Cardiothoracic Surgical Science and Principles Examination (CSSP) Syllabus

EMBRYOLOGY AND NORMAL ANATOMY

The trainee is expected to have a detailed knowledge of the structures of the thorax, arm, leg, groin, upper abdomen, neck and Spinal Column. The following is a guide:

Normal anatomy of the Heart, Great Vessels, Lungs, Mediastinum and Chest wall
(Normal Anatomy includes both gross and microscopic anatomy, plus the nerve and blood supply to the organ and venous and lymphatic drainage).

Normal Anatomy of the Arm, Leg, Groin, Neck, Upper abdomen Spinal Column as it relates to the practice of cardiothoracic surgery.

Normal Embryology of the Heart, Great Vessels, Lungs and Fore Gut.

Common Embryological abnormalities of the Heart, Great Vessels, Lungs and Fore Gut.

Sources for acquisition of relevant knowledge:

Last's Anatomy, Regional and Applied, 9th Edition
Langman's Medical Embryology, 11th Edition,
Surgical Anatomy of the Heart, (2005) Wilcox & Anderson
Operative Anatomy of the Heart (2010) Berdajs
Thoracic Anatomy Part 1. An issue of *Thoracic Surgery Clinics* (2007)
Thoracic Anatomy Part 11. An issue of *Thoracic Surgery Clinics* (2011)
(The Thoracic Surgery Clinics are available online through many libraries)

CARDIOVASCULAR PHYSIOLOGY (INCLUDING MONITORING OF PARAMETERS)

The trainee is expected to have a detailed knowledge of the normal physiological function and diseased states. The following is a guide:

Normal Physiology
- Physiology of the Myocardium
- Cardiac Action Potential
- Natural Excitation of the Heart
- Regulation of Heart Rate
- ECG
- Common dysrhythmias
- Inotropy
- Control of Cardiac output
- Concept of preload and afterload
- Interpretation of Atrial, Ventricular, Arterial and Venous wave forms

Peripheral Circulation
- Control of peripheral circulation
- Control of Blood Pressure

Physiological response to
- Exercise
- Sepsis
- Haemorrhage
- Intracardiac Shunts

Extracardiac Shunts
Obstructive Cardiac Valve Lesions
Regurgitant Cardiac Valve Lesions
Restrictive Pericarditis/Tamponade
Restrictive Cardiomyopathy

Haemodynamics
Normal haemodynamics
Monitoring/measurement of Heart rate, intracardiac pressures
Monitoring/measurement of Cardiac Output
Monitoring the peripheral circulation
Quantification of intracardiac shunts

Sources for acquisition of relevant knowledge:

Cardiovascular Haemodynamics for the Clinician (2007) Stouffer
Haemodynamic monitoring made incredibly visual (2010) Lippincott
Functional Haemodynamic monitoring (2005) Pinsky. In Update in Intensive Care and Emergency Medicine Volume 42 (PDF available online)
Mosby Cardiovascular Physiology (2007) Levy
Ganong's Review of Medical Physiology 23rd Edition

RESPIRATORY PHYSIOLOGY – INCLUDING MONITORING OF PARAMETERS

The trainee is expected to have a detailed knowledge of the normal physiology of the lungs and their function in diseased states. The following is a guide:

Normal Physiology
Mechanical Properties of the Chest Wall
Lung Volumes
Oxygen and carbon Dioxide Transport
Control of Ventilation
Non ventilator functions of the lungs
Physiology of the Pulmonary Circulation
Normal Blood gases
Acid/Base principles

Physiological response to
Exercise
Sepsis
Haemorrhage - Haemothorax
Pneumothorax
Cardiopulmonary Bypass
Hypoxia
Changing Altitude

Pulmonary Function
Monitoring adequacy of Pulmonary Function
Measurement of Lung Volume
Measurement of Alveolar Function
Blood gas interpretation
Acid Base interpretation
Principles of Pulse Oximetry

Sources for acquisition of relevant knowledge:

Mosby Respiratory Physiology (2007) Cloutier
Ganong's Review of Medical Physiology 23rd Edition

PATHOLOGY AND PATHOPHYSIOLOGY OF THE HEART, BLOOD VESSELS, LUNGS, PLEURA,

MEDIASTINUM AND OESOPHAGUS

The trainee is expected to have a detailed knowledge of the pathology of the heart blood vessels, lungs, pleura, mediastinum and oesophagus. The following is a guide:

Inflammatory conditions including:
- Rheumatic Fever
- Myocarditis
- Pericarditis
- Vasculitides
- Cardiomyopathies
- Infiltrative Lung Disease

Infective Conditions
- Heart
- Pericardium
- Lung
- Mediastinum
- Pleura
- Chest Wall
- Oesophagus

Degenerative Conditions
- Heart
- Pericardium
- Lung
- Mediastinum
- Pleura
- Chest Wall
- Oesophagus

Benign Tumours
- Heart
- Pericardium
- Lung
- Mediastinum
- Pleura
- Chest Wall
- Oesophagus

Malignant Tumours
- Heart
- Pericardium
- Lung
- Mediastinum
- Pleura
- Chest Wall
- Oesophagus

Blood Vessels
- Atheroma
- Aneurysm
- Dissection

Pathology of:
- Hypertension
- Ischaemic Heart Disease
- Valvular Heart Disease
- Myasthenia Gravis
- Obstructive Airways Disease

Sources for acquisition of relevant knowledge:

Robbins and Cotran Pathologic Basis of Disease, 8th Edition – Kumar

CARDIOPULMONARY BYPASS, MYOCARDIAL PROTECTION AND MECHANICAL SUPPORT OF THE CIRCULATION

The trainee is expected to have a detailed knowledge of the principles and performance of cardiopulmonary bypass, Myocardial Protection and Mechanical Support of the Circulation. The following is a guide:

Cardiopulmonary Bypass (CPB)
- Circuits and priming solutions
- Types of Pumps/oxygenators available and the pros and cons of each type
- Metabolic Management during CPB
- Blood/Coagulation management during CPB
- HITTS
- Deep Hypothermic Circulatory Arrest
- Weaning from CPB
- Organ preservation during CPB
- Complications of CPB

Myocardial Protection

Principles of Myocardial protection/Cardioplegia
Cardioplegia – Solutions and routes of administration
Non Cardioplegia strategies for myocardial protection

Intra-aortic Balloon Counterpulsation (IABP)
Principles of IABP
Indications for IABP
Techniques and principles of Insertion
Correct setting of the Balloon Pump and siting of the balloon
Complications of IABP
Timing/techniques of removal of IABP

Left Heart Bypass - ECMO
Principles
Indications
Techniques and principles of Insertion
Monitoring of the patient
Complications

Sources for acquisition of relevant knowledge:

Cardiopulmonary bypass (2009) Ghosh
On bypass (2008) Mongero
Cardiopulmonary Bypass: Principles and practice (2007) Gravlee

PRINCIPLES AND INDICATIONS FOR CARDIOTHORACIC INVESTIGATIONS

Radiology
Plain Film
CT Examination
Cardiac magnetic resonance (CMR
Nuclear Scanning
PET
Thallium
Technitium

Echocardiography
Normal Anatomy
Systematic Approach
TTE v TOE
Standard views
Complications

Ischaemic testing
exercise treadmill – Bruce protocol
exercise stress myocardial perfusion – SPECT, technetium-labelled agent (sestamibi)
pharmacological stress myocardial perfusion – dipyridamole, adenosine, dobutamine

Coronary Angiography
Indications
Access strategies
Standard views
Reporting Criteria

Pulmonary tests
Volumes
Gas exchange
Isolated Lung function testing
Compliance

IMPLANTABLE DEVICES – PACEMAKERS/ICDs

The trainee is expected to have a detailed knowledge of the principles and application of pacing and ICD. The following is a guide:

Pacing
- Principles
- Indications – Temporary and Permanent
- Lead placement
- Monitoring
- Complications
- Biventricular for Heart Failure

ICDs
- Principles
- Indications – Temporary and Permanent
- Lead placement
- Monitoring
- Complications

Sources for acquisition of relevant knowledge

Implantable cardiac pacemakers & defibrillators (2006) Chow

PHARMACOLOGY OF DRUGS COMMONLY USED IN CARDIOTHORACIC SURGERY

The trainee is expected to have a detailed knowledge of the drugs commonly encountered in the setting of cardiothoracic surgery. The following is a guide:

Classes of Drugs
- Inotropes
- Vasodilators
- Vasoconstrictors
- Diuretics
- Anti-arrhythmics
- β Blockers
- ACE Inhibitors
- Calcium Channel Blockers
- Lipid Lowering Agents
- Platelet Inhibitors
- Anticoagulants
- Anti-Thrombotic Agents

Sources for acquisition of relevant knowledge

Drugs for the Heart (2008) 7th edition – Opie
Pharmacology (2011) 7th Edition – Rang HP; Dale MM; Ritter JM; and Moore PK

Outline for Cardiothoracic Surgical Sciences and Principles Exam – MCQ component

(Two x 100 question MCQ papers)

Topic	**No of questions**
Cardiovascular physiology	30
Respiratory physiology	30
Pathology – Heart & vessels	20
Pathology – Lungs & pleura	20
Pathology – Mediastinum & Chest wall	10
Pathology – Oesophagus	5
Embryology (this will also be asked in the anatomy viva)	5
Haemodynamic monitoring	13
Cardiopulmonary bypass, myocardial protection, mechanical support	20
Pacemakers & ICDs	7
Cardiothoracic Investigations	15
Cardiac pharmacology	25
Total	**200**