38a A&P: Lymphatic System and Immunity
# 38a A&P: Lymphatic System and Immunity

## Class Outline

<table>
<thead>
<tr>
<th>Duration</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 minutes</td>
<td>Attendance, Breath of Arrival, and Reminders</td>
</tr>
<tr>
<td>10 minutes</td>
<td>Lecture:</td>
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<tr>
<td>25 minutes</td>
<td>Lecture:</td>
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<tr>
<td>15 minutes</td>
<td>Active study skills:</td>
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<tr>
<td>60 minutes</td>
<td>Total</td>
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</tbody>
</table>
Assignments:
- 41a Review Questions (A: 149-162)
- 43a Swedish: Outside Massages

Quizzes:
- 42a Written Exam Prep Quiz (35a, 36a, 37a, 38a, 39a, 40a, and 41a)
- 42b Kinesiology Quiz
  - adductor magnus, gracilis, iliopsoas, sartorius, TFL, piriformis, quadratus femoris
- 44a Written Exam Prep Quiz (33b, 37b, 41b, 42b, and 43a)

Practical Exam:
- 44b Integration Massage: Practical Exam (60-minute Swedish, Passive Stretches, and BMTs)

Preparation for upcoming classes:
- 39a Pathology: Lymph and Immune System
  - Trail Guide: sartorius and tensor fasciae latae
  - Werner: Chapter 6
  - Packet E: 77-80
  - Packet A-157

- 39b BMTs: Technique Demo and Practice - Supine
  - Packet F: 83-84
Classroom Rules

**Punctuality** - everybody’s time is precious
- Be ready to learn at the start of class; we’ll have you out of here on time
- Tardiness: arriving late, returning late after breaks, leaving during class, leaving early

**The following are not allowed:**
- Bare feet
- Side talking
- Lying down
- Inappropriate clothing
- Food or drink except water
- Phones that are visible in the classroom, bathrooms, or internship

*You will receive one verbal warning, then you’ll have to leave the room.*
**Sartorius**

**Trail Guide, Page 326**

**Sartorius** is the longest muscle in the body.

It travels from the ASIS to the medial knee.

The slender belly of sartorius is entirely superficial, but it is still difficult to palpate.

*Sartor* means *tailor* in Latin.

This refers to the ability of sartorius to bring the thigh and leg into the position a tailor would use when sewing.
Sartorius, page 326

Flex the hip (coxal joint)

Laterally rotate the hip (coxal joint)

Abduct the hip (coxal joint)

Flex the knee (tibiofemoral joint)

Medially rotate the knee (tibiofemoral joint)

Anterior superior iliac spine (ASIS)

Proximal, medial shaft of the tibia at pes anserinus tendon

Anteromedial View
Sartorius, page 326

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Sartorius, page 326

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**I** Proximal, medial shaft of the tibia at pes anserinus tendon

Anteromedial View
Tensor fasciae latae is a small, superficial muscle.

Approximately 3 fingers wide, the TFL is located on the lateral side of the upper thigh.

Tensor means something that stretches.

Fasciae means band or bandage.

Latae means broad.

“Broad band that stretches or adds tension”
Tensor Fasciae Latae, page 324

A Flex the hip (coxal joint)
   Medially rotate the hip (coxal joint)
   Abduct the hip (coxal joint)

O Iliac crest, posterior to the ASIS

I Iliotibial tract

Lateral View
Tensor Fasciae Latae, page 324

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Lateral View
Tensor Fasciae Latae, page 324

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I Iliotibial tract

Lateral View
Iliotibial Tract is a superficial sheet of fascia. Its vertical fibers stretch between the iliac crest and the tibial tubercle. Both TFL and gluteus maximus have insert into the IT tract.
38a A&P: Lymphatic System and Immunity
Packet E-73
Anatomy

Lymph
Lymph vessels
Lymph glands, such as the thymus.
Lymphatic organs, such as the spleen.
Lymph nodes
Lymphocytes
Physiology

Transportation
Immune response
Maintain homeostasis
The process of transporting dietary proteins, lipids, and lipid-soluble vitamins such as A, D, E, and K from the digestive tract to the blood.
Physiology

**Immune response**  The process of active immune defense.
Physiology

Maintains homeostasis  The process of collecting accumulated __tissue__ fluid and returning it to blood circulation. This maintains blood volume, blood pressure, and prevents edema (swelling).
Lymph

Lymph  Liquid connective tissue that is part of the lymphatic system. Nearly colorless fluid. Chemically it is very similar to blood plasma. Contains white blood cells, proteins, and fats.
Lymph Vessels

Lymph capillary
Lymph vessel
Lymphatic trunk
Lymphatic duct

Fig. 27-2. Flow of lymph.
Lymph capillary  Tiny, open-ended channel located in tissue space throughout most of the body.
Lymph Vessels

**Lymph vessel** Larger vessels than a lymph capillary. Has _thinner_ walls and more _valves_ than veins. Has lymph nodes situated along them.
Lymph Vessels

**Lymphatic trunk**  Made up of large vessels into which lymph is drained from the lymph vessels.
Lymph Vessels

**Lymphatic duct** The joining of lymphatic trunks. Examples:

- Right lymphatic duct drains the right side of the head, right arm, and right torso (in green)

- Thoracic duct drains the rest of the body.
Lymph Vessels

- Right lymphatic duct
- Thymus gland
- Axillary lymph node
- Peyer's patches in intestinal wall
- Thoracic duct
- Spleen
- Red lymph nodes
Lymphatic Structures

Red bone marrow
Lymphocyte
Thymus
Spleen
Lymph node
Mucosa-associated lymphoid tissue
Lymphatic Structures

**Red bone marrow**  Blood forming cells found in flat and long bones. Produce red blood cells, platelets, and white blood cells (specifically lymphocytes called B cells).
Lymphatic Structures

**Lymphocyte**  Type of white blood cell. Examples: B cell, T cell, macrophage
Lymphatic Structures

**Thymus**  Bi-lobed gland posterior to the *sternum*. Secretes thymosin and thymopoietin, which stimulate the production and activation of T cells.
**Lymphatic Structures**

**Spleen**  Largest lymphatic organ. Located within the left lateral rib cage just posterior to the stomach. Stores **lymphocytes**, releasing them during immune responses.
Lymphatic Structures

**Lymph node**  Bean-shaped structures located along lymph vessels. Filters lymph. Houses phagocytes and lymphocytes that destroy pathogens and other foreign substances in the lymph before it returns to the blood.
Lymph Flow

Lymphatic drainage
Lymphatic pump
Lymph Flow

Lymphatic drainage  The **movement** of lymph.
Lymphatic pump  The mechanism of lymphatic drainage that uses pressure gradients from external sources exerted on its vessel walls to move lymph.

Examples:
- Skeletal muscle contractions against vessel walls
- Pressure changes in the thorax and abdomen during __breathing__.
- Pulling of the skin and fascia during __movement__.
- Contraction of smooth muscle in the walls of lymphatic vessels
- Rhythmic pumping of __walking__ and grasping.
Lymph Flow
Immunity

Non-specific immunity
  Infection
  Inflammation

Specific immunity
  T cells
  B cells
Immunity

Immunity  Reaction that involves **all** body systems as they join together to destroy and eliminate pathogens, foreign substances, or toxic materials.
Immunity

Non-specific immunity (AKA: innate immunity)  Non-specific response to invading pathogens. Includes intact skin and mucous membranes, saliva, gastric juices, vomiting, urine flow, certain white blood cells, fever, and inflammation.
Immunity

Specific immunity (AKA: adaptive immunity) Body’s response to invaders. T cells and B cells become activated for a specific pathogen after they come into contact with it and then destroy it.
Immunity

**T cells**  Lymphocytes that begin as **B** cells that migrate from bone marrow to the thymus where they fully mature. They recognize pathogens and respond by releasing inflammatory and toxic substances.
Immunity

**B cells**  Lymphocytes that grow and mature in the bone marrow. Produce **antibodies** which circulate in body fluids such as blood and lymph. Their antibodies inactivate pathogens as they come across them.
38a Lymphatic System and Immunity