



THE UNIVERSITY OF
BUCKINGHAM

MEDICAL SCHOOL

MB ChB

Unit Summary: Infection and Immunity

1 *Educational Aims of the Unit*

The unit aims to enable students to make progress towards meeting some of the learning outcomes described in Tomorrow's Doctors (2009) relevant to the Doctor as Scholar and Scientist and the Doctor as a Professional. The specific aims of this unit are to enable the student to gain a basic knowledge and understanding of infection, infective agents and immunology which provides a platform for developing appropriate related skills in clinical practice.

The unit focuses on the basic mechanisms of innate and acquired immunity, and how these translate into immune protection, immunodeficiency, immune damage and autoimmunity will be the immunology targets. It develops a detailed knowledge of a range of infective agents and how their differing properties impinge on epidemiology, pathogenesis, diagnosis, treatment and control of infection encompasses the infection targets. The balance between infection and immunology will be 2:1.

2 *Learning Outcomes From Tomorrow's Doctors (2009)*

Outcomes 1: The Doctor as a Scholar and Scientist.

8. The graduate will be able to apply to medical practice biomedical scientific principles.
 - a) Explain normal human structure and functions.
 - b) Explain the scientific bases for common disease presentations.
 - c) Justify the selection of appropriate investigations for common clinical cases.
 - d) Explain the fundamental principles underlying such investigative techniques.
 - e) Select appropriate forms of management for common diseases, and ways of preventing common diseases, and explain their modes of action and their risks from first principles.
 - f) Demonstrate knowledge of drug actions: therapeutics and pharmacokinetics; drug side effects and interactions, including for multiple treatments, long-term conditions and non-prescribed medication; and also including effects on the population, such as the spread of antibiotic resistance.
 - g) Make accurate observations of clinical phenomena and appropriate critical analysis of clinical data.
12. Apply scientific method and approaches to medical research.
 - a) Critically appraise the results of relevant diagnostic, prognostic and treatment trials and other qualitative and quantitative studies as reported in the medical and scientific literature.
 - b) Formulate simple relevant research questions in biomedical science, psychosocial science or population science, and design appropriate studies or experiments to address the questions.
 - c) Apply findings from the literature to answer questions raised by specific clinical problems.

Outcomes 3: The Doctor as a Professional

20. Behave according to ethical and legal principles.
 - e) Recognise the rights and the equal value of all people and how opportunities for some people may be restricted by others' perceptions.
21. Reflect, learn and teach others.

- b) Establish the foundations for lifelong learning and continuing professional development, including a professional development portfolio containing reflections, achievements and learning needs.
- c) Continually and systematically reflect on practice and, whenever necessary, translate that reflection into action, using improvement techniques and audit appropriately for example, by critically appraising the prescribing of others.
- d) Manage time and prioritise tasks, and work autonomously when necessary and appropriate.
- e) Recognise own personal and professional limits and seek help from colleagues and supervisors when necessary.

3 Teaching and Learning Strategies

Principles will be introduced in formal lectures, and learning will be reinforced in practical classes and facilitator led small-group work immediately afterwards. Student will work in the same teams throughout Phase I to encourage team-working.

Some concepts will be discussed in more detail in tutorials, and Moodle- based tests and coursework will allow for formative assessment. Students will be provided with workbooks describing structured tasks to direct independent learning throughout the unit, and ongoing use of an e-portfolio will nurture and encourage reflective practice.

4 Unit Outline/Syllabus

Session 1: Introduction to the course, infection and microbiology, principles of immunology

Lecture: Outline of the course

What you need to know about bacteria and viruses

Lecture: Principles of innate and adaptive immunity

Lecture: Components of the immune system

Directed learning: Review year 1 infection material. Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 2: Immune recognition and response

Group work: Tutorial covering SAQ

Lecture: Overview of antibodies and complement

Lecture: Antigen processing and recognition

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 3: Cell mediated immunity and soluble mediators

Group work: Tutorial covering SAQ

Lecture: Immune response to intracellular pathogens

Lecture: Immunodeficiency and Infection

Directed learning: Review year 1 infection material. Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 4: How microbes work and how they cause infection

Group work: Tutorial covering SAQ

Lecture: The growth, survival and death of microbes

Lecture: The natural history of infection

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 5: Eukaryotic agents of infection

Group work: Tutorial covering SAQ

Lecture: Eukaryotic microbes

Lecture: Multicellular agents of infection and infestation

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 6: Presentation of infection

Group work: Tutorial covering SAQ

Lecture: Microbial virulence – how do microbes cause infection?

Lecture: The natural history of infection

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

On-line formative assessment.

Session 7: Antimicrobial agents

Group work: Tutorial covering SAQ

Lecture: Antibacterial agents

Lecture: Antiviral agents.

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 8: Model organisms and infections 1

Group work: Tutorial covering SAQ

Lecture: Escherichia coli

Lecture: Anaerobic infections.

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 9: Introduction to clinical immunology

Group work: Tutorial covering SAQ

Lecture: Auto-immune disease and hypersensitivity reactions

Lecture: Principles of immunosuppression and immunomodulation

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes

Session 10: Model organisms and infections 2

Group work: Tutorial covering SAQ

Lecture: Viral respiratory tract infections

Lecture: Herpesvirus infections

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 11: The control of infection

Group work: Tutorial covering SAQ

Lecture: Immunisation – principles and practice

Lecture: Control of infection

Directed learning: Prepare answers to next session EMMCQs and SAQ and review learning outcomes.

Session 12: Review

Lecture: Diagnosis of infection.

Review discussion Immunology

Review discussion Infection

5 Secondary Learning Outcomes

In addition to meeting the outcomes described in Tomorrow's Doctors, at the completion of the unit students will be able to:

- Pronounce and recognise the names of key pathogens affecting humans and describe the range of infective agents affecting humans. (Knowledge should be sufficient to enable rapid assimilation of clinically relevant points concerning any infective agent and illustrate basic principles of clinical infection by reference to specific examples).
- Outline the major distinctive patterns by which host-microbe interactions lead to clinical disease and give a few examples of the underlying mechanisms.
- Identify key anti-bacterial, anti-viral and anti-fungal agents and briefly indicate their main clinical uses and selected examples of their adverse effects.
- Outline the basic rationale for choice of antimicrobial agents in the treatment of urinary tract infections*, lower respiratory tract infections* and meningitis.
- Outline the principles of the epidemiology of infective diseases and contrast infections acquired in different settings (e.g. community, hospital, travel).
- Explain the importance of hospital acquired infection and how this may be reduced to a minimum.
- Outline the basic approaches to immunisation and their practical application.
- Compare and contrast the characteristics of innate and acquired (adaptive) immunity.
- Evaluate the characteristics and functions of the cells and tissues of the immune system.
- Outline the maturation of B cells and their response to antigenic stimulation, and describe the structure and function of antibodies and their role in the elimination of extracellular pathogens.
- Outline the role of T cells in immunity, contrast how T cells and B cells recognise antigens, and discuss the consequences of T cell stimulation.
- Describe the clinical features and mechanisms of immunodeficiency disease.
- Outline the features of autoimmunity and autoimmune diseases, and the mechanisms whereby immunological reactions can produce tissue injury.

6 Key Texts and/or Other Learning Materials

- *Lippincott's Illustrated Reviews: Microbiology*. (Third Edition 2013), Harvey, RA, Cornelissen, CN, Fisher, BD.
- *Medical microbiology and infection at a glance* – Stephen Gillespie and Kathleen Bamford
- *Medical microbiology – a guide to microbial infections* – David Greenwood, Richard Slack, John Peutherer and Mike Barer
- *The viral storm* – Nathan Wolfe

Principles and practice of infectious diseases – Gerald Mandell, John Bennett, Raphael Dolin

Document Version Information

Document Title: Unit Summary: Infection and Immunity

Originator:

Date:

Replacing Document:

Approved:

Date: