



Department of Biomedical Sciences  
Physiotherapy Degree Programme  
Pathologies of the locomotor apparatus syllabus

Academic year 2020-2021. Academic term: second semester of second year  
Course coordinator: Prof. Elizaveta Kon

**ORTHOPAEDICS (4 ECTS)**

<b>Prof. Elizaveta Kon</b>	Associate Professor of Diseases of the Locomotor System at Humanitas University. Head of the Orthopaedics Section, Centre for Knee Joint Reconstruction at Humanitas Hospital. E-mail: <a href="mailto:elizaveta.kon@humanitas.it">elizaveta.kon@humanitas.it</a>
<b>Dr Berardo Di Matteo</b>	Researcher at Humanitas University. Consultant Orthopaedic Physician. Centre for Knee Joint Reconstruction at Humanitas Hospital E-mail: <a href="mailto:berardo.di_matteo@humanitas.it">berardo.di_matteo@humanitas.it</a>
<b>Objectives</b>	Learn the general terminology, anatomy, biomechanics and function of major joints. Learn to recognise the most common joint problems based on the reason of the patient's visit, history and physical examination. Have general knowledge of the most common trauma problems and know how to recognise an emergency. Understand the biomechanics of joint pathologies in order to be able to recognise them and to understand the most relevant instrumental examinations (MRI, CT, X-ray). To be able to recognise the extent of a disease and understand how to approach it. Have basic knowledge of the differences in the anatomy of the locomotor apparatus in adults, children and the elderly.
<b>Teaching methods</b>	Lectures, presentation of videos and work in small groups on motor dysfunction simulations.
<b>Teaching material</b>	Slides presented during lectures and available on LMS for physiotherapy students

**Content**

**1) Developmental pathologies**

The knee: osteochondritis dissecans and Osgood-Schlatter disease. The hip: Legg-Calvè-Perthes disease and epiphysiolysis

**2) Osteoporosis**

Pathophysiology and clinical features of osteoporosis. Osteoporosis and related fractures. Prevention and treatment of osteoporosis

**3) Gonarthrosis**

Anatomy and biomechanics of the knee. Clinical/instrumental approach and physical examination. Definition and classification of gonarthrosis according to Kellgren Laurence. Conservative treatment of gonarthrosis. Surgical treatment of gonarthrosis: arthroscopic lavage from axial correction to prosthetic surgery (osteotomy and prostheses). Regenerative medicine for gonarthrosis: Platelet Rich Plasma (PRP), Autologua Protein Solution, Mesenchymal cells

#### **4) Knee pathologies**

Biomechanics of meniscal and ligamentous injuries. Meniscal injuries: conservative and surgical treatment and post-operative rehabilitation. Anterior cruciate and posterior cruciate injuries, medial and lateral collateral ligament injuries: conservative and surgical treatment and post-operative rehabilitation

#### **5) Hip diseases**

Anatomy and biomechanics of the hip. Clinical/instrumental approach and physical examination. Congenital hip dysplasia, femoroacetabular impingement, osteonecrosis, coxarthrosis, greater trochanteric pain syndrome

#### **6) Lumbago**

Clinical/instrumental approach, physical examination and pathophysiological mechanisms of low back pain. Clinical/instrumental approach, physical examination and pathophysiological mechanisms of low back pain with or without leg pain. Epidemiology, symptoms and pharmaceutical treatment of low back pain with or without leg pain. Spondylolysis, spondylolisthesis and major pathologies

#### **7) Herniated disc**

Clinical/instrumental approach, physical examination and pathophysiological mechanisms of herniated disc. Epidemiology, symptoms and pharmaceutical treatment of herniated disc

#### **8) Scoliosis**

Aetiology and treatment of scoliosis and scoliotic attitude.

#### **9) Fractures**

Biology, biomechanics, clinic and treatment of fractures. Types and locations of fractures and their complications

#### **10) Pathologies of the ankle and foot**

Sprains, fractures, plantar fasciitis, achilles tendinopathy, Morton's neuroma, Haglund's syndrome, Sever's disease, osteochondral injury of the ankle joint, congenital clubfoot, hallux valgus, flatfoot

#### **11) Lesion of the ankle joint**

Biomechanics and clinic of ankle joint injuries. Orthopaedic and physiotherapy treatment

#### **12) Muscle injuries**

Muscle and tendon injuries. Clinical and radiological investigation. Degrees of injury. Treatment

#### **13) Shoulder pathologies**

Pathophysiology and biomechanics of musculoskeletal disorders of the shoulder. Epidemiology, treatment and radiological examinations of: instability and dislocation, impingement syndrome, rotator cuff lesions and shoulder prosthesis. Surgical versus conservative treatments

#### **14) Physical examination of the shoulder**

Practical exercise led by orthopaedist

#### **15) Hand pathologies**

Anatomy of the hand and most frequent clinical conditions: fractures and mechanisms of deformation of the metacarpals and phalanges. Wrist fractures, scaphoid fracture, rhizarthrosis, trigger finger.

#### **16) Hand surgery**

The surgical treatment of hand fractures.

#### **17) Pathologies of the peripheral nerves of the hand**

Functional anatomy. Pathophysiology and treatment of carpal, radial and cubital tunnel syndrome

#### **18) Functional tests in orthopaedics**

Practical exercise on the main functional tests of the hip, knee and ankle.

### **RHEUMATOLOGY (1 ECTS)**

<b>Prof. Carlo Selmi</b>	Associate Professor at Humanitas University. He worked as a post-doc between August 2001 and December 2004 at the Division of Rheumatology, Allergy and Clinical Immunology at the University of California, Davis. In July 2005, he was appointed Assistant Professor of Medicine by the same Division at UC Davis until 2016. He currently directs the Unit of Rheumatology and Clinical Immunology at Humanitas Hospital. E-mail: <a href="mailto:carlo.selmi@humanitas.it">carlo.selmi@humanitas.it</a>
<b>Objectives</b>	For each body system, the course will look into diseases that are frequently encountered and are of particular importance in terms of severity, therapeutic possibilities and examples. The student must be able to define the disease, know the main epidemiological data, and illustrate its causes, pathogenetic mechanisms and symptoms at disease onset and during the course of the disease. Finally, they will know the physiopathological causes of the symptoms and signs, the indications for instrumental investigations useful for diagnosis and general outlines of rheumatological therapies.
<b>Teaching methods</b>	Lectures and classroom discussions
<b>Teaching material</b>	Slides presented in lecture, available for physiotherapy students on LMS
<b>Content</b>	
<b>1) Introduction</b> Definition of rheumatology. Characteristics of the rheumatology patient. Physical examination	
<b>2) Osteoarthritis</b>	

Definition of idiopathic and secondary osteoarthritis. Clinical and radiographic characteristics of osteoarthritis. Pharmacological, non-pharmacological and surgical treatment of osteoarthritis

### 3) Osteoporosis and fibromyalgia

Definition, pathophysiology, clinical features of osteoporosis. Risk factors, symptoms and treatment of osteoporosis. Definition, pathophysiology, clinical features of fibromyalgia. Risk factors, symptoms and treatment of Fibromyalgia

### 4) Connective tissue disease

Definition, symptoms and treatment. Classification of connective tissue disease: systemic sclerosis, systemic lupus erythematosus, Sjögren's syndrome, polymyositis, dermatomyositis

### 5) Arthritis

Definition, pathophysiology clinical features of arthritis. Classification of arthritis, spondyloarthritis, ankylosing spondylitis, psoriatic arthritis, reactive arthritis, rheumatoid arthritis

## IMAGING OF THE MUSCULOSKELETAL SYSTEM (2 ECTS)

<b>Dr Nicoletta Trenti</b>	Graduated in Medicine and Surgery from the University of Milan in 1981. In 1986 she obtained her Specialisation in Radiodiagnostics and Radiotherapy from the same University. Since 2002 she has been working at the Medical Diagnostic Radiology Area of Humanitas Research Hospital in Rozzano, Milan. Expert in imaging of the musculoskeletal system. E-mail: <a href="mailto:nicoletta.trenti@humanitas.it">nicoletta.trenti@humanitas.it</a>
----------------------------	--

<b>Objectives</b>	The aim of the module is to provide students with sufficient content to recognise the clinical conditions depicted in the musculoskeletal system images and to discuss with radiologists.
-------------------	---

<b>Teaching methods</b>	Lectures with classroom discussion.
-------------------------	-------------------------------------

<b>Teaching material</b>	Slides presented in class, available to physiotherapy students on LMS, and scientific articles presented during the course
--------------------------	--

### Content

#### 1) Introduction

Physics of radiation; functioning of ultrasound, x-rays, CT and MRI; their use and clinical indications.

#### 2) Spine

Imaging of anatomical structures of the spine. Indications and limitations of X-ray, CT and MRI in static and functional assessment. Study of congenital and acquired spine dysmorphism. Radiological characteristics of scoliosis. Use and characteristics of the EOS device for the spine: 2D and 3D evaluation: therapeutic and surgical planning and follow-up.

### **3) Lower limbs**

Evaluation of mechanical and anatomical load and lower limb length discrepancies Study of congenital and acquired skeletal dysmorphisms.

Lower limb torsion defects: CT and EOS. Surgical planning and monitoring during corrective and lengthening treatment.

### **4) Knee**

Imaging of anatomical structures of the knee. Indications and limitations of ultrasound, X-rays, CT and MRI in structural and functional investigations of the knee. Study of congenital and acquired skeletal dysmorphisms. Radiological characteristics of the most frequent skeletal and muscular pathologies: patellofemoral dysplasia, evaluation of prosthetic implants integration and ligament reconstruction, implant check-ups after knee traumatology and in traumatic and degenerative pathologies, distraction - injury and muscle haematoma.

### **5) Shoulder**

Imaging of the anatomical structures of the shoulder. Indications and limitations of ultrasound, X-rays, CT and MRI: morphological, structural and functional investigations of the shoulder. Study of congenital and acquired skeletal dysmorphisms; radiological characteristics of the most frequent acromioclavicular and scapulohumeral pathologies: dislocation, labrum lesion, rotator cuff lesion. Imaging of scapulohumeral instability and rotator cuff pathologies. Ultrasound study.

Comparative and contrast graphic techniques: arthro-CT – arthro-MRI, PICO protocol.

Evaluation in rheumatic and degenerative pathology.

### **6) Hip and pelvis**

Imaging of anatomical structures of the hip and pelvis. Indications and limitations of ultrasound, X-rays, CT and MRI in morphological, structural and functional investigations of the hip and pelvis: evaluation of congenital and acquired dysmorphisms. Radiological characteristics of the most frequent pathologies: hip dysplasia (ultrasound study), necrosis of the femoral head, algodystrophy and rheumatology (sacroiliitis, symphysitis), insertional and muscular and degenerative coxa-femoral diseases. Evaluation of the femoralacetabular impingement with contrast graphic technique: arthro-MRI.

### **7) Ankle and foot**

Imaging of anatomical structures of the ankle and foot. Indications and limitations of ultrasound, X-rays, CT and MRI in structural and functional investigations of the ankle and foot. Study of congenital and acquired skeletal dysmorphisms. Radiological characteristics of tibiotarsal joint and subtalar instability, study of foot axes, post-traumatic pathologies, tibiotarsal ligament lesions, osteochondritis astragalus, algodystrophy; degenerative and inflammatory pathologies, gout, diabetic foot. Evaluation of Achilles tendon and plantar fascia.

### **8) Wrist**

Imaging of anatomical structures of the wrist. Indications and limitations of ultrasound, X-rays, CT and MRI in structural and functional investigations of the wrist. Study of congenital and acquired skeletal dysmorphisms Radiological characteristics of traumatic lesions of the wrist, lesions of the

scaphoid and avascular necrosis of the lunate bone (Kienböck's disease). Study of degenerative, post-traumatic and rheumatological pathology. Ultrasound study of capsular ligament pathology.

### 9) Hand

Imaging of anatomical structures of the hand. Indications and limitations of ultrasound, X-rays, CT and MRI in structural and functional investigations of the hand. Study of congenital and acquired skeletal dysmorphisms. Radiological characteristics of traumatic, degenerative and rheumatic injuries of the hand, pathologies of soft tissue and ligamentous injuries with the aid of ultrasound.

### 10) Elbow

Imaging of anatomical structures of the elbow. Indications and limitations of ultrasound, X-rays, CT and MRI in structural and functional investigations of the elbow. Study of congenital and acquired skeletal dysmorphisms. Radiological characteristics of traumatic lesions of the elbow (fracture of the radial head or distal humerus). Ultrasound study of entheses in sportspeople (tennis elbow and golfer's elbow), in capsular ligament injuries.

## PHARMACOLOGY (1 ECTS)

<b>Dr Francesca Navone</b>	Degree in Medicine and Surgery, Specialisation in Clinical Pharmacology, Lead Researcher at the CNR Institute of Neuroscience, Milan, c/o Department of Medical Biotechnology and Translational Medicine, Via Vanvitelli 32, Milan E-mail: <a href="mailto:f.navone@in.cnr.it">f.navone@in.cnr.it</a>
<b>Objectives</b>	The aim of this module is to provide essential knowledge of pharmacology for disorders of the locomotor system and to integrate physiotherapy with the knowledge of the mechanism of action of drugs, their therapeutic properties and their undesired effects. The learning objectives include the acquisition of basic knowledge of drug targets and molecular mechanisms underlying their action, and to understand their use in the treatment of diseases of the locomotor system in relation to physiotherapy.
<b>Teaching methods</b>	Lectures with classroom discussion.
<b>Teaching material</b>	Slides presented in class, available to physiotherapy students on LMS and scientific articles presented during the course Clark M. A., Finkel R., Rey J. A., Whalen K. "Le basi della Farmacologia" - Seconda Edizione Italiana - Edizioni Zanichelli. Clementi F., Fumagalli G., "Farmacologia Generale e Molecolare" - Quarta Edizione Aggiornata – Edizioni EDRA
<b>Content</b>	
<b>1) Basic principles and overview of inflammation and the immune system</b>	
Definition of Inflammation and the Immune System. Mediators and effectors of inflammation. The inflammatory response. Acute inflammation and chronic inflammation. The immune response. The concept of autoimmunity. A brief overview of the role of the histaminergic system in inflammation and anti-histamine drugs.	

## **2) Non-steroidal anti-inflammatory drugs (NSAIDs) (part 1)**

Role of lipid mediators (eicosanoids) derived from arachidonic acid in inflammatory processes. The arachidonic acid cascade. Biosynthesis and function of leukotrienes: the lipoxygenase pathway and their pharmacological inhibition. Biosynthesis and function of prostanoids: the prostaglandin H synthase pathway and the cyclooxygenase enzymes COX-1 and COX-2.

Pharmacological inhibition of prostaglandin synthesis: mechanism of action of non-steroidal anti-inflammatory drugs (NSAIDs). The main chemical classes of NSAIDs.

## **3) Non-steroidal anti-inflammatory drugs (NSAIDs) (part 2) - Steroidal anti-inflammatory drugs**

Main actions, therapeutic uses and adverse effects of the chemically distinct groups of substances with anti-inflammatory action: acetylsalicylic acid, propionic acid derivatives, acetic acid derivatives, fenamates and specific enzyme COX-2 inhibitors (oxicam derivatives).

Paracetamol.

Physiotherapists and *Over the Counter* (OTC)/No Prescription medicines.

Glucocorticoids and their therapeutic use in reducing symptoms of inflammation and treating autoimmune disorders. Side effects of long-term corticosteroid therapy. Discontinuation of corticosteroid therapy.

## **4) Medications for the Treatment of Rheumatoid Arthritis and Osteoporosis**

Pharmacological strategies for the treatment of inflammation and modulation of the immune system in rheumatoid arthritis, with particular reference to disease-modifying antirheumatic drugs (DMARDs) and immunosuppressive drugs. Biological therapies for rheumatoid arthritis.

Pharmacological strategies for the treatment of osteoporosis (bisphosphonates, selective oestrogen receptor modulators, calcitonin, teriparatide and denosumab).

## **5) Principles of Pain Therapy**

Nociceptive transmission: structures and molecules involved in the central and peripheral mechanisms of analgesia. Endogenous opioid peptides and their receptors. Therapeutic tools for pain control. Opioid analgesics. Undesirable effects of opioids. Tolerance and physical dependence on opioids. Drugs active on the endocannabinoid system. Treatment of chronic pain of a non-neoplastic nature: the case of gabapentinoid drugs.

**Examination for the pathologies of the locomotor apparatus course.** Written examination with multiple-choice questions on all modules (Chairman of the Examination Committee: Prof. Elizaveta Kon)