

MD RADIODIAGNOSIS

Syllabus

Course contents:

Anatomy

Gross and cross sectional anatomy of all the body systems.

Pathology

Gross morphology of pathological conditions of systemic diseases affecting all organ systems.

Radiology Course

This would cover imaging and interventions of diseases affecting all the body systems:

- Chest
- Cardiovascular system
- Musculoskeletal including soft tissue
- Gastrointestinal system
- Hepato-biliary-pancreatic system
- Urogenital (genito-urinary) system
- CNS including head and neck
- Obstetrics and gynaecology
- ENT, eye, dental, breast
- Endocrine and metabolic system
- Clinically applied radionuclide imaging

Radiological Physics

1. Introduction of general properties of radiation and matter: Fundamentals of nuclear physics and radioactivity
2. Interaction of x-rays and gamma rays with matter and their effects on irradiated materials
3. X-ray Generating Apparatus
4. Screen-film radiography
5. Film processing: Dark room, dry processing, laser /dry chemistry cameras, artifacts.
6. Fluoroscopy: Digital including flat panel units, fluoroscopy cum radiography units
7. Digital radiography: Computed Radiography, Flat panel radiography
8. Other equipments: Ultrasound including Doppler, CT, MRI and DSA
9. Contrast Media (Iodinated, MR & Ultrasound) - types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management
10. Nuclear Medicine: Equipments and isotopes in various organ systems and recent advances
11. Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film-less department and for Teleradiology
12. Radiation protection, dosimetry and radiation biology

13. Image quality and Quality Assurance (QA)
14. Recent advances in radiology and imaging

The student should have knowledge of the following physics experiments:

- Check accuracy of kVp and timer of an X ray unit
- Check accuracy of congruence of optical radiation field
- Check perpendicularity of x ray beam
- Determine focal spot size
- Check linearity of timer of x ray unit
- Check linearity of mA
- Verification of inverse square law for radiation
- Check film screen contact
- Check film screen resolution
- Determine total filtration of an x ray unit
- Processor quality assurance test
- Radiological protection survey of an x ray unit
- Check compatibility of safe light
- Check performance of view box
- Effect of kVp on x ray output

Radiography and processing techniques

1. Processing techniques: includes dark room and dry processing.
2. Radiography of the musculo-skeletal system including extremities.
3. Radiography of the chest, spine, abdomen and pelvic girdle.
4. Radiography of the skull, orbit, sinuses.
5. Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
6. Contrast techniques and interpretation of the Central Nervous system.
7. Contrast techniques and interpretation of the cardiovascular system including chest.
8. Contrast techniques and interpretation of the genito - urinary system including Obstetrics and Gynaecology.
9. Paediatric radiology including MCU, genitogram, bone age.
10. Dental, portable and emergency (casualty) radiography.

TEACHING AND LEARNING METHODS

The training is spread over 3 years and includes following components:

1. Physics related to imaging
2. Rotational posting in various sub-specialties.
3. Seminars, case discussion, journal club.
4. Research methodology and statistics.
5. A log book should be maintained by the student and will be checked and signed

- regularly by the faculty-in-charge during the training program.
- The postgraduate students shall be required to participate in the teaching and training program of undergraduate students and interns.
 - The postgraduate student would be required to present one poster presentation, to read one paper at a national/state conference and to submit one research paper which should be published or accepted for publication or sent for publication to a peer reviewed journal, during the period of his/her postgraduate studies so as to make him/her eligible to appear at the postgraduate degree examination.
 - Department should encourage e-learning activities.

Rotations:

During the three-year course, suggested rotations are as follows:-

- Conventional chest, abdomen, musculoskeletal including skull, spine, PNS and mammography etc 8 months
- Contrast studies: G.U., GIT, Hepato-biliary, angiography etc including fluoroscopic guided interventions 8 months
- US, Doppler and US guided interventions 8 Months
- CT and CT guided interventions 6 Months
- Emergency radiology 2 Months
- M.R.I. 2 Month
- Elective posting 2 Months

During each posting, post graduate student should be able to perform the procedures and interpret the findings.

PROPOSED SCHEDULE FOR ROTATION

1 st Year (1/6)	Conventional Chest & abdomen	Conventional skull, spine, musculo-skeletal etc.	US	Contrast studies - GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US
	US & interventions	Conventional skull, spine, musculo-skeletal etc.	CT	Contrast studies -- GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US & interventions
2 nd Year (3/6)	Conventional Chest & abdomen	Contrast studies - GIT & other fluoroscopic investigations including angiography	Contrast studies - G.U. tract	US & interventions	Emergency	CT
	Conventional skull, spine, musculo-skeletal etc.	Contrast studies - G.U. tract including pediatric MCU/genitogram	US & interventions	US & Doppler	Emergency	MRI
3 rd year (5/6)	Conventional Chest & mammo-graphy	Contrast studies - GIT & other fluoroscopic investigations including angiography	US & Doppler	Emergency	CT & interventions	Elective
(6/6)	Conventional musculo-skeletal & mammo-graphy	Contrast studies - G.U. tract including pediatric	CT& interventions	CT & interventions	MRI	Elective

		MCU/genito-gram				
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During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

Postgraduate Examination

The Post Graduate Examination was conducted in three parts.

1. Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis (Dissertation). Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of

identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D. shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

- Paper I:** Basic sciences related to Radiology (consists of Anatomy, Pathology, Basic and Radiation Physics, Imaging Techniques, and Film processing).
- Paper II:** Chest, CVS, CNS including Head & Neck, Eye, ENT, musculo-skeletal, pediatric radiology and Mammography.
- Paper III:** Abdominal Imaging including GI, GU, Hepatobiliary, endocrine and metabolic, Obstetrics and Gynaecology and Interventional radiology
- Paper IV:** Recent advances, nuclear medicine; Radiology related to clinical specialties

All papers would consist of short answer questions (minimum 10) covering all aspects of the course.

3. Practical/clinical and oral Examination (will include cases, spots, ultrasound procedure, physics, implements etc)

Practical Examination will have:

1. 3-4 Cases
2. Film Quiz (50 – 60 Spots)
3. To perform Ultrasound on a patient

Oral/Viva voce will include:

- Radiation Physics and quality assurance
- Implements, Catheters and contrast
- Cassettes, films, dark room, equipment
- Radiographic techniques, Radiological procedures,
- Gross pathology

Suggested Reading:

Books (latest edition)

1. Grainger & Allison's Text book of Diagnostic Radiology (Churchill Livingstone)

2. Textbook of Gastrointestinal Radiology- Gore and Levine (Saunders)
3. MRI of Brain and Spine - Scott Atlas (LWW)
4. Diagnosis of Diseases of the Chest -Fraser
5. Diagnostic Imaging Series: (Amirsys, Elsevier)
Abdominal Imaging, Orthopedics, Head and Neck, Neuroradiology, Pediatric Radiology Chest, Obstetrics, Breast
6. MRI in Orthopedics and Sport Injuries - Stoller
7. Skeletal Radiology - Greenspan
8. Abdominal-Pelvic MRI - Semelka (IWW)
9. Caffey's Pediatric Radiology
10. CTI and MRI of the whole body- John R. Haaga
11. Text Book of Radiology and imaging - Davod sulton
12. Diagnostic ultrasound - Carol C. Rumack
13. AIIMS-MAMC-PGI's Comprehensive Textbook of Diagnostic Radiology,
Volumes 1, 2, 3

Journals

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journal based / recent advances learning				
2.	Patient based /Laboratory or Skill based learning				
3.	Self directed learning and teaching				
4.	Departmental and interdepartmental learning activity				
5.	External and Outreach Activities / CMEs				
6.	Thesis / Research work				
7.	Log Book Maintenance				

Publications Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE SIGNATURE OF CONSULTANT SIGNATURE OF HOD

