



2.1 Orthopaedic Principles and Basic Sciences

Musculoskeletal

Demonstrate a detailed understanding of the structure and function of all human tissues relevant to the musculoskeletal system.

Apply a detailed knowledge of surface and topographic anatomy as a basis for precise clinical assessment and safe surgical exposure.

Describe bone and joint development, discussing the factors that influence this process.

Explain the processes of injury, repair of bone and other connective tissues.

Pathology

Discuss the embryology of congenital orthopaedic conditions manifesting in paediatric and adult populations.

Explain the role of human genetics in the development of inherited musculoskeletal disorders.

Apply knowledge of bone cell biology, mineral homeostasis and variation in bone mineral density in the pathogenesis and treatment of orthopaedic conditions.

Outline biological processes underpinning the development of degenerative and inflammatory arthritis.

Discuss the basis for the development of the major connective tissue disorders.

Discuss the effect of neuromuscular conditions on growth and their role in the development of orthopaedic deformity of the musculoskeletal system.

Explain the pathological basis of primary and secondary musculoskeletal tumours, particularly relating to their diagnosis and management.

Biomechanics and motion

Describe the biomechanics of the musculoskeletal system and principles as it relates to the development and management of musculoskeletal conditions.

Discuss the kinetics and dynamics of joint motion, including in normal and pathological limb function.

Assess deformity, understand the 'centre of rotation' of angular deformity and the principles of correction in planning osteotomies.

Materials and engineering

Describe the properties and use of biomaterials in orthopaedic surgery.

Discuss the principles of tissue engineering in orthopaedics.

Infection, immunology and inflammation

Discuss the manifestations of infectious diseases in orthopaedic surgery

Discuss inflammation and its relevance to orthopaedic conditions and orthopaedic surgery.

Describe the prevention and management of infection.

Discuss immunological influence in development of orthopaedic conditions, response to musculoskeletal infections and reaction to foreign materials.

Neurovascular

Discuss venous and arterial embolism relating to orthopaedic practice.

Discuss vascular homeostasis and the prevention of pathological surgical thrombosis and bleeding.

Discuss the physiology of pain and the development of abnormal pain responses.

Discuss the physiology, neural pathways, injury, repair and recovery of the peripheral nervous system.

Pharmacology

Outline the safe use of medications and drugs encountered in orthopaedics including:

- Local anaesthetics
- Analgesics
- Antibiotics
- Anti-inflammatories
- Medications used for rheumatological conditions
- Interventions that affect bone mineral homeostasis
- Anticoagulants

Describe natural and alternative therapies patients may use to treat orthopaedic conditions, including risks, potential/proposed benefits and interaction with other medications.

Radiology and Investigations

Explain the basic scientific principles that underpin radiological and nuclear medicine investigations.

Explain radiation biology and describe the appropriate use of radiation, including measures employed to ensure maximum safety.

Discuss the rationale for selection and use of orthopaedic imaging modalities for diagnosing conditions.

Research Methodology

Discuss the advantages and disadvantages of different study designs and the impact of study designs on results and conclusions.

Explain levels of evidence and quality of evidence.

Describe principles of basic biostatistics to analyse data.