



Dr. Doaa Shuaib

Anatomy of trachea & bronchi

**Assistant Professor of Anatomy & Embryology
Faculty of Medicine – Cairo University
Email: doaa.shuaib@kasralainy.edu.eg**

The background is a textured, golden-yellow surface. In the center, there are several concentric circles in a lighter shade of yellow. In the top-left and bottom-right corners, there are stylized floral motifs with multiple pointed petals.

Trachea

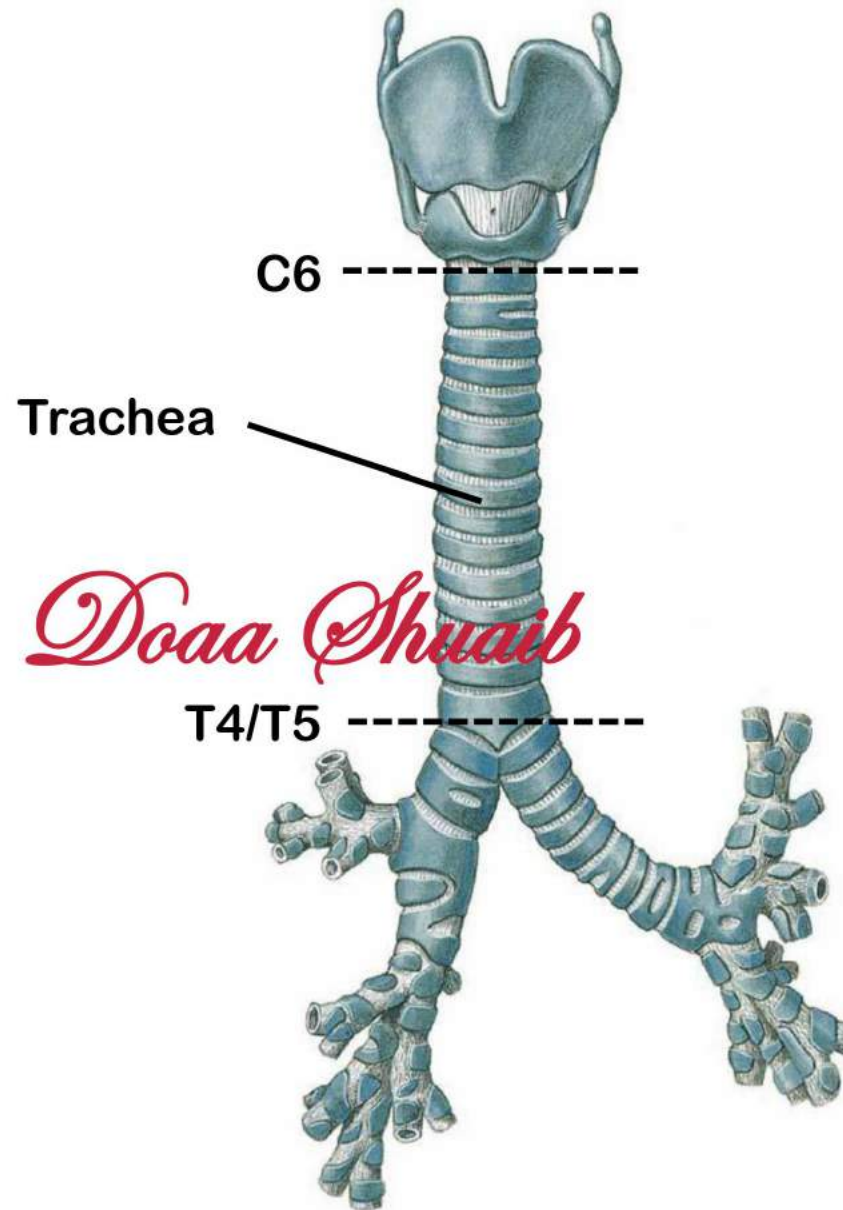
Trachea

Beginning

In the neck, at the level of the lower border of C6, as a continuation of the larynx

End

In the thorax, at the level of the sternal angle (disc between T4/T5) by dividing into 2 principal bronchi.



Source: Sobotta Atlas of Anatomy

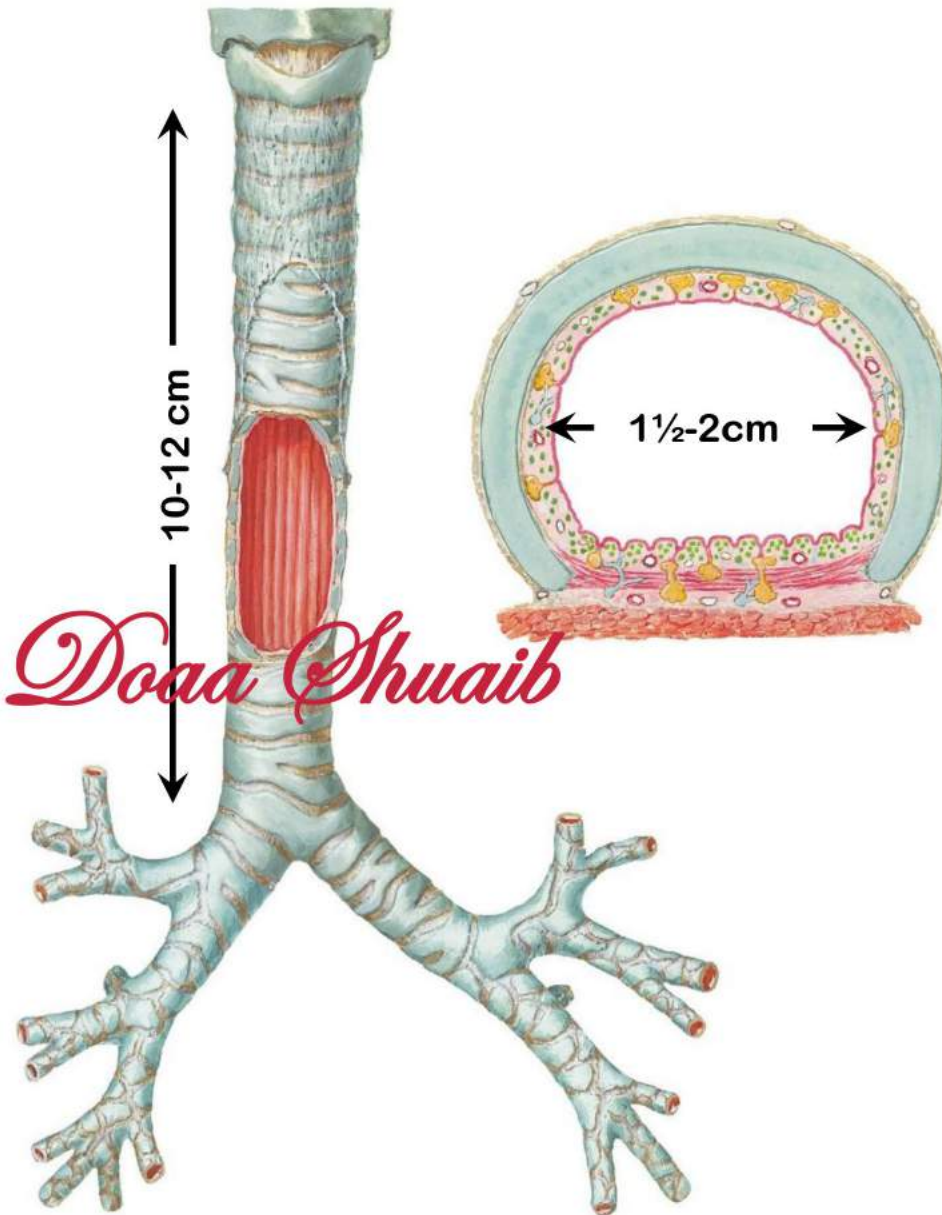
Trachea

Length

4-5 inches (10-12 cm)

Diameter

1/2-3/4 inch (1½-2cm)

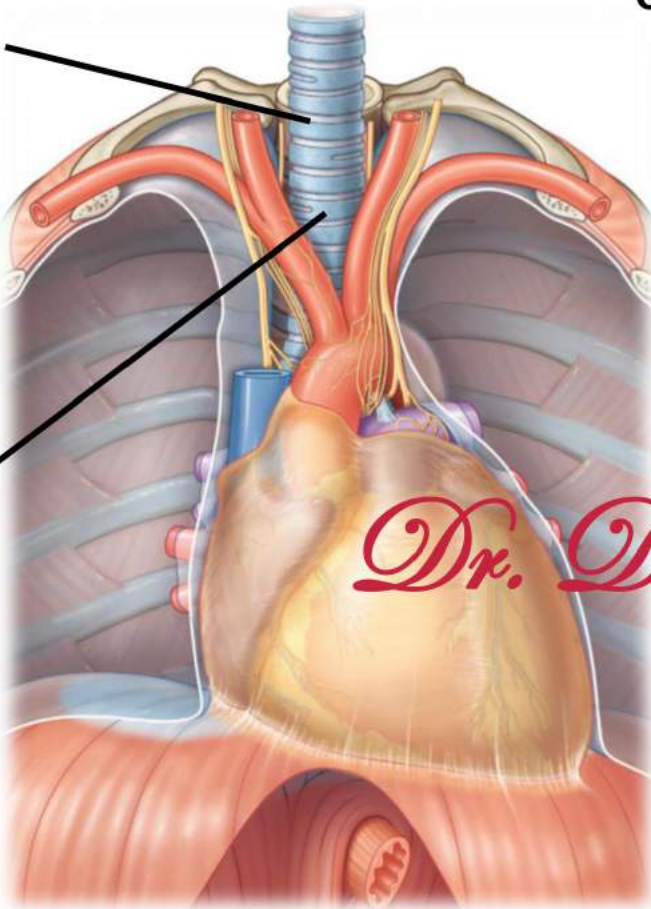


Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

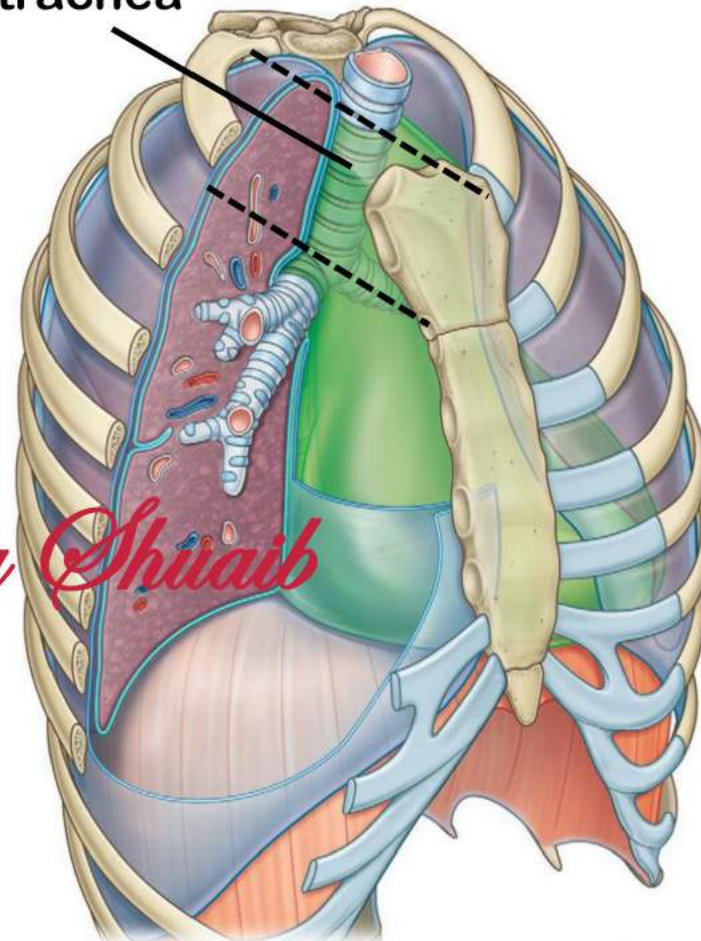
Trachea

Cervical
part of the
trachea

Thoracic
part of the
trachea



Thoracic part
of the trachea



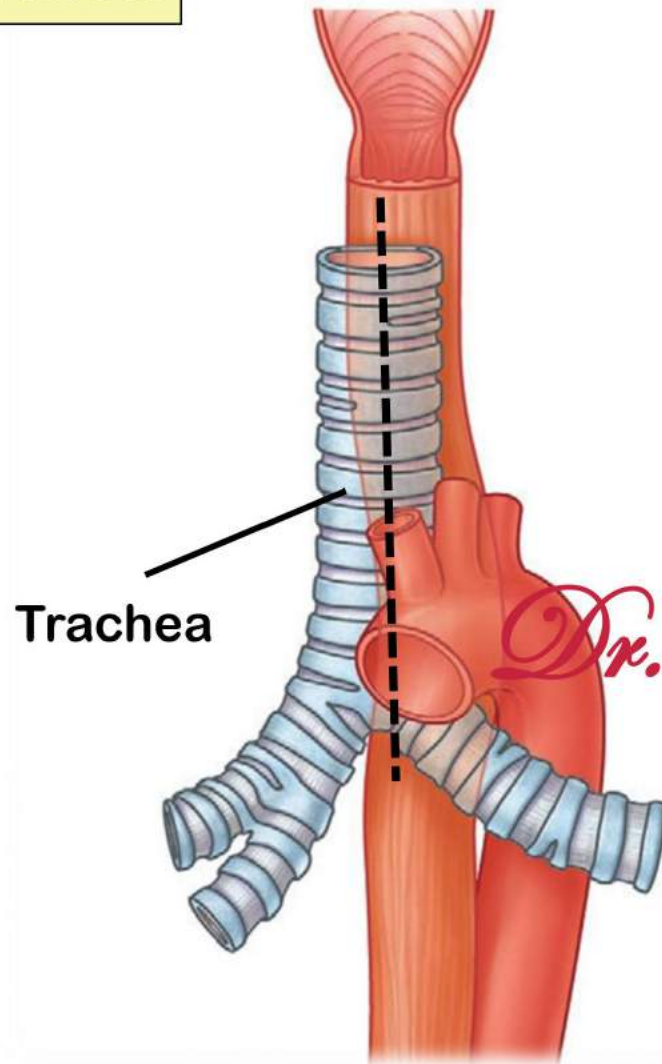
Dr. Doaa Shuaib

Source: Gray's Atlas of Anatomy – 2nd edition

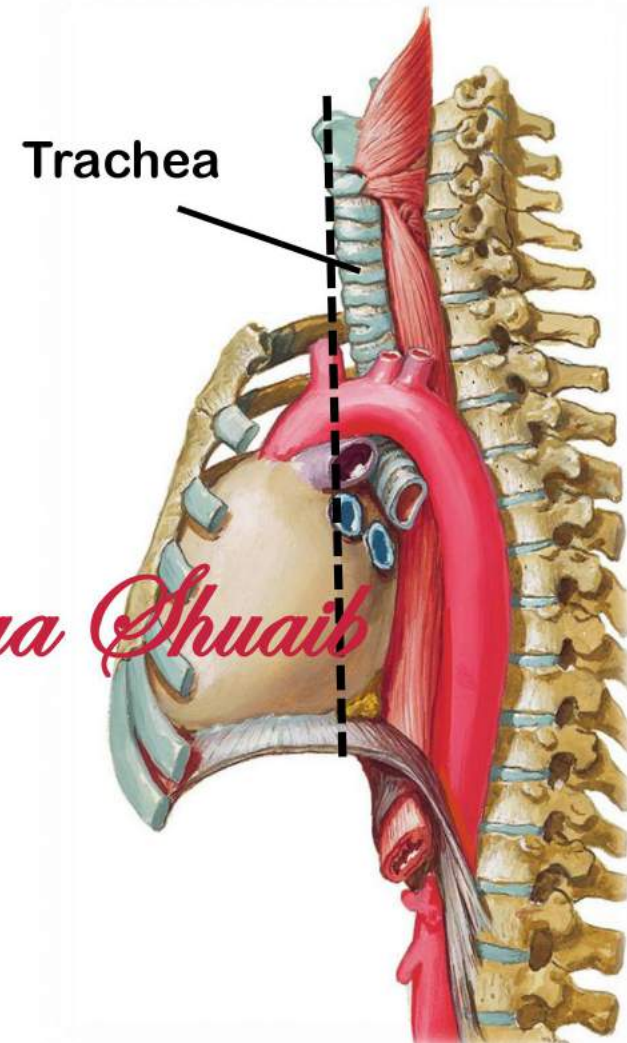
Position

- Its upper 1/2 lies in the neck (cervical part) while its lower 1/2 lies in the thorax (thoracic part).
- The thoracic part of the trachea spans the whole superior mediastinum extending from the suprasternal notch to the sternal angle

Trachea



Source: Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

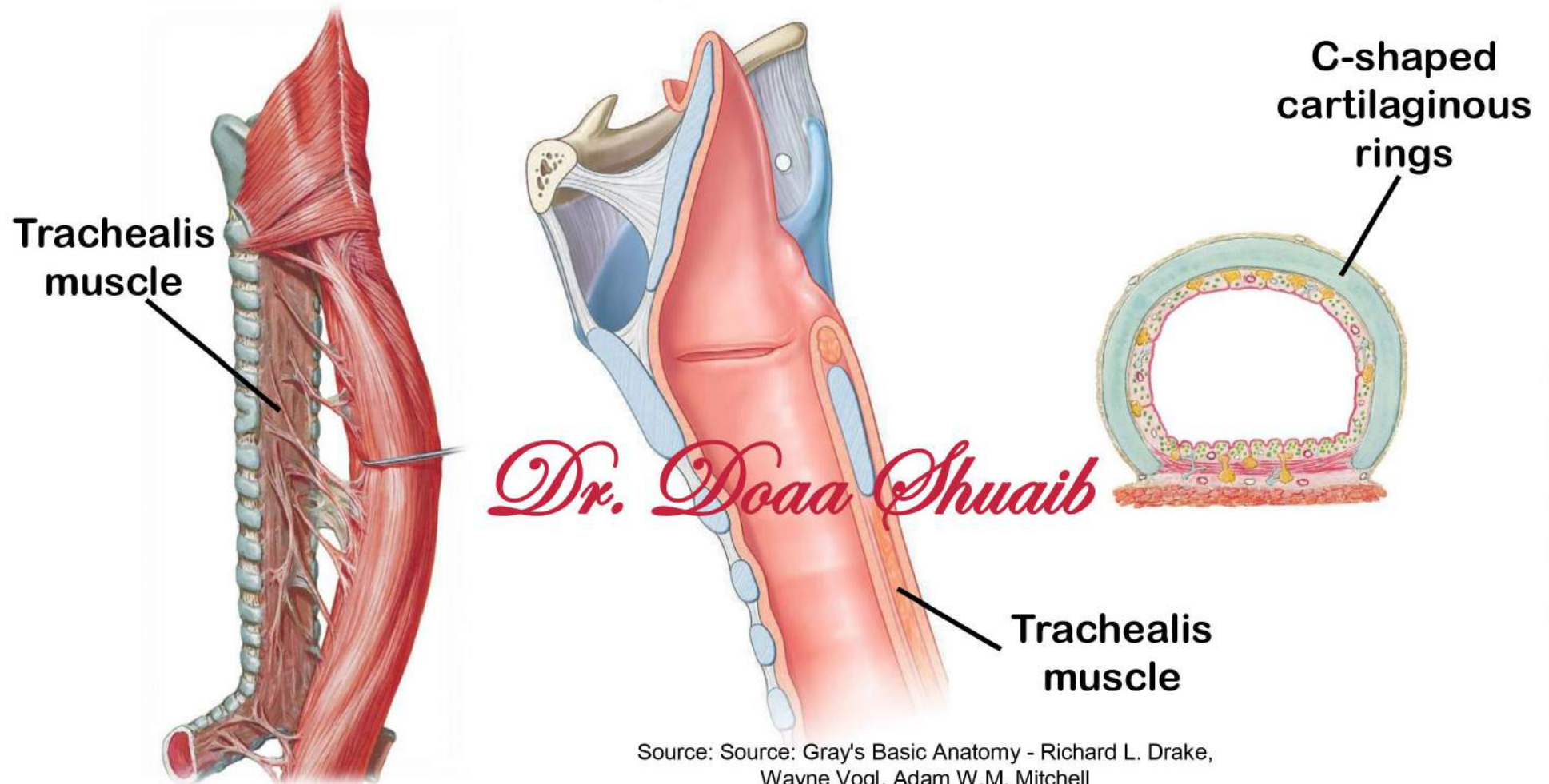


Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Position

- The trachea lies exactly in the middle line except at its lower end where it deviates slightly to the right (pushed by the arch of the aorta).
- As it descends, it recedes from the surface to follow the curvature of the vertebral column.

Trachea



Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

Source: Source: Gray's Basic Anatomy - Richard L. Drake,
Wayne Vogl, Adam W.M. Mitchell

Structure of Trachea

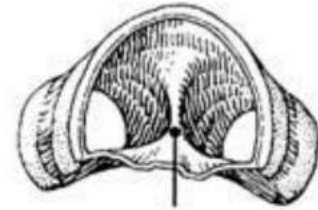
- The trachea is an elastic tube which is kept patent by a series of 16- 20 C-shaped (incomplete) cartilaginous rings.
- The opening of the C is directed backwards to allow distension of the oesophagus during swallowing.
- The 2 ends of each cartilagenous ring are connected together by smooth muscle fibres (trachealis muscle).

Trachea

Structure of trachea

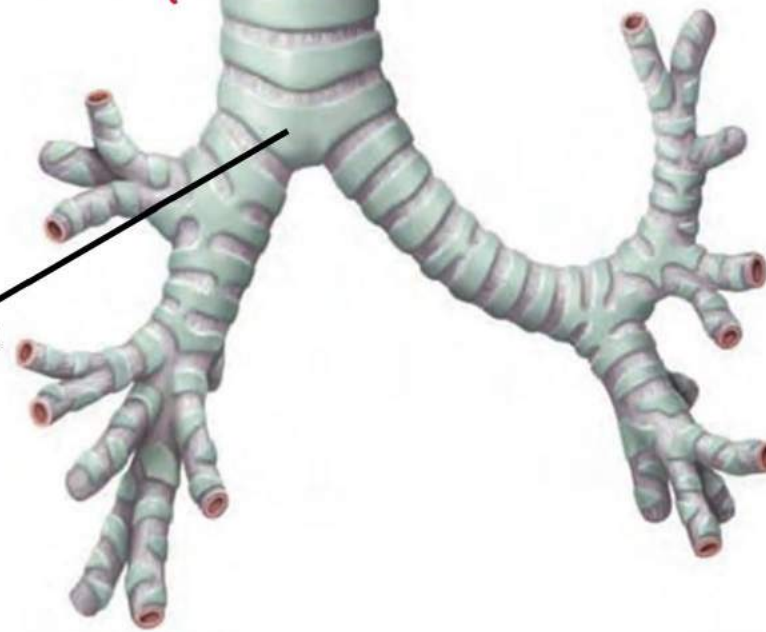
The lower border of the last cartilagenous ring projects upwards inside the cavity of the trachea, forming a ridge between the 2 bronchi called the **carina**.

Dr. Doaa Shuaib

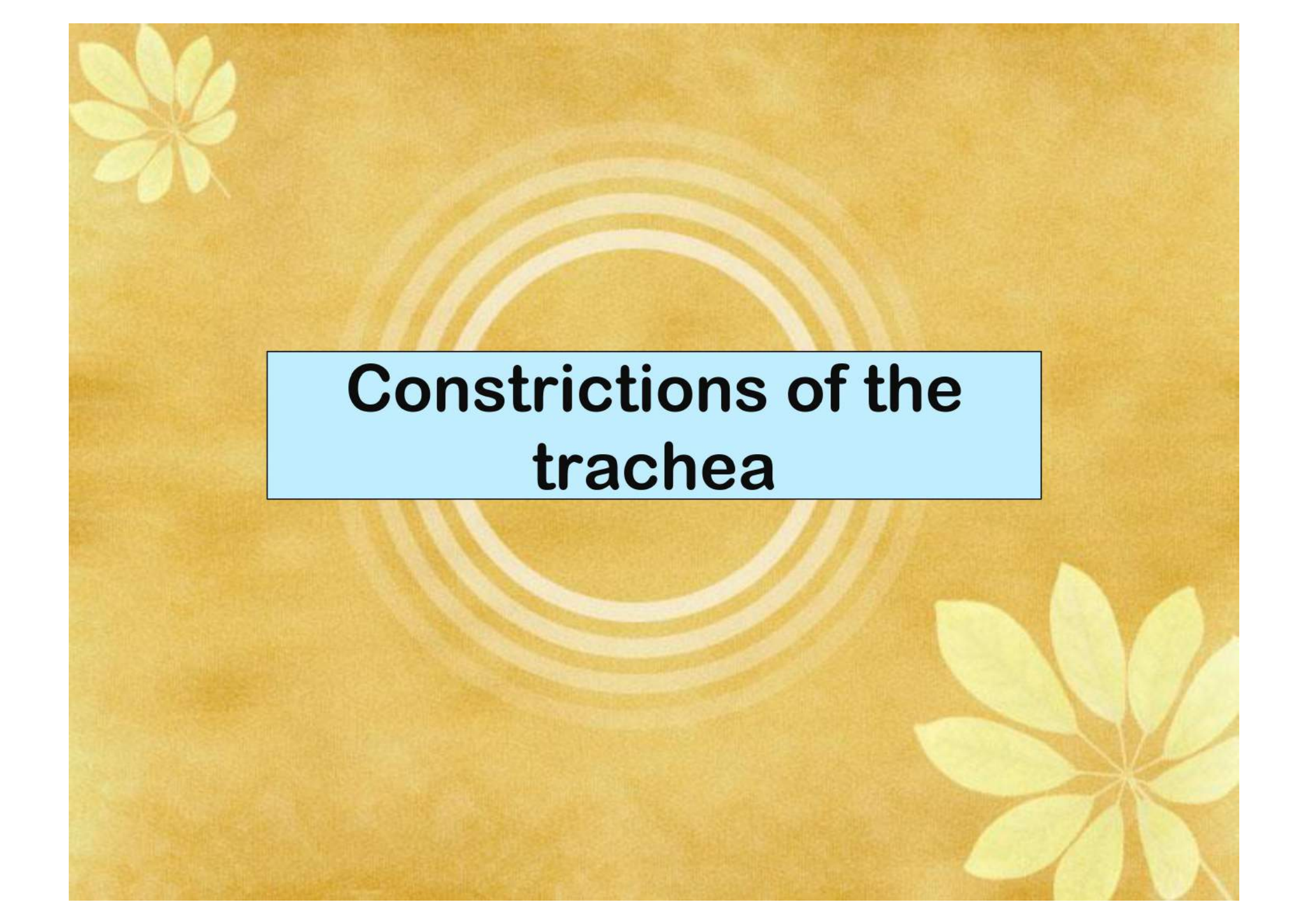


Bifurcation of trachea
(from above).

Carina



Source: Atlas of Anatomy, Anne M. Gilroy, Brian R. MacPherson,
Lawrence M. Ross (2nd edition)

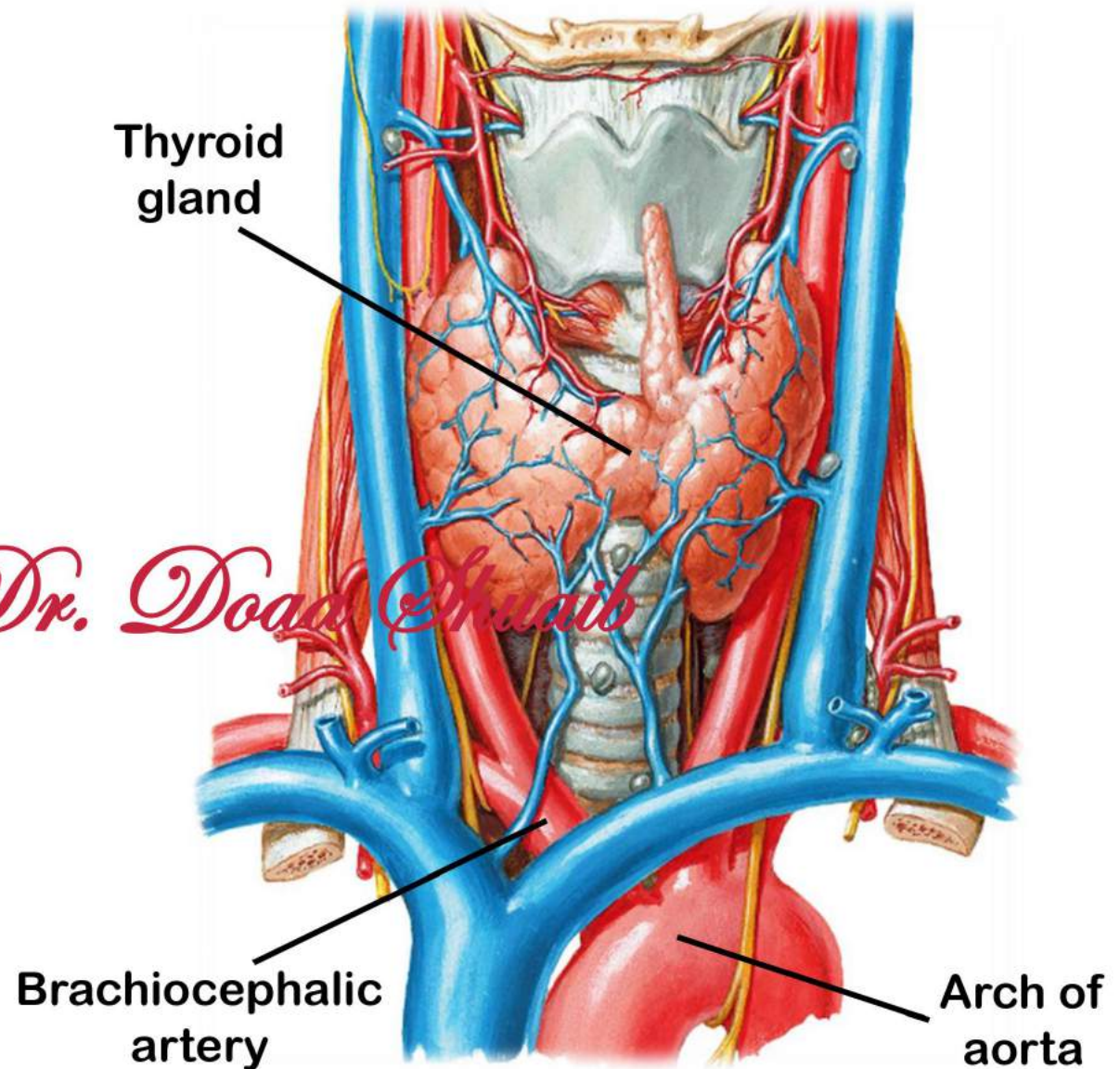
The background is a textured, golden-yellow surface. In the center, there are several concentric, light-colored circles that create a ripple effect. In the top-left and bottom-right corners, there are stylized, light-yellow floral motifs with multiple pointed petals.

Constrictions of the trachea

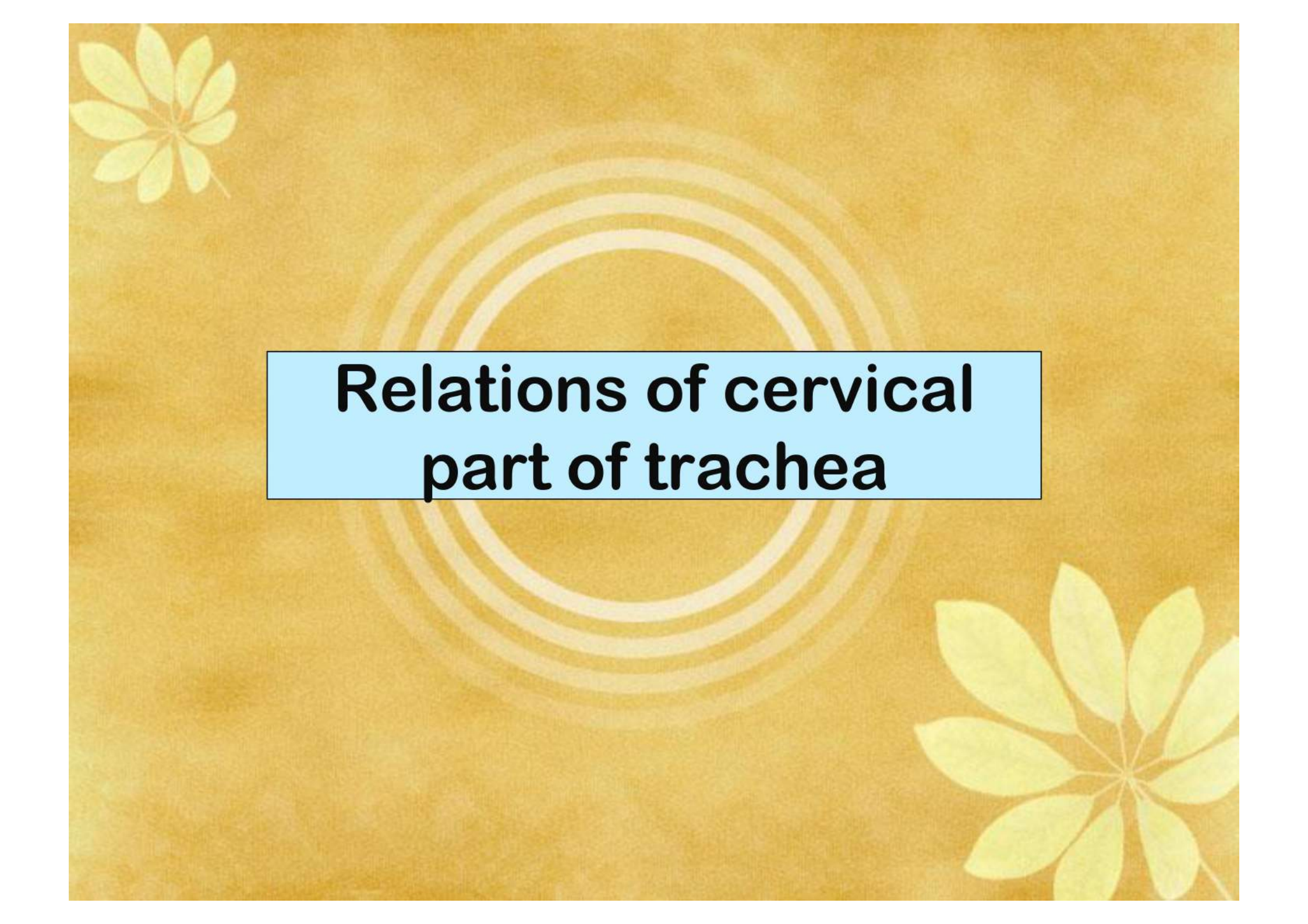
Constrictions of the trachea

- a- at its upper end, by the thyroid gland.
- b- at its middle, by the brachiocephalic artery, on its right side.
- c- at its lower end, by the arch of the aorta, on its left side.

Dr. Doaa Shuaib

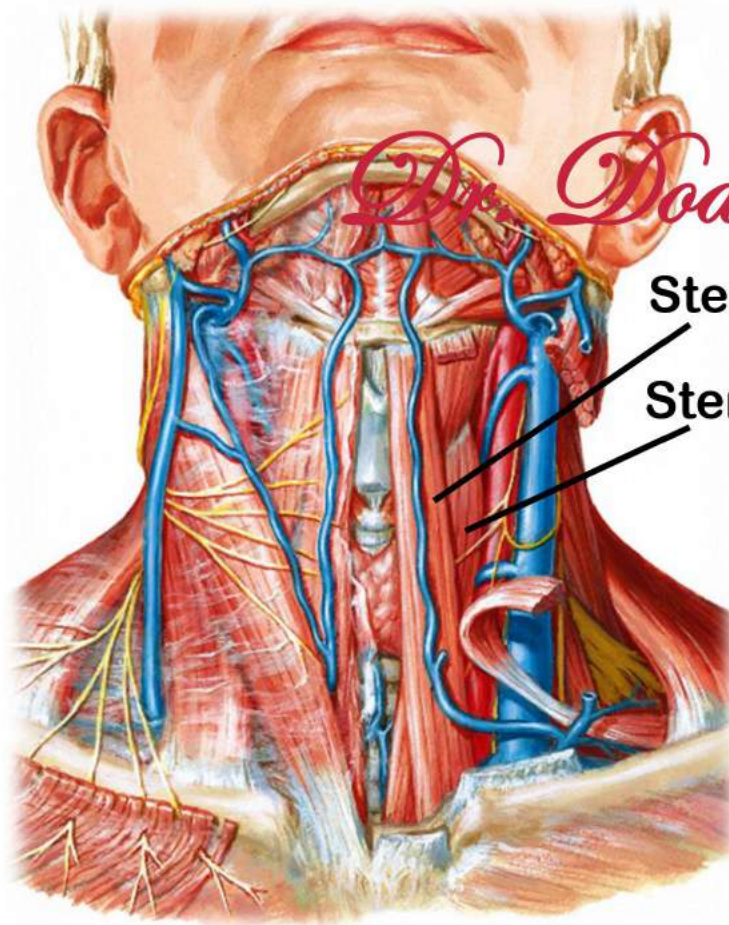


Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

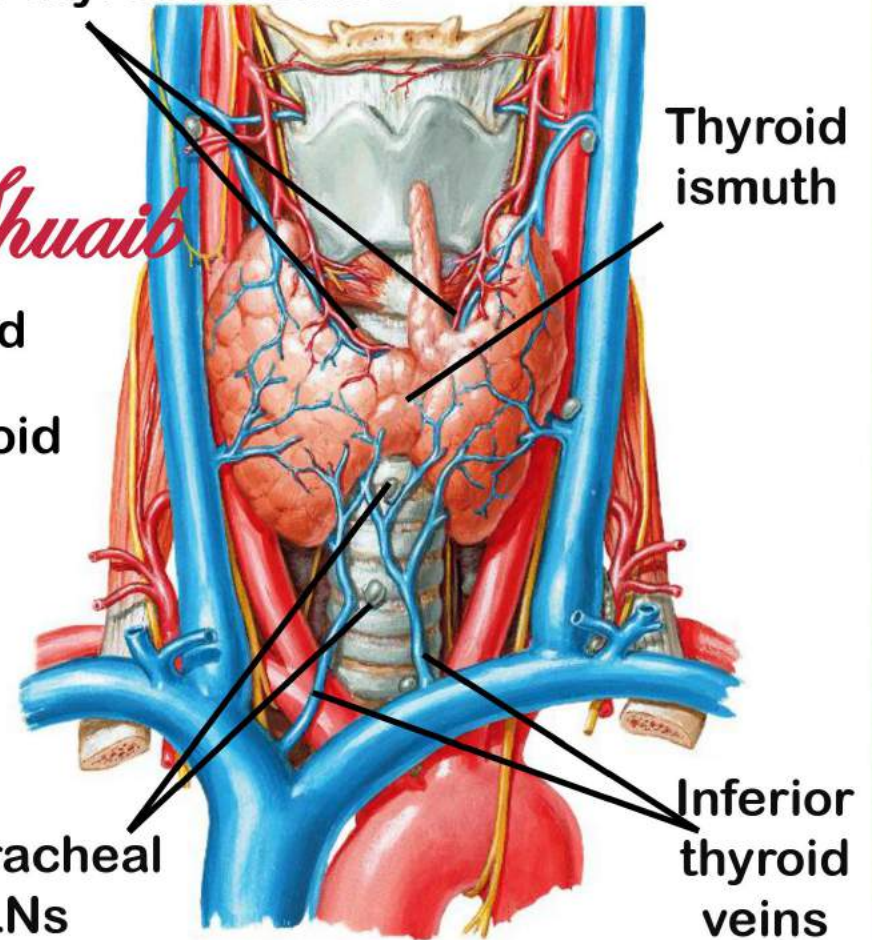


Relations of cervical part of trachea

Relations of cervical part of trachea



Anastomosis between superior thyroid arteries



Thyroid isthmus

Sternohyoid

Sternothyroid

Pretracheal
LNs

Inferior
thyroid
veins

Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Anteriorly

- 1- Skin and fascia.
- 2- Muscles: Sternohyoid and sternothyroid.
- 3- Isthmus of thyroid gland covers 2nd, 3rd and 4th tracheal rings.
- 4- Blood vessels: thyroidea ima artery, inferior thyroid veins, jugular arch and anastomosis between both superior thyroid arteries.
- 5- Lymph nodes: pretracheal.

Trachea

On each side

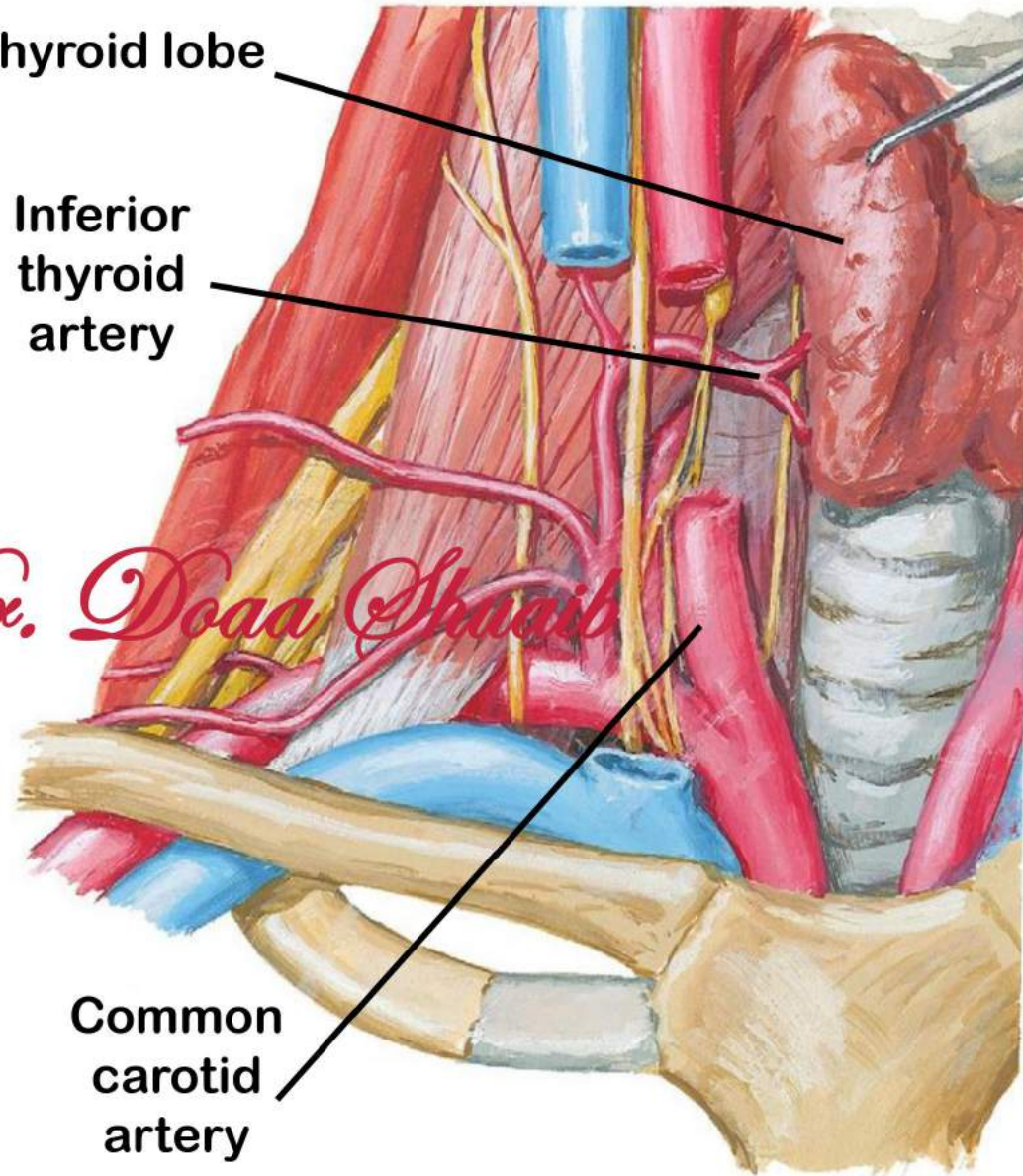
- 1- Lobe of thyroid gland.
- 2- Common carotid artery.
- 3- Inferior thyroid artery.

Thyroid lobe

**Inferior
thyroid
artery**

Dr. Doaa Shuaib

**Common
carotid
artery**



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

Trachea

Posteriorly

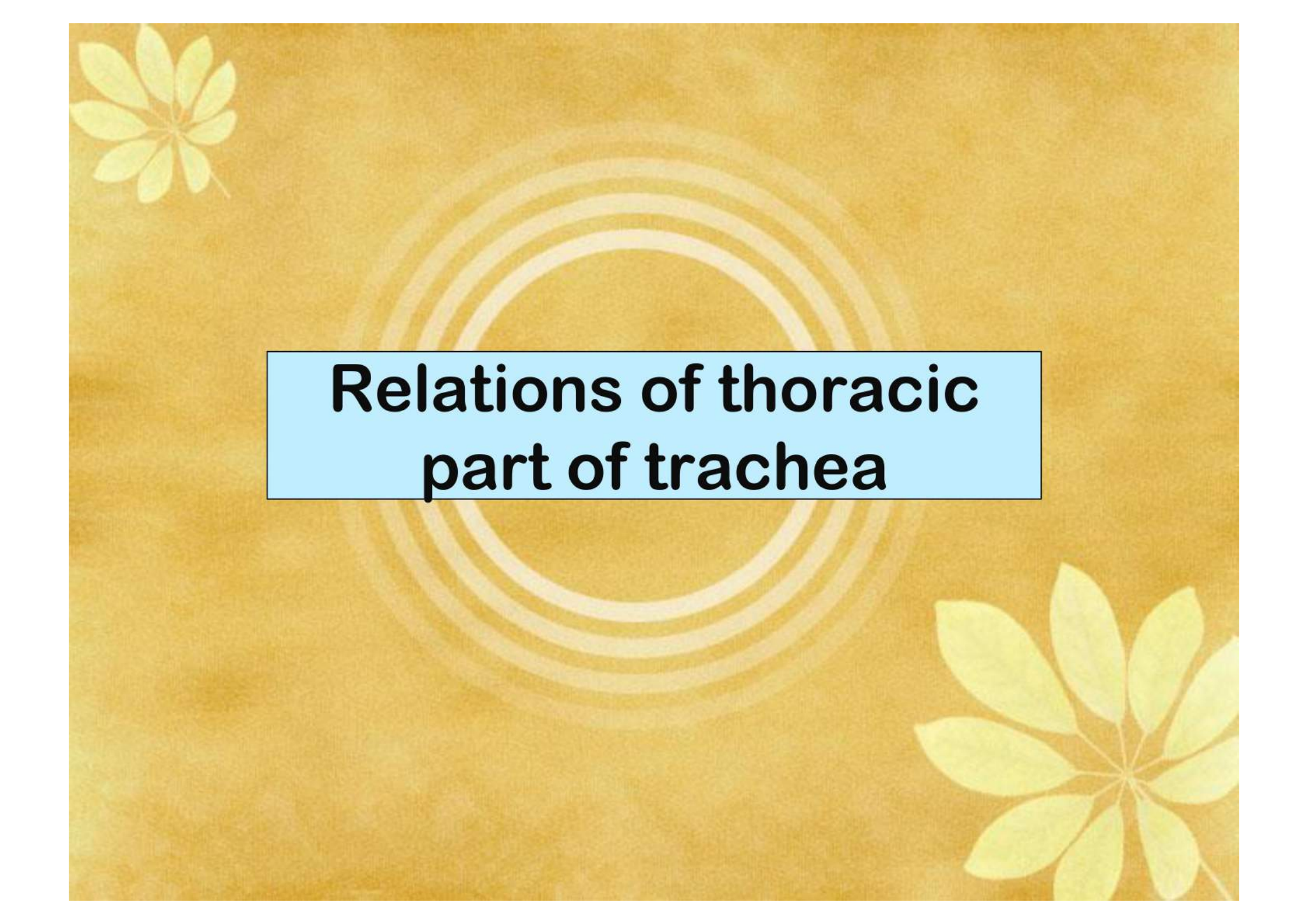
- Oesophagus
- Recurrent laryngeal nerves

Oesophagus

Recurrent laryngeal nerves

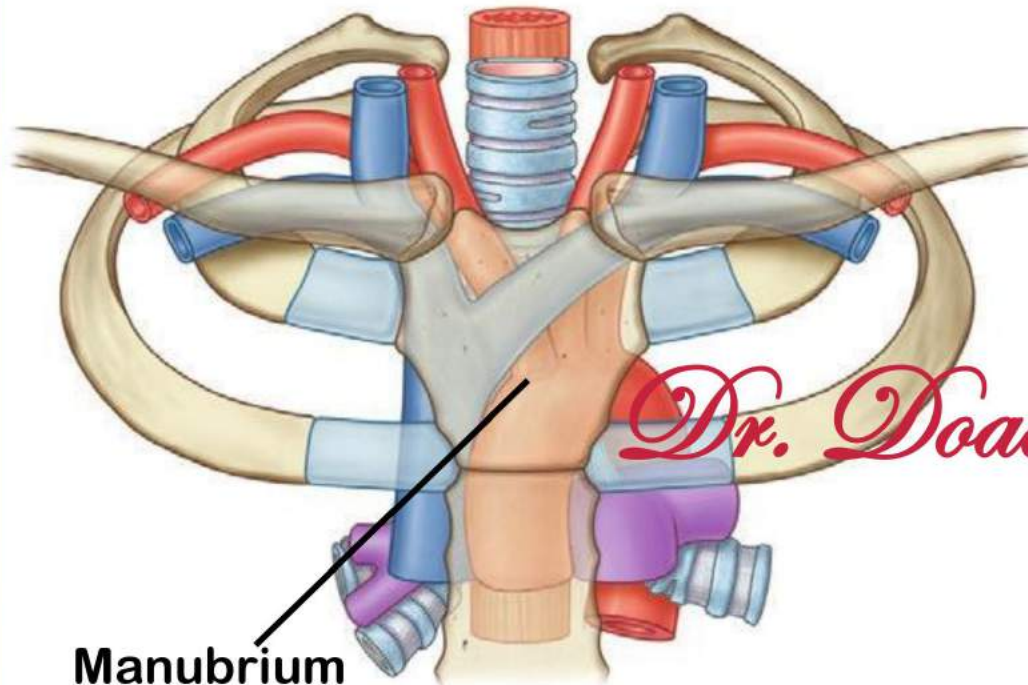


Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

The background is a solid mustard yellow color. In the center, there are several concentric circles in a lighter, cream-colored shade. In the top-left and bottom-right corners, there are stylized floral motifs made of overlapping leaf-like shapes in a pale yellow-green color.

Relations of thoracic part of trachea

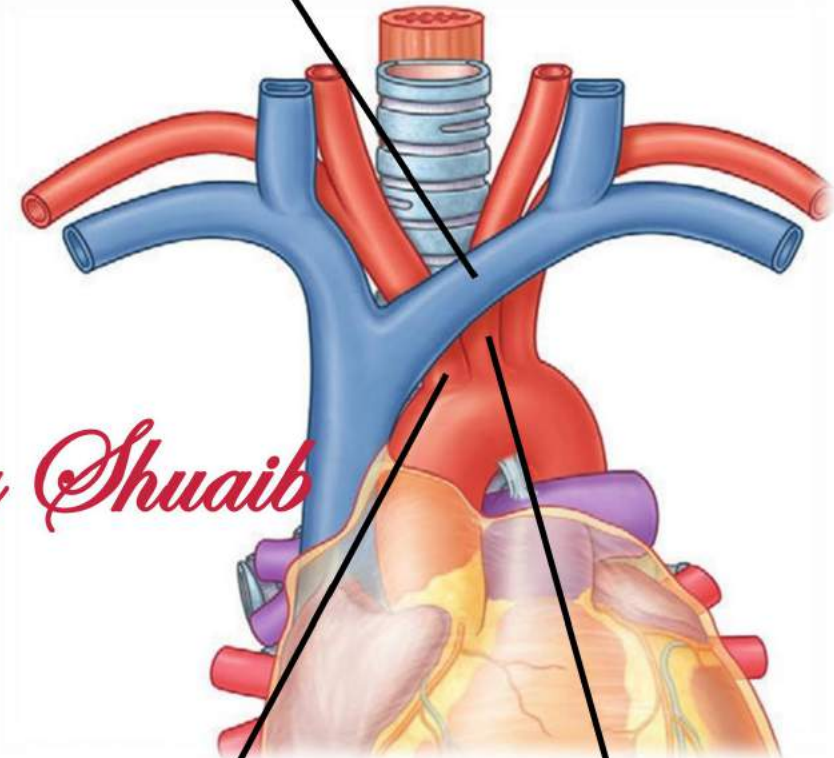
Relations of thoracic part of trachea



Manubrium
sterni

Dr. Doaa Shuaib

Left brachiocephalic
vein



Brachiocephalic
artery

Left common
carotid artery

Source: Source: Gray's Basic Anatomy - Richard L. Drake, Wayne Vogl, Adam W.M. Mitchell

Anteriorly

from before backwards:

- i) Manubrium sterni.
- ii) Left brachiocephalic vein running obliquely along the upper aspect of the arch of aorta and origins of the brachiocephalic and left common carotid arteries.

Relations of thoracic part of trachea

Posteriorly

- Esophagus separates the trachea from the vertebral column.
- Left recurrent laryngeal nerve lies between the trachea and esophagus.

Oesophagus

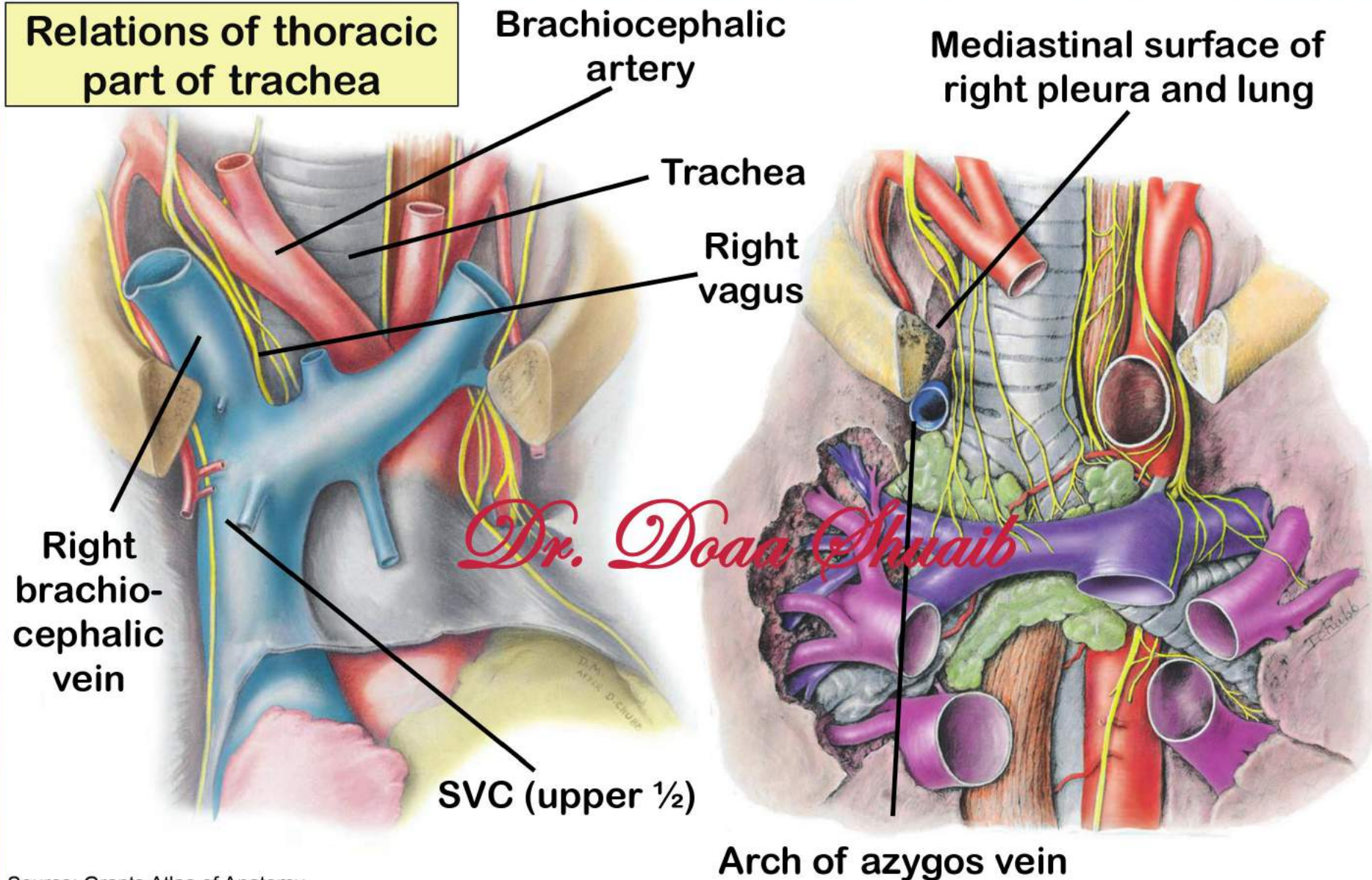
Left
recurrent
laryngeal
nerve

Trachea

Dr. Doaa Shuaib

Source: Source: Gray's Basic Anatomy - Richard L. Drake,
Wayne Vogl, Adam W.M. Mitchell

Relations of thoracic part of trachea

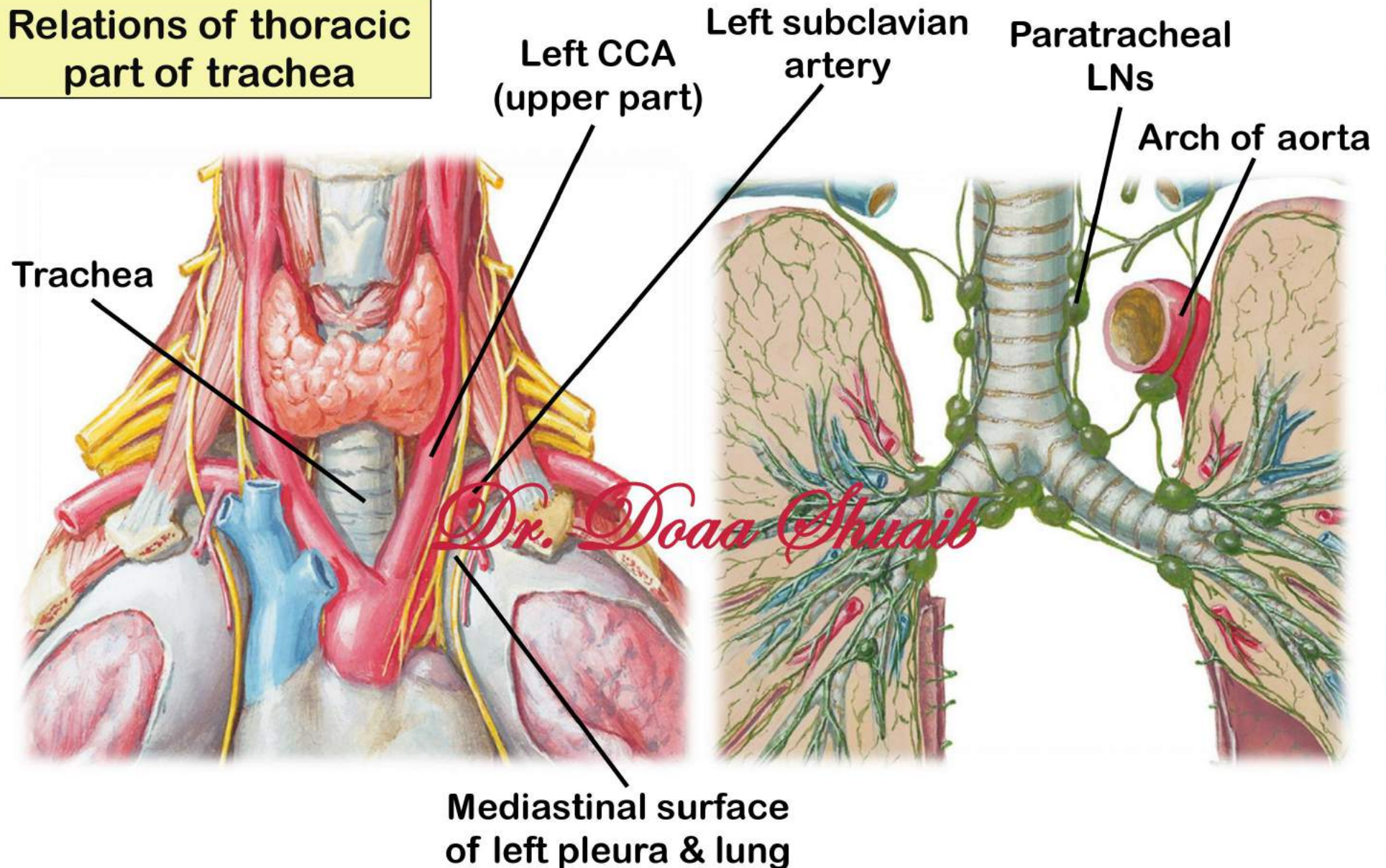


Source: Grants Atlas of Anatomy

c- On the right side

- i) Right vagus nerve and paratracheal lymph nodes.
- ii) Upper part of the brachiocephalic artery (above).
- iii) Right brachiocephalic vein and upper 1/2 of S.V.C.
- iv) Arch of the azygos vein (below).
- v) Mediastinal surface of right pleura and lung, most laterally.

Relations of thoracic part of trachea

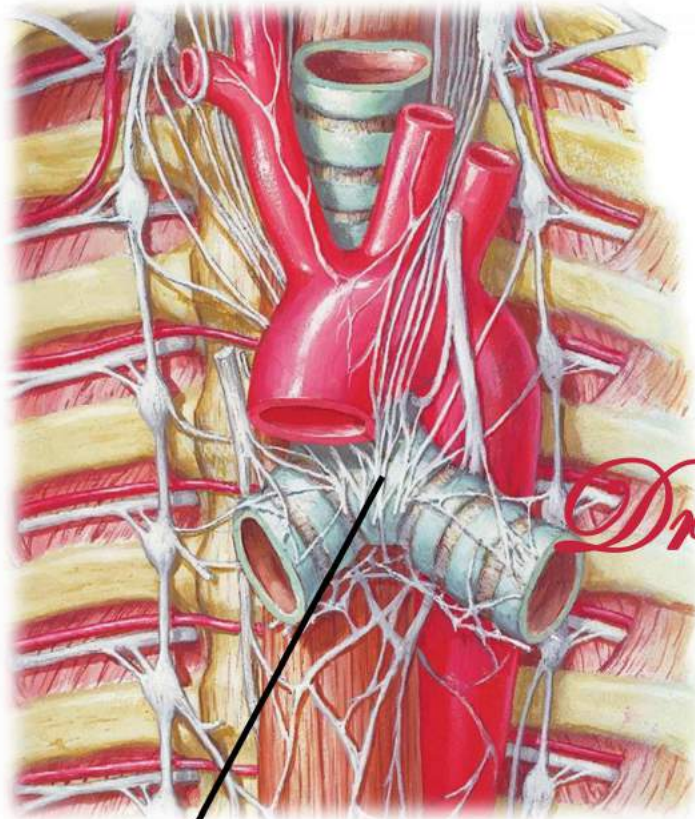


Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

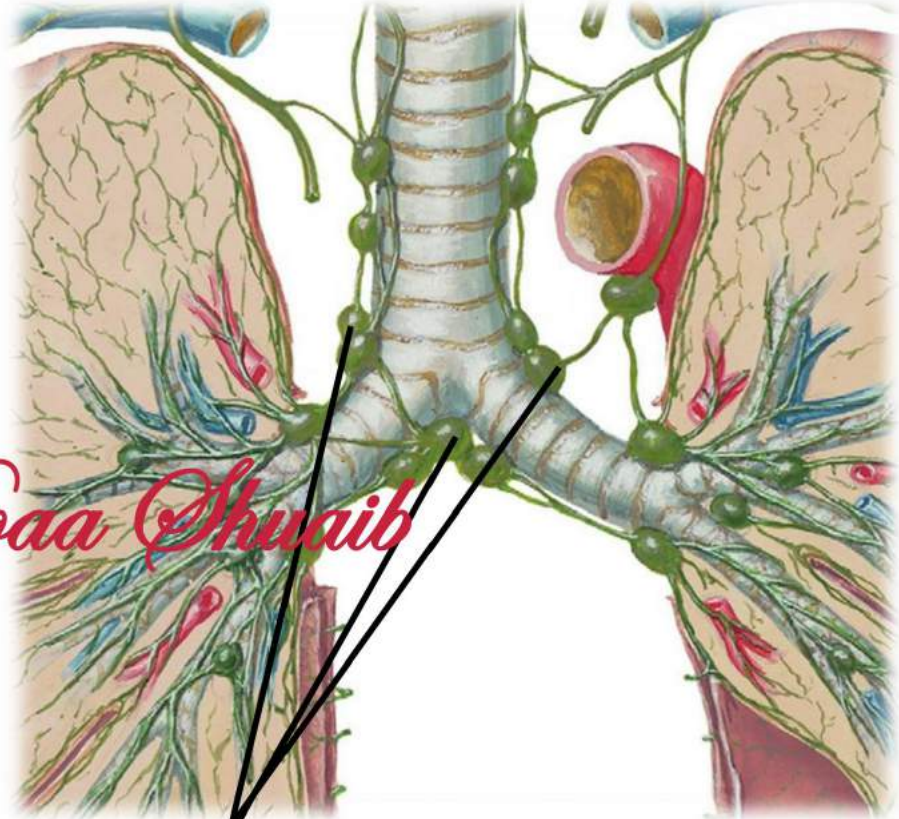
d- On the left side

- i) Left subclavian artery and upper part of left common carotid artery (above).
- ii) Arch of aorta (below).
- iii) Paratracheal lymph nodes.
- iv) Medial surface of left pleura and lung, most laterally.

Relations of thoracic part of trachea



Deep cardiac plexus



Tracheobronchial lymph nodes

Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D

e- At bifurcation of trachea

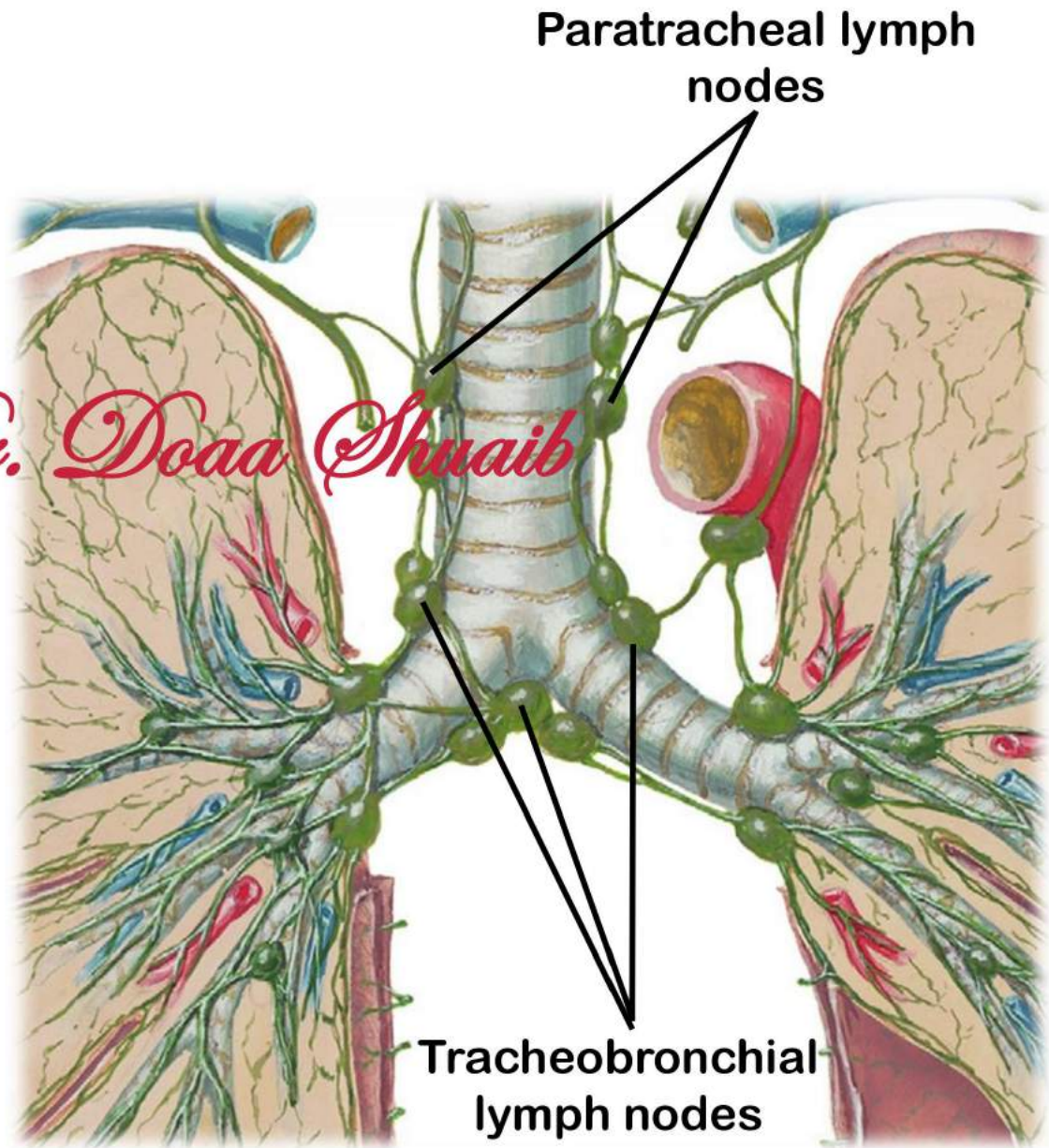
- i) Deep cardiac plexus, on the front and sides of the bifurcation.
- ii) Three groups of tracheobronchial lymph nodes, at the 3 angles between the trachea and the 2 bronchi.

**Blood supply, lymphatic
drainage and innervation**

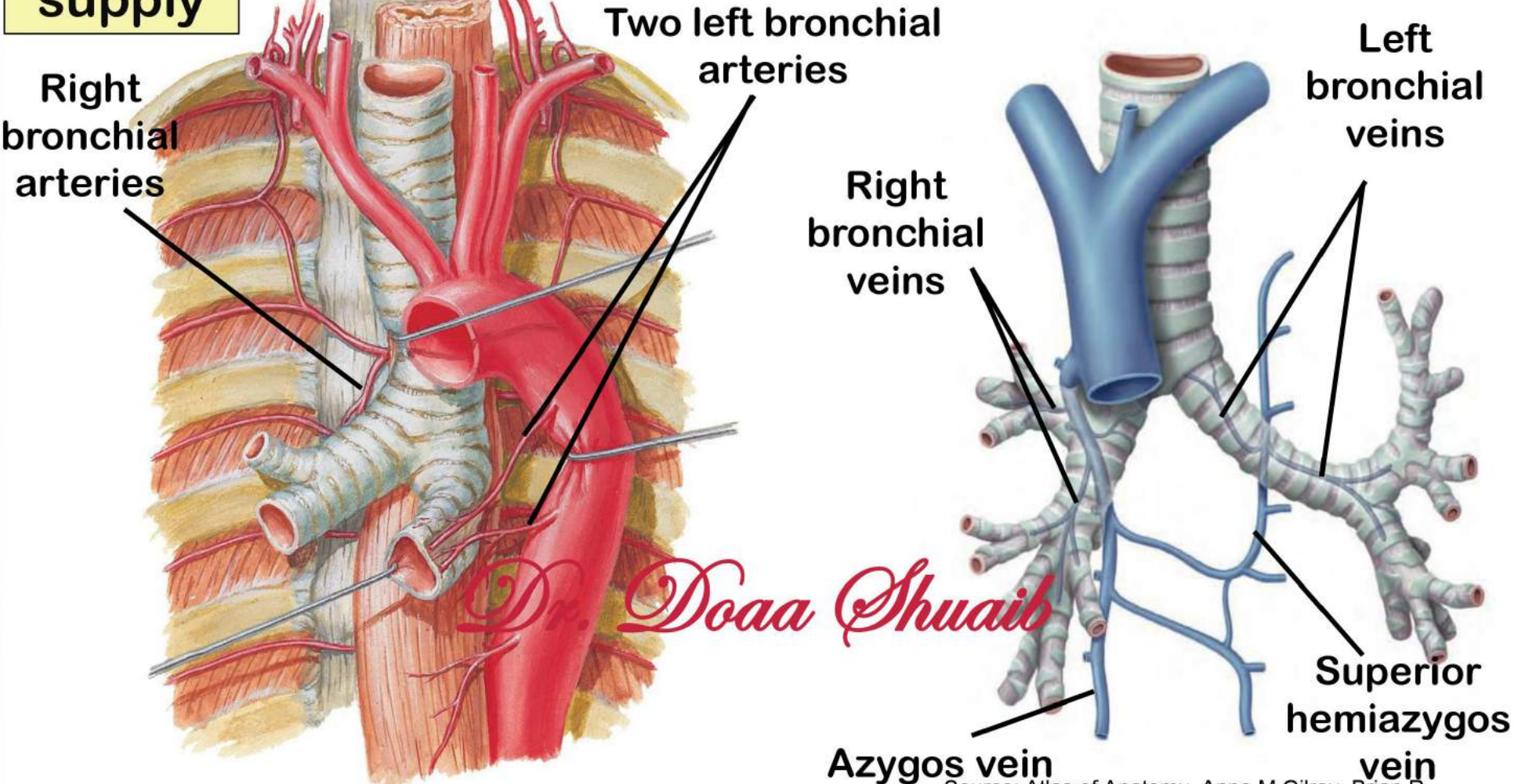
Lymphatic drainage

Drain to tracheobronchial and paratracheal lymph nodes.

Dr. Doaa Shuaib



Blood supply



Source: Atlas of Human Anatomy, Sixth Edition-
Frank H. Netter, M.D

Source: Atlas of Anatomy, Anne M.Gilroy, Brian R.
MacPherson, Lawrence M. Ross (2nd edition)

Right lung

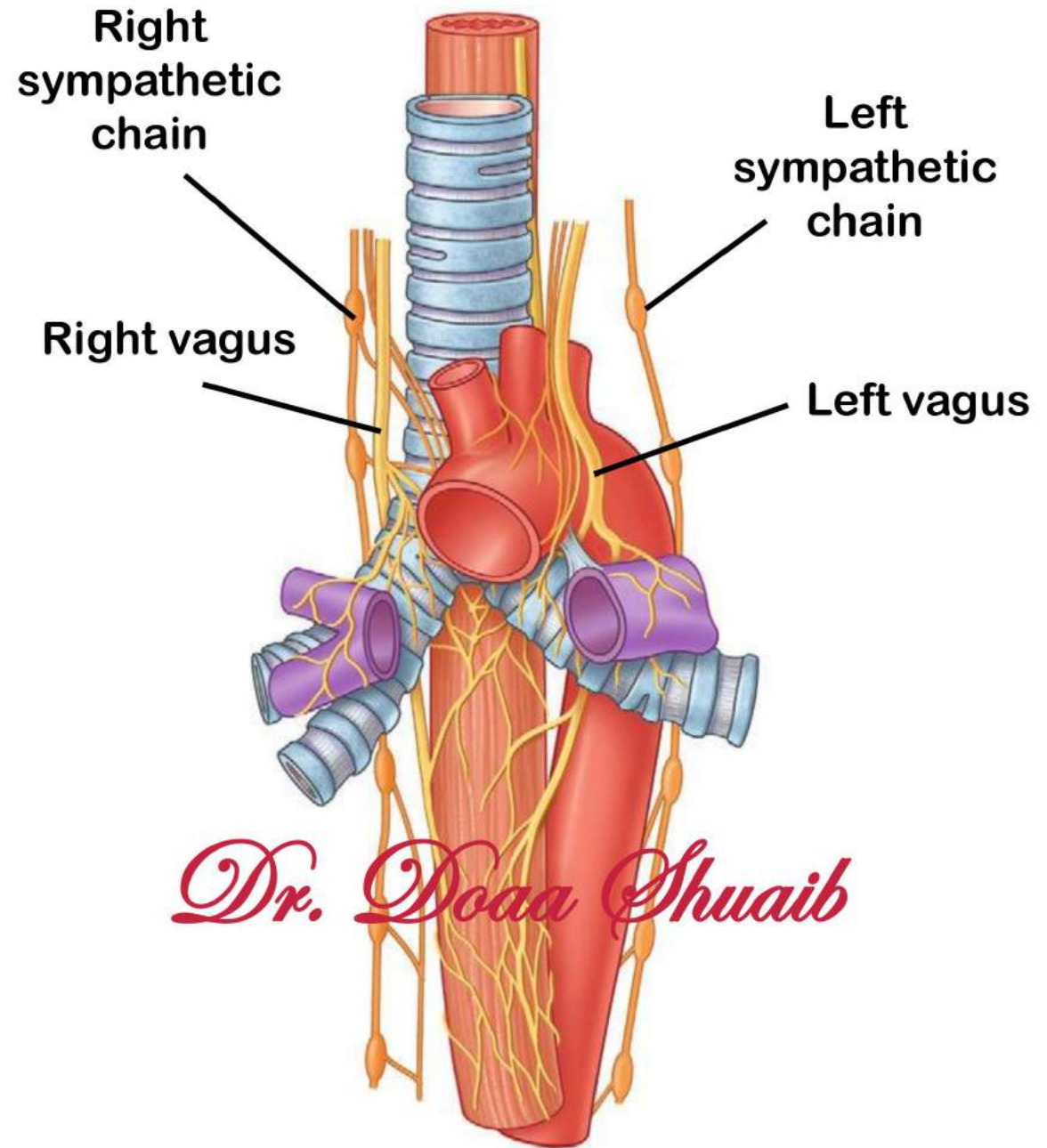
- from bronchial arteries

Left lung

- via bronchial veins to azygos system of veins

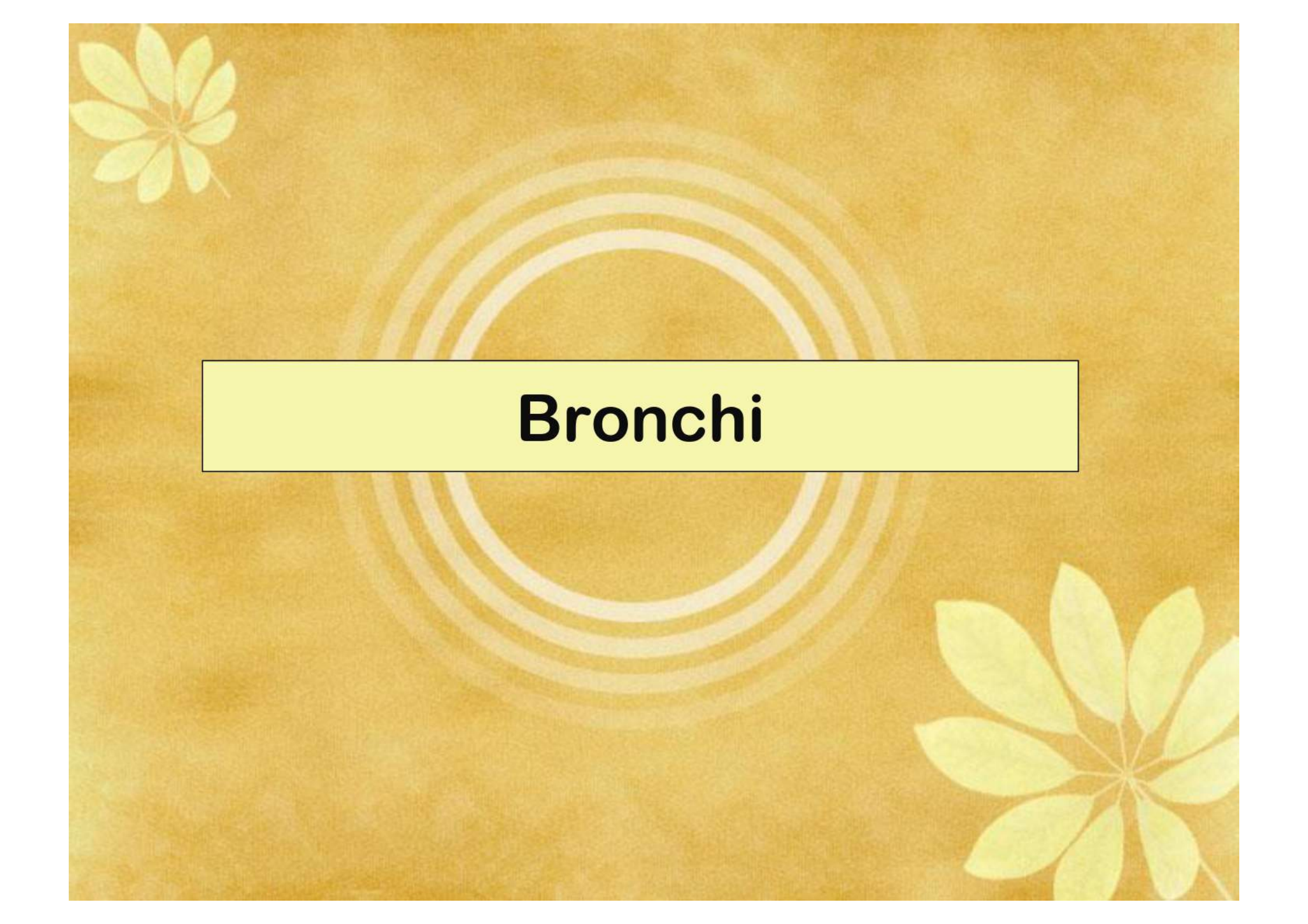
Nerve supply

Autonomic fibres from the 2 vagi and their recurrent laryngeal branches and from the sympathetic chains



Dr. Doaa Shuaib

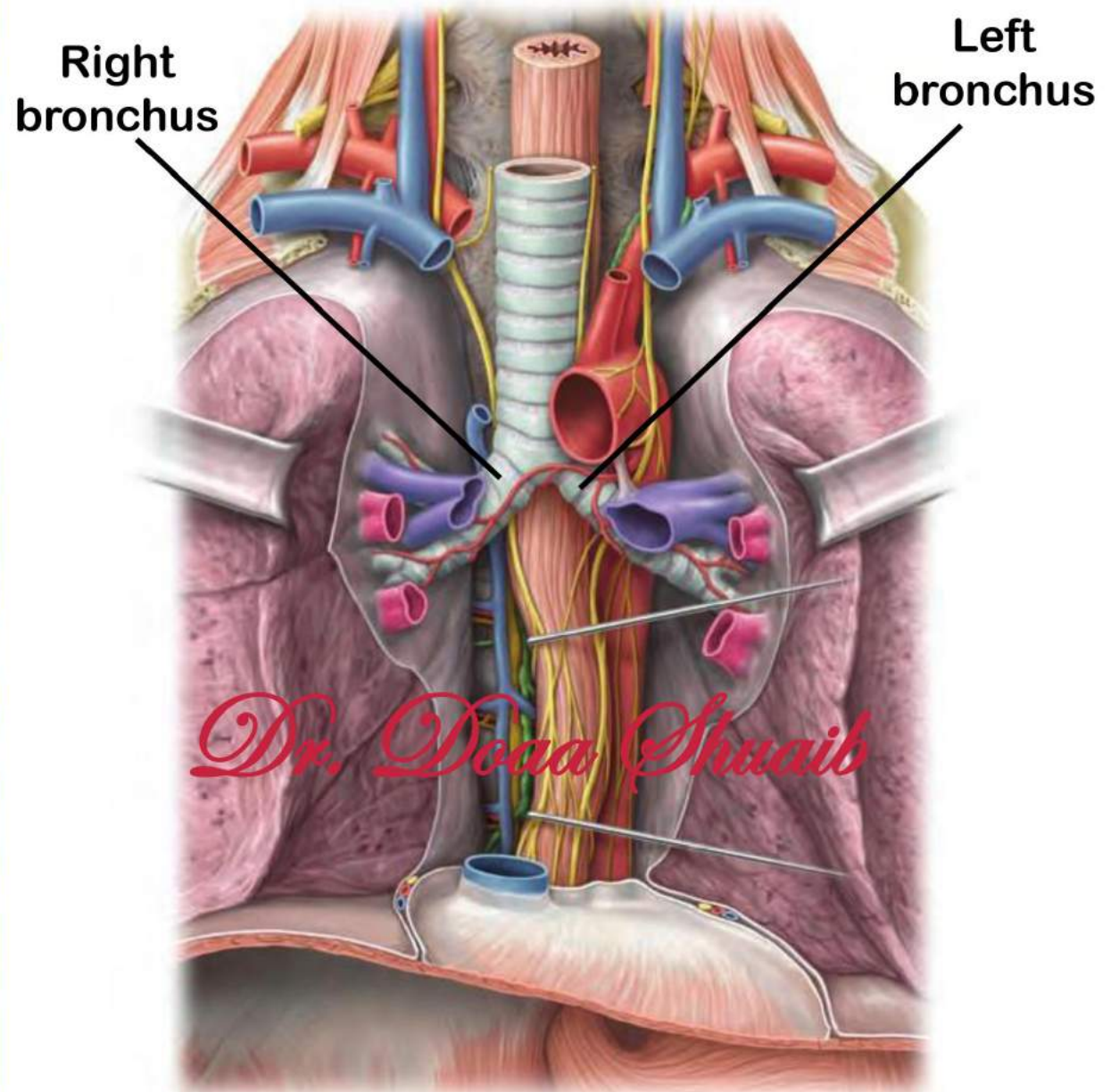
Source: Source: Gray's Basic Anatomy - Richard L. Drake,
Wayne Vogl, Adam W.M. Mitchell

The background is a textured, golden-yellow color. In the center, there are several concentric circles in a lighter shade of yellow. In the top-left and bottom-right corners, there are stylized floral motifs with multiple pointed petals.

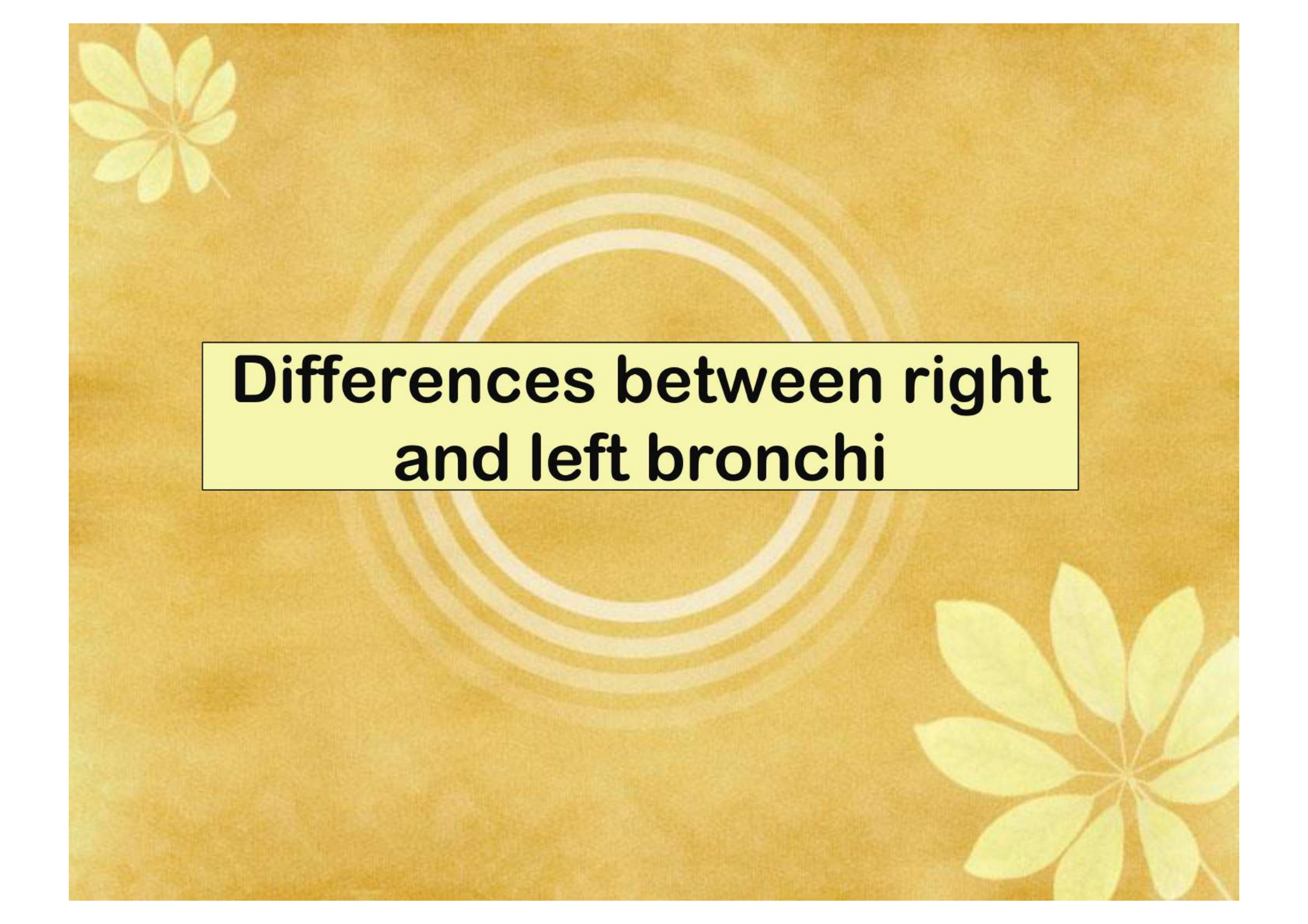
Bronchi

Bronchi

- They arise from the lower end of the trachea at the level of the sternal angle (disc between T4/T5).
- Each bronchus descends downwards and laterally in the root of its lung to enter the lung at its hilum.

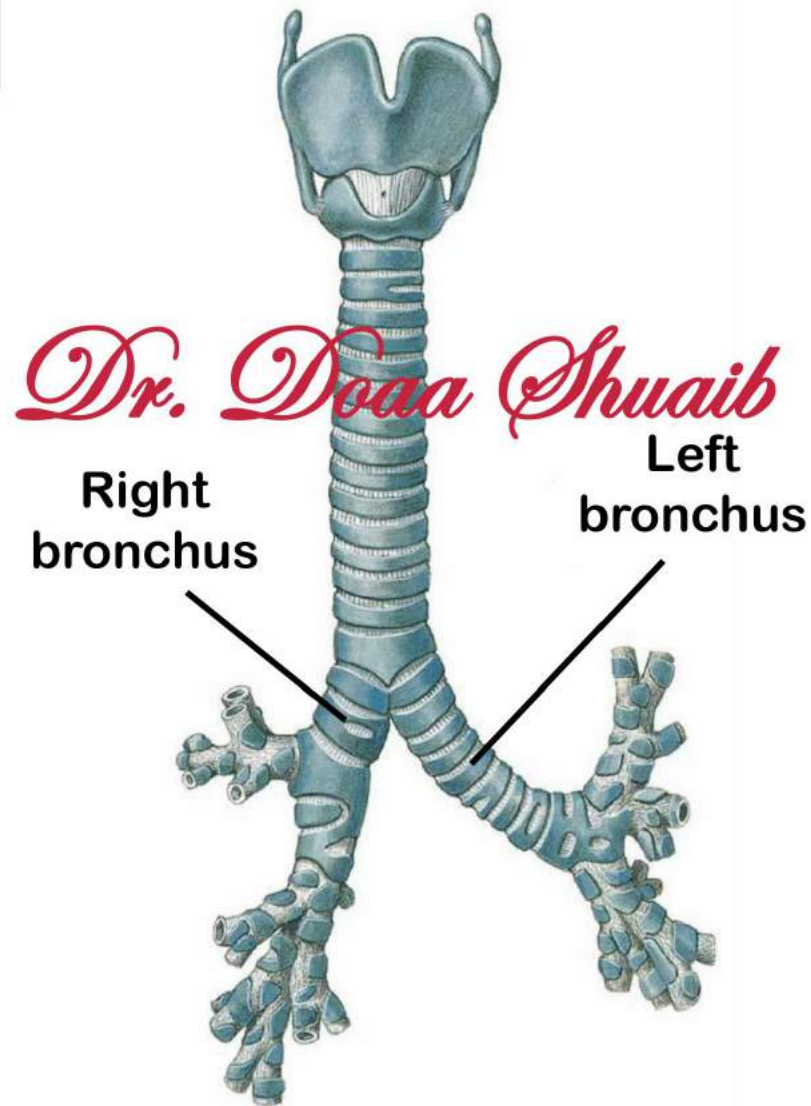


Source: Atlas of Anatomy, Anne M. Gilroy, Brian R. MacPherson, Lawrence M. Ross (2nd edition)



Differences between right and left bronchi

**1- Length, width
& direction**



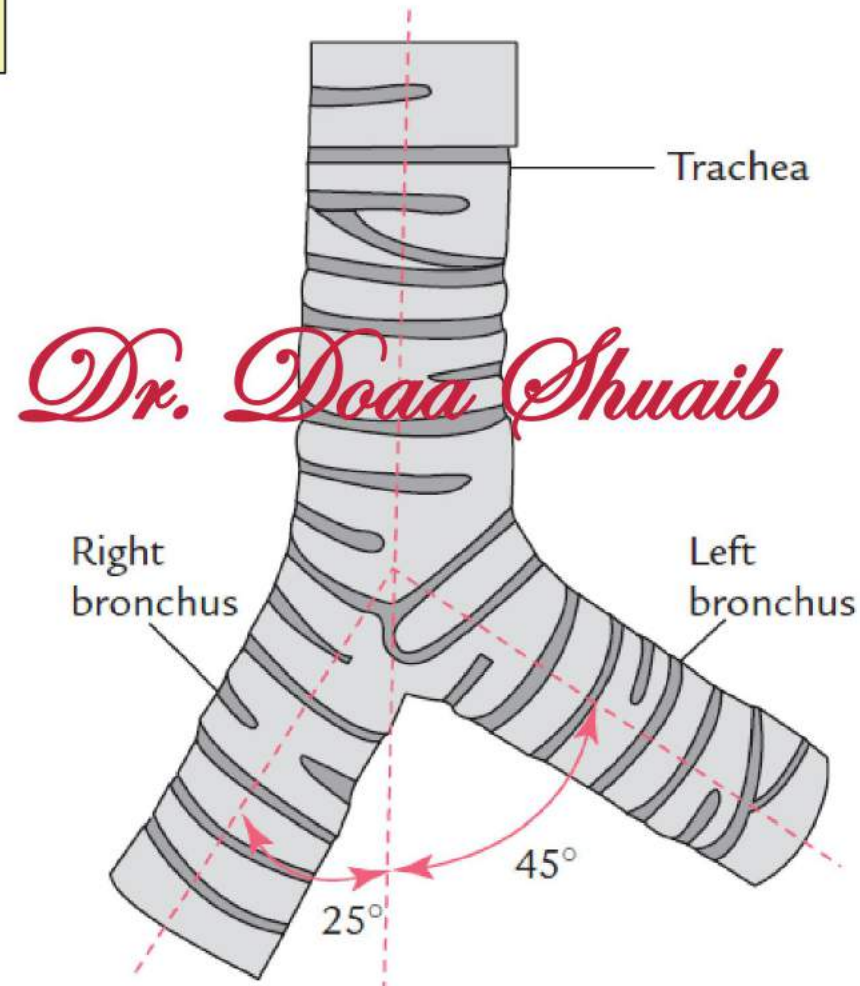
Right bronchus

- Shorter (one inch long)
- Wider
- More in line with the trachea, forming an angle of 25° with the middle line

Left bronchus

- Longer (2 inches)
- Narrower
- More horizontal than the right, forming an angle of 45° with the middle line.

1- Length, width & direction



Source: Textbook of Anatomy, Head, Neck & Brain,
Vishram Singh, 2nd edition

Right bronchus

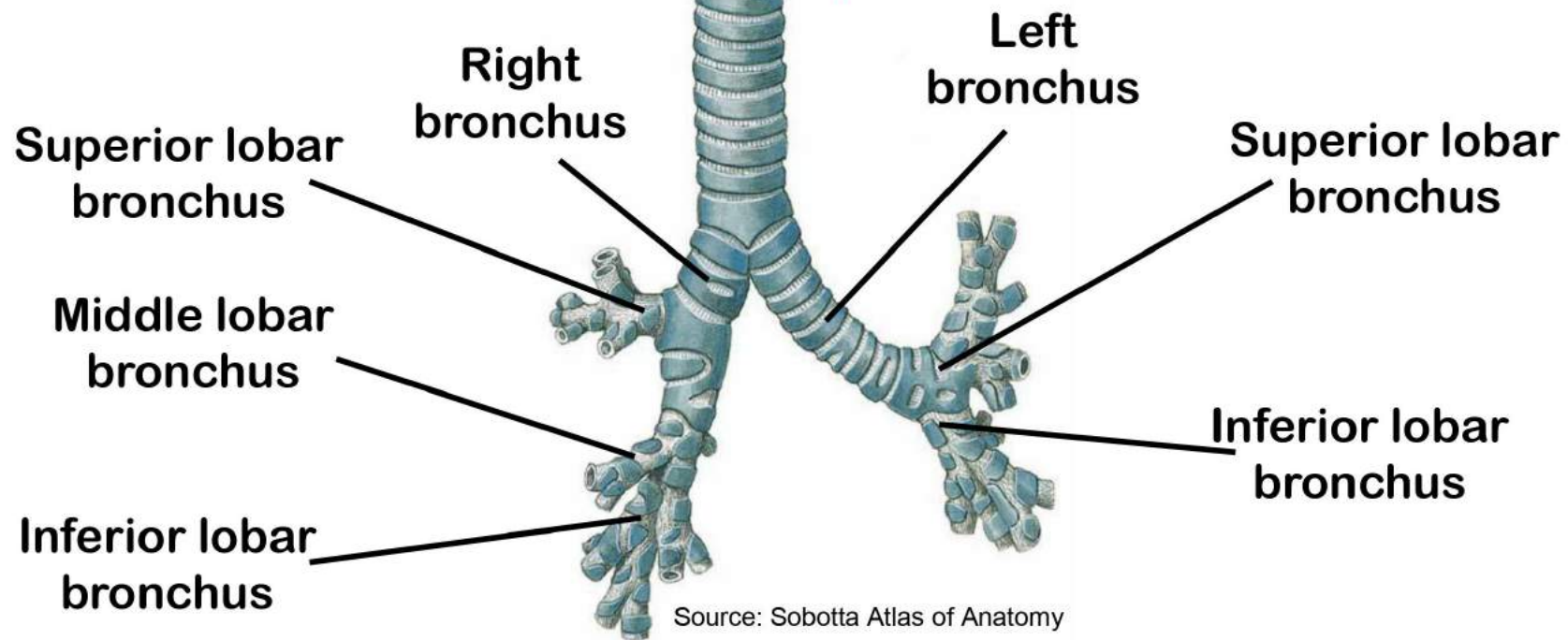
- Shorter (one inch long)
- Wider
- More in line with the trachea, forming an angle of 25° with the middle line

Left bronchus

- Longer (2 inches)
- Narrower
- More horizontal than the right, forming an angle of 45° with the middle line.

2- Number and way of division

Dr. Doaa Shuaib



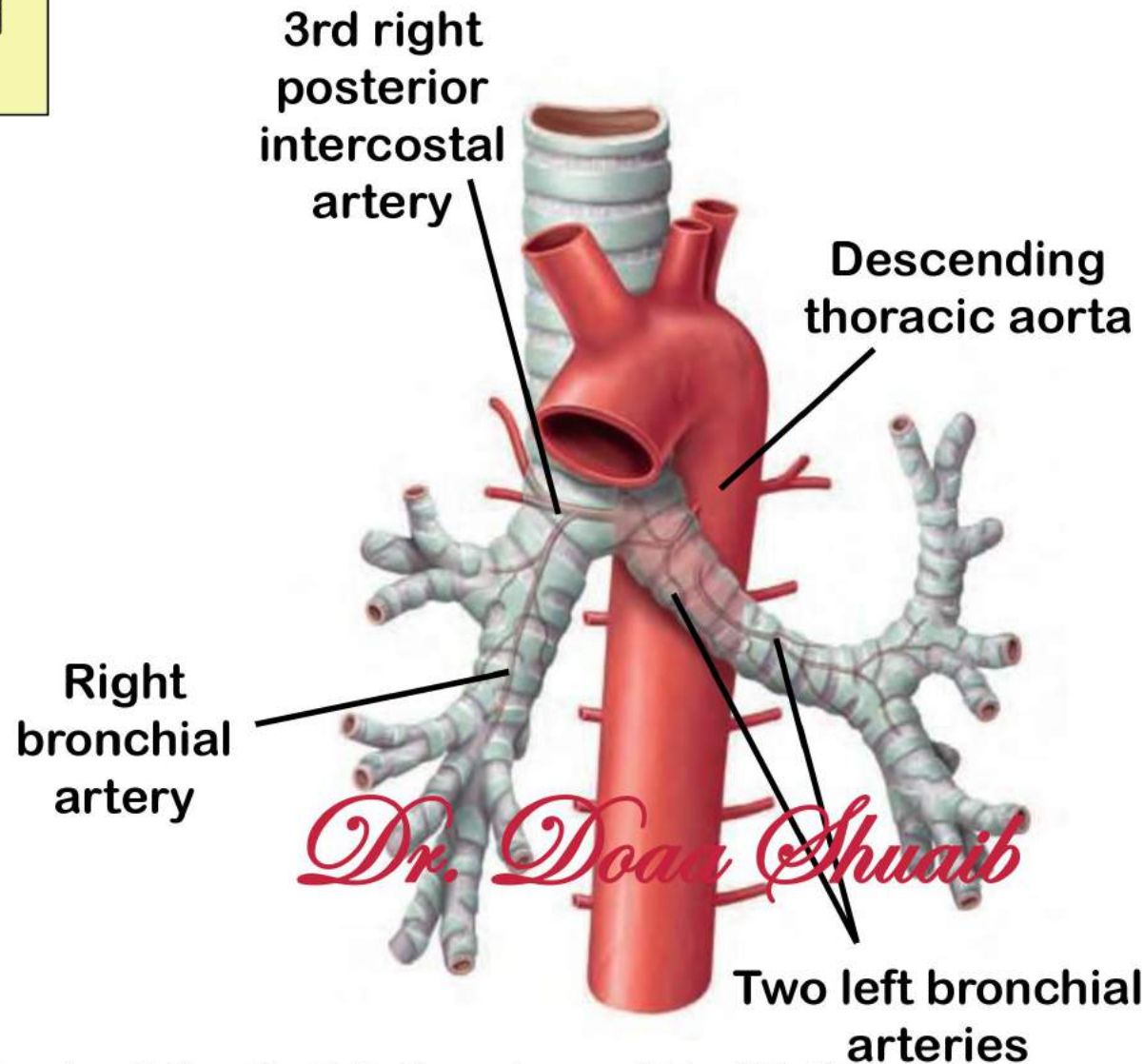
Right bronchus

- Divides into 3 lobar bronchi (superior, middle & inferior) to the 3 lobes of the lung
- The superior lobar (eparterial) bronchus arises outside the hilum

Left bronchus

- Divides into 2 lobar bronchi (superior and inferior) to the 2 lobes of the lung, as it enters the hilum

3- Blood supply



Source: Atlas of Anatomy, Anne M.Gilroy, Brian R. MacPherson, Lawrence M. Ross (2nd edition)

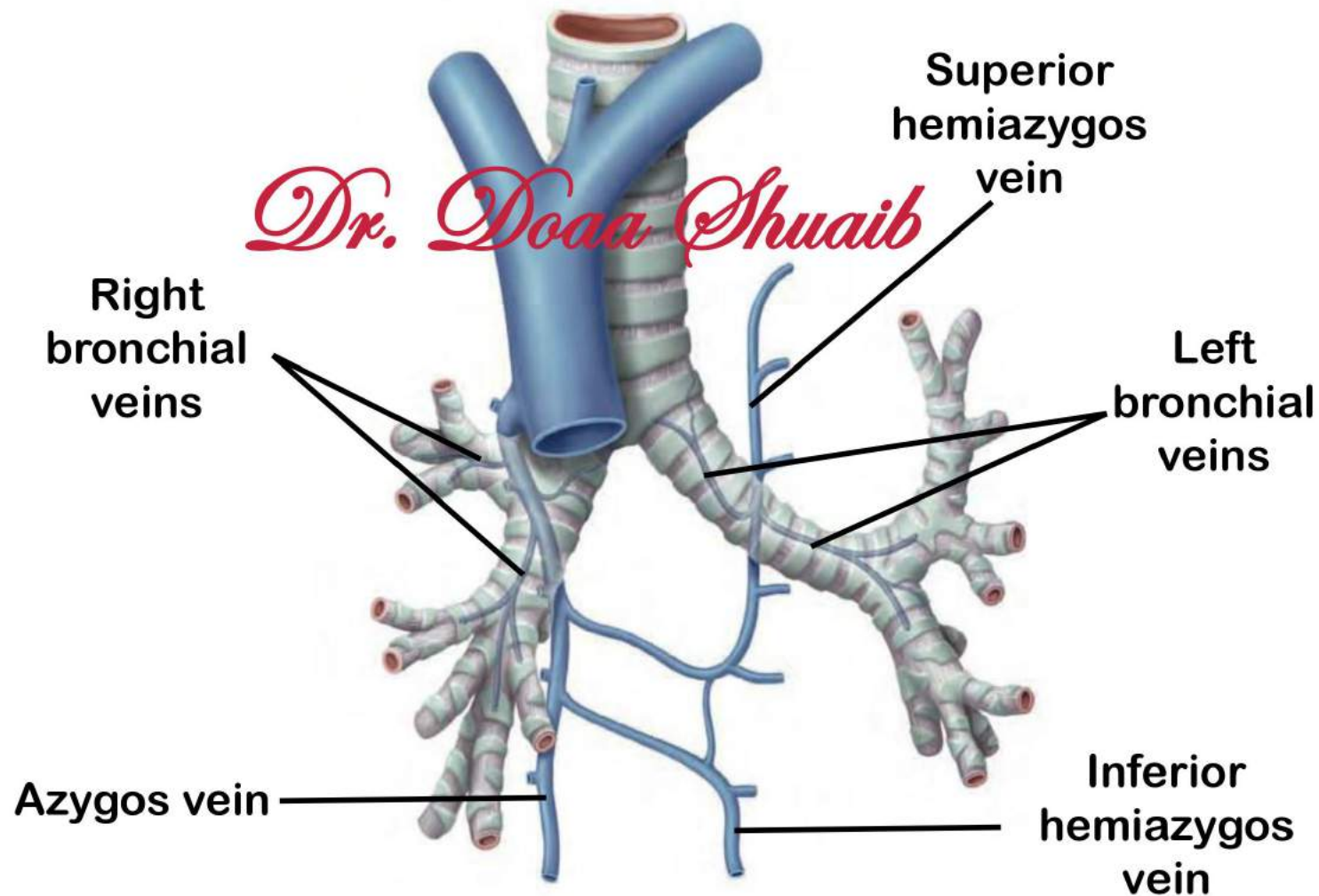
Right bronchus

- Receives one (right) bronchial artery which arises from the 3rd right posterior intercostal or the upper left bronchial artery.

Left bronchus

- Receives two (left) bronchial arteries which arise from the descending thoracic aorta

3- Blood supply



Source: Atlas of Anatomy, Anne M. Gilroy, Brian R. MacPherson, Lawrence M. Ross (2nd edition)

Right bronchus

The venous drainage ends into the azygos vein

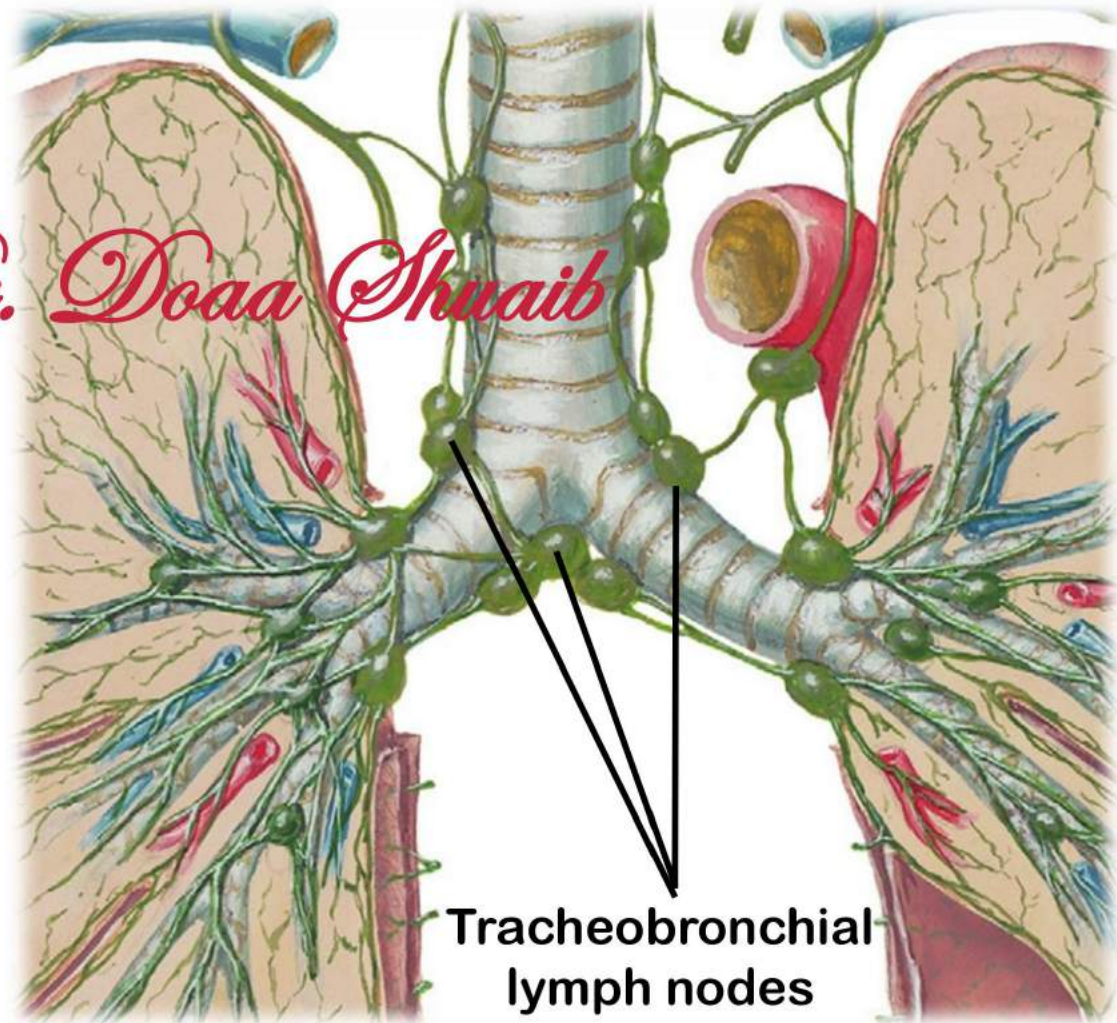
Left bronchus

The venous drainage ends in the superior and inferior hemiazygos veins.

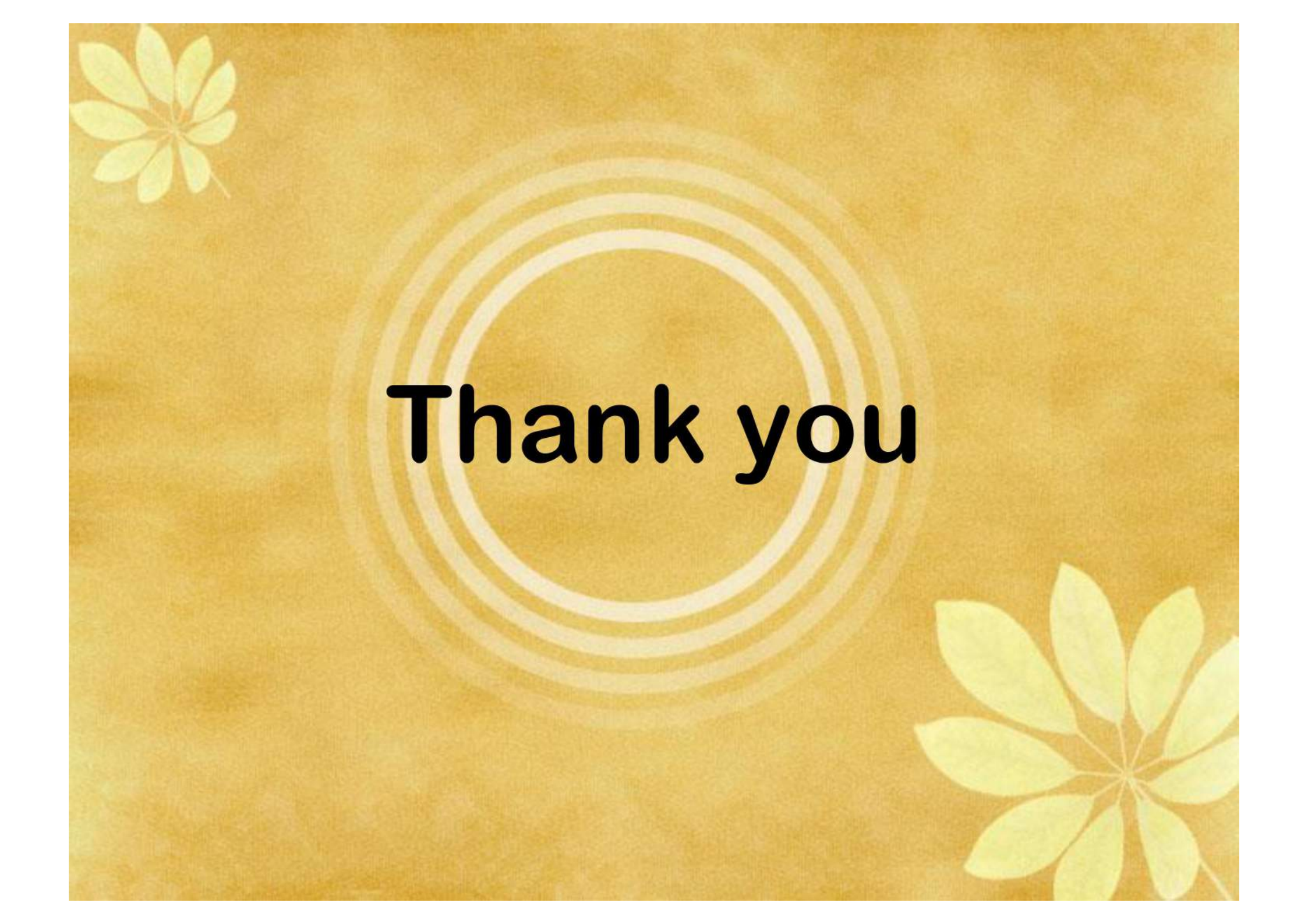
Lymphatic drainage

- Lymphatics drain into inferior tracheobronchial nodes, in the angle between the 2 bronchi
- A chain of bronchopulmonary nodes along each bronchus

Dr. Doaa Shuaib



Source: Atlas of Human Anatomy, Sixth Edition- Frank H. Netter, M.D



Thank you