

POST - DOCTORAL FELLOWSHIP PROGRAMME IN MUSCULO SKELETAL  
RADIOLOGY  
SYLLABUS

Course Duration : 2 years

Syllabus

The course contains more practically oriented teaching. Very useful and oriented towards making of dedicated clinical musculoskeletal radiologist.

Curriculum

During this one year period, candidate exposed to advanced imaging modalities for in both in and outpatient care. They will learn to avoid unwanted interventions, and restrict radiation

Importance of Imaging in musculoskeletal disorders

- With the advent of improving imaging technologies, there are constant and tremendous improvements in diagnostic capabilities.
- By early detection based on newer diagnostics can improve outcomes of treatment.
- Diagnosis of the disease is a major crucial step for the management of the disease.
- To provide more accurate, specific and fast diagnosis of various disorders, appropriate and adequate training is mandatory.

Imaging Techniques: Relevant to both diagnostic and therapeutic purpose.

(α) For Diagnostic Imaging

- The primary treatment of all musculoskeletal disorders revolves around appropriate diagnostic imaging.
- Diagnostic imaging is a field of which experiences the **very best and latest in cutting edge technology that science has to offer and needs continuing**

medical education to stay abreast of developing advances.

- Imaging modalities in MSKD involve the **wide gamut of technologies including Magnetic Resonance Imaging, Computer Tomography, Ultrasonography and Radiography** with each having specific indications in diagnostics.
- Each of these technologies **undergoes periodic change with newer techniques being formulated**, which improve upon existing indications of use and protocols of execution.

### Magnetic Resonance Imaging

Magnetic resonance imaging is non-ionising imaging modality of choice in a wide array of musculoskeletal disorders including the **speciality fields of sports medicine, spinal disorders, neurological and trauma care.**

Latest advances have been implemented with high resolution specific protocols designed to yield maximum information for musculoskeletal related disease. These include special protocols to assess for **cartilage damage in articular joint pathologies.**

**Diffusion tensor imaging** is being used widely in assessment of Neurological pathologies in both spine and brain.

**Metal artefact reduction sequence** to evaluate post-operative cases with metallic implants in-situ.

### Computer Tomography

Computer tomography is now considered **gold standard diagnostic imaging especially in acute trauma care.** The **development of multi slice whole body CT protocols** have increased accuracy, speed and evaluation time during diagnostic procedures for poly trauma care including head, chest, abdominal and skeletal injuries.

## Ultrasonography

Ultrasonography has multiple applications in musculoskeletal disorders including diagnostic and therapeutic treatment options in disorders for shoulder, knee and hips joints.

They are affordable, accessible, non-invasive, with no radiation or side effects and have now a widely acceptable position in the **diagnostic of shoulder rotator cuff pathologies, labrum assessment and shoulder instability scenarios.**

They form a part of routine and basic diagnostic imaging for the gastrointestinal and genitourinary disorders.

## Radiography

This is the time tested and indispensable imaging modality in the management of MSKD and forms the backbone of any diagnostic imaging department. Latest Digital Radiography techniques have revolutionised this modality.

## Therapeutic and Interventional Radiology

- CT scan guided biopsy for vertebral and other skeletal lesions.
- Ultrasonography can be used to perform interventional procedure for peripheral nerve root block.
- Fluoroscopy guided Spinal nerve root blocks, bone tumour biopsy & Vertebroplasty
- Ultrasonography aided diagnostic and therapeutic procedure for peri-arthritis shoulder and rotator cuff disorders.
- MR Arthrogram, CT myelogram, USG guided diagnostic aspiration

## Goals and objectives of the course

In addition to regular radiology practices, the fellows are trained in research methodology, manuscript preparation, and other activities essential to an academic career and objective interpretation of medical literature. To offer speciality training, achieve system based practice, optimum patient care, practice clinical Radiology with best and updated current practices, improvement in professional

career, core competency and develop communication skills and medical knowledge.

To train fellows to become efficient, practical, and skilled in the

- multi-modality imaging approach and use the best imaging modality for the field of orthopedics, rheumatology, orthopedic oncology, spine, podiatry and sports medicine disorders,
- Preoperative workup and postoperative imaging of orthopedic patients including the recognition of possible complications.
- The selection, performance and interpretation of image guided intervention including fluoroscopy, CT and ultrasound guided musculoskeletal therapeutic procedures including fenestrations and steroid injections.
- To provide fellows the training and experience to become expert imaging consultants in the subspecialty of musculoskeletal imaging.

**To provide the opportunity for scholarly activity, including presentations at conferences, lectures and clinical research.**

### **Imaging techniques:**

- to select the best modality for a particular disorder and clinical finding.

To check for the indications and contraindications if any before the scan

-In several situations like for e.g., bone tumor, multimodality approach practiced to provide complete details to yield maximum information. For eg: In bone tumour, MRI more useful to define intramedullary and soft tissue components, invasion on surrounding structures, however simple plain radiograph give additional information to look for periosteal reaction and cortical destruction.

- Also learn about various MRI sequences performed in different clinical scenario, e.g. - spine trauma protocol, scoliosis protocol etc.,

- extra sequences like gradient to be done while suspecting PVNS, bleed etc.,
- to use the contrast appropriately as and when required

### **Anatomy and radiology physics:**

-knowledge of the basics for better understanding on characteristics and localization of any lesion.

### **Report writing and risk management strategies in skeletal radiology:**

-to learn the skills of reporting to be accurate, precise, short, highlight on relevant features, suggest next step of management as and when required.

- Report the emergencies and critical findings to the appropriate clinician immediately as and we required.

### **Radiographic Artifacts:**

Knowledge about causative factors can be used to remove such artefacts. Eg: grid artefacts lines on x-ray.

Learn steps to reduce metallic artefacts by implants in CT and MRI in post operative cases.

Normal Skeletal Anatomy and Radiographic Positioning : apart from routine radiography, Special views like flexion and extension, stress and dynamic views

Measurements in Skeletal Radiology : very useful in detecting various abnormalities. Eg. angle measurement in DDH, FAI and scoliosis assessment,

Congenital Anomalies and Normal Skeletal Variants : Ascertain that indolent findings which could be mistaken to be more sinister lesions. With familiarity of such findings unnecessary imaging and surgeries can be avoided.

### **Skeletal trauma**

- grading and classification of all fracture and dislocation,
- precautions and care while handling injured cases,
- detect unstable injuries and provide such information at the earliest.

Emergency trauma: determine non skeletal injuries like intracranial, abdominal, vascular injuries, tension pneumothorax etc.,

Bone tumours: Benign and tumor-like Processes: the don't touch lesions which are self limiting and need no intervention to be detected as far as possible.

Bone tumours : Malignant Indeterminate and aggressive lesions which need further evaluation for staging.

Hematologic, myeloproliferative and similar disorders:

assessment of disseminated metastasis, determine the primary, myeloma,

Nutritional, metabolic and endocrine related diseases of the skeleton: osteoporotic, hyperparathyroidism, flurosis, etc,

Skeletal dysplasias and malformation syndromes

Joint arthritides: various degenerative, infective and inflammatory

Bone and soft-tissue infection:

Familiarise with features common in different infections, to differentiate Pyogenic or tuberculosis.

Apply multimodality approach, in Osteomyelitis, although MRI would define extent of involvement and abscess well, CT scan can exactly give additional information about the Sequestrum.

Follow up imaging to assess healing response.

Imaging of soft tissues:

Tumours, vascular abnormalities, and infections. Diagnostic and therapeutic USG guided aspiration and biopsies performed for evaluation of superficial abscess and solid tumours.

Paediatric musculoskeletal radiology: nonaccidental injury, green stick, Salter Harris and green stick fractures, etc.,

Spine : varied spectrum of routine studies include degenerative disc disease/ canal stenosis, sacroiliitis, listhesis, spondylodisctis, scoliosis, injury, metastasis, intraspinal and bone tumours, myelopathy.

Joint imaging: Knee : can learn about arthritis, different types of meniscal and ligament injuries, transient patellar dislocation

Joint imaging: Shoulder: recurrent dislocation, rotator cuff tear, tendinosis, labral tears, adhesive capsulitis

Joint imaging: wrist: ganglion cyst, TFCC/ intercarpal ligament tear, carpal tunnel,

Joint imaging: hip FAI, AVN , perthes, Slipped capital femoral epiphysis, idiopathic chondrolysis

Joint imaging: elbow : tendinosis, arthritis, injuries etc.,

Joint imaging: ankle: impingement, tendon / ligament tears, osteochondritis dissecans

Foot disorders: foreign bodies, Osteomyelitis, charcot's joint,

Scoliosis to assess the severity and to exclude associated intraspinal lesions and spinal cord anomalies.

Recent advances: Diffusion tensor imaging, Cartilage mapping etc.,

Interventional diagnostic and therapeutic techniques: vertebroplasty, diagnostic aspiration, fluoroscopy image guided biopsies, USG guided nerve blocks,

Special procedures: Myelogram, arthrogram, urogram, cystogram, CT angiogram,

Post operative assessment: for failed back syndrome, ACL reconstruction, assess healing of spondylitis and union of fractures

Exposure following ALARA principle. Innovative imaging techniques will be chosen according to the necessity of each patient.

ROTATION SCHEDULE : 8AM to 1.30PM

8-9 a.m (daily)			
9-11 a.m (weekly once)			
11.30 - 12.30 (daily)			
12.30-1.30 p.m. (daily)			
PLAIN XRAY REPORTING	REPORTING SPECIAL PROCEDURES UNDER FLURO	Very high Frequency ULTRASOUND and Doppler RELATED to MSK	Musculoskeletal CT , MRI
DIGITAL	SINOGRAMS		
CONVENTIONAL	VERTEBROPLASTY		
BED XRAY	PERCUTANEOUS ALCOHOL INJECTION OF OSTEIOD OSTEOMA		
C-ARM	REST OF DAYS LOGBOOK MAINTAINANCE, CLINICAL CORRELATIONS, REVIEW OF POST SURGICAL IMAGES		

From 2.30 pm onwards : **didactic lectures** Clinical conferences, seminars, small discussion groups, journal clubs and one-on-one instruction are all an integral part of the Musculoskeletal Imaging Fellowship.

Activities include:

1. Orthopedic tumor conference – weekly
2. MR–arthroscopic correlation and ortho–radiology correlation (nonarthroscopic cases) conferences – alternating Tuesdays
3. Journal club – weekly
4. Sarcoma conference
5. Sports medicine conference

RESEARCH ACTIVITIES;

Publish research articles,

Attending two state conferences

One National Conference.

TOPICS OF THEORY

Radio Anatomy of MSK

Congenital anomalies and variants.

Radio pathology

Endocrine and METABOLIC DISORDERS OF MSK

MSK IMAGING OF TUMORS

Knowledge of imaging of orthopaedic prosthesis

FOLLOW UP OF CASES

TEXT BOOKS

- Taybi H, Lachman RS. [Radiology of syndromes, metabolic disorders, and skeletal dysplasias. \(4th ed.\) Chicago: Year Book, 1996.](#)
- Musculoskeletal Imaging: The Requisites, 4e (Requisites in Radiology) 4th Edition

by [B. J. Manaster MD PhD FACR](#) (Author), [David A. May MD](#) (Author), [David G. Disler MD FACR](#) (Author)

- Helm's classic [Fundamentals of Skeletal Radiology](#)
- [Orthopedic Imaging: A Practical Approach](#).
- [Musculoskeletal MRI](#) (Helms strikes again) is the book to read to gain a dedicated foundation in MSK MRI.

### **Journals**

National : 1. Indian journal of Radiology and Imaging

International : American Journal Of Radiology  
Seminars in Radiology

E journals

Following ALARA PRINCIPLE