Blood and Lymph Vessels

VIBS 443/602
OBJECTIVES

1. LAYERS IN VASCULAR WALLS
2. CLASSIFICATION OF VESSELS
3. VARIATION IN MICROVASCULATURE
4. LYMPHATIC SYSTEM
Introduction

Multicellular Organisms Need 3 Mechanisms

1. Distribute oxygen, nutrients, and hormones

2. Collect waste

3. Transport waste to excretory organs
CARDIOVASCULAR SYSTEM

HEART PRODUCES BLOOD PRESSURE (SYSTOLE)

Vessels are structurally adapted to physical requirements and metabolic needs.
CARDIOVASCULAR SYSTEM

ELASTIC ARTERIES - CONDUCT BLOOD AND MAINTAIN PRESSURE DURING DIASTOLE
CARDIOVASCULAR SYSTEM

MUSCULAR ARTERIES - DISTRIBUTE BLOOD, MAINTAIN PRESSURE

ARTERIOLES - PERIPHERAL RESISTANCE AND DISTRIBUTE BLOOD

CAPILLARIES - EXCHANGE NUTRIENTS AND WASTE

VENULES - COLLECT BLOOD FROM CAPILLARIES (EDEMA)
<table>
<thead>
<tr>
<th>Layer</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunica Intima</td>
<td>Endothelium (Subendothelia ct. Internal Elastic Lamina)</td>
</tr>
<tr>
<td>Tunica Media</td>
<td>Smooth Muscle (Elastic Lamellae, External Elastic Lamina)</td>
</tr>
<tr>
<td>Tunica Adventitia</td>
<td>Connective Tissue (Longitudinal Smooth Muscle, Vasa Vasorum)</td>
</tr>
</tbody>
</table>
Fig. 7-1 Blood and Lymphatic Vessels. Stain: hematoxylin. Medium magnification.
Fig. 7-1  Blood and Lymphatic Vessels. Stain: hematoxylin. Medium magnification.
432 lung
fallopian tube
426 renal
EM 9 of arteriole:

1. Endothelial cell
2. Internal elastic membrane
3. Smooth muscle cell
Note difference in density of smooth muscle cells.
EM 17 of capillary in the lamina propria of the intestine

1. Smooth muscle cell
2. Capillary
3. Endothelial cell
EM 10a: pericyte in vessel wall; 20,000x

1. Lumen
2. Endothelial cell
3. Tight junction
CONTINUOUS

FENESTRATED

SINUSOIDAL
# TYPES OF CAPILLARIES & BASAL LAMINA CHARACTERISTICS

<table>
<thead>
<tr>
<th>CAPILLARIES LOCATIONS</th>
<th>BASAL LAMINA</th>
<th>EXAMPLES OF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTINUOUS</td>
<td>COMPLETE</td>
<td>MUSCLE, TESTIS, BRAIN, THYMUS</td>
</tr>
<tr>
<td>FENESTRATED</td>
<td>COMPLETE</td>
<td>GLOMERULUS, ADRENAL</td>
</tr>
<tr>
<td>DISCONTINUOUS OR SINUSOIDAL</td>
<td>INCOMPLETE OR LACKING</td>
<td>LIVER, SPLEEN, BONE MARROW</td>
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</tbody>
</table>

**Images:***
- MUSCLE
- GLOMERULUS
- LIVER
Tongue, monkey
CONTINUOUS capillaries in muscle
Adrenal-cortex and medulla

FENESTRATED capillaries
Rib bone marrow

SINUSOIDAL capillaries
SINUSOIDAL capillaries
155 Gall bladder & liver, monkey

SINUSOIDAL capillaries
Bile duct with portal vein, monkey
Bile duct with portal vein, monkey
Vein of Spermatic cord
UT196 valves in large vein of spermatic cord
CARDIAC MUSCLE
Opened Interclated disc in cardiac cells of Heart, endocardium
UT196 valve in lymphatic vessel in spermatic cord
Slide 201 Higher magnification of intestinal villus:

1. Lymphatic capillary
2. Blood capillary
3. Endothelial cell
4. Central lacteal
Slide 201  Intestinal villus of duodenum

1. Brush border
2. Central lacteal
lymphatic vessels in spermatic cord
LYMPH VESSELS

FUNCTIONS
RETURN PROTEIN, FLUID, AND BLOOD CELLS
TRANSPORT SECRETIONS (HORMONES, ANTIBODIES)
TRANSPORT FAT (NEUTRAL FAT)
Thoracic duct
Thoracic duct
SUMMARY
CARDIOVASCULAR SYSTEM

Vessels are structurally adapted to physical requirements and metabolic needs.
SUMMARY
CARDIOVASCULAR SYSTEM

Vessels are structurally adapted to physical requirements and metabolic needs.