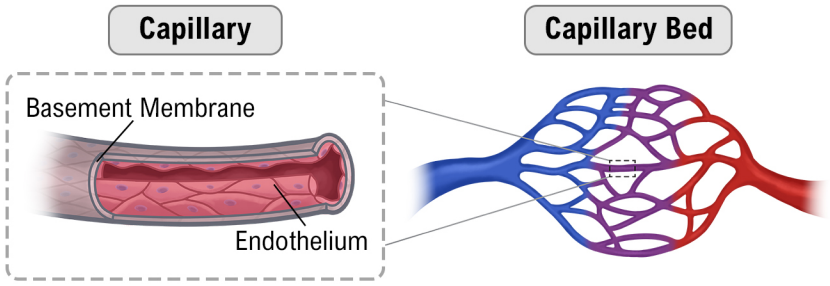
TOPIC: CAPILLARIES

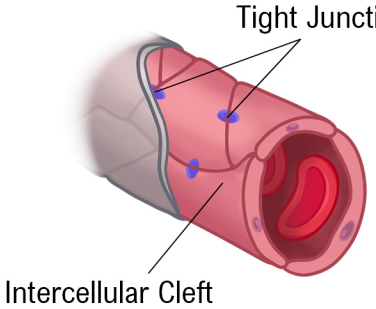
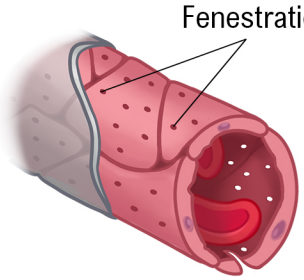
Introduction to Capillaries

- Recall: **Capillaries**: *smallest* vessels facilitating _____ between blood & tissues (ex. nutrients, gases).
  - Capillary walls _____ smooth muscle & only have a thin *tunica* _____.
  - Form an extensive network of numerous, branched, connected capillaries (*capillary* _____).



Types of Capillaries

- Structurally, there are ____ types of capillaries based on their structure, prevalence, & permeability:
  1. **Continuous Capillaries**: endothelium forms a *continuous* tube with *intercellular* clefts (_____) between cells.
  2. **Fenestrated Capillaries:** endothelial cells contain *fenestrations* (small _____) with *moderate* permeability.
  3. **Sinusoid Capillaries:** endothelium is _____*continuous* (larger "holes").

_____ Capillaries	_____ Capillaries	_____ Capillaries
◆ Most common ◆ Least permeable		◆ Least common ◆ Most permeable
		
Found in _____, nervous tissue, connective tissue, muscle tissue.	Found in kidneys (filtration), endocrine glands (secretion), & small intestines (absorption).	Allows diffusion of _____ substances & found in liver, lymphoid organs, bone marrow, & spleen.

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EXAMPLE

Which type of capillary would you NOT expect to find in a tissue where relatively large molecules need to be exchanged between blood and surrounding tissues, & smaller molecules need to be exchanged rapidly?

a) Continuous capillaries. b) Fenestrated capillaries. c) Sinusoid capillaries.

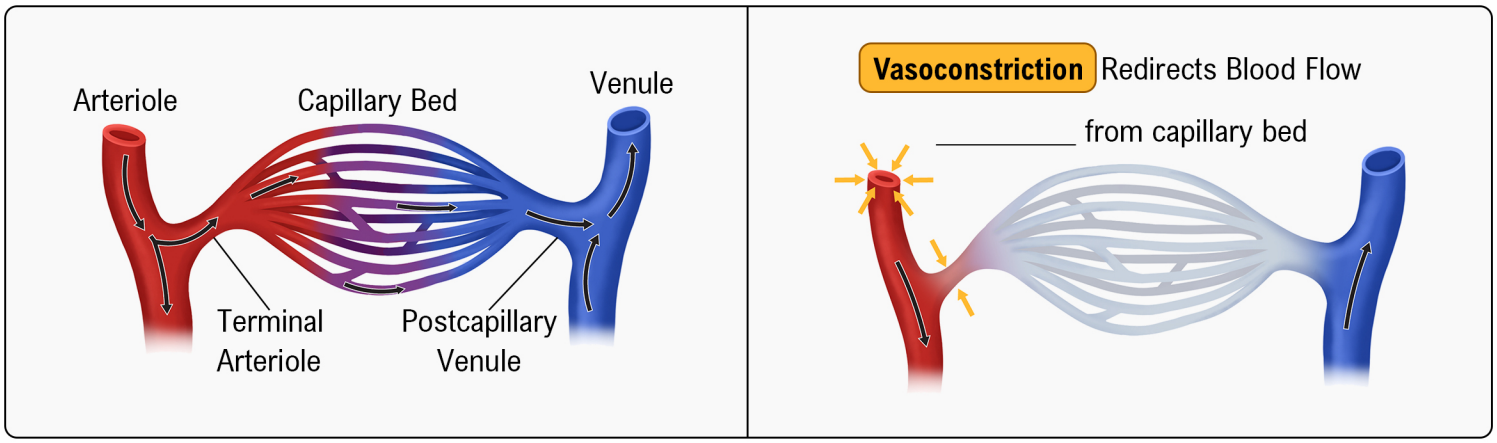
PRACTICE

Which type of capillary is characterized by a discontinuous basement membrane, allowing for the easy passage of larger molecules and cells?

a) Continuous capillaries.
b) Fenestrated capillaries.
c) Sinusoid capillaries.
d) Muscular capillaries.

General Structure of Capillary Beds

- Recall: **Capillary Bed**: an extensive _____ of numerous, branched, connected capillaries.
  - **Terminal Arteriole**: region near _____ of an arteriole.
  - **Postcapillary Venule**: _____ blood from a capillary bed.
- **Microcirculation**: blood flow *through* capillary bed (terminal arteriole → capillary bed → postcapillary venule).
  - Arterioles can *vasoconstrict* to_____ blood flow away from capillary beds.



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EXAMPLE

If the body requires blood in skeletal muscles, _____ in the digestive system will _____.

a) Veins; constrict.

b) Capillaries; dilate.

c) Terminal Arterioles; dilate.

d) Terminal Arterioles; constrict.

PRACTICE

Which of the following areas of the body has the highest concentration of capillary beds?

a) Skeletal muscle.

b) Joints.

c) Connective tissue.

d) Cartilage.

PRACTICE

Which of the following best describes the microcirculatory flow of blood (microcirculation)?

a) Terminal Arteriole → Arteriole → Capillary Bed → Postcapillary Venule.

b) Arteriole → Terminal Arteriole → Capillary Bed → Postcapillary Venule.

c) Postcapillary Venule → Capillary Bed → Terminal Arteriole → Arteriole.

d) Capillary Bed → Postcapillary Venule → Arteriole → Terminal Arteriole.

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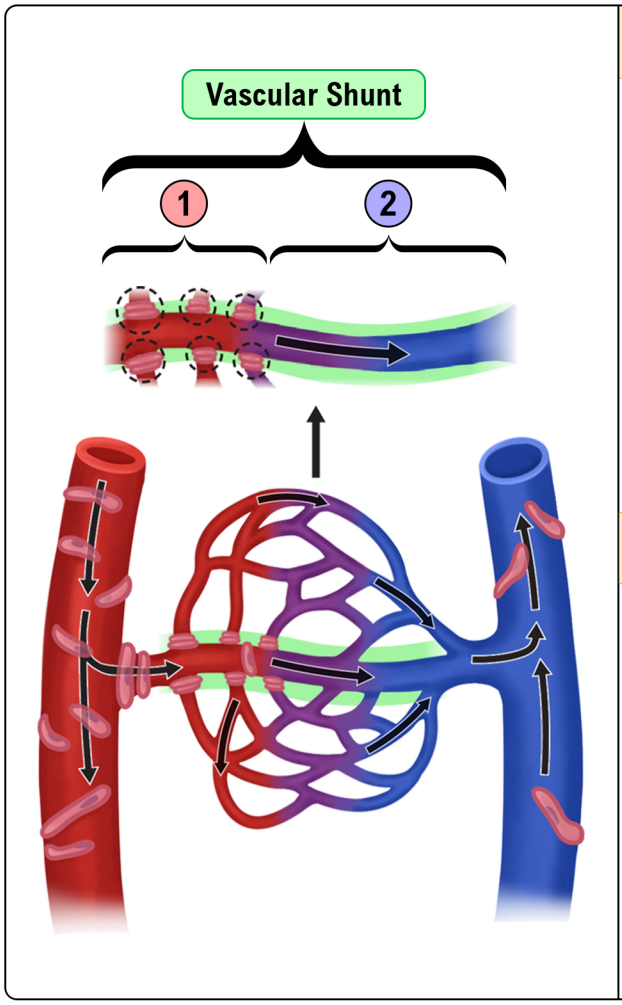
Structure of Mesenteric Capillary Beds

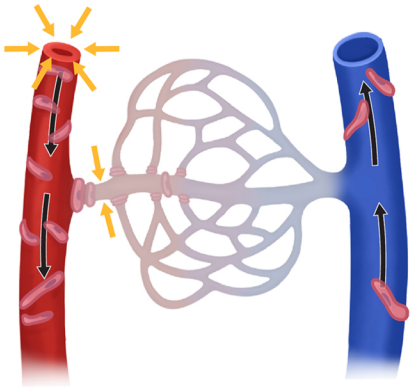
◆ _____ (serous membranes of digestive system) have a *specialized* capillary bed structure.

Vascular Shunt

1. **Metarteriole:** transitional blood vessel containing _____*capillary sphincters* on its branches.
   - **Precapillary Sphincters:** smooth muscle rings acting as _____ for blood flow control.
2. **Thoroughfare Channel:** metarteriole continuation _____ smooth muscle.

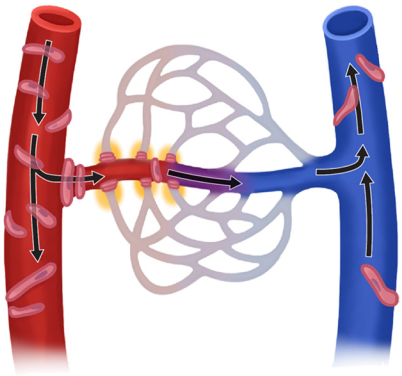


Vasoconstriction of Arteriole & Terminal Arteriole



Blood flow bypasses capillaries & vascular shunt.

Vasoconstriction of Precapillary Sphincters



Blood flows via vascular shunt, only bypassing capillaries.

EXAMPLE

Which scenario results in dilation of arterioles & precapillary sphincters in mesenteric capillary beds?

a) Increased CO_2 concentration in mesenteries.

b) Adequate O_2 concentration in mesenteries.

c) Increased pH level near mesenteries.

d) A greater need for blood elsewhere in the body.

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PRACTICE

Which scenario results in constriction of arterioles & precapillary sphincters in mesenteric capillary beds?

a) Increased metabolic activity in mesenteries.

b) Decreased pH level near mesenteries.

c) Low O_2 concentration in mesenteries.

d) A greater need for blood elsewhere in the body.

PRACTICE

Which structure regulates blood flow distribution in mesenteric capillary beds & diverts blood from one area to another based on local metabolic needs?

a) Precapillary sphincters.

b) Arteriole valves.

c) Capillary gates.

d) Venous pumps.

PRACTICE

Which of the following correctly describes the flow of blood through a mesenteric capillary bed when the precapillary sphincters are constricted?

a) Terminal arteriole > metarteriole > capillaries > thoroughfare channel > postcapillary venule.

b) Terminal arteriole > metarteriole > thoroughfare channel > postcapillary venule.

c) Terminal arteriole > vascular shunt > capillaries > postcapillary venule.

d) Terminal arteriole > thoroughfare channel > metarteriole > postcapillary venule.