Arterial Circulation (Oxygenated Blood Pathway)

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1. From the Heart:

- **Oxygenated blood** from the lungs enters the **left atrium** through the **pulmonary veins**.
- It passes through the **mitral valve** into the **left ventricle**.
- The **left ventricle** pumps the blood into the **aorta** through the **aortic valve**.

2. Aorta and its Branches:

- ### Ascending Aorta:
  - Gives rise to the **right and left coronary arteries** that supply the heart itself.

- **Aortic Arch:**
  - **Brachiocephalic trunk: Divides into:**
    - **Right subclavian artery (supplies the right upper limb).**
    - **Right common carotid artery (supplies the right side of the head and neck).**
  - **Left common carotid artery: Supplies the left side of the head and neck.**
  - **Left subclavian artery: Supplies the left upper limb.**
- **Descending (Thoracic) Aorta: Supplies blood to the thoracic organs and intercostal spaces.**
- **Abdominal Aorta: Gives rise to:**
  - **Celiac trunk (stomach, liver, spleen).**
  - **Superior mesenteric artery (small intestine, proximal colon).**
  - **Renal arteries (kidneys).**
  - **Inferior mesenteric artery (distal colon and rectum).**

1. Distribution to the Body:

- ## Head and Neck:
  - The common carotid arteries divide into:
    - **Internal carotid artery** (brain).
    - **External carotid artery** (face, scalp).
- ## Upper Limbs:
  - Subclavian arteries → Axillary arteries → Brachial arteries → Divide into:
    - **Radial artery** (lateral forearm).
    - **Ulnar artery** (medial forearm).
- ## Lower Limbs:
  - Abdominal aorta → Common iliac arteries → External iliac arteries → Femoral arteries → Popliteal arteries → Divide into:
    - **Anterior tibial artery** (anterior leg).
    - **Posterior tibial artery** (posterior leg).

1. **At the Tissue Level:**
    - Arteries branch into smaller **arterioles**, which further branch into **capillaries**.
    - **Capillaries** are the site of gas exchange, where oxygen and nutrients are delivered to tissues, and carbon dioxide and waste are picked up.

2. Venous Circulation (Deoxygenated Blood Pathway)

1. From the Tissues:

- After oxygen is delivered, **deoxygenated blood** is collected by **venules**, which merge into **veins**.

2. Veins of the Body:

- **Head and Neck:**
    - **Internal jugular vein:** Drains blood from the brain.
    - **External jugular vein:** Drains blood from the face and scalp.
    - Both drain into the **brachiocephalic veins**.

- **Upper Limbs:**

  - **Deep veins:** Radial and ulnar veins → Brachial vein → Axillary vein.
  - **Superficial veins:** Cephalic vein (lateral), basilic vein (medial), connected by the **median cubital vein**.
  - All drain into the **subclavian vein**.

- **Lower Limbs:**

  - **Deep veins:** Anterior tibial, posterior tibial, and popliteal veins → Femoral vein → External iliac vein.
  - **Superficial veins:** Great saphenous vein (medial side of the leg) and small saphenous vein (posterior leg).
  - Both drain into the **femoral vein**.

- **Abdomen:**

  - Blood from abdominal organs is collected by:
    - The **hepatic portal vein**, which carries blood to the liver.
    - After processing in the liver, blood leaves via the **hepatic veins** into the **inferior vena cava (IVC)**.

1. Return to the Heart:

- **Superior Vena Cava (SVC):**
  - Drains blood from the head, neck, upper limbs, and thorax.
- **Inferior Vena Cava (IVC):**
  - Drains blood from the abdomen, pelvis, and lower limbs.
- Both the SVC and IVC empty into the **right atrium** of the heart.

. Pulmonary Circulation (Lung Pathway for Oxygenation)

1. **From the Right Side of the Heart:**
   - Deoxygenated blood from the **right atrium** passes through the **tricuspid valve** into the **right ventricle**.
   - The **right ventricle** pumps blood through the **pulmonary valve** into the **pulmonary arteries**.
2. **In the Lungs:**
   - Blood flows through the pulmonary capillaries, where it releases carbon dioxide and picks up oxygen.
3. **Return to the Left Side of the Heart:**
   - Oxygenated blood flows back to the heart via the **pulmonary veins**, entering the **left atrium**.

. Full Circulation Summary:

1. **Left Heart → Aorta → Arteries → Arterioles → Capillaries (Oxygen Delivery).**
2. **Capillaries → Venules → Veins → Vena Cavae → Right Heart → Pulmonary Circulation → Lungs (Oxygenation).**
3. **Pulmonary Veins → Left Heart (Cycle Repeats).**