

# PRINCIPAL ARTERIES of the BODY

The arteries of the systemic circulation transport blood away from the heart. Their main purpose is to carry oxygen and nutrients to body tissues, but they also carry hormones and elements of the body's immune system. All the systemic arteries of the body branch from the aorta. This major vessel is the source of the principal arteries of the body, as we shall see in this plate.

Begin this plate by coloring the title Principal Arteries of the Body. As you look over the plate, you will note that the emphasis is on the major arterial routes leading away from the heart. Note that many letters carry a subscript 1 or 2. Arteries indicated with a 1 lie on the anatomical left side of the body (your visual right), while those arteries labeled with a number 2 lie on the anatomical right side (your visual left). When considering the arteries, the same name is used for both the right and left artery. Another characteristic of arteries is that they flow into one another, much as one river flows into another. In many cases, a single major artery will give rise to many minor arteries leading to various places in the body. It is often difficult to distinguish where one artery begins and another ends, so we have marked the boundaries (i.e., the beginning and end of the artery) with markers for your use. The area between the markers is the boundary point for a particular artery. When coloring the arteries, darker colors may be used for the large arteries, but as you reach the smaller ones, a lighter color is recommended. Do not be concerned with the smaller, unnamed arteries at this point, since they will be covered in successive plates.

Arising from the left ventricle of the heart is the largest artery of the body, the **aorta (A)**. In the plate, this artery is seen making a curve to the left, at which point the aorta becomes the **thoracic aorta (A<sub>1</sub>)**. The thoracic aorta passes near the spine and through the diaphragm. It then becomes the **abdominal aorta (A<sub>2</sub>)**, which splits to become the common iliac arteries that we shall encounter presently.

A major branch of the aorta at its arch area is the **brachiocephalic trunk (B)**, also called the innominate artery. It branches into the common carotid artery, which then branches into the **left common carotid (C<sub>1</sub>)** and the **right common carotid artery (C<sub>2</sub>)**. The right common carotid artery then divides to form the **right external carotid artery (C<sub>3</sub>)**. The **right internal carotid artery (C<sub>4</sub>)** also arises here. It may be difficult to see on the diagram, because it runs close to the right external carotid. The carotid arteries supply the neck and head with blood.

The third branch from the brachiocephalic trunk is the **right subclavian artery (E<sub>2</sub>)**. This pattern is seen only on the right side of the body. On the left side, the **left subclavian artery (E<sub>1</sub>)** arises from the arch of the aorta. The subclavian arteries supply the upper limbs with blood. Arising from the right subclavian artery is the **vertebral artery (D)** to the vertebrae, deep muscles of the neck, and spinal cord.

Also arising from the subclavian arteries are the **left and right axillary arteries (F<sub>1</sub> and F<sub>2</sub>)**. Axillary arteries supply the muscles of the shoulder and thoracic muscles. They give rise to the **brachial arteries (G<sub>1</sub> and G<sub>2</sub>)**, which service the arm. The **radial arteries (H<sub>1</sub> and H<sub>2</sub>)** arise from the brachial and carry blood to muscles of the forearm, as do the **ulnar arteries (I<sub>1</sub> and I<sub>2</sub>)**.

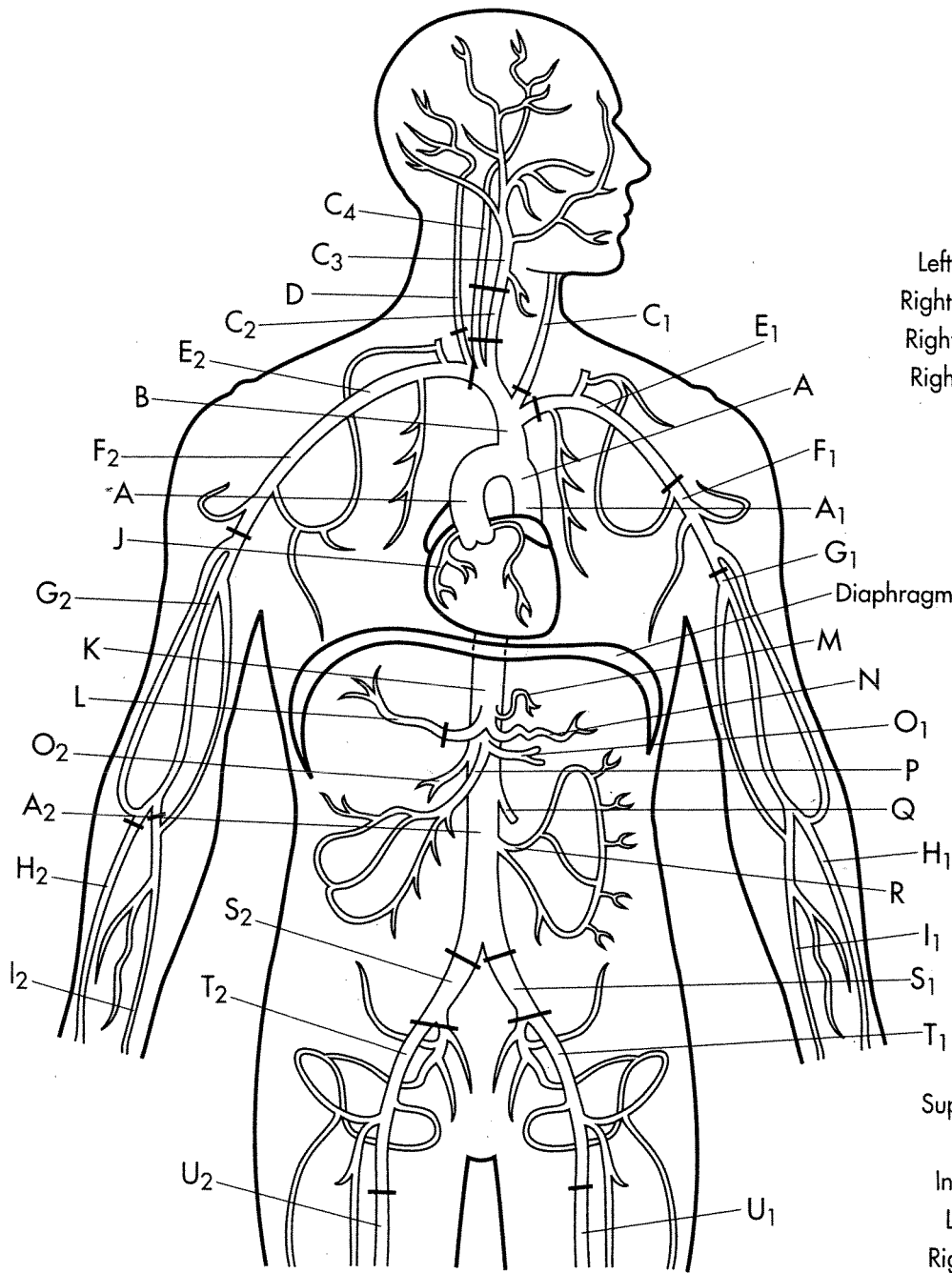
To this point we have briefly surveyed the principal arteries to the head, neck, and upper extremity. These arteries are explored in more detail in a future plate. For the time being, we shall return to the thoracic and abdominal regions, and locate the principal branches from the aorta. Continue your coloring as you read below, and continue to locate the arteries on the left and right sides. Watch for the beginning and ending of the artery, and try to make your colors blend as one artery becomes another.

The **coronary arteries (J)** are so-named because they "crown" the heart. Arising from the aorta just as it leaves the left ventricle, the arteries pass into the heart muscle, and they supply the muscle of this organ with oxygen and nutrients. After the aorta has passed through the diaphragm, a major trunk emerges. This is an unpaired artery called the **celiac trunk (K)**. Arteries from the celiac trunk branch to the liver, stomach, spleen, and other regions of the upper abdomen. The **hepatic artery (L)** branches from the celiac trunk and extends to the liver. From the abdominal aorta, the **gastric artery (M)** supplies the stomach, while the **splenic artery (N)** moves in the direction of the spleen.

Inferior to the celiac trunk is the origin of the paired renal arteries. The **left renal artery (O<sub>1</sub>)** supplies the left kidney, while the **right renal artery (O<sub>2</sub>)** extends to the right kidney. Next is the unpaired **superior mesenteric artery (P)**. This artery carries blood to the small intestine, pancreas, and portions of the large intestine. The **gonadal artery (Q)** leads to arteries supplying the ovaries in females and testes in males. Beyond the gonadal artery is the **inferior mesenteric artery (R)**. The plate shows its numerous branches as it services portions of the transverse colon, descending colon, sigmoid colon, and rectum.

At the level of the fourth lumbar vertebra, the abdominal aorta divides and the two major arteries that arise are the **common iliac arteries (S<sub>1</sub> and S<sub>2</sub>)**. They soon split to form the internal and external iliac arteries. Only the external iliac arteries are shown (T<sub>1</sub>, T<sub>2</sub>). These arteries lead to the **left and right femoral arteries (U<sub>1</sub>, U<sub>2</sub>)**. Blood from these arteries will service muscles at the floor of the body cavity and near the femur. More detailed descriptions of arteries in this area are given in a future plate.

# PRINCIPAL ARTERIES OF THE BODY



Anterior view

Aorta	A	○
Thoracic aorta	A <sub>1</sub>	○
Abdominal aorta	A <sub>2</sub>	○
Brachiocephalic trunk	B	○
Left common carotid artery	C <sub>1</sub>	○
Right common carotid artery	C <sub>2</sub>	○
Right external carotid artery	C <sub>3</sub>	○
Right internal carotid artery	C <sub>4</sub>	○
Vertebral artery	D	○
Left subclavian artery	E <sub>1</sub>	○
Right subclavian artery	E <sub>2</sub>	○
Left axillary artery	F <sub>1</sub>	○
Right axillary artery	F <sub>2</sub>	○
Left brachial artery	G <sub>1</sub>	○
Right brachial artery	G <sub>2</sub>	○
Left radial artery	H <sub>1</sub>	○
Right radial artery	H <sub>2</sub>	○
Left ulnar artery	I <sub>1</sub>	○
Right ulnar artery	I <sub>2</sub>	○
Coronary arteries	J	○
Celiac trunk	K	○
Hepatic artery	L	○
Gastric artery	M	○
Splenic artery	N	○
Left renal artery	O <sub>1</sub>	○
Right renal artery	O <sub>2</sub>	○
Superior mesenteric artery	P	○
Gonadal artery	Q	○
Inferior mesenteric artery	R	○
Left common iliac artery	S <sub>1</sub>	○
Right common iliac artery	S <sub>2</sub>	○
Left external iliac artery	T <sub>1</sub>	○
Right external iliac artery	T <sub>2</sub>	○
Left femoral artery	U <sub>1</sub>	○
Right femoral artery	U <sub>2</sub>	○

# PRINCIPAL VEINS of the BODY

The veins deliver blood back to the right atrium of the heart after oxygen and nutrients have been deposited at the cells and tissues. The blood returning from the veins is oxygen-poor (and rich in carbon dioxide and metabolic waste products). The walls of the veins are generally thinner than those of the arteries because the blood pressure within the veins is lower.

Two great veins receive blood from areas above and below the diaphragm, respectively. These are the superior vena cava and the inferior vena cava. All veins, with one exception, lead to them, as this plate will show. The principal veins are surveyed here, and additional veins are presented when the body areas are discussed in more detail.

Begin the plate by coloring the main title Principal Veins of the Body. Then look over the plate and note that veins return to the heart from above and below. This plate will show that all veins lead to these two main pathways. Where one vein has flowed into another, we have used crossmarks to indicate where one vein begins and another ends. Darker colors may be used in this plate since the veins are generally large and easy to see. Reds, blues, and greens are advised. Where one vein flows into another, you may use variations of the same color to show that the vein is continuous. As you read the paragraphs below, color the title of the vein as you encounter it in the reading, then color the vein in the plate. We have used the subscripts 1 and 2 to indicate left and right veins, respectively.

All areas of the body superior to the diaphragm are drained by the **superior vena cava (A)**, seen above the heart in the plate. Veins below the diaphragm collect blood and send it to the **inferior vena cava (B)**. We shall begin with the veins leading to the superior vena cava.

The superior vena cava is formed by the union of two veins known as the **left and right brachiocephalic veins (C<sub>1</sub> and C<sub>2</sub>)**. You may recall from the plate on arteries that there is only one brachiocephalic artery. To form the brachiocephalic veins, the subclavian veins join with the internal jugular veins. The **subclavian veins (D<sub>1</sub> and D<sub>2</sub>)** drain blood from the shoulder area, and they are relatively short in length.

The **internal jugular veins (F<sub>1</sub> and F<sub>2</sub>)** receive most of the blood draining from the brain, neck, and head area. As the plate shows, several veins flow into them. One is the **sigmoid sinus (G)**, where the internal jugular vein originates and where blood from the brain collects. Another major vein leading to the internal jugular is the **facial vein (H)**, draining the face area. The subclavian veins receive blood from the **external jugular veins (E<sub>1</sub> and E<sub>2</sub>)**, which drain blood from the superficial head and facial areas.

Among the veins leading to the subclavian veins are the **cephalic veins (I<sub>1</sub> and I<sub>2</sub>)**. This vein services the area near the radius then travels up the lateral aspect of the arm to the shoulder. Here it empties into the **axillary vein (J<sub>1</sub> and J<sub>2</sub>)**, as the plate shows. The axillary vein is formed by the union of the **brachial veins (K<sub>1</sub> and K<sub>2</sub>)** and the **basilic veins (L<sub>1</sub> and L<sub>2</sub>)**. The basilic vein is more medial than the brachial vein.

Continue your work by focusing on the veins of the thoracic cavity. Many of these veins will be studied in other plates as well. This plate introduces them to you.

The plate shows a large number of veins in the thoracic cavity. These are the **pulmonary veins (M)**. A single color may be used for the entire grouping. The pulmonary veins return blood from the lungs and lead to the left atrium of the heart. You will note that the main pulmonary vein stands next to the superior vena cava because they are entering different atria. Also seen is the **coronary sinus (N)**. This area gathers blood from the coronary veins and leads back to the right atrium. With the superior and inferior vena cavae, the coronary sinus is the third vein returning blood to the right atrium.

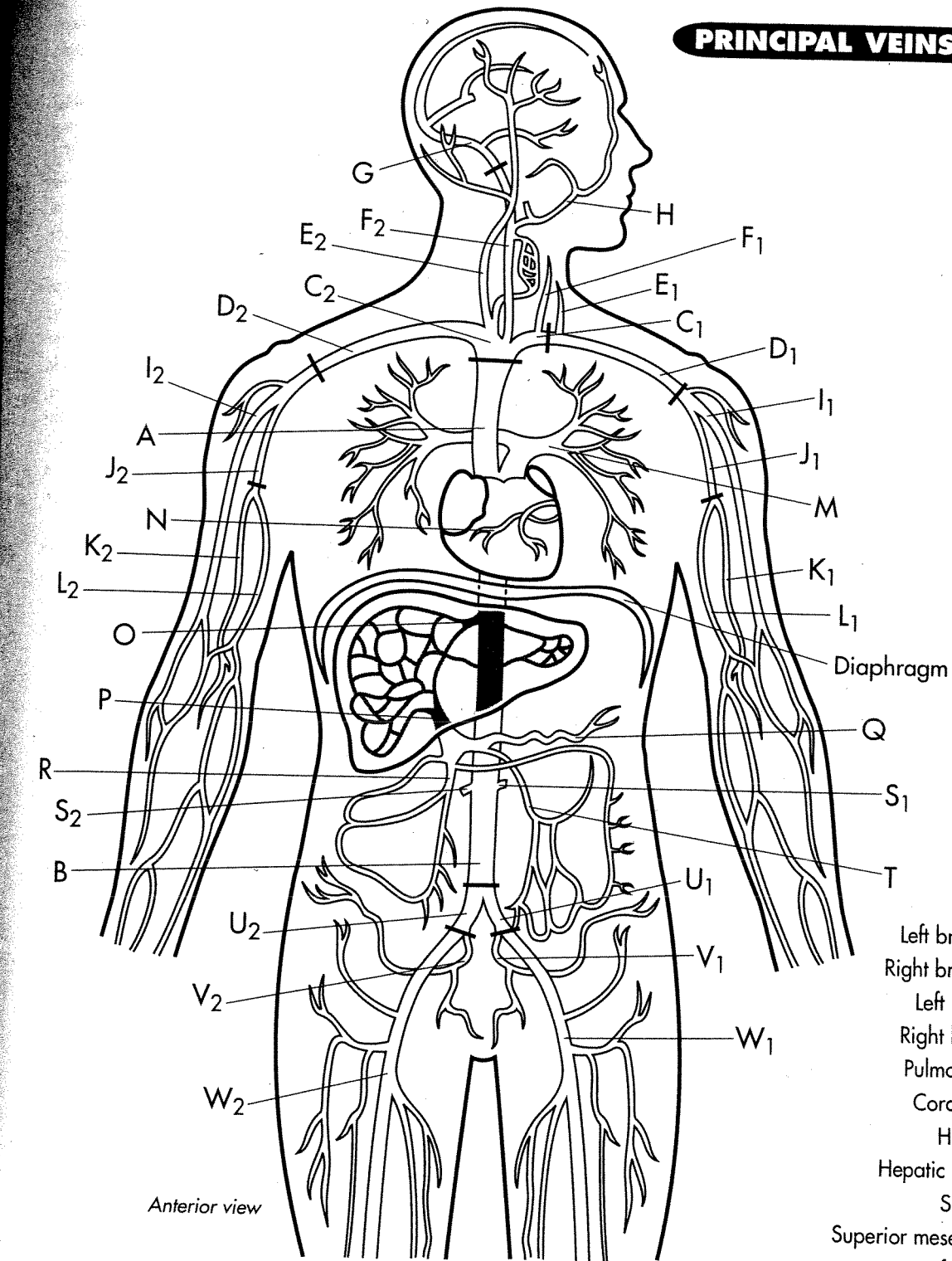
Having briefly surveyed the veins above the diaphragm, we shall now move to the area below the diaphragm and explore the veins leading to the inferior vena cava. It may be more difficult to color these veins because the veins are more numerous. Light colors are suggested. You will note that some of the veins are unpaired veins and are designated by a letter only. Other veins are paired veins, and we continue to use subscripts with the designations.

In the region below the diaphragm, all veins ultimately lead to the **inferior vena cava (B)**. Near the diaphragm, the **hepatic vein (I)** enters the vena cava. This vein returns blood from the liver. The **hepatic portal vein (P)** is an unpaired vein leading from the intestinal veins to the liver. It is a major thoroughfare of the hepatic portal system. It carries nutrients to the liver for processing before entering the blood stream. Close by is the **splenic vein (Q)**, an unpaired vein leading from the spleen.

Moving away from the diaphragm, we encounter the **superior mesentery vein (R)**. This unpaired vein returns blood to the circulation from the area of the small intestine and gastric region. The **renal veins (S<sub>1</sub> and S<sub>2</sub>)** are the important veins leading away from the kidneys. Approximately the same area is the **inferior mesenteric vein (T)**. This vein arises from a network of veins draining the intestinal area.

At its most distal portion, the inferior vena cava is formed by the merger of the **common iliac veins (U<sub>1</sub> and U<sub>2</sub>)**. This merger occurs about the level of the fifth lumbar vertebrae. The common iliacs are formed by the merger of the **internal iliac veins (V<sub>1</sub> and V<sub>2</sub>)** and **external iliac veins (W<sub>1</sub> and W<sub>2</sub>)**. The internal iliac veins drain the pelvic musculature and numerous organs of the pelvic cavity. The external iliac veins are formed from the femoral veins, which receive blood from the lower limbs. These veins are discussed in a future plate.

# PRINCIPAL VEINS OF THE BODY



Anterior view

- |                             |                |   |                             |                |   |                               |                |   |
|-----------------------------|----------------|---|-----------------------------|----------------|---|-------------------------------|----------------|---|
| Superior vena cava          | A              | ○ | Left internal jugular vein  | F <sub>1</sub> | ○ | Left brachial vein            | K <sub>1</sub> | ○ |
| Inferior vena cava          | B              | ○ | Right internal jugular vein | F <sub>2</sub> | ○ | Right brachial vein           | K <sub>2</sub> | ○ |
| Left brachiocephalic vein   | C <sub>1</sub> | ○ | Sigmoid sinus               | G              | ○ | Left basilic vein             | L <sub>1</sub> | ○ |
| Right brachiocephalic vein  | C <sub>2</sub> | ○ | Facial vein                 | H              | ○ | Right basilic vein            | L <sub>2</sub> | ○ |
| Left subclavian vein        | D <sub>1</sub> | ○ | Left cephalic vein          | I <sub>1</sub> | ○ | Pulmonary veins               | M              | ○ |
| Right subclavian vein       | D <sub>2</sub> | ○ | Right cephalic vein         | I <sub>2</sub> | ○ | Coronary sinus                | N              | ○ |
| Left external jugular vein  | E <sub>1</sub> | ○ | Left axillary vein          | J <sub>1</sub> | ○ | Hepatic vein                  | O              | ○ |
| Right external jugular vein | E <sub>2</sub> | ○ | Right axillary vein         | J <sub>2</sub> | ○ | Hepatic portal vein           | P              | ○ |
|                             |                |   |                             |                |   | Splenic vein                  | Q              | ○ |
|                             |                |   |                             |                |   | Superior mesentery vein       | R              | ○ |
|                             |                |   |                             |                |   | Left renal vein               | S <sub>1</sub> | ○ |
|                             |                |   |                             |                |   | Right renal vein              | S <sub>2</sub> | ○ |
|                             |                |   |                             |                |   | Left inferior mesenteric vein | T              | ○ |
|                             |                |   |                             |                |   | Left common iliac vein        | U <sub>1</sub> | ○ |
|                             |                |   |                             |                |   | Right common iliac vein       | U <sub>2</sub> | ○ |
|                             |                |   |                             |                |   | Left internal iliac vein      | V <sub>1</sub> | ○ |
|                             |                |   |                             |                |   | Right internal iliac vein     | V <sub>2</sub> | ○ |
|                             |                |   |                             |                |   | Left external iliac vein      | W <sub>1</sub> | ○ |
|                             |                |   |                             |                |   | Right external iliac vein     | W <sub>2</sub> | ○ |