



THE UNIVERSITY OF
BUCKINGHAM

MEDICAL SCHOOL

MB ChB

Unit Summary: Urinary System

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 a Scholar and Scientist' and 'The Doctor as a Professional'. The specific aims of this third term unit are that students should have sufficient knowledge of the macroscopic and microscopic structure of the urinary tract to understand normal function and common clinical abnormalities. Secondly, students should appreciate the role of the kidney in controlling the volume and composition of body fluid and the way in which they respond to departures from normal parameters of volume, electrolyte concentration and systemic haemodynamics. Thirdly, they should understand as much detail of renal cellular function as will allow them to appreciate the basis of relevant therapeutics, and fourthly, they should be able to describe normal micturition, the reasons for oliguria, and such common conditions as glomerulonephritis, pyelonephritis, urinary tract infection, haematuria, proteinuria and acute and chronic renal failure.

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.
 - 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. The graduate will be able to behave according to ethical and legal principles. The graduate will be able to:
 - 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 on-going use of an e-portfolio will nurture and encourage reflective practice.

4 Unit Outline/Syllabus

Session 1: Introduction to the urinary tract

Lecture: Introduction to urinary system

Lecture: Imaging of the Urinary Tract

Group Work: Structure of the Urinary System

Self-directed Learning: Anatomy of the Urinary System

Session 2: Development of the urinary system

Lecture: Development of the urinary system

Group Work: Development Problems

Lecture: Structure/Function

Self-directed learning: Histology of the Nephron

Session 3: Filtration

Lecture: Filtration

Group Work: Filtration Problems

Lecture: Glycosuria

Self-directed learning: Formative Assessment

Session 4: Renal control of plasma volume

Lecture: Volume control

Group Work: Volume Problems

Lecture: Control of blood pressure

Self-directed learning: Renal control of blood pressure

Session 5: Renal control of Osmolarity

Lecture: Osmolarity Control

Group Work: Osmolarity problems

Lecture: Calcium and stone formation

Self-directed learning: Calcium & stones

Session 6: Acid and base balance

Lecture: Acid Base balance

Group Work: Acid Base Problems

Lecture: Control of Plasma Potassium

Self-directed learning: Changes in plasma potassium/ formative assessment

Session 7: Urinary tract infections

Lecture: UTI

Group Work: UTI Problems

Lecture: Diuretics

Self-directed learning: Diuretics

Session 8: Micturition

Lecture: Control of Micturition

Group Work: Control of Micturition Problems

Lecture: Urinary Incontinence

Self-directed learning: Incontinence

Session 9: Acute Kidney injury

Lecture: Acute kidney injury

Group Work: AKI Problems

Lecture: Clinical Presentation of Kidney disease

Self-directed learning: Glomerular disease

Session 10: Pathology

Lecture: Pathology of the system

Group Work: Anatomy and histology of the urinary tract

Lecture: Malignancy of the Urinary tract

Self-directed learning: Pathology

Session 11: Chronic Kidney disease

Lecture: Chronic kidney disease (CKD)

Group Work: CKD Problems

Lecture: Renal support

Self-directed learning: formative assessment

Session 12: REVISION WEEK

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:

- Describe the structure and relations of the kidney, ureters, bladder and urethra in the male and female, and the ways in which these structures may be imaged and examined.
- Describe the fluid compartments of the body, their electrolyte composition, and state the normal concentrations of major electrolytes in extracellular fluid, blood and urine.
- Describe the histological structure of the kidney, and identify the component parts of the nephron.
- Describe the structure of the glomerulus and the process of glomerular ultrafiltration.
- Describe how the kidney is able to elaborate urine that is more concentrated or more dilute than plasma.
- Describe renal responses to extracellular fluid volume depletion and other common alterations in systemic haemodynamics.
- Describe the mechanisms controlling sodium and potassium balance.
- Describe the role of the kidney in maintaining acid base balance, and interpret uncomplicated cases of acid base disturbances.
- Describe classes of diuretics and their mode of action.
- Describe the bladder and control of micturition.
- Describe defence mechanisms of the urinary tract, common urinary tract infections and the principles of their assessment and treatment.
- Describe common pathological changes in the urinary tract, including glomerulonephritis, pyelonephritis, neoplasia, and prostate enlargement, and their clinical consequences.
- Describe the features, consequences and management of acute and chronic renal failure.

6 Key Texts and/or Other Learning Materials

- *Renal physiology A clinical approach*; Danziger J et al., LWW: First Edition: ISBN:9780781795241: ISBN 10:0781795249, Pub Date:15 May 2012
- *The renal system explained*; Deshmukh SR & NWK Wong; Nottingham University Press: First Edition: ISBN: 9781904761846: ISBN 10:1904761844, Pub Date:22 June 2009
- *Fluids and electrolytes made incredibly easy*; Scott, WN. LWW: First Edition: ISBN:9781901831153: ISBN 10:1901831159 Pub Date:15 Jul 2010
- *Renal pathophysiology*, HG Rennke et al., LWW: Third Edition: ISBN:9780781799959 : ISBN 10:0781799953, Pub Date:15 Sep 2009
- Boron, W.F. & Boulpaep, E.L. *Medical Physiology* (with student consult online), 2nd Edition, Saunders, 2008, ISBN 9781437717532
- Barrett, K. E., Barman, S. M., Boitano, S. & Brooks, H. 2009. *Ganong's Review of Medical Physiology*, 23rd Edition, Mcgraw-hill.
- *Clinically Orientated Anatomy* Moore KL , Dalley AF & Agur AMR Publisher: Lippincott Williams and Wilkins: Seventh Edition: ISBN:9781451184471
- *Langman's Medical Embryology* Sadler TW Publisher: Lippincott Williams and Wilkins: Twelfth Edition: ISBN:145114461X

- *Color Atlas and Text of Histology* Gartner LP & Hiatt JL Publisher: Lippincott Williams and Wilkins: Sixth Edition: ISBN:1451184484

Also available in the Moodle Learning Environment is a series of self-marking multiple-choice formative assessments to allow you to assess your learning in the Unit.

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