



UNSW MEDICINE


MFAC1527: Society and Health

Student Practical Manual 2018

## Contents

Preparation & Behaviour in Practical Classes .....	3
Online Practical Activities.....	3
Participating in Anatomy laboratory classes.....	3
Attendance Requirements .....	4
Schedule .....	5
Practical 1: Lymphoid Tissue & Organs .....	8
Practical 2: Pharmacokinetics.....	14
Practical 3: Anatomy: Upper Respiratory Tract.....	19
Practical 4: Physiology: Spirometry and respiratory mechanics .....	21
Practical 5: Transmission of infection.....	34
Practical 6: Immunology Practical .....	38
Practical 7: Research Skills 1: Introduction to Research Methods Prac .....	50
Practical 8: Anatomy: Lower respiratory tract .....	51
Practical 9: Immunity and Opportunistic Infection .....	53
Practical 10: Public Health and Health Services management of an outbreak .....	59
Practical 11: Musculoskeletal Anatomy of the Chest Wall.....	61
Practical 12: Viruses and epidemics .....	63
Practical 13: Physiology: Respiratory Gas Exchange .....	71
Practical 14: Research Skills 2: Basic Analysis of Data Prac Part 1.....	83
Practical 15: The respiratory tract: normal and inflamed .....	84
Practical 16: Research Skills 3: Basic Analysis of data Prac Part 2.....	87
Practical 17: Chronic Inflammation and Tuberculosis.....	88
Practical 18: Physiology: Control of Respiration .....	92
Practical 19: Pathophysiology of asthma .....	97

## Preparation & Behaviour in Practical Classes

- You are required to familiarise yourselves with the appropriate section of the practical manual before attending each class.
- In the interests of your safety, special attention should be paid to any precautionary measures recommended in the notes. If any accidents or incidents occur, they should be reported immediately to the demonstrator in charge of the class who will record the incident and recommend what further action is required.
- You must take due care with biological and hazardous material and make sure all equipment is left clean and functional.
- No eating, drinking or smoking is permitted in the teaching laboratories.
- A white laboratory coat **must** be worn to those practical classes identified by the lab coat icon  in the science practical schedule. Lab coats must be removed upon leaving the laboratory class.
- Enclosed shoes must be worn to **ALL** classes.
- You are expected to be punctual. Those who arrive more than 10 minutes late may not be admitted to the class.

## Online Practical Activities



Some pracs have related online activities required for preparation before the prac or for completion following the prac, such as quizzes, revision exercise etc. Students are required to complete these as directed in the instructions for relevant practicals.

## Participating in Anatomy laboratory classes

### General lab rules

The use of mobile phones is strictly forbidden in the GAL unless you are acting under the direction of an Academic Staff member. You are not to use your phone, take pictures with your mobile, or use any camera equipment within the GAL. Photography of any of the teaching materials in GAL is forbidden. These materials include the cadaveric specimens, bones and the anatomical models (which are copyright protected). Infringements of this rule are taken very seriously and will be treated as academic misconduct. You will be reported to the Head and Deputy Heads of School immediately. There are no exceptions. This rule is constantly monitored by the Laboratory staff, Academic Staff and Tutors.

Food and drink are absolutely forbidden in the GAL. This includes water and chewing gum.

You should place any rubbish into the appropriate waste receptacle. This applies to both the dissecting room and histology teaching laboratories. If rubbish is left in the histology teaching laboratories, those labs may be closed to revision.

### Personal Protective Equipment

Students of the GAL must wear a lab coat at all times. You will not be permitted to attend your laboratory class without a lab coat and will be asked to leave the GAL. If you do not bring your lab coat you can purchase one from the ground floor MESO office for \$3. You must put your lab coat on when you are inside the GAL. You must remove your lab coat before you leave the GAL.

Enclosed footwear must be worn at all times within the GAL. Footwear must fully enclose your foot including the dorsum and heel of the foot. You will not be permitted to attend your laboratory class without the appropriate footwear.

Gloves should always be worn when handling the specimens in the dissecting room. Gloves are located in every cubicle in the glove dispensers. They must be used to handle cadaveric material. Every person using the GAL

must wash their hands thoroughly before exiting the premises. Hands should be dried on the paper hand towels and disposed of in the biological waste bins provided.

### Handling of specimens

Students must conduct themselves in an appropriate manner within the GAL. Donors who give their bodies to UNSW provide us with an invaluable resource that must be respected. Technical staff spend many hours preparing prosections, so failure to treat prosections carefully is also disrespectful to them. The handling of all cadaveric dissections must be done with the utmost care and respect.

Proper care should be taken when handling specimens. The appropriate probes should be used when demonstrating. Please do not grip delicate tissue with serrated forceps. All gross specimens should be covered with a damp towel at the end of the class. Each specimen represents an enormous investment of staff time and money and must be treated with care. Nerves and small vessels are particularly prone to damage by desiccation.

Do not move specimens from the table on which they were placed for your inspection. If an organ or tissue becomes separated from its original prosection, please report this immediately to the demonstrators or lab staff. This is very important as the GAL is legally obliged to track and keep accurate record of the location of all specimens.

Any accidents or incidents in the GAL must be reported to a staff member because treatment may be required and an incident report must be completed.

**NB: Those who do not adhere to these basic laboratory rules will be excluded from the class and marked absent.**

## Attendance Requirements













































- Given the considerable time, effort and cost involved in the design, preparation and delivery of practical classes, **attendance is expected at all practical classes/demonstrations by all students.**
- A roll will be marked in some classes.
- You are also expected to attend **ONLY** the class to which you have been rostered. Teachers can and will exclude from a class any student who is not rostered to attend, unless they have **written approval from the principal teacher** to be there.

Please do NOT email the course convenors about changes to practical times. Such emails will not be responded to.

**Check eMed Timetable for scheduled dates times and locations of the Practicals for your group**

**NOTE: The schedule is subject to change. Please check your email and the eMed Timetable system to confirm times and locations before each lab class.**

## Schedule

	Practical	Principal Teacher
	1. Lymphoid Tissue & Organs	Dr. Mark Hill
 	2. Pharmacokinetics	Dr. Trudie Binder & Dr. Ross Grant
   	3. Anatomy: Upper respiratory tract*	Prof. Ken Ashwell
  	4. Physiology: Spirometry and respiratory mechanics*	Dr. Richard Vickery, Dr. Karen Gibson
   	5. Transmission of infection*	Dr Li Zhang
 	6. Immunology Practical	A/Prof. Bill Sewell
 	7. Research Skills 1: Introduction to Research Methods Prac	Dr. Rachel Thompson
   	8. Anatomy: Lower respiratory tract*	Prof. Ken Ashwell
  	9. Immunity and opportunistic infection*	Dr Li Zhang
 	10. Public Health and Health Services management of an outbreak*	Prof. Mary-Louise McLaws
  	11. Musculoskeletal Anatomy of the Chest Wall*	Prof. Ken Ashwell
  	12. Viruses and epidemics*	Prof. Hazel Mitchell
  	13. Physiology: Respiratory Gas Exchange*	Dr. Lesley Ulman
	14. Research Skills 2: Basic analysis of data Prac Part 1	Dr. Rachel Thompson
	15. The respiratory tract: normal and inflamed	Patrick De Permentier & Prof. Gary Velan
 	16. Research Skills 3: Basic Analysis of data Prac Part 2	Dr. Rachel Thompson
	17. Chronic Inflammation and Tuberculosis	Prof. Gary Velan
 	18. Physiology: Control of Respiration*	Dr. Lesley Ulman
	19. Pathophysiology of asthma	Prof. Gary Velan



ENCLOSED SHOES MUST BE WORN TO ALL CLASSES.



denotes those classes in which laboratory coats must be worn.



denotes those classes in which gloves must be worn.



denotes those classes in which safety glasses must be worn.



There is an online activity (e.g. pre-lab or post-lab activity, revision tutorial, quiz, etc.) associated with these prac classes.

Medicine Teaching Laboratory  
Student Risk Management Form



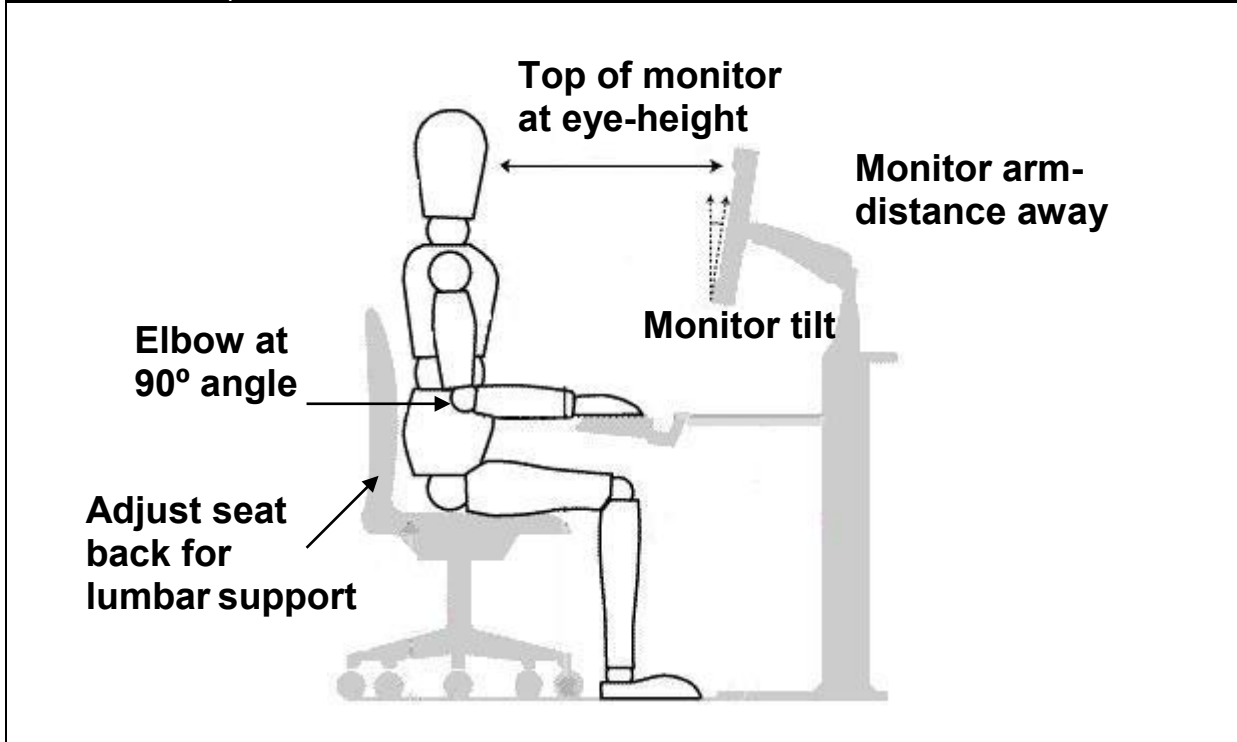
UNSW  
SYDNEY

Medicine

Phase 1 Medicine  
All Computer Labs in  
Wallace Wurth  
Society & Health, 2018

Hazards	Risks	Controls
Ergonomics	Musculoskeletal pain.	Correct workstation set-up.
Electrical	Electrical shock/fire	Check electrical equipment in good condition before use. All portable electrical equipment tested and tagged.

#### Workstation set-up



#### Personal Protective Equipment

Not necessary in these practicals.

#### Emergency Procedures

In the event of an alarm, follow the instructions of the demonstrator. The initial sound is advising you to prepare for evacuation and during this time start packing up your things. The second sound gives instruction to leave. The Wallace Wurth assembly point is in the lawn in front of the Chancellery. In the event of an injury inform the demonstrator. First aiders and contact details are on display by the lifts. There is a first aid kit in the laboratory and the Wallace Wurth security office.

#### Clean up and waste disposal

No apparatus used in these practicals.

#### Declaration

I have read and understand the safety requirements for this practical class and I will observe these requirements.

Signature:

Date:

Student Number: ..

This form covers Practicals 1, 2, 6, 7, 10, 14, 15, 16, 17, & 19.



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Medicine

Medicine Teaching Laboratory  
Student Risk Management  
Form



UNSW  
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Medicine

Gross Anatomy Practical  
Classes for Medical and  
Science Students  
DOC:PHSL-SRA-S&H-01rev1.18

Hazards	Risks	Controls
<p>Physical Cold temperature (16°C) Sharp bone/plastic</p> <p>Biological Fungi, bacteria (tetanus), hepatitis B and C</p> <p>Chemical Formaldehyde Methanol 2-phenoxyethanol</p>	<p>Cold Penetrating wound of foot</p> <p>Infection</p> <p>Corrosive/Flammable Irritant/toxic Irritant</p>	<ul style="list-style-type: none"> <li>Wear laboratory coat over appropriate clothing</li> <li>Wear enclosed shoes with full coverage of the dorsum and heel of the foot</li> <li>Have appropriate immunisation</li> <li>Do not eat, drink or smoke in the Gross Anatomy Lab</li> <li>Do not place anything (e.g. pens, pencils) into your mouth</li> <li>Use disposable gloves when handling wet specimens and do not cross-contaminate models or bones with wet specimens</li> <li>Always wash hands with liquid soap and dry thoroughly with the disposable paper towel before leaving</li> <li>Low concentrations of chemicals used</li> <li>Chemicals used in well ventilated area</li> <li>Safety Data Sheets for chemicals available in the Gross Anatomy Lab</li> </ul>

Personal Protective Equipment required

 Closed in Footwear	 Lab. Coat	 Gloves	
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Emergency Procedures

In the event of an alarm sounding, stop the practical class and wait for confirmation to evacuate from demonstrators/laboratory staff. Then wash your hands and follow the instructions of the demonstrators and laboratory staff regarding exits and assembly points.

Clean up and waste disposal

- Place all specimens in their original trays. Cover wet specimens with the towels provided. Make sure that towels do not hang over the edge of the table, because this allows fluid to drip onto the floor. Fluids on the floor are a major safety hazard and should be reported to staff.
- Replace stools under the tables in the Gross Anatomy Lab.
- Remove your gloves and dispose in the biowaste bins provided.
- Wash your hands and instruments thoroughly with the soap provided and dry your hands with the paper towel.
- Remove your laboratory coat when you leave the Gross Anatomy Lab.

Ethics Approval

This type of practical has been previously considered and approved by the UNSW Human Research Ethics Advisory Panel (**HREC09372**).

Declaration

I have read and understand the safety requirements for this practical class and I will observe these requirements.

Signature:

Date:

Student Number: ..

ANATb-SRAb-Med&SciStudent relates to RAb-MEDb-06. Date for review: 01/06/2018

This form covers Practicals 3, 8 & 11



UNSW  
SYDNEY

Medicine

## Practical 1: Lymphoid Tissue & Organs

**Principal Teacher: Dr Mark Hill**

### Objectives

1. Understand the major cell types of blood as they appear in blood smears.
2. Understand the histology and organization of lymphoid organs (thymus, spleen, lymph nodes).
3. Understand the histology and organization of lymphoid tissue, particularly that associated with the gastrointestinal tract.

### Resources

#### Virtual Slides

Moodle Virtual Slides module: <http://moodle.telt.unsw.edu.au/mod/book/view.php?id=828270>

Student Self-enrolment Key: **VSlides**

#### UNSW Embryology

[http://tiny.cc/SH-Lymphatic\\_Practical](http://tiny.cc/SH-Lymphatic_Practical)

[http://tiny.cc/SH-Lymphatic\\_Lecture](http://tiny.cc/SH-Lymphatic_Lecture)

#### Textbook

Kierszenbaum, A.L. and Tres, L.L. (2012). *Histology and Cell Biology: an introduction to pathology*. (3rd ed.). St. Louis, Mo.; London: Mosby. [Electronic access via UNSW Library]

Part I: Basic Tissues and Integrated Cell Biology Chapter 6. Blood and Hematopoiesis

<http://tiny.cc/Kierszenbaum-Ch6-Blood>

Part II: Organ Systems: Protection of the Body - Chapter 10 on Immune – Lymphatic System

<http://tiny.cc/Kierszenbaum-Ch10-Immune>

Hill, M.A. (2018, February 14) Embryology SH Lecture - Lymphatic Structure and Organs. Retrieved from [http://tiny.cc/SH-Lymphatic\\_Lecture](http://tiny.cc/SH-Lymphatic_Lecture)

### Introduction

This practical class has 2 main parts. The first part will briefly revise the cellular components of blood and their development. The second part will look in more detail at the organs and tissues associated with lymphoid (lymphatic) immune function. The Practical involves studying Virtual Slide Box slides displayed in Slice (Best Network). Additional online self-directed learning resources are available from UNSW Embryology page (address above) including external resource and [glossary](#) links. Blood cells have been covered previously, and you should revise your understanding before the class, do not spend too much time on this topic in this current class. Notes slide thumbnails below link directly to the appropriate virtual slide.

### Blood

The circulating blood is a liquid connective tissue consisting of cells (red and white blood cells), fragments of cells (platelets) and liquid (plasma). The different cell types are all derived from haemopoietic stem cells located in the bone marrow. Red blood cells (RBCs) have a metabolic role, in carrying oxygen to tissues and carbon dioxide to the lungs. White blood cells (WBCs or leukocytes) have a role in the body's defence, and are an important clinical indicator of disease.

#### Virtual Slide Box: 1. Human Blood Smear



Find an area in the smear where the red blood cells are spread out and individual cells can be identified.

Identify: Red blood cells (7-8 um diameter anucleate biconcave disc)

White blood cells: neutrophils, eosinophils, basophils, lymphocytes and monocytes.



(basophils are normally rare). Note the presence or absence of granules, shape of the nucleus and relative cell sizes. Also identify platelets.

**Virtual Slide Box: 2. Bone Marrow Smear**



Do not attempt to identify all the cells in the bone marrow smear, but compare its appearance with that of the blood smear.

Hematopoiesis is the process of blood cell differentiation and occurs mainly in the bone marrow. This bone marrow smear will contain a large number of differentiating blood cells: band cells and normoblasts. The largest cells visible are megakaryocytes, which are responsible for platelet production.

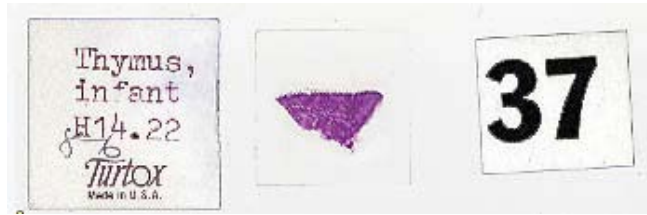
Lymphocyte differentiation begins in the bone marrow and continues in central lymphoid organs (bone marrow - B cells and thymus - T cells), then in the peripheral secondary lymphoid organs (lymph nodes, spleen).

**Questions**

1. What is the normal blood haematocrit range?
2. Does this haematocrit differ for male/female?
3. What are the functions of the various blood cells?
4. Which tissues have very large numbers of white blood cells and why?
5. In histology tissue sections which vessel (artery/vein/lymph) is more likely to contain blood cells?

**Lymphoid Tissue**

Lymphoid (or lymphatic) tissues consist of dense accumulations of lymphocytes in many different body regions, typically at sites that provide a route of entry of pathogens or sites that are prone to infections. Depending on their precise location these lymphoid tissues may be epithelia associated and referred to as mucosa-associated lymphoid tissue (MALT) in gut (GALT) or bronchus-associated lymphoid tissue (BALT). The gastrointestinal tract tonsils and Peyer's patches are large examples of mucosa-associated lymphoid tissues.

**Virtual Slide Box: 3. Infant Thymus**

Section of a thymus lobe of an infant.

The thymus changes its histological appearance from infant to puberty to adult, in a process called involution (replacement of cortical lymphoid tissue by adipose tissue) and there is also an increase in the size of thymic corpuscles.

At low magnification: note the surrounding connective tissue capsule along the surface. The thymus is divided into many smaller lobules by connective tissue septa extending inward from the capsule. These lobules have a cortex (dark staining) and a medulla (pale staining). The interlobular septa do not penetrate into the medulla, and lobules are joined together in the medulla. Some septa may carry blood vessels and efferent lymphatic vessels.

At high magnification: **Cortex** has a dense layer of closely packed cells (developing and maturing T lymphocytes, thymocytes). **Medulla** consist of an eosinophilic central mass surrounded by concentrically arranged epithelial cells (Hassall's corpuscles). Do not confuse them with blood vessels.

Compare the appearance of the infant with the adult thymus (below).

**Virtual Slide Box: 4. Adult Thymus****Virtual Slide Box: 5. Spleen**

The spleen in fetal life is a site for blood formation (hematopoiesis). The adult spleen has 2 main functions: immune, as a major site of antigen presentation for the circulation system and removal of aged erythrocytes from the circulation. The spleen has a dense connective tissue capsule, which contains trabeculae running into the interior of the spleen forming incomplete compartments (as in the thymus). The stroma is mainly composed of reticular connective tissue and cells. There is a Hilum, which contains arteries and veins, but unlike a lymph node, there are no lymphatics. Note that the spleen cannot be divided into a medulla and cortex, which helps differentiate it from the thymus or a lymph node.

The spleen is a major site of antigen presentation for the circulation system, and in fetal life, it is a site for hematopoiesis. It also functions in removing senescent erythrocytes from the circulation. The spleen is surrounded by a dense connective tissue capsule, which contains trabeculae running into the interior of the

spleen forming incomplete compartments. The stroma is mainly composed of reticular connective tissue and cells. There is a Hilum, which contains arteries and veins, but unlike a lymph node, there are no lymphatics. It should also be noted that the spleen cannot be divided into a medulla and cortex, which helps differentiate it from the thymus or a lymph node.

Identify connective tissue capsule, trabeculae, white pulp, red pulp, lymphatic nodules, and central arterioles.

The two main interior divisions of the spleen are white and red pulp. White pulp consists of a sheath of lymphoid cells surrounding an eccentrically located central arteriole. The T lymphocytes immediately surrounding the central arteriole are referred to as periarterial lymphatic sheaths (PALS). Surrounding that is a layer of peripheral white pulp (PWP), which is composed of B lymphocytes. Antigen enters the white pulp from the central arteriole, activates the PALS, which then activates the PWP. The marginal zone on the periphery of the white pulp is believed to be an important area for trapping antigens and initiation of immune responses. Both lymphocytes and macrophages are present in the marginal zone.

The red pulp consists of splenic cords of Billroth and splenic sinusoids. The splenic cords of Billroth contain reticular cells, macrophages, lymphocytes, plasma cells, and erythrocytes. The splenic sinusoids are modified capillaries with an exceptionally wide lumen and spaces in the wall to allow cells to squeeze in and out. Macrophages are also able to extend processes into the sinusoid, allowing them to identify senescent red blood cells.

Blood enters the spleen via the splenic artery at the hilum. The blood then travels through the trabecular arteries, central arterioles, penicillar arterioles, capillaries, splenic sinusoids, trabecular veins, and finally out the splenic vein at the hilum.

**Virtual Slide Box: 5. Spleen**



(monkey silver stain)

Spleen silver-stained to show connective tissue reticular fibers (black), compare this with the silver-stained lymph node.

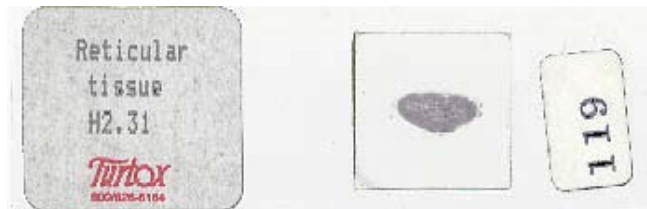
**Virtual Slide Box: 6. Lymph Node**



Lymph nodes are peripheral lymphoid organs involved in helping the body defend against foreign organisms. Lymph, which contains antigen and antigen presenting cells, flows from local tissue lymphatic vessels and enters the subcapsular sinus. The lymph then filters through the intermediate sinuses, into the medullary sinuses, and finally out the efferent lymphatic vessels at the hilum before it is returned to the circulation. B and T cells are numerous in the lymph node, and they enter through afferent arteries, enter the lymphoid tissue across specialized vessels called high-endothelial venules, and return to the circulation via efferent veins.

Identify the following features: the connective tissue capsule, the trabeculae, the subcapsular sinus (lying immediately below the capsule), the intermediate sinus (lying next to a trabecula), outer cortex (composed of lymphatic nodules/follicles), the inner cortex (non-nodular area between outer cortex and medulla) and the medulla (with medullary cords and medullary sinuses).

**Virtual Slide Box: 7. Lymph Node (silver stain)**



Lymph node silver stained to show connective tissue reticular fibers (black).

Identify reticular fiber distribution in: capsule, trabeculae, subcapsular sinuses, intermediate sinuses, lymphoid nodules, the inner cortex, and the medulla.

**Virtual Slide Box: 8. Lingual tonsil (tongue)**



The lingual tonsils are numerous small tonsils located at the base of the tongue. They are covered by a stratified squamous epithelium, but are not enclosed by a capsule. Salivary glands and skeletal muscle are directly adjacent to the tonsil.

**Virtual Slide Box: 9. Pharyngeal tonsil**



Closely packed lymph nodules comprise the outer portion of this organ. The pharyngeal tonsil is covered with a pseudostratified columnar epithelium with cilia (typical of respiratory tract). Note the easiest way to identify histologically the location of a specific tonsil is by its overlying epithelium.

**Virtual Slide Box: 10. Appendix**



Within the gastrointestinal tract wall along its length, extending into the small and large intestine, are a number of immune specialisations that through lymph vessels drain into mesenteric lymph nodes. One anatomical structure is the appendix (vermiform appendix) that forms a finger-like structure arises from the cecum. The length (2.5-13 cm) is longer in both infants and children and also has more abundant lymphatic tissue in early life. The wall structure is similar to the small intestine (though with no villi), nor plicae circularis.

Lymph nodules surround the lumen of the gastrointestinal tract and extend from the mucosa into the submucosa. Note in this section most of the muscularis mucosa has been obliterated by lymphatic invasion.

### Questions

1. What is the difference between stroma and parenchyma?
2. Which cells make reticular fibers?
3. Why are lymphoid tissues associated with the gastrointestinal tract and respiratory tissues?
4. What are the main differences between diffuse lymphatic tissue and lymph nodes?
5. The thymus lacks which lymph vessels?
6. What are the other functions of the spleen?