

## Veins

Veins conduct blood away from body tissues and back to the heart . Generally, the diameters of veins are larger than those of corresponding arteries; however, veins are thinner walled, since they do not bear high blood pressures.

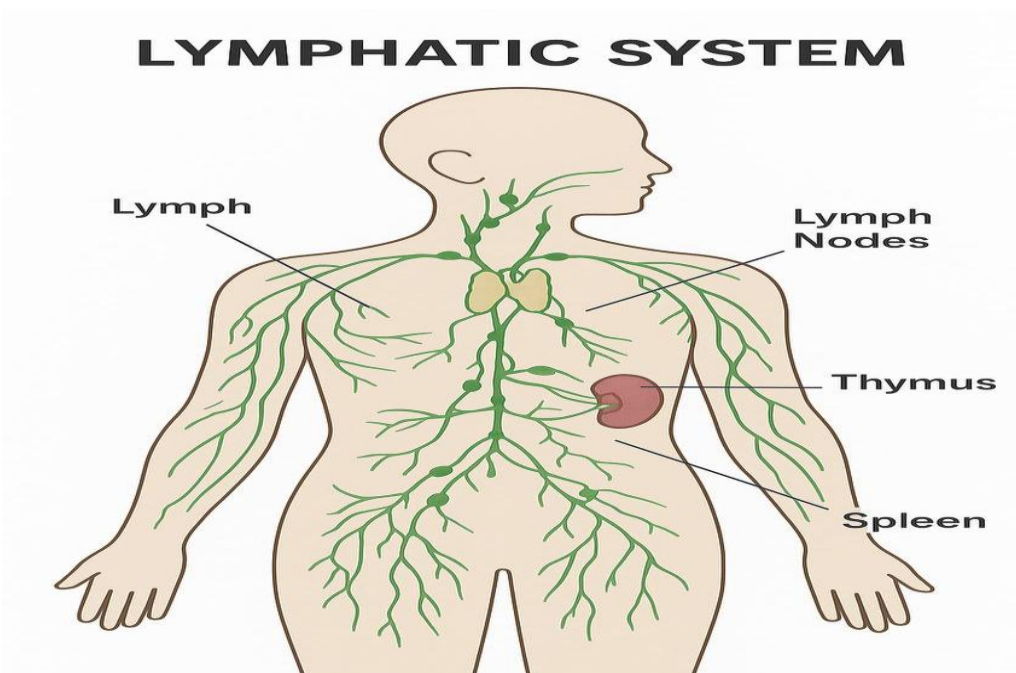
Veins also possess three 4 concentric, more or less definite layers: **tunica intima, tunica media, and tunica adventitia**. Furthermore, veins have fewer layers of smooth muscle cells in their tunica media than do arteries. Finally, many veins possess valves that act to prevent regurgitation of blood. **Three categories of veins exist: small, medium, and large** . The smallest of the veins, venules, especially postcapillary venules, are also responsible for the exchange of materials. Postcapillary venules have pericytes instead of a tunica media, and their walls are more permeable than those of venules and even of capillaries.

- **Medium** veins receive blood from most of the body, including the upper and lower extremities. They also possess three layers. Tunica intima frequently forms valves, especially in the lower extremities, to counteract the gravitational forces and avert the backflow of blood. Tunica media is slender and houses only a loosely organized network of smooth muscle cells interspersed with fibroblasts and type I collagen fibers .Tunica adventitia is the thickest of the three layers consisting mostly of elastic fibers and type I collagen bundles arranged parallel to the longitudinal axis of the vein. Occasional smooth muscle cells are also present in the adventitia.

- **Large** veins, such as the venae cavae, pulmonary, and renal veins, are more than 1 cm in diameter. As the venae cavae and pulmonary veins approach the heart, they exhibit the presence of cardiac muscle cells in their adventitia. Most of the large veins (except for those in the lower extremities) possess no smooth muscle cells in their tunica media instead those cells are located in their tunica adventitia. The tunica intima of large veins are rich in elastic fibers and fibroblasts. The walls of these large veins are supplied by slender vessels derived from the vasa vasorum located in their adventitia.

### **Lymph vascular system**

Excess extracellular fluid, which does not enter the venous return system at the level of the capillary bed or venule, gains entry into lymphatic capillaries, blindly ending 5 thin vessels of the lymph vascular system. Subsequent to passing through chains of lymph nodes and larger lymph vessels, the fluid known as lymph enters the blood vascular system at the root of the neck.



## **Main Components**

### 1. Lymph:

- A clear fluid that carries white blood cells, especially lymphocytes, throughout the body.

### 2. Lymphatic Vessels:

- Network of thin tubes that transport lymph from tissues to the bloodstream.

### 3. Lymph Nodes:

- Small, bean-shaped structures that filter lymph and trap bacteria, viruses, and other harmful substances.

### 4. Organs Associated with Lymphatic System:

- Spleen: Filters blood, removes old cells, and helps fight infection.
- Thymus: Matures T-lymphocytes (a type of white blood cell).
- Tonsils: Protect against pathogens entering through mouth and throat.

## **Functions**

### 1. Fluid Balance:

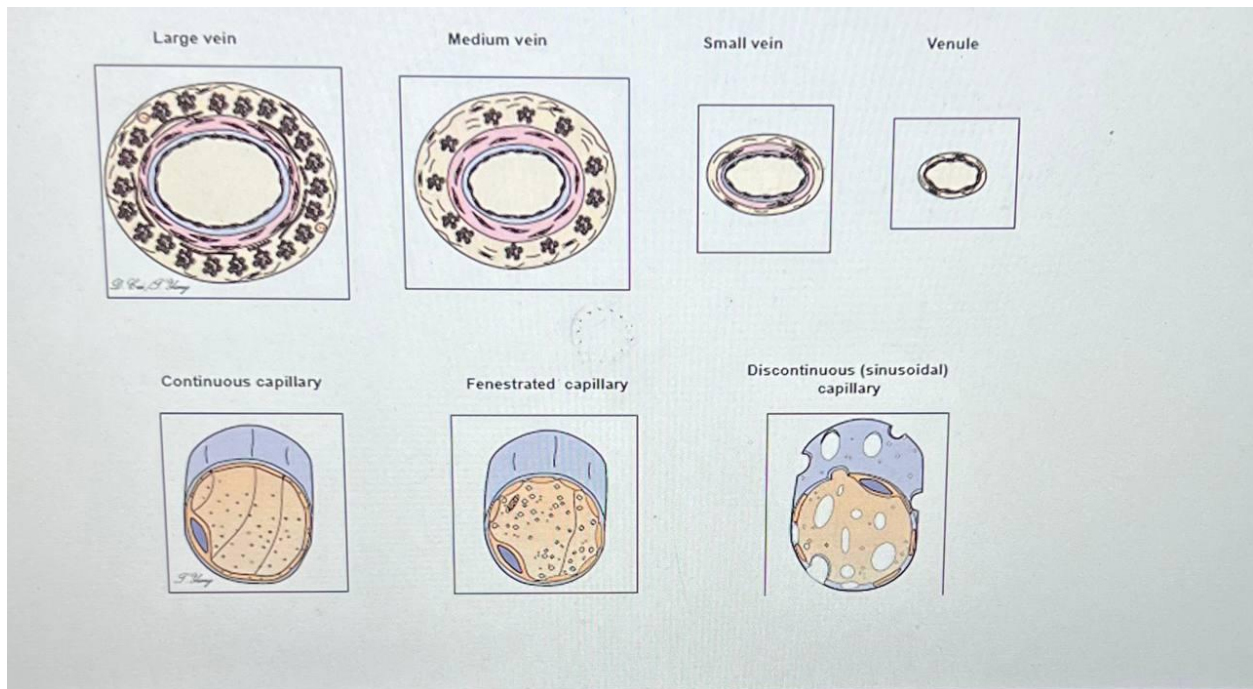
- Returns excess tissue fluid to the bloodstream.

### 2. Immune Defense:

- Produces and transports immune cells to fight infections.

### 3. Fat Absorption:

- Transports fats and fat-soluble vitamins from the digestive system to the blood.



## ARTERY AND VEIN

