally.



1.2b) Pectoralis major

Q1) Where is the lymphatic drainage of the breast?

(Answer on page 15.)



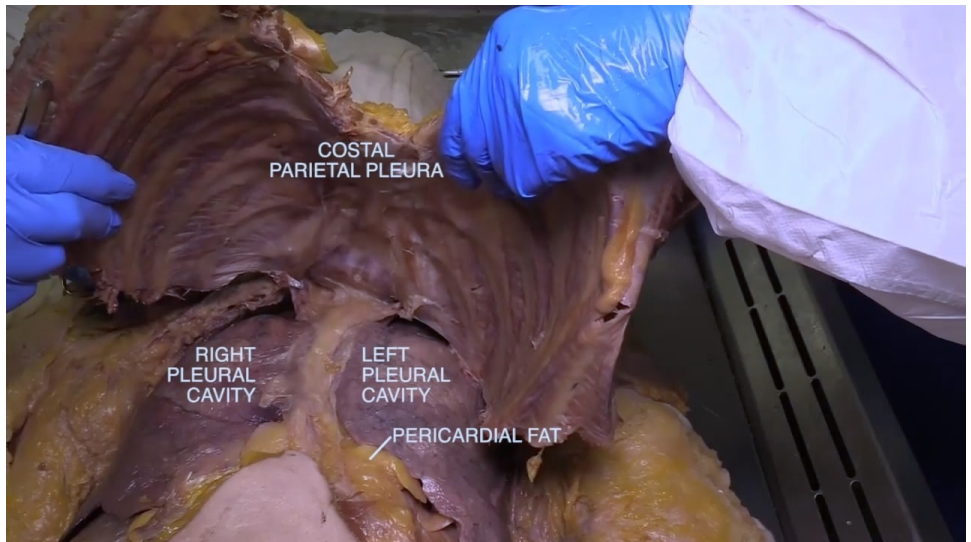
1.2c) Ribs and sternum

1.3) Removal of Chest Plate

Using the oscillating saw, cut the **manubrium** and the first and second ribs just below the **clavicle**.

Extend this cut laterally and inferiorly along the posterior axillary line.

The inferior cut should be 5cm above the costal margin.



1.3a) Chest plate removal

Gradually elevate the chest plate from inferior to superior while separating pleura and **pericardium** from the chest wall. **Note, the cut ribs are sharp.**

Where necessary, divide soft tissue with sharp dissection.

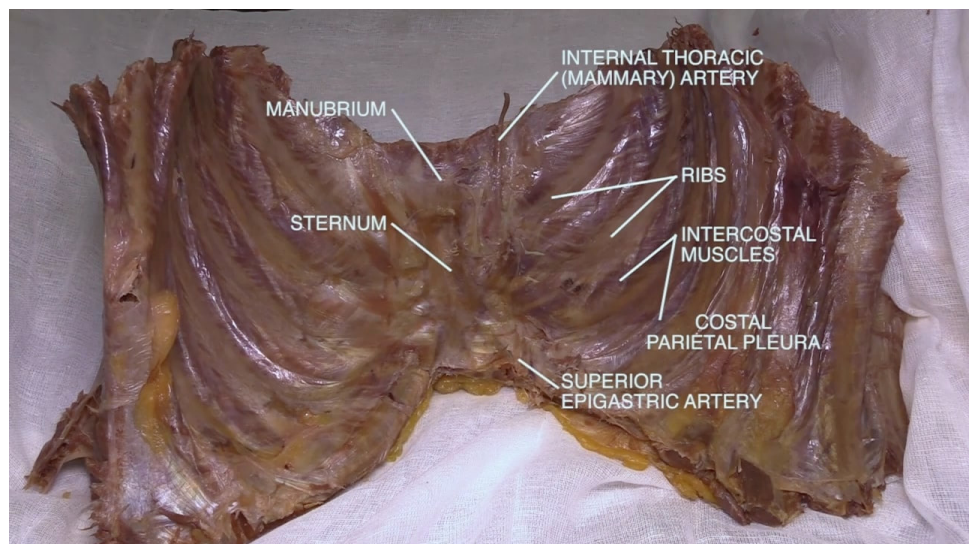
1.4) Internal Surface Chest Plate

Examine the interior surface of the chest plate.

Identify the costal **parietal pleura** lining the ribs and intercostal spaces.

Locate the internal thoracic (internal mammary) vessels lateral to the sternum.

Q2) How could the **internal thoracic artery** be useful in coronary artery bypass graft surgery?



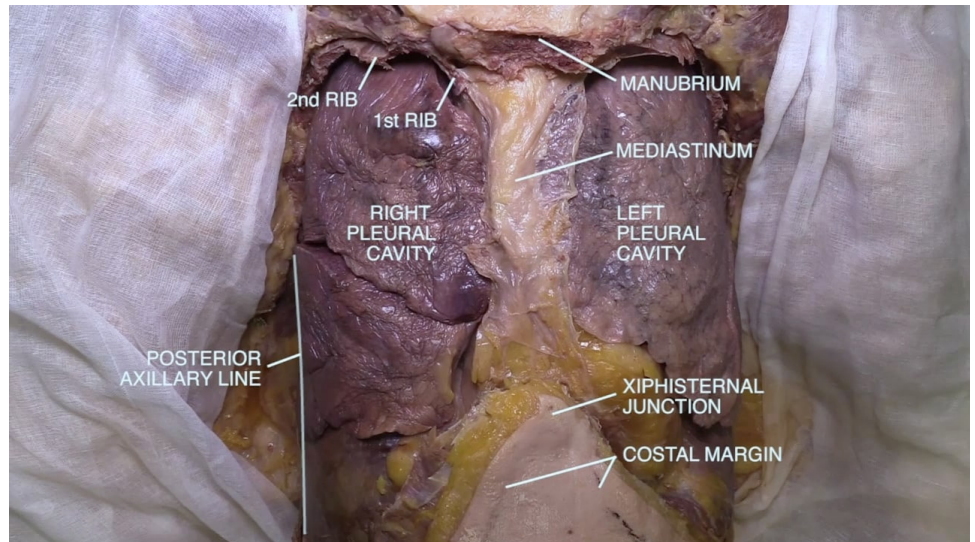
1.4a) Interior chest plate

(Answer on page 15.)

1.5) Chest Cavity

Note the right and left pleural cavities and the mediastinum.

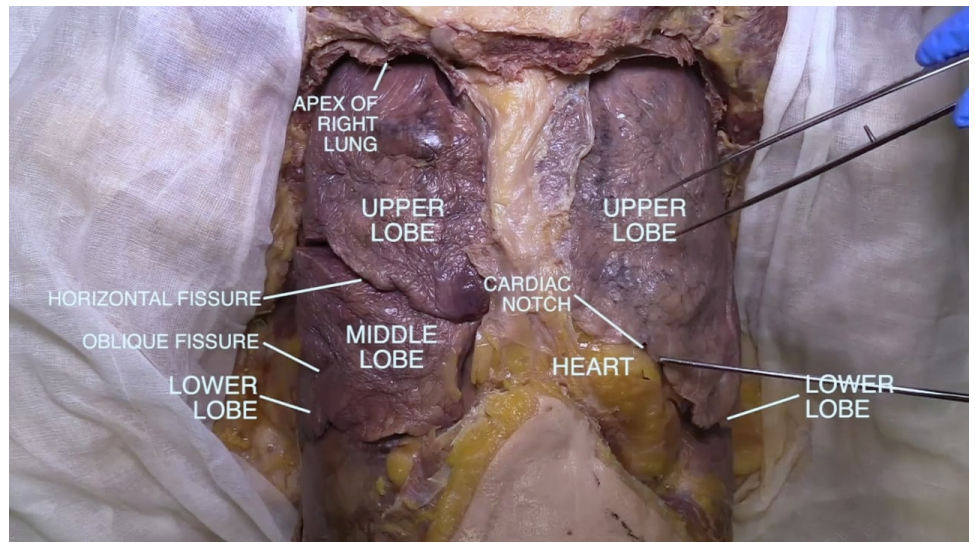
Identify the parietal pleura (costal, diaphragmatic and mediastinal divisions) and **visceral pleura**.



1.5a) Chest cavity

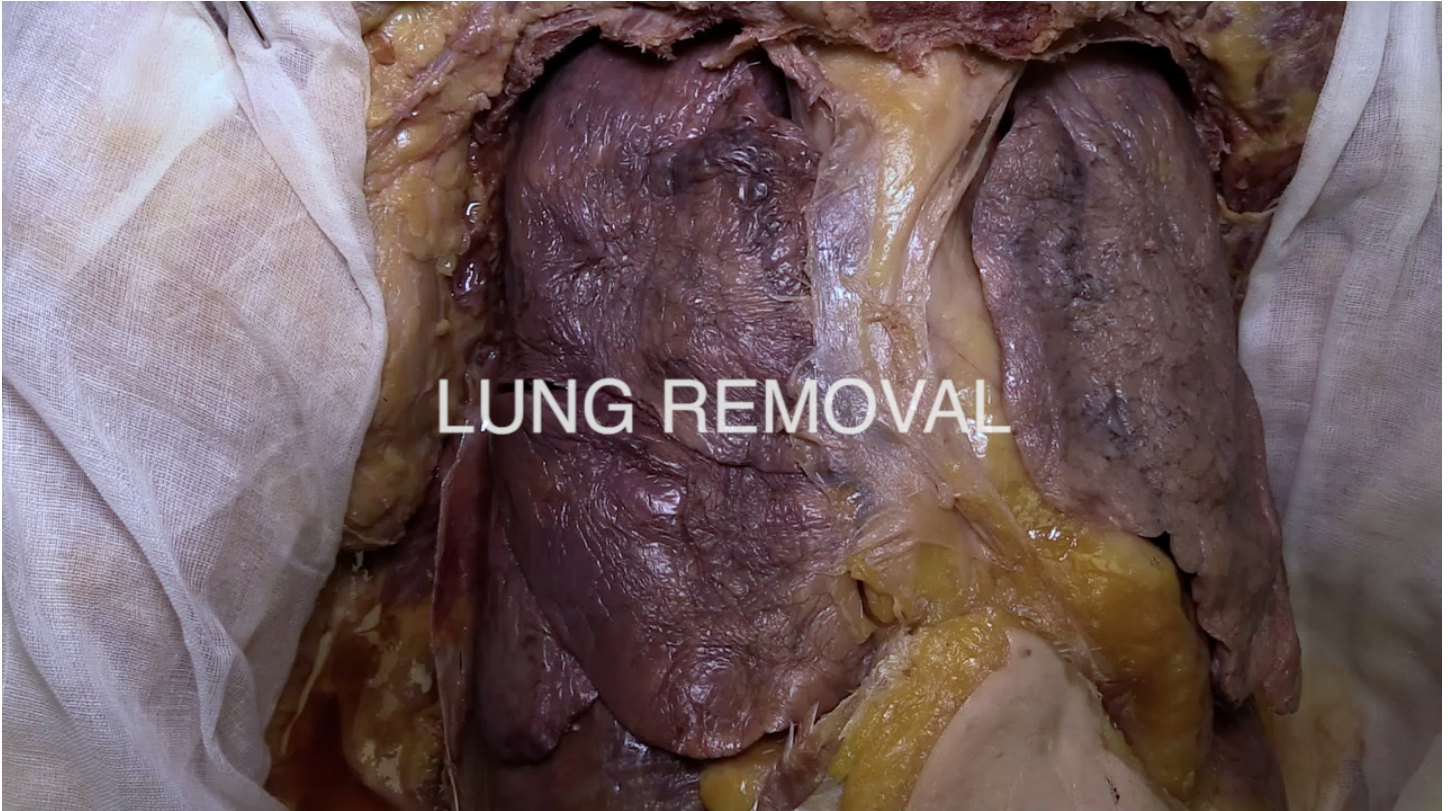
Identify the right and left lungs along with their lobes.

Identify the pericardium. Note the relationships of the heart to the diaphragm and lungs.



1.5b) Lobes

2) Lung Removal

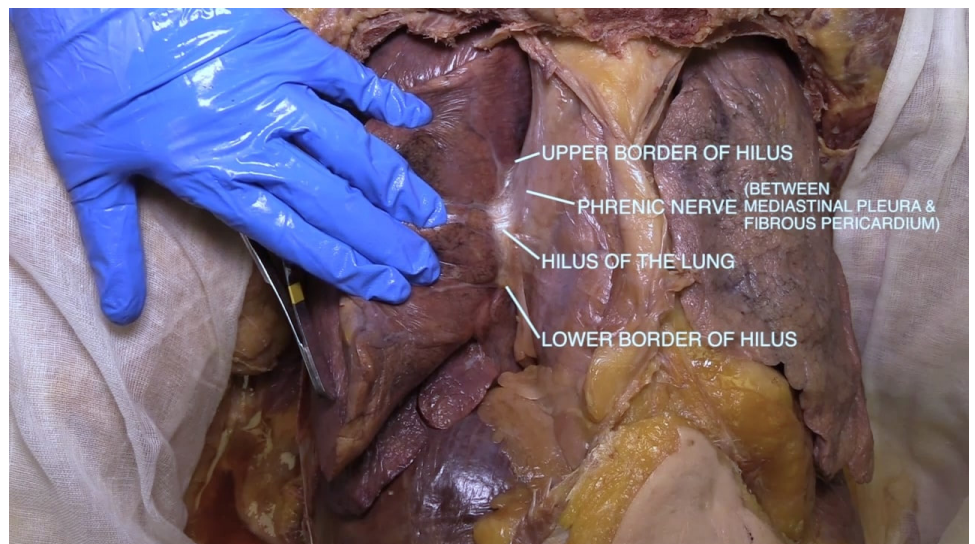


Use the following content as an additional guide alongside the Lung Removal video.

2.1) Right Pneumonectomy

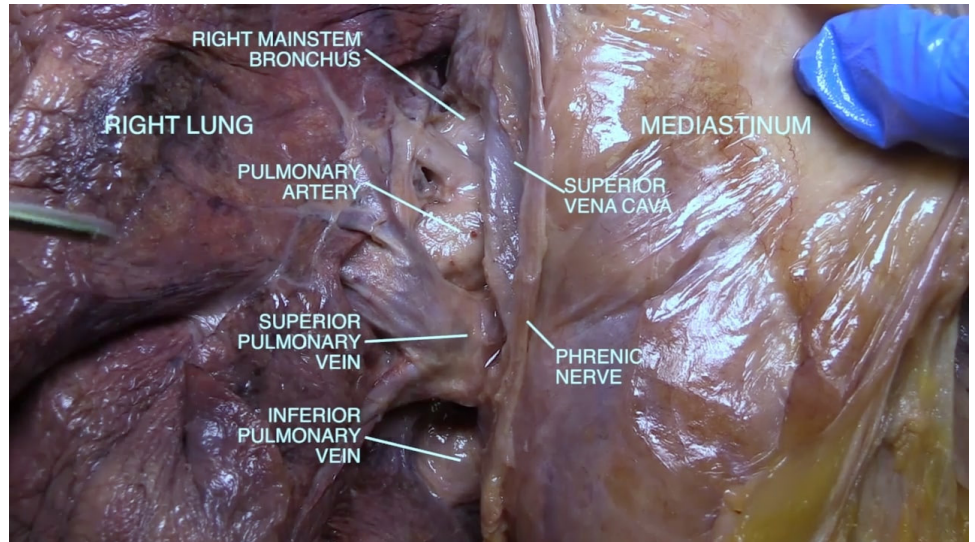
Manually retract the medial surface of the right lung laterally to expose the hilus.

At the hilus of the lung, the **mediastinal pleura** is reflected onto the lungs as visceral pleura.



2.1a) Pleura at right hilus

Anterior to the hilus, identify the **phrenic nerve**, which runs between pleura and pericardium to reach the diaphragm.

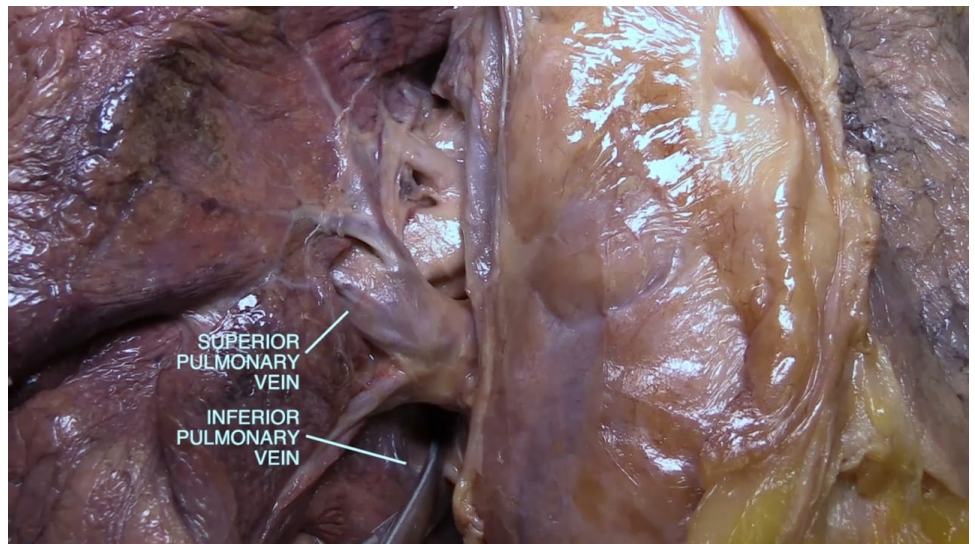


2.1b) Right hilus

2.2) Right Pneumonectomy

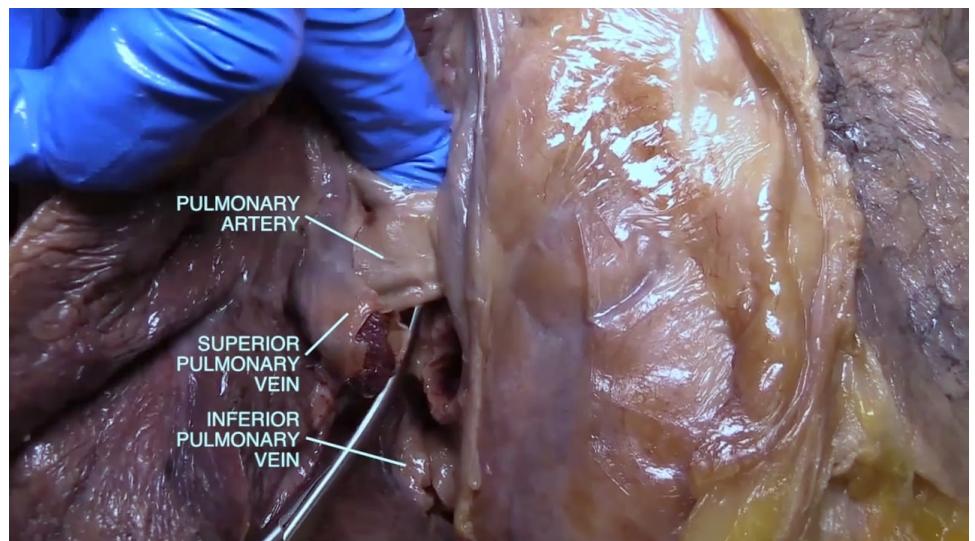
Divide the pleura at the hilus.

Locate and divide superior and inferior pulmonary veins.



2.2a) Pulmonary veins - right hilus

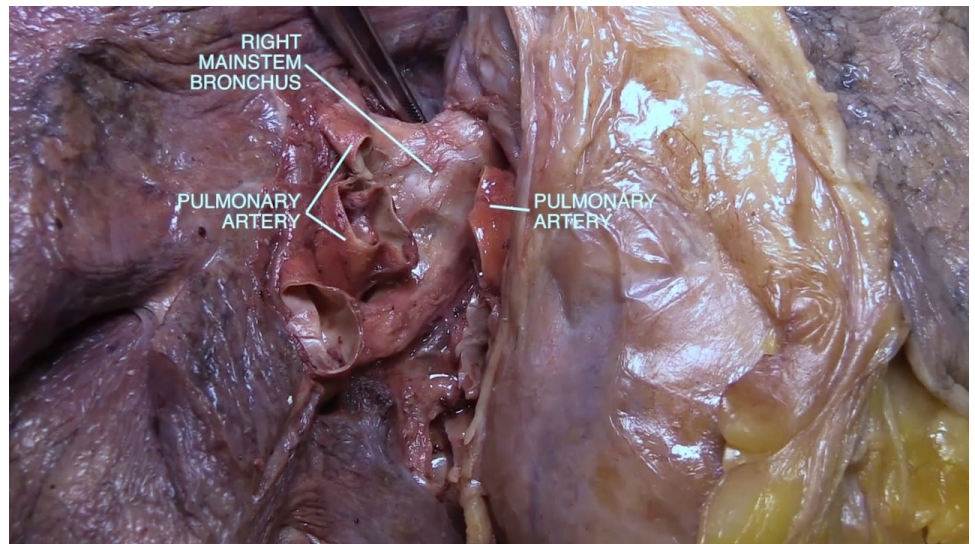
Next divide the right **pulmonary artery**.



2.2b) Pulmonary artery - right hilus

Posterior to the right pulmonary artery, locate and divide the **mainstem bronchus**.

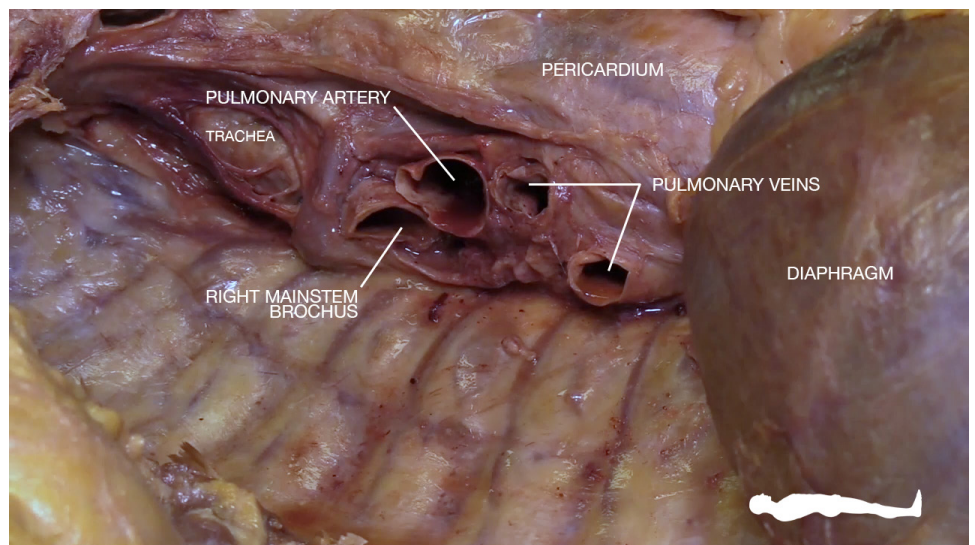
Divide the posterior pleura and remove the lung.



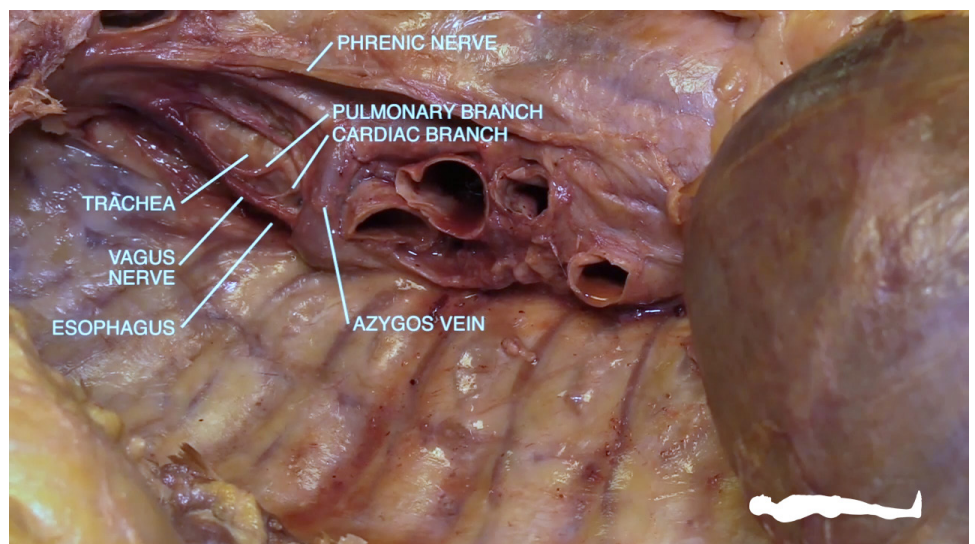
2.2c) Mainstem bronchus - right hilus

Re-identify the phrenic nerve. On the mediastinum, locate the **azygos vein** and the right **vagus nerve** superior and posterior to the hilus.

Identify the mainstem bronchus, pulmonary artery and pulmonary veins on the medial surface of the lung and mediastinum.



2.2d) Right hilus



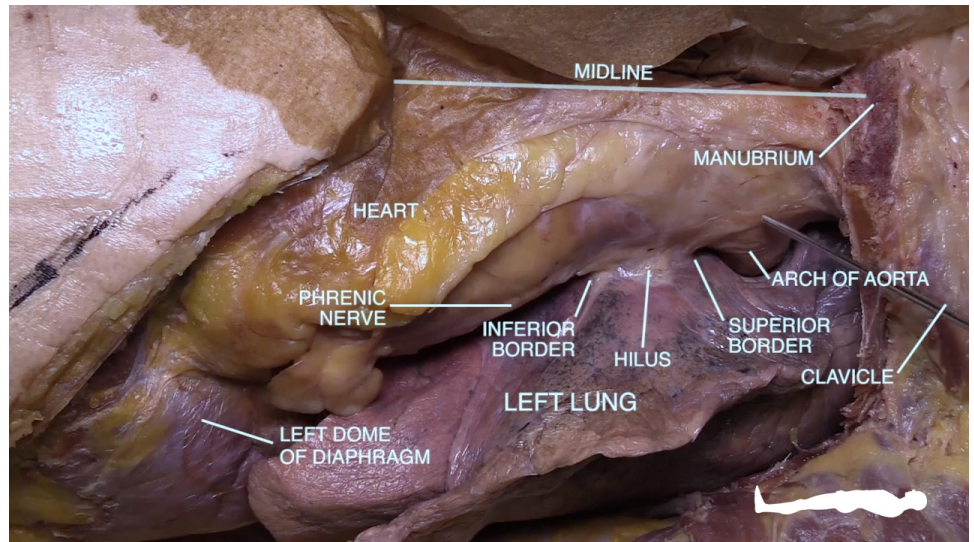
2.2e) Mediastinum - right hilus

2.3) Left Pneumonectomy

Manually retract the medial surface of the left lung laterally to expose the hilus. Note the relationships of the left lung to the diaphragm, pericardium and arch of aorta.

Identify the phrenic nerve.

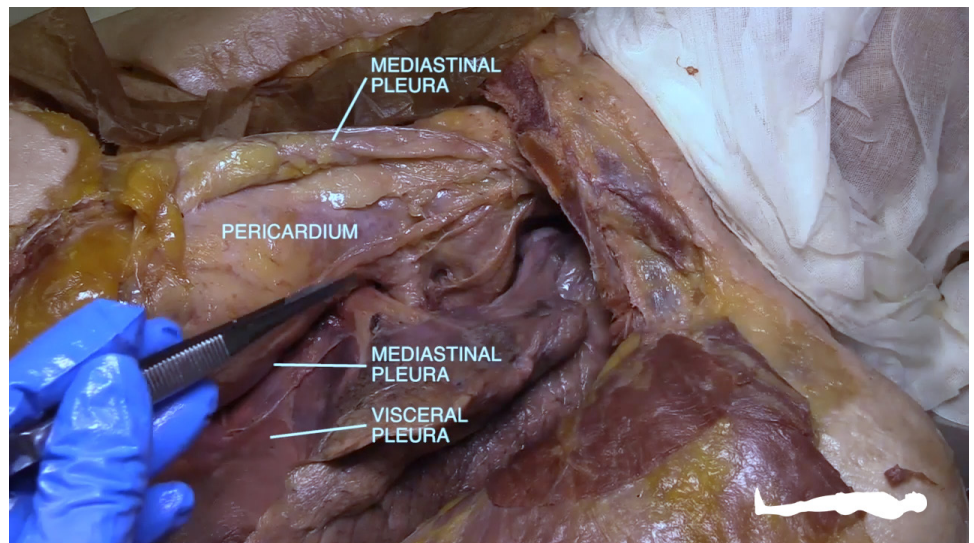
Locate the left vagus nerve lateral to the arch of the aorta.



2.3a) Left hilus

Locate the ligamentum arteriosum between the left pulmonary artery and the arch of the aorta.

Locate the left recurrent laryngeal branch of the vagus nerve as it passes posterior to the ligamentum arteriosum. Locate cardiac and pulmonary branches of the vagus nerve.



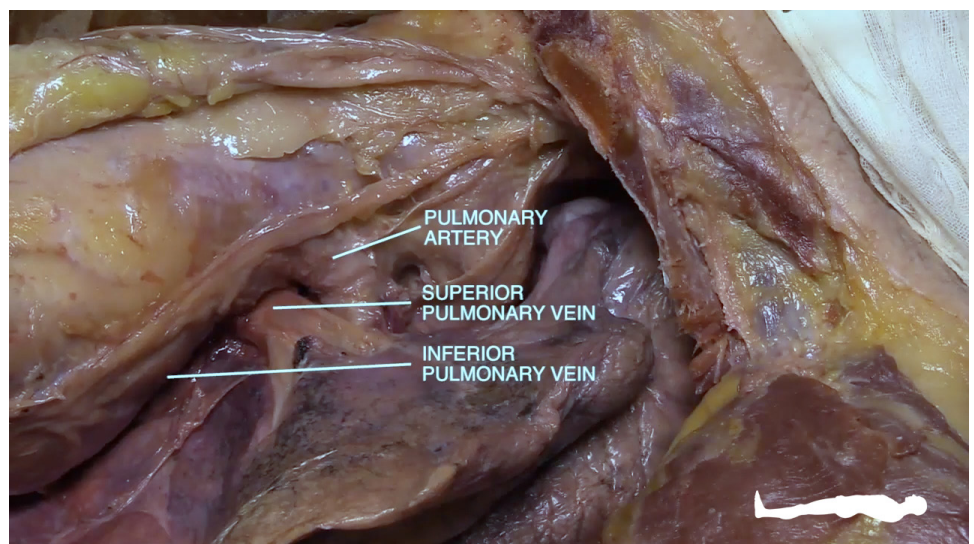
2.3b) Pleura and pericardium from left

Divide the pleura at the hilus.

Divide the superior and inferior pulmonary veins then divide pulmonary artery. Next divide mainstem bronchus.

Incise the posterior pleura and remove the lung.

Identify the mainstem bronchus, pulmonary artery and pulmonary veins on the medial surface of the lung

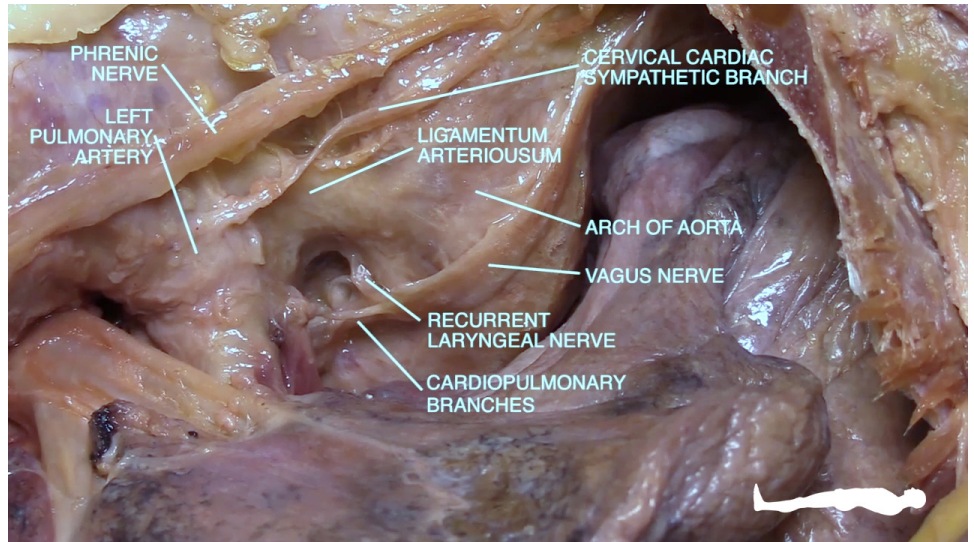


2.3c) Contents of left hilus

and mediastinum.

Q3) Why are the phrenic nerves at risk for surgery in this area?

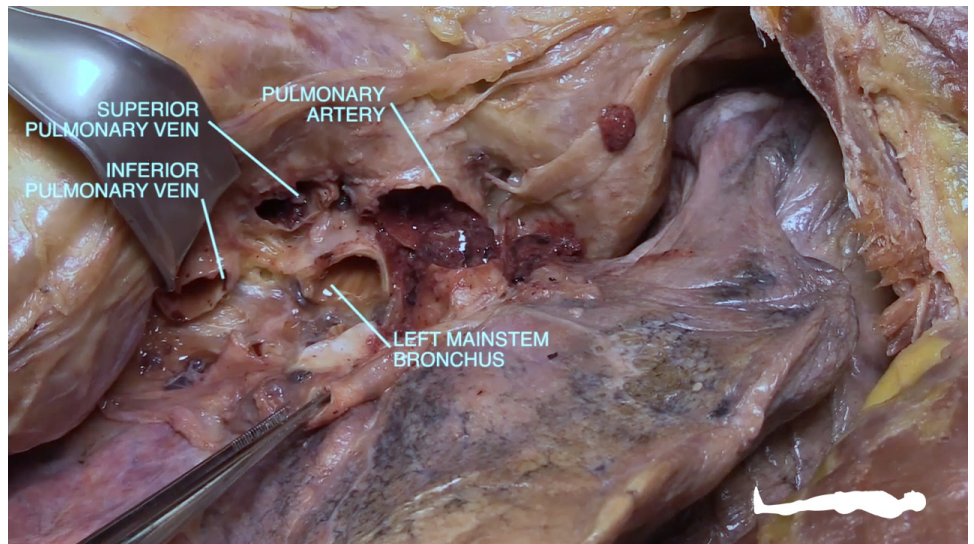
(Answer on page 15.)



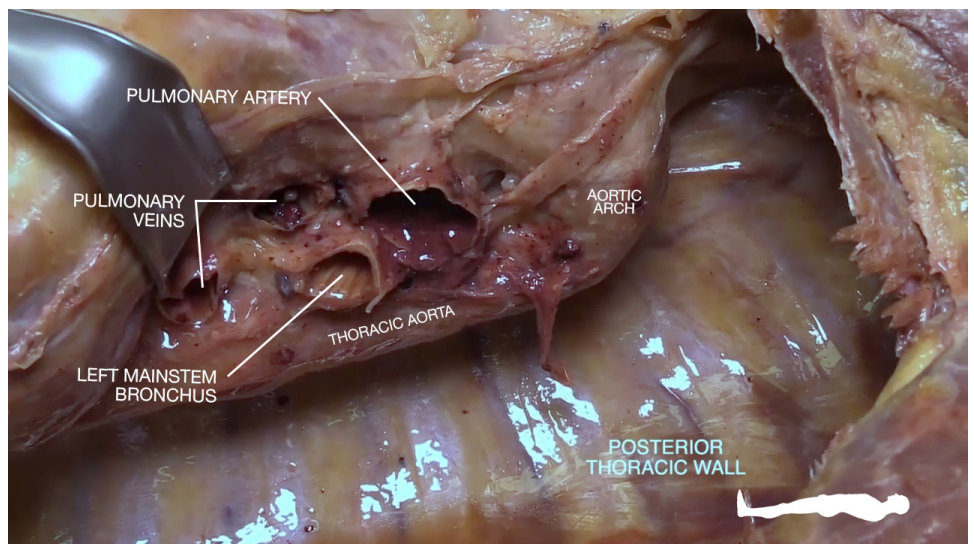
2.3d) Nerves - left hilus

Q4) What embryologic structure does the ligamentum arteriosum represent?

(Answer on page 15.)



2.3e) Divided left hilus



2.3f) Left mediastinum

3) Right Lung Dissection

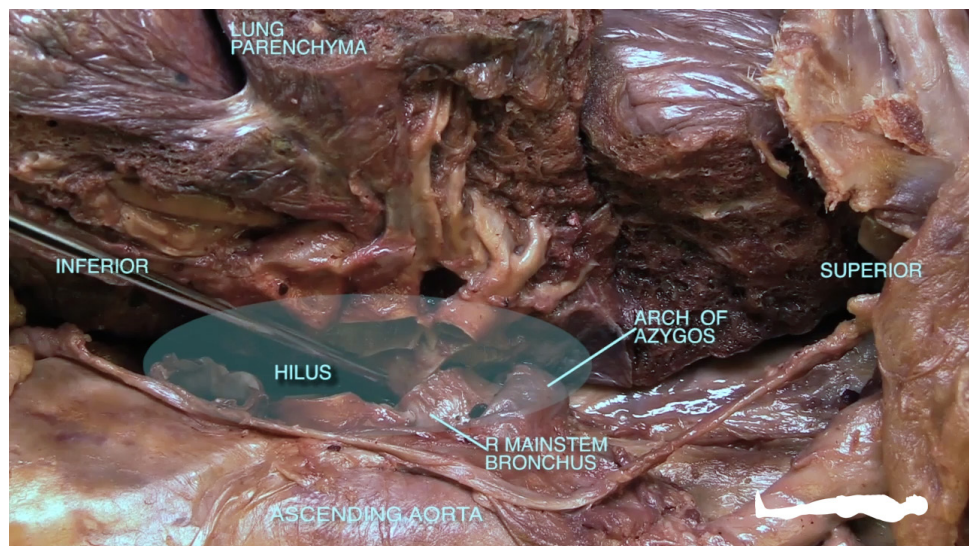


Use the following content as an additional guide alongside the Right Lung Dissection video.

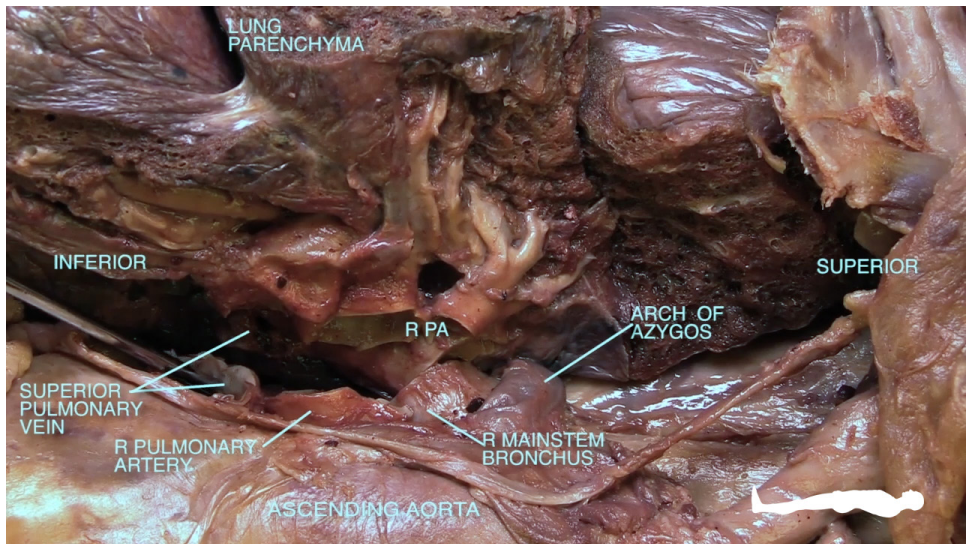
3.1) Lobar Bronchi

Bluntly dissect from the mainstem bronchus to **lobar bronchi**. Also dissect the accompanying **pulmonary arteries**.

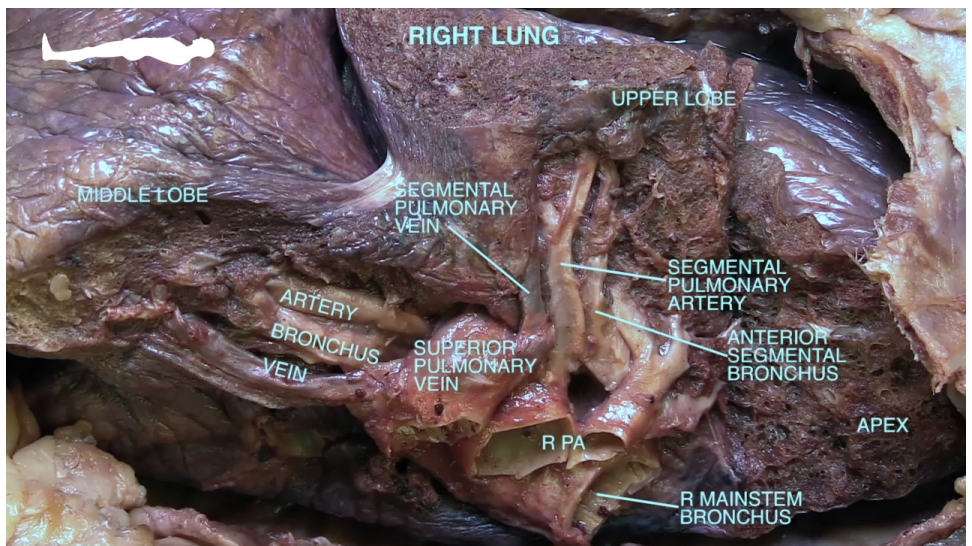
Place the lung back in the chest cavity and note the relationship of bronchus, artery and veins from hilus to lung.



3.1a) Pulmonary view right hilus



3.1b) Pulmonary view right hilus

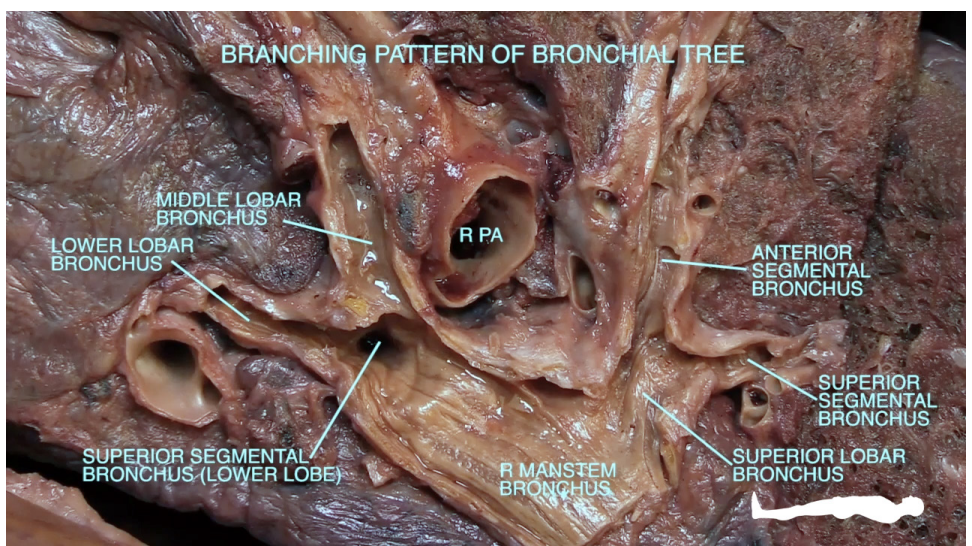


3.1c) Right lobar bronchi

Open the bronchi to examine their internal structure.

Q5) What is a segmental bronchus?

(Answer on page 15.)



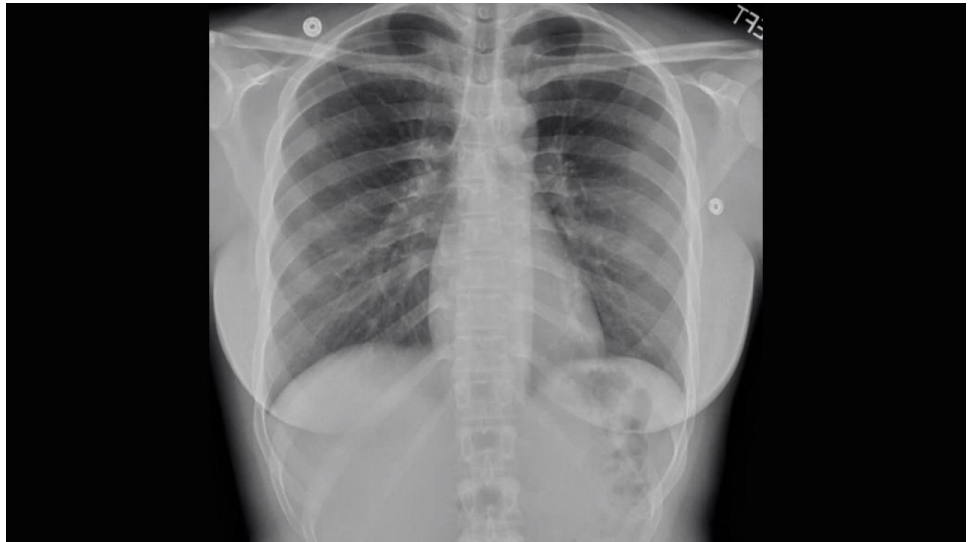
3.1d) Right bronchial tree

3.2) Examining Recesses

Place your hand in the costodiaphragmatic recess in the midclavicular, midaxillary and scapular lines.

Look at a skeleton in order to name the corresponding rib levels and compare to the chest film in figure 3.2a.

Place your hand in the **cupola** (chest cavity apex) on the donor or a skeleton. Note the relationship to the medial clavicle.



3.2a) PA Chest

Chest Cavity and Lungs Answer Key

Q1) Axillary lymph nodes.

Q2) The left internal thoracic artery runs close to the heart and can be anastomosed to a coronary artery.

Q3) The phrenic nerve passes anterior to the hilus of the lung.

Q4) The ductus arteriosus which allows blood from the right ventricle to bypass the lungs.

Q5) A tertiary bronchus which, along with a branch of the pulmonary artery, supplies a portion of the lobe called the bronchopulmonary segment.