A Guide to Learning and Teaching of Pathology in the Medicine Program at the University of NSW

Overview of learning and teaching in Pathology

Pathology is a scientific discipline which involves the study of diseases, such as infections and cancers, at the genetic, molecular, cellular, and organ levels. It is also a medical specialty that focuses on making diagnoses, but contrary to popular belief, it is not all about blood tests!

Pathology examines:

- How and why diseases develop;
- The disease process - what happens to our bodies when we are ill; and
- The effects of diseases, including their symptoms and complications.

Thus, a deep knowledge of Pathology is critical to medical practice.

All academic staff of the Department of Pathology at UNSW are passionate about ensuring that you graduate with the necessary knowledge, skills and attitudes to become competent medical practitioners. For that reason, we are involved in curriculum design, teaching and assessment at all levels of the Medicine program, from the very first course in Phase 1 to the last course in Phase 3. You are expected to develop an understanding of Pathology over the course of the Medicine program, and to graduate with the ability to use your knowledge of Pathology and pathological processes in the diagnosis and management of common, classical and critical conditions. We also expect that in the years following graduation, you will continue to use your knowledge of Pathology to develop your skills in whatever branch of Medicine you choose to pursue.

This document sets out in clear terms our expectations (the "what, when, and how") of your learning in Pathology over the six years of the Medicine program. The information contained here should be read in conjunction with material provided in Program and Course Outlines, as well as in the eMed Curriculum Map.

Pathology in Phase 1

Goals and learning styles in Phase 1

Phase 1 will provide a foundation on which to build your understanding of Pathology. Many of your learning experiences will be interactive and independent, but there will also be some formal teaching. By the end of Phase 1, you should achieve the following important milestones:

1. An understanding of the common ways in which cells and tissues respond to injury. These responses occur in fairly consistent patterns, which are often referred to as “pathological processes”. They include inflammation and repair, vascular disorders (thrombosis, embolism and infarction), as well as disorders of growth, including neoplasia. Since these pathological processes form the basis for our current understanding of disease, a clear understanding of each of these processes is central to the practice of medicine.

2. A more detailed understanding of specific disease states that are common, classical or critical examples of pathological processes, and which relate directly to the various scenarios considered in Phase 1. There is no attempt to provide comprehensive coverage of all relevant disease states, just moderately in-depth coverage of representative examples.

Formal learning activities in Phase 1

During Phase 1, three types of formal learning activities will facilitate the development of your knowledge of Pathology:

Lectures are an important way of providing key concepts regarding disease states and processes. The Foundations lecture series is particularly important, since it lays out in simple terms the common pathological processes you will encounter in this and subsequent phases. You may not have fully integrated the material presented in the Foundations series for a year or more, but it is essential that you do so by the end of Phase 1.

Practical classes are also critical to an understanding of pathology. This is because "pathological processes" were first identified, and are currently defined, by changes in the appearance of cells and tissues. Understanding these microscopic changes will strengthen your grasp of the underlying concepts. Practical classes also allow us to explore the clinical manifestations that arise from abnormalities in cells and tissues (clinicopathological correlation), and introduce the role of laboratory investigations as a critical element of the diagnosis and management of disease. Practical classes will be integrated with the study of relevant Histology (the normal appearance of tissues), since disease states can only be appreciated with reference to changes in normal structure and function.

Tutorials will be provided on specific topics that are both important and conceptually challenging. Tutorials will not cover new material but are an opportunity for you to better understand material that has been presented in lectures and practicals. These sessions utilise macroscopic specimens of diseased tissue from the Museum of Human Disease to assist in your understanding of disease processes and clinicopathological correlation.

The following table captures the broad plan for Pathology in Phase 1. Full details of Pathology teaching sessions are available through eMed Map.

	Processes	Key disease entities
Foundations	Introduction to pathological processes Responses of cells to injury Acute inflammation	
BGDA	Healing and Chronic inflammation	Pelvic inflammatory disease
HMA	Thrombosis, Embolism and Infarction	Atherosclerosis Myocardial infarction Cardiac failure
AEB	Cellular degeneration Vascular disease Disorders of growth including neoplasia	Dementia; Parkinson's disease Cerebral infarction and haemorrhage Intracranial space-occupying lesions, Including brain tumours
SH	Acute inflammation, repair, chronic inflammation Neoplasia	Pneumonia; Tuberculosis; Asthma Lung cancer
HMB	Inflammation, necrosis, repair, regeneration	Diabetes mellitus; Hepatitis; Cirrhosis; Acute kidney injury
AEA	Degeneration; Neoplasia including carcinogenesis; Haematological disorders	Arthritis; Metabolic bone disease Breast Cancer; Bowel cancer Lymphadenopathy Anaemia

Resources for independent learning in Phase 1

- *Glossary of terms* – this should assist you to become familiar with the language of Pathology, which is the language of Medicine.
- *Text* – Robbins Basic Pathology (10th Ed) – this provides background information to aid your understanding of pathological processes, morphology and clinicopathological correlation. [Electronic Access via UNSW Library]
- *Museum of Human Disease* – "Specimens of the Week" – these encourage you to utilise the vast learning resources of the Museum of Human Disease to learn about diseases relevant to the current scenario.
- *e-Learning*
    - Images of Disease online – contains digitised images of macroscopic specimens of diseased tissue, correlated with clinical manifestations of disease, as well as microscopic and radiological images. Images of Disease (IOD) is now available as an interactive app and can be downloaded free from the App Store (iPhones and iPads) via https://itunes.apple.com/au/app/images-of-disease/id756150891?ls=1&mt=8; once downloaded, the full version of the IOD app can be unlocked using your zID and zPass.
    - The IOD website (http://iod.med.unsw.edu.au) can also be viewed using standard web browsers on tablet computers and laptop or desktop computers after logging in with your zID and zPass. More information is available from: https://iod.med.unsw.edu.au/SOMS/iod.nsf/Online_Help.pdf.
    - Virtual slides via Slice (BEST Network) – these are digitised images of tissue sections, which can be viewed in a web browser, simulating use of a real microscope. All practical classes use virtual slides. We have created online virtual microscopy adaptive tutorials using some of these slides, to assist in your interpretation of microscopic changes in tissue, and to remediate common misconceptions.
    - Testable online knowledge maps (pathogenesis maps) related to topics covered in several courses. It is intended that these testable maps will help you to connect the underlying mechanisms of disease with resulting clinical manifestations. We have shown that the use of such maps enhances learning.

Assessment in Phase 1

Assessment will largely be through short answer questions and/or objective item (multiple choice) questions in each end of course exam, as well as in the end of Phase theory exam.

We will not test everything, but we will sample your knowledge of Pathology in a manner that can reliably determine if you have acquired the basic knowledge required to progress. There is also a Pathology component in all practical assessments during the Phase, and you must also pass this component to progress. Exams should not be a daunting challenge if you work consistently and diligently, and ensure that you understand fully the key pathological processes you will encounter during Phase 1.

Pathology in Phase 2

Goals and learning styles in Phase 2

Phase 2 presents opportunities to consolidate your understanding of pathological processes acquired during Phase 1, to expand your breadth of knowledge of common diseases, and to develop your skills in the rational use of diagnostic investigations.

Formal learning activities in Phase 2

During Phase 2, there are two types of formal learning activities that will facilitate the development of your knowledge of Pathology. Please be aware that there are also increasing opportunities for you to understand the role of pathology in the diagnosis and management of disease, both in Case Method Tutorials, and in your clinical work within hospital settings.

Lectures (face-to-face and online) provided in Phase 2 will cover a range of common diseases.

Practical classes will be on a smaller scale than those you experience in Phase 1, and will give you a chance to again appreciate the microscopic and macroscopic appearance of common diseases. They will also have a strong clinical focus, with an emphasis on clinicopathological correlation, and on the appropriate use of investigations.

The following table captures the broad plan for pathology in Phase 2.

	Processes	**Key disease entities**
BGD	Neoplasia	Leukaemia, Cervical cancer
Adult Health 1	Acute inflammation	Pneumonia, Appendicitis, Pancreatitis, Infective endocarditis
	Chronic inflammation	Valvular heart disease
	Vascular disease	Myocardial infarction, Pulmonary embolism
Adult Health 2	Chronic inflammation	Arthritis
	Healing and Repair	Fracture healing
Oncology	Neoplasia	Common malignancies, including those of the lung, prostate, oesophagus, stomach, pancreas, thyroid, bladder
	Hyperplasia	Common hyperplastic diseases, including those of the thyroid and prostate
SH	Chronic inflammation	Environmental lung diseases, including chronic obstructive pulmonary disease (COPD) and pulmonary fibrosis
	Neoplasia	Skin neoplasms, including melanoma

Resources for independent learning in Phase 2

As per Phase 1, plus:

- eDiagnostic – an online resource for learning about the rational cost-effective use and interpretation of diagnostic investigations – accessible via the “Quick Links” menu in eMed (login required);
- A suite of online adaptive tutorials relating to common imaging investigations, including Chest X-Rays, CT scans, MRI and molecular imaging – accessible via the Phase 2 Coursework Moodle module.

Assessment in Phase 2

Pathology contributes to an online objective item examination focusing on Biomedical Sciences, Clinical Medicine, Public Health, Quality Medical Practice and Ethics, which is a barrier component of the Phase 2 Integrated Clinical Examination. Hence it is important that you integrate your understanding of Pathology with your clinical learning during this phase.

Pathology in Phase 3

Goals and learning styles in Phase 3

In Phase 3, learning in Pathology will build upon the material dealt with in Phase 1 and Phase 2. Most teaching will be in Biomedical Science tutorials, delivered within the hospital setting by local specialist pathologists, university academics, or other clinicians. Topics that were comprehensively covered in earlier Phases are assumed knowledge in Phase 3 and will not be dealt with in detail again. **Please note that the biomedical sciences correlation viva at the end of 5th Year may include references to knowledge from *all* Phases.**

The Phase 3 program stresses understanding of the Biomedical Sciences in the context of clinical scenarios. The focus is on clinical presentations, and an approach to diagnosis and management in terms of the underlying science. Relevant biomedical science knowledge includes, but is not limited to anatomical structures, the pathophysiological processes that affect those structures, and the effect of pharmacological treatment on those processes.

Formal learning activities in Phase 3

To assist in your development of a sound approach to diagnosis and management based upon knowledge of the biomedical sciences, the Phase 3 program includes a series of teaching sessions which cover many of the important topics for study. Teaching in the biomedical sciences will consist of 24 hospital-based tutorials, as well as a total of 5 theme-based Campus Days and 4 theme-based Medical Imaging Seminars.

Hospital-Based Tutorials

During Year 5 Medicine and Surgery clinical terms, you will be expected to attend 24 x 1.5-hour hospital-based biomedical science tutorials. In the major metropolitan hospitals, tutorials will be led predominantly by conjoint members of academic staff and staff specialists in the Departments of Anatomical Pathology, Clinical Biochemistry, Microbiology and Haematology. Tutorials will be replicated at RCS campuses.

Tutorial Title
Acute dyspnoea and haemoptysis
Anaemia
Anaphylaxis, Allergy and Shock
Back pain and Bone tumours
Bleeding disorders
Breast lumps
Cerebrovascular disease
Chest pain and vascular disease
Chronic cough and dyspnoea
CNS tumours and CNS infections
Diabetes mellitus - complications
Dysphagia and haematemesis
Endocrine disease
Gallbladder and pancreatic disease
Glomerulonephritis and chronic kidney disease
Gynaecological malignancies

Tutorial Title
Haematuria
Hepatitis and chronic liver disease
Inflammatory bowel disease
Leukaemia and myeloproliferative disease
Lymphoma
Multisystem disease and polyarthritis
Opportunistic infections and AIDS
Scrotal masses

The Phase 3 Biomedical Sciences Student Manual contains learning objectives and case protocols associated with each tutorial topic. This information provides a useful guide to the depth of knowledge and understanding that you are expected to achieve. It should also serve to remind you about material covered in earlier Phases that is included within the scope of knowledge expected by the end of 5th Year. This is supplemented by a self-enrolment Moodle module containing 21 self-learning modules.

Campus Days

Biomedical Sciences Campus Days are based on the following themes:

- Obesity and cardiovascular disease
- Infectious diseases
- Acute surgical emergencies and post-surgical care (including fluid replacement, analgesia and fluid balance)
- Head and spinal injury
- Clinical genetics

Learning activities include multidisciplinary case-based seminars, in which Pathology plays a prominent role.

Resources for independent learning in Phase 3

Resource materials for Biomedical Sciences in Phase 3 include:

- A series of 21 self-learning modules contained in the P3 Biomedical Science Modules Moodle course: http://moodle.telt.unsw.edu.au/course/view.php?id=14483 (student enrolment key: P3BMS)
- The "Images of Disease" (IOD) collection: http://iod.med.unsw.edu.au and app for iPhones and iPads - https://apps.apple.com/au/app/images-of-disease/id756150891 (unlock full version with zID and zPass)
- A series of adaptive tutorials and formative assessments on Medical Imaging available via the Phase 3 Moodle module (covering chest X-rays, CT scans, MRI, ultrasound and molecular imaging)
- A series of adaptive tutorials on common Laboratory Investigations (e.g. LFTs, TFTs, FBC, blood film and coagulation studies), and Management Issues (Fluid Management, Pain Management) available via the Biomedical Sciences section of the Phase 3 Moodle module
- eDiagnostic – an online resource for learning about the rational cost-effective use and interpretation of diagnostic investigations – accessible via the "Quick Links" menu in eMed (login required)
- Online learning modules in Clinical Pharmacology made available via the National Prescribing Service (NPS) website: http://learn.nps.org.au
- A series of adaptive tutorials covering Clinical Anatomy available via the Phase 3 Moodle module

- Videos of Anatomy and macroscopic Pathology demonstrations, linked from the Biomedical Sciences component of the Phase 3 Moodle module

A major focus of Biomedical Sciences in Phase 3 is to develop your understanding of the rational use of diagnostic investigations. To this end, we want you to learn how common investigations are performed, through your own study or discussion with your tutors. In addition, you are required to complete a number of educational activities which should give you some insight into the provision of diagnostic services. They include:

- Attendance at four hospital laboratories (e.g. Clinical Biochemistry, Clinical Pharmacology, Haematology, Molecular Genetics, Immunology, Microbiology, Anatomical Pathology) and
- Attendance at four macroscopic Pathology Demonstrations, which comprise of so-called 'cut-up' sessions of surgically resected specimens in the Department of Anatomical Pathology, but which may also include the study of tissues removed at autopsy.

Assessment in Phase 3

All students must pass the Phase 3 Biomedical Sciences Correlation Viva examination prior to graduation. The intention of this barrier examination is to test your understanding of biomedical sciences in the context of clinical scenarios. Assessment of knowledge of material covered in macroscopic pathology demonstrations and laboratory visits will comprise part of the examination. Images of anatomical and pathological specimens, microbiological reports, diagnostic laboratory results and imaging investigations may also be used as a focus of discussion during the *viva voce* examination.

Please note that viva stations will be based on learning activities and/or supporting materials in the Phase 3 Biomedical Sciences curriculum, including:

- Hospital-based tutorials and their associated case protocols in the Phase 3 Biomedical Sciences Student Manual;
- Mandatory attendance at hospital-based diagnostic laboratories and macroscopic Pathology Demonstrations, documented in your Clinical Skills Acquisition booklets;
- eDiagnostic cases;
- eLearning modules in the P3 Biomedical Sciences Modules self-enrolment course in Moodle; and
- Phase 3 Campus Day activities and Medical Imaging Seminars.

Summary of formal teaching activities in Pathology in Medicine

Phase	Lectures	Science Practicals	Tutorials	SGS	Seminars
1	33	20	5	8	
2	11	17			
3			24		2