

The **phrenic nerves** originate from branches of the ventral rami of C3, C4 and C5 at the upper lateral borders of the scalenus anterior muscles. There are variations in the route taken by the right and left phrenic nerves. They descend vertically across the anterior surfaces of the scalenus anterior muscles, deep to the prevertebral fascia. They pass deep to the sternocleidomastoid and the inferior belly of the omohyoid muscles, the internal jugular vein, the transverse cervical and suprascapular arteries, and to the left the thoracic duct. They then pass between the subclavian artery and vein to enter the thorax by crossing medially anterior to the internal thoracic artery. Having passed through the thorax anterior to the pulmonary hilum along with the pericardiophrenic vessels, they pierce the diaphragm. There are variations in the route taken by the right and left phrenic nerves.

The right phrenic nerve is shorter and runs more vertically than the left. At the root of the neck the scalenus anterior separates it from the second part of the right subclavian vein. It is located lateral to the right brachiocephalic vein, the superior vena cava and the fibrous pericardium over the right surface of the right atrium and the inferior vena cava. It crosses the central tendon of the diaphragm, by the caval orifice or lateral to it.

The left phrenic nerve leaves the root of the neck from the medial edge of the scalenus anterior, it passes in front of the upper part of the left subclavian artery, posterior to the thoracic duct. The nerve then passes over in front of the left internal thoracic artery, runs down across the medial surface of the left lung and its pleura to the upper part of the subclavian artery. It crosses this vessel and runs into the groove between the left common carotid and subclavian arteries. The nerve then passes antero-medially in front of the left vagus nerve superior to the aortic arch, posterior to the left brachiocephalic vein. It passes over the surface of the left superior intercostal vein and the aortic arch, anterior to the left pulmonary hilum, and reaches the region between the fibrous pericardium of the left aspect of the left ventricle and the mediastinal pleura. It crosses the muscular part of the diaphragm in front of the central tendon, lateral to the left cardiac surface and more anterior than the right phrenic nerve.

In the neck they receive branches from the cervical sympathetic ganglia; there may also be connections with the internal thoracic sympathetic plexus.

Supply

The phrenic nerves are sensory to the mediastinal and diaphragmatic pleura, fibrous and parietal serous pericardium and diaphragmatic peritoneum and motor to the diaphragm.