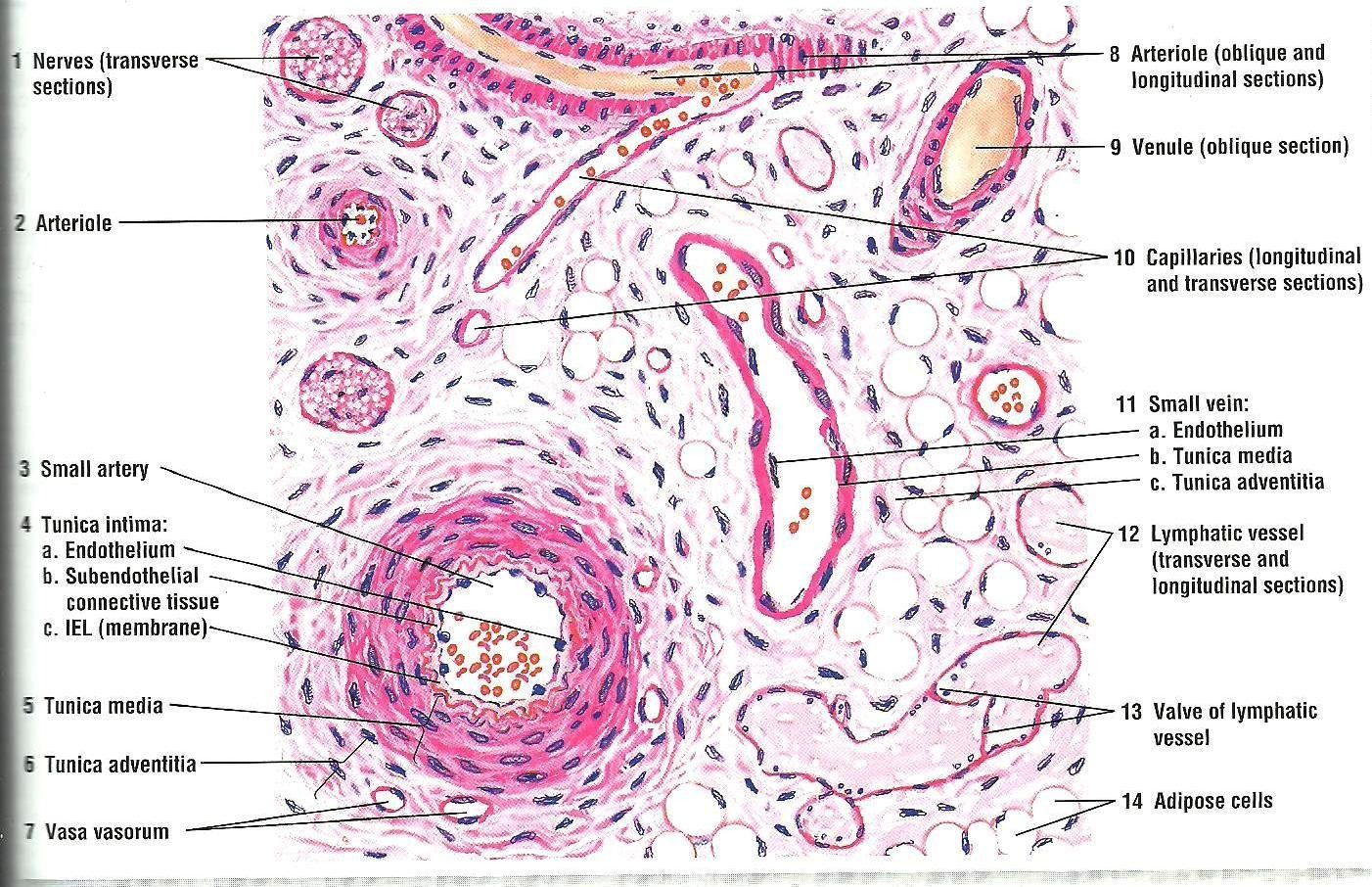
# Cardiovascular System

### Blood & lymphatic vessels in the connective tissue



**Constituents**

#### Heart

* **Blood vessels:**

##### Arteries

* 1. Capillaries
  2. Veins

###### large vein

**medium-sized vein venules**

**elastic arteries muscular arteries arterioles**

**capillaries/sinusoids**

**Arteries** – ALWAYS carry blood away from the heart

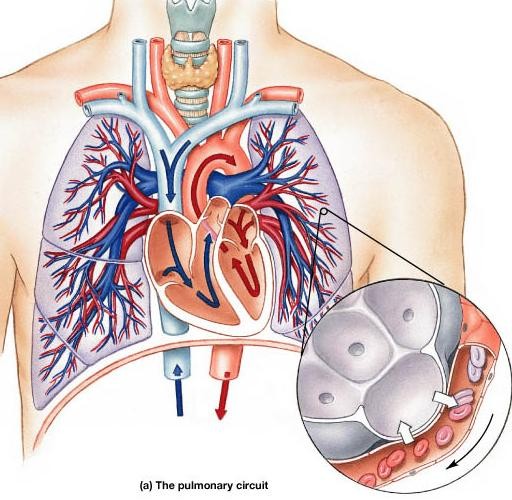
**Veins** – ALWAYS return blood to the heart

All are lined on their inner surface by endothelial cells (simple squamous)

### Gross Anatomy of Circulatory System

Pulmonary & Systemic Circulations

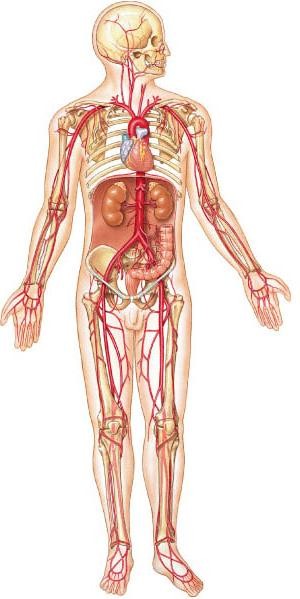
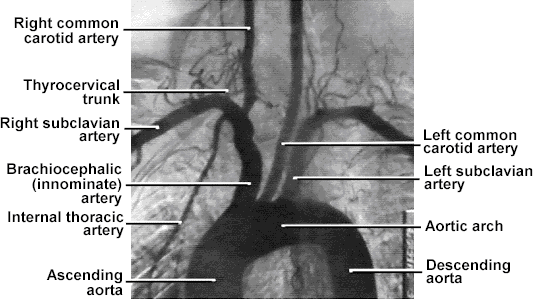
**Pulmonary Circuit**



* Right ventricle into pulmonary trunk to pulmonary arteries to lungs.
* Return by way of 4

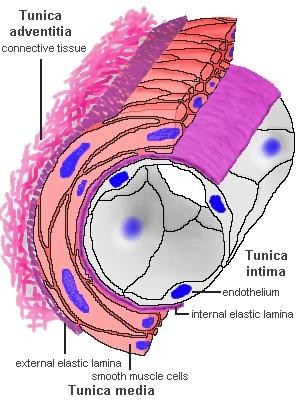
pulmonary veins to left atrium.

**Systemic Circuit**



### Basic structure of arteries

1. **Tunica interna or intima:**

consists of-

* 1. Endothelium
  2. Basal lamina
  3. Sub endothelial connective tissue
  4. Internal elastic lamina

1. **Tunica media**
2. **Tunica externa or adventitia**

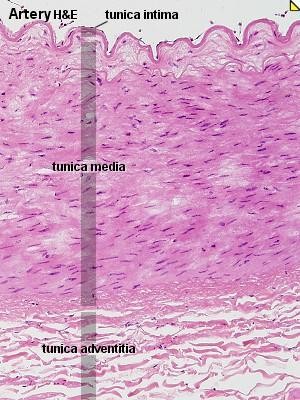
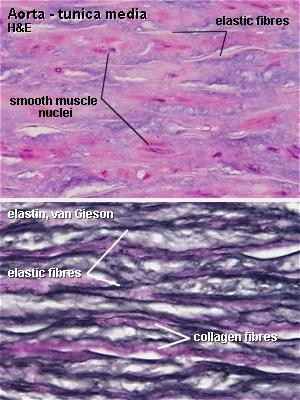
## Classification of Arteries

#### Elastic (conducting/ large size arteries):

##### e.g. aorta, pulmonary trunk, carotids, subclavian, axillary, iliac.

* **Muscular (distributing/ medium size arteries)**
* **Arterioles**

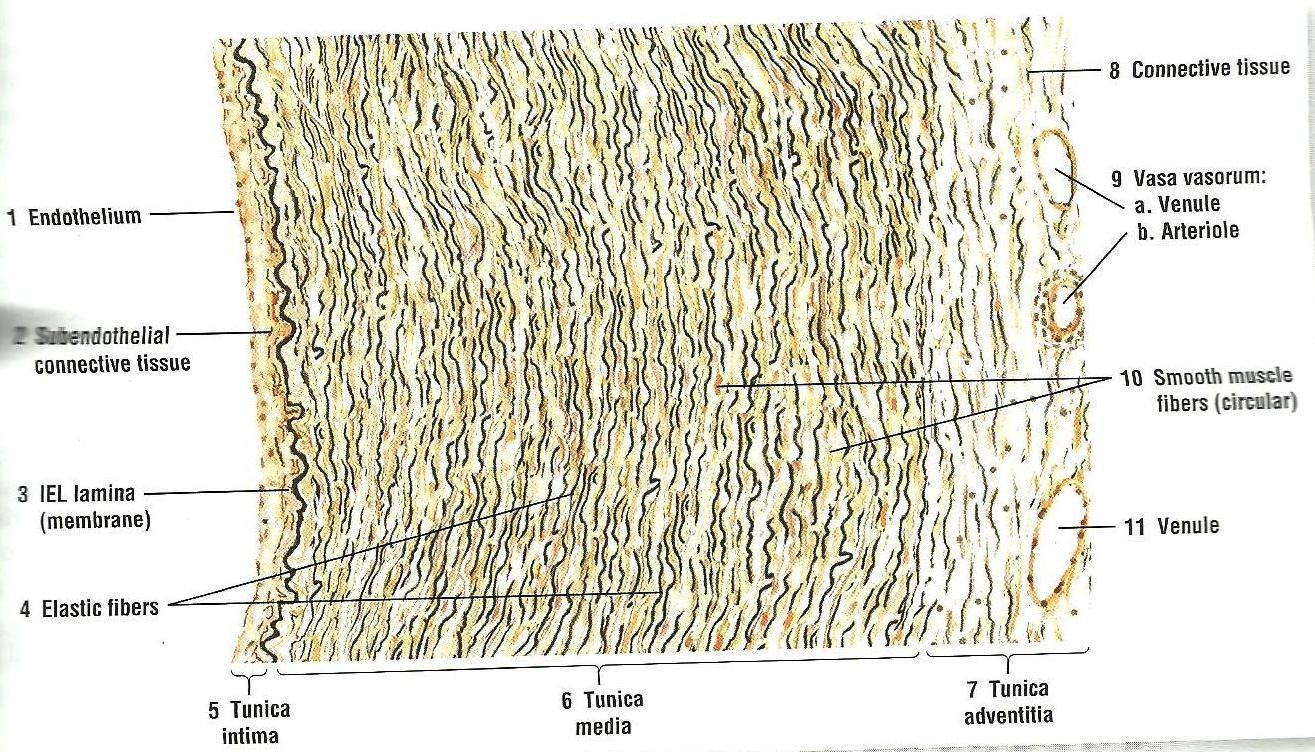
**Elastic arteries**



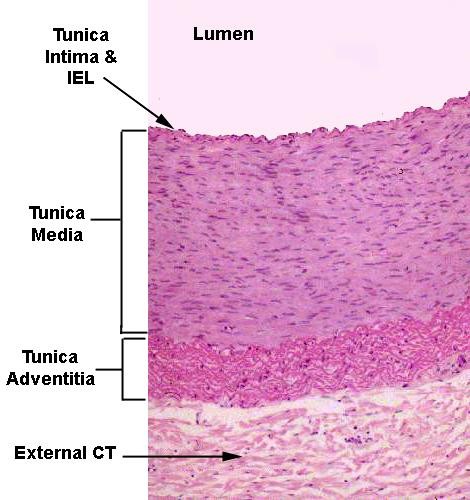
* Internal elastic lamina is ill- defined.
* Tunica media is predominantly made up of elastic fibres.
* Tunica adventitia contains blood vessels (vasa vasorum).

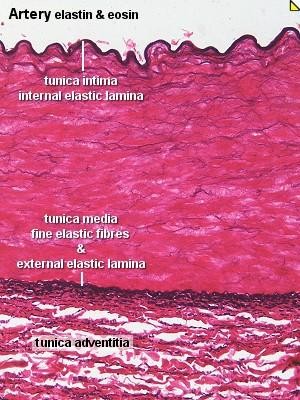
**Diameter: > 1 cm**

# Elastic artery



### Muscular arteries (Medium sized arteries)



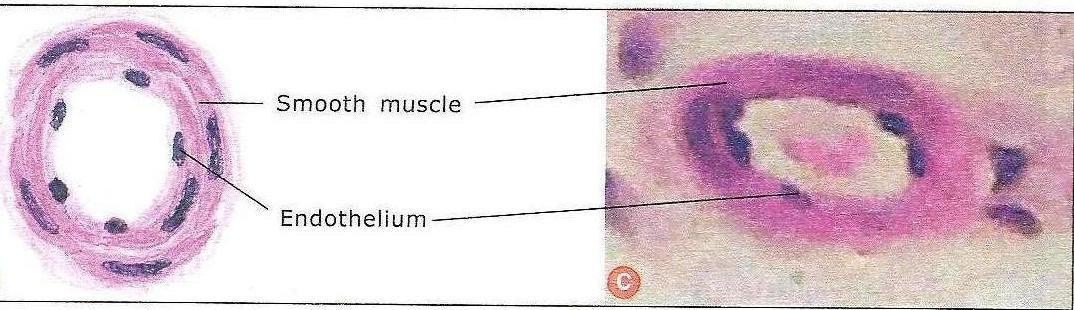
* Internal elastic lamina is

clearly visible.

* Tunica media is predominantly made up of smooth muscle cells.
* Tunica adventitia is thicker than of elastic artery.

**Diameter: 2-10 mm**

# Arterioles

* Arterioles less than 50 μm diameter are called terminal arterioles.
* The smallest terminal arteriole is < 12 μm
* Internal elastic lamina is

poorly developed.

* Thin layer of smooth muscle in tunica media.
* Precapillary sphincter
* Tunica adventitia is thin.
* Metarterioles **Diameter: < 100 μm**

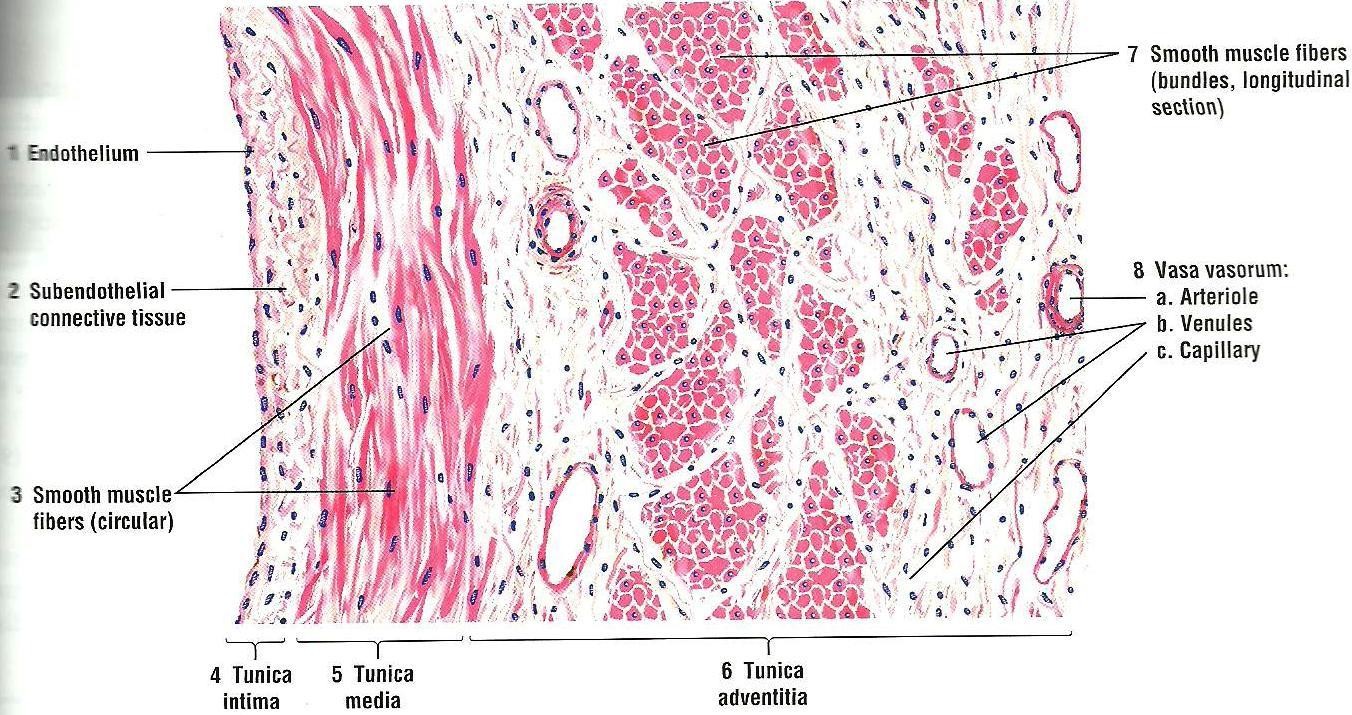
# vei20heVeins

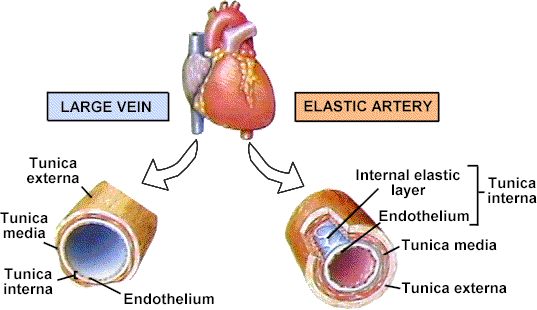
* Classified as large, medium & small (venules).
* All the 3 tunics are present but not well defined.
* T. intima: endothelial cells, basal lamina, subendothelial connective tissue & few smooth muscle cells
* T. media: larger amount of

collagen, thinner

* T. adventitia: thicker

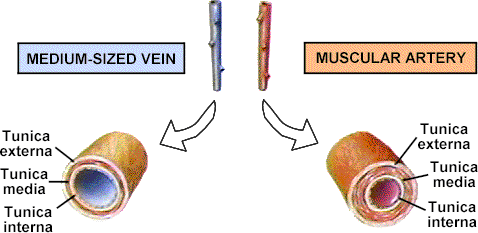
# Large vein



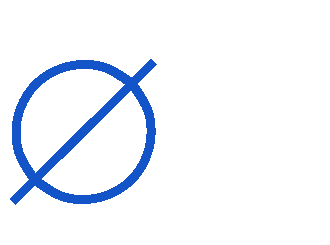
Largest conducting arteries – lead directly from heart, subject to high pressure

Superior & inferior vena cava and their tributaries

Pulmonary trunk & aorta and their major branches



- 9 mm 4 mm



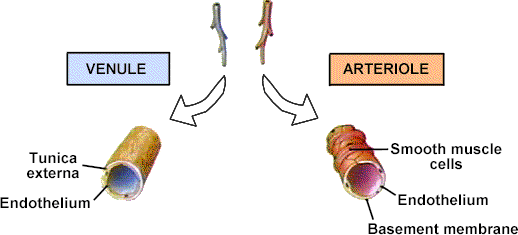
2



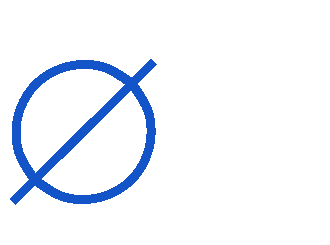
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External and internal jugular, brachial & femoral veins

External and internal carotids, brachial & femoral arteries



10-50 µm



~

30 µm

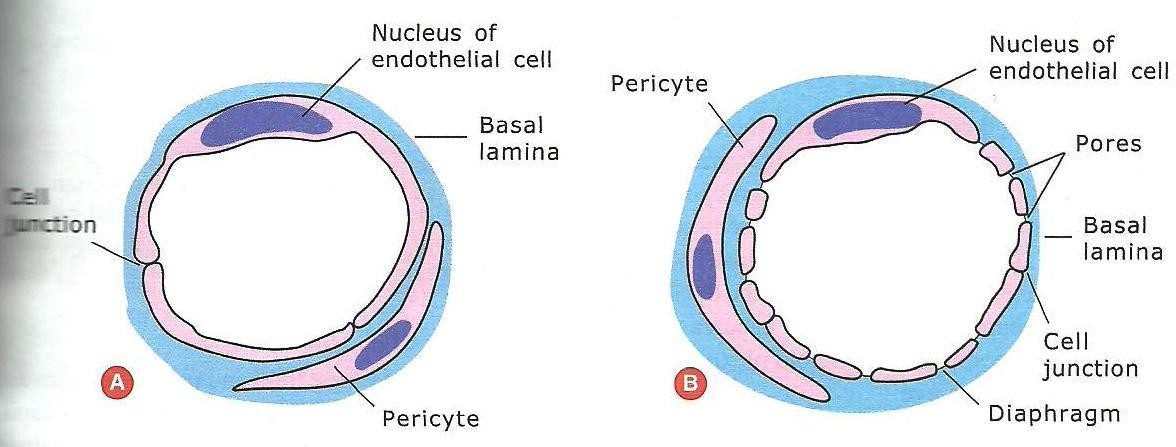


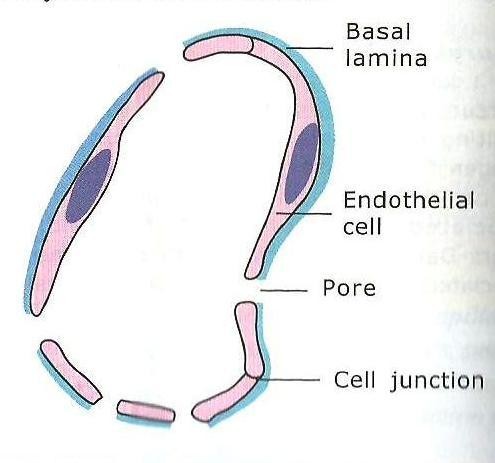
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## Capillaries

* + Thin-walled endothelial-lined microscopic vessels that connect arterioles & venules.
  + Extensive network
  + Diameter: 5-10 μm
  + Flow of blood through capillary is called Microcirculation.
  + **Absence of T. media & adventitia.**

### Types of capillaries



* Continuous capillaries
* Fenestrated capillaries
* Sinusoids

Capillaries

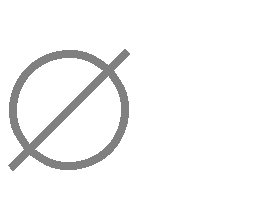
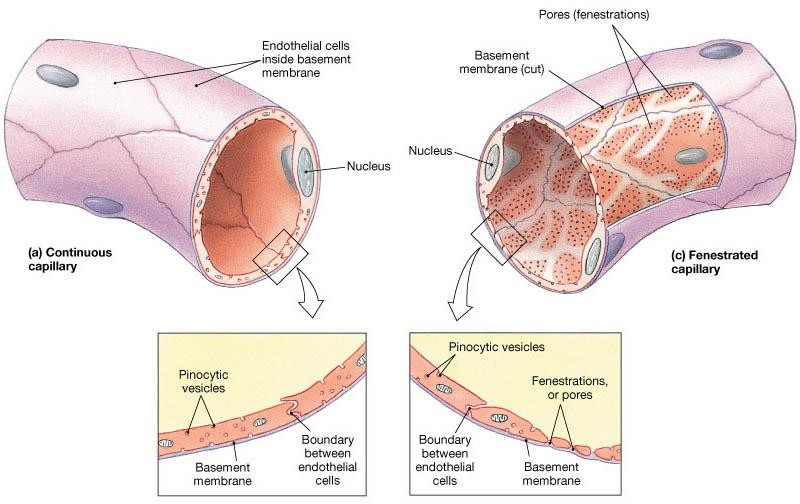
Only endothelium Variably permeable

~ 8 µm

somewhat

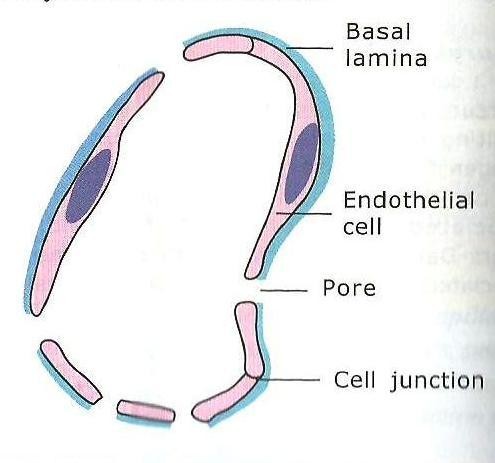
permeable

Characterized by circular fenestrae or pores that penetrate the endothelium - permit exchange of larger molecules.



Intestinal mucosa, choroid plexus, endocrine glands, kidneys

Most body regions

**Sinusoids**

* + Resemble fenestrated capillaries but have:
  1. irregular shapes
  2. longer pores
  3. thinner (or no) basement membrane
  + Blood flow is sluggish
  + Found in the liver, bone marrow, spleen etc.
  + Sometimes called as sinusoidal capillary.