



THE UNIVERSITY OF  
BUCKINGHAM

MEDICAL SCHOOL

**MB ChB**

# **Unit Summary: Cardiovascular 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', 'The Doctor as a Scientist' and 'the Doctor as a Professional'. The specific aims of this unit are that students should understand the structure and function of the human cardiovascular system, how its condition is assessed, how cardiovascular function is altered in common diseases, and begin to understand the basis of management of cardiovascular disorders.

## 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 2: The doctor as a practitioner**

14. Diagnose and manage clinical presentations.
  - a) Interpret findings from the history, physical examination and mental-state examination, appreciating the importance of clinical, psychological, spiritual, religious, social and cultural factors.
  - b) Make an initial assessment of a patient's problems and a differential diagnosis. Understand the processes by which doctors make and test a differential diagnosis.

### **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 CVS, anatomy of the heart in situ and major blood vessels**

Lecture: Introduction to the cardiovascular system

Group work: Introduction to the anatomy

-Middle mediastinum and heart in situ (pericardium, external features of the heart, major vessels and relations).

-Major arteries and veins of the body (cross reference to musculoskeletal module)

Lecture: Histology – blood vessels and heart tissue

Directed Learning: Questions relating to major vessels, pericardium and histology of blood vessels

#### **Session 2: The cardiac cycle. Development of the heart**

Lecture: The heart as a pump

Group work: Examining problems on pressures/flows at various stages of the cardiac cycle. Heart sounds - prediction of timing of uncomplicated murmurs

Lecture: Development of the heart 1

Directed Learning: Self study - embryology of the heart and great vessels.

#### **Session 3: The anatomy of the heart. Congenital heart problems**

Lecture: Development of the heart 2

Group work: Surface and radiological anatomy of the heart. Introduction to anatomy.

-The coronary circulation, chambers and valves of the heart

Lecture: Congenital heart disease

Directed Learning: Coronary circulation and chambers of the heart. Study of common congenital defects.

Formative assessment

#### **Session 4: Role of the Autonomic Nervous System**

Lecture: The autonomic nervous system and the CVS

Group work: The autonomic nervous system

Lecture: Feedback session for formative assessment

Directed Learning: Self study of the autonomic nervous system and any problems with formative assessment

#### **Session 5: Blood flow to tissues and its control**

Lecture: Factors affecting flow through tubes

Group work: Work on relationship between pressure resistance and flow.

Lecture: Pressures and flows in the systemic circulation

Directed Learning: Factors affecting tissue perfusion

#### **Session 6: Overall control of the Cardiovascular System**

Lecture: The control of cardiac output.

Group work: Predict how the CVS will react in common situations. Eating a meal, exercise, changes in posture

Lecture: Responses of the whole system

Directed Learning: Further study of responses of the whole circulation

#### **Session 7: Cellular and molecular events in the heart**

Lecture: Cellular events in the heart

Group work: Control of the heartbeat

Lecture: Drugs and the CVS

Directed Learning: Further work on problems set in the workbook

#### **Session 8: The Electrocardiogram**

Lecture: The electrical activity of the heart and the ECG

Group work: Examination of and interpretation of normal ECG and some common, simple, abnormalities

Plenary session: Review of common ECG abnormalities

Directed Learning: Interpretation of the ECG. ECG quiz

#### **Session 9: Special circulations**

Lecture: Special circulations, with emphasis on the coronary and pulmonary circulations, but considering also the circulation to brain, skeletal muscle and skin

Group work: Problems on the Pulmonary and Coronary circulations

Formative Assessment – Written Paper

### **Session 10: Ischaemic heart disease**

Lecture: Causes of chest pain

Group work: Case studies on patients with chest pain

Clinical skills: CVS examination

### **Session 11: Heart failure**

Lecture: The patient with heart failure

Group work: Case studies on heart failure

Group work: Review of case studies and management of heart failure

### **Session 12: Shock**

Lecture: Shock and review of module

Group work: Work on problems using shock as a theme in order to integrate information from earlier in the module

## *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 heart and major blood vessels of the body and relate their structure to function in the circulation.
- Describe the operation of the heart as a pump, including the function of the heart valves, and be able to use their understanding of the cardiac cycle as a basis for physical examination of the heart.
- Describe the development of the heart, some common congenital defects, and the pathology of valvular problems.
- Describe the factors influencing blood flow to individual tissues, the mechanisms of control of vascular resistance and the special features of the pulmonary, cerebral, coronary, skin and skeletal muscle circulations.
- Describe in general terms the role of the autonomic nervous system in the control of cardiovascular function, including the concepts of local and central control.
- Describe the mechanisms controlling cardiac output in the normal individual, and how they operate in common situations such as exercise.
- Describe the molecular and cellular events underlying the cardiac cycle, the principles of altering heart rhythm and contractility by drugs, the categories of drugs used for common cardiac conditions and the principles involved.
- Describe the features of the normal electrocardiogram and their relationship to electrical events in the heart, and be able to interpret changes in the ECG produced by common clinical conditions.
- Describe the structure and properties of the coronary circulation, and the pathology and effects of ischaemic heart disease.
- Describe the assessment, diagnosis and management of a patient presenting with acute chest pain.
- Describe some common causes, major effects and treatment of heart failure.

- Describe the essential characteristics of shock.

## 6 *Key Texts and/or Other Learning Materials*

- Lilly LS *Pathophysiology of Heart Disease* 5th Edition, LW&W
- Hampton JR *The ECG made Easy* 7th Edition, Churchill Livingstone
- Aaronson PI & Ward JPT *The Cardiovascular System at a Glance* 3rd Edition, Blackwell Science

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