# REGULATIONS AND CURRICULUM GOVERNING

# FELLOWSHIP IN INTERVENTIONAL RADIOLOGY PROGRAM

**(2023-24)**

**Name of the Constituent Unit/Centre: Yenepoya Medical College**




**Deralakatte, Mangalore, Karnataka.**

YENEPOYA

A+ NAAC

## YENEPOYA (DEEMED TO BE UNIVERSITY)

OFFICE OF THE REGISTRAR

No.: 52-ACM/06/2023

Date: 22.9.2023

# NOTIFICATION

**Sub:** Starting of Fellowship Program in Interventional Radiology reg.:-

**Ref:** 1. Resolution of the Academic Council at its 52nd meeting held on 17.08.2023 vide agenda-06.

2. Resolution of the Board of Management at its 63rd meeting held on 21.09.2023 vide agenda-03.

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Pursuant to the resolutions cited in the above references, the Yenepoya (Deemed to be University) hereby notifies the commencement of the Fellowship program in Interventional Radiology in the Department of Radio-diagnosis & Medical Imaging under the Faculty of Medicine from the academic year 2023-2024.

The curriculum and regulations governing the program have also been approved by the above bodies.

**REGISTRAR**

To:

PA to Vice Chancellor
Dean of Academics, Yenepoya (Deemed to be University)
Controller of Examinations
Dean, Faculty of Medicine
Principal, YMC
Head, Department of Radio-diagnosis & Medical Imaging
File Copy

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# Preamble

The purpose of fellowship program is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Interventional Radiology is a subspeciality of radiology in which minimally invasive procedures are performed using image guidance. Some of these procedures are done for purely diagnostic purposes (for example, Angiography), while others are done for treatment purposes.

Interventional radiology procedures are life-saving and cost-effective. Ranging from the treatment of acute stroke to tumors, technology coupled with innovations in interventional radiology is bringing significant changes to traditional treatment options with better outcomes for patients and shorter stays in hospitals. It is important, therefore, with limited resources and increased demand for healthcare in India, interventional radiologist can play vital role in bridging the gap. This will increase the overall efficiency of our health care system. Currently, fellowship training program in Interventional radiology are not available in most parts of India.

Though interventional radiology is very much part of the MD or Diplomate of National board (DNB) radiology curriculum in India, the 3-year training may only provide an overview of the field. Further training is necessary to learn the skills required to be a competent and safe Interventional radiologist. With limited number of training posts available in India, there is a shortage of interventional radiologists to cater to the rising need.

Yenepoya Medical College provides comprehensive care through 1268 bedded tertiary care facility through broad and super specialty departments. Department of Radiodiagnosis is running postgraduate program from 2009. We have all the expertise, clinical material, infrastructure to offer fellowship program in Interventional Radiology.

## PROGRAM CODE -IR04

## Eligibility for admission

MD, or DNB in Radiology

## Aim of the Program/Course:

The aim of the course is to train specialists in radiology to acquire comprehensive knowledge of the imaging modalities used in Interventional radiology and develop the skills to do both diagnostic and therapeutic interventional procedures

# Objectives/ Outcomes of the program

## *(Knowledge/ Skill/ Attitude/ Communication)*

## Program Outcomes

At the end of the course, the student should be able to acquire the following competencies.

## Knowledge domain

- PO01. Demonstrate comprehensive knowledge about radiologic and gross anatomy, relevant to vascular and non-vascular interventions.
- PO02. Gain thorough knowledge of the essential and advanced tools and equipment for vascular and non-vascular procedures to safely and effectively perform the required intervention.
- PO03. Acquire comprehensive understanding of vascular pathologies and indications/ contraindications/ complications for radiological interventions.
- PO04. Demonstrate ability to perform detailed clinical examination and evaluation of patients referred for interventional procedures.
- PO05. Appreciate to comply with legal and ethical standards in carrying out clinical, procedural and post procedural patient care.
- PO06. Be aware of indications and contra indications for vascular and non-vascular interventional radiological procedures.
- PO07. Be conversant about hardware/ instrumentation involved in interventional radiological procedures.

## Skill domain

- PO08. Assist/ Perform and interpret non-invasive and invasive imaging evaluation of disease of the vascular systems and of other regions amendable to Interventional radiology therapy.
- PO07. Demonstrate ability to deliver periprocedural care and follow-up in patients who undergo interventions.

- PO08. Assist/ Perform under supervision undertake the vascular techniques including access, cannulation, angiography, angioplasty, stent placement, embolization, intra-arterial drug administration, vascular closure, and hemostasis.
- PO09. Demonstrate ability to undertake the non-vascular approaches such as percutaneous drainage, biopsy, or ablation using different guidance methods, including ultrasound, Computed Tomography, etc.
- PO010. Acquire necessary skills to perform imaging, therapeutic and interventional procedures as required in all neurological diseases.
- PO011. Demonstrate ability to integrate knowledge and skill for conducting common procedures in simulated environment.
- P012. Attain basic skills in biomedical research including critical analysis of medical literature and generating research questions, hypothesis and undertake research projects.

## Attitude/Communication Domain

- P013. Acquire skills to communicate effectively with patients and primary care givers by providing empathic, compassionate, confident and evidence-based counselling with respect to the interventions planned as a part of diagnosis or therapy.
- PO14. Demonstrate ability to practice according to ethical principles of providing or withholding of clinical care, confidentiality of patient information, obtaining informed consent and general practice of medicine.
- P015. Demonstrate ability to explain the risks and benefits of diagnostic or therapeutic proceduresand listen compassionately patient's preferences and expectations.
- PO16. Acquire essential communication skills to effectively interact with specialists in a wide range of other disciplines in the hospital and other hospitals, to deliver state of the art clinical care by multi-disciplinary patient care approach.

# Program Specific Outcomes

| | | |
|---|---|---|
| PSO1 | To make a diagnosis | Demonstrate ability to use all modern diagnostic imaging modalities including fusion imaging, ultrasound, DSA, CT, MR, SPECT, CT SPECT, PET, CT-PET and radionuclide scans.<br><br>Demonstrate ability to decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.<br><br>Demonstrate ability for clinical judgment and technical skills in diagnosis and comprehensive management of patients requiring interventional radiology procedures |
| PSO2 | To formulate a treatment plan | Demonstrate scientific approach in evaluating the patient, discussing with multidisciplinary team and formulating appropriate diagnostic or therapeutic treatment plan keeping in mind the patient needs. |
| PSO3 | To counsel the patient | Acquire Counselling skills to help patient and primary care provider understand about rationality of all imaging and interventional procedures, possible contrast reaction, complications of anesthesia and interventions and how it may affect the overall outcome.<br><br>Demonstrate ability to explain the procedure and answer all related questions and concerns raised by the patient and family. |
| PSO4 | To Perform appropriate Procedures | Acquire skills to perform simple, common non- vascular procedures under ultrasound and fluoroscopy guidance e.g.abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc. |

| | | |
|---|---|---|
| | | Assist/ Perform under supervision common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents.<br><br>Assist/ Perform transfemoral puncture and insert catheter, help in angiographic procedures both diagnostic and interventional |
| PSO5 | To Manage or prevent Complications | Acquire knowledge about the relative and absolute contraindications for each individual procedure and apply clinical skills to weigh the risks versus benefits for each patient.<br><br>Demonstrate ability to properly recognize procedural complications and manage them using pharmacological or procedural interventions, or by timely consulting proper services. |
| PS06 | To acquire basic skills in research | Develop the expertise to perform a scientific study including formulating hypothesis, research questions, designing appropriate study, analyze and interpret the results.<br><br>Demonstrate competence in presentation of case reports, short study findings at institute level, regional, or national professional and scientific society meetings. |

## Program structure: Weekly schedule

| | |
|---|---|
| Duration of the course | 13 months |
| Theory | 4 hours per week |
| Practical and Clinics | 12 hours per week |
| Contact hours | 42 hours per week |

| | |
|---|---|
| E-learning hours | 4 hours per week |
| Research Work | 2 hours per week |
| Self-Directed Learning | 6 hours per week |
| Clinical services/ Diagnostic services | 18 hours per week |

## Attendance

After completing 13 months of course with 80% minimum attendance is required to appear for the University exam.

# Syllabus / Course contents

A. PATIENT SAFETY AND OCCUPATIONAL HAZARDS:

- Selection and evaluation of patients before Interventional radiology procedures
- Identify high risk factors for procedures and anesthesia
- Importance of consent taking before procedures
- ALARA and its applications in Interventional radiology
- Patient education and follow up

B. PHYSICS RELATED TO INTERVENTIONAL RADIOLOGY PROCEDURES

- Basic DSA physics
- Types of DSA equipment
- Various advanced application of DSA such as 3D rotational angiography, Xper CT etc

C. TECHNICAL ASPECTS RELEVANT TO INTERVENTIONAL RADIOLOGY (BASIC KNOWLEDGE OF HARDWARE)

- Sheaths, wires and catheters
- Micro guide ware and Micro catheters
- Balloons, stents and stent grafts
- Embolizing agents
- Other products: Stroke intervention, IVC filters, sclerosants, DE beads
- Basic technique: Seldinger and Pigtail etc

D. PHARMOCOLOGY RELEVANT TO INTERVENTIONAL RADIOLOGY

- Local anesthetic agents: Lignocaine, Bupvacaineetc
- Heparin/ Heparin induced toxicity
- Other anticoagulants including newer agents
- Anti-platelet agents
- Thrombolytic agents
- Contrast agents and their effects
- Emergency/ important drugs: Adrenaline, Non Adrenaline, Steroids, Anti histamines, Dopamine, Labetalol, Mitroglycerine, Abciximab, Tirofiban, rtPA, Urokinase, Nimodipne and other drugs used in ICU
- Common antibiotics – doses, adv effects used in peri-procedure period
- Drugs used for sedation/ analgesia for short procedures: Midazolam, Fentanyl and Tramadol etc

E. ANATOMY AND PATHOLOGY RELEVANT TO INTERVENTIONAL RADIOLOGY PROCEDURES

- Anatomy of important parts of body in brief with emphasis on arterial and venous anatomy and nerve supply or other important applied aspects relevant to Interventional radiology
- Pathology of various vascular and non-vascular disorders managed by Interventional radiology
- CNS: Aneurysms, AVMs, DAVFs and Venous thrombosis
- H&N: Parangliomas, JNF and Thyroid lesions etc
- Chest: Common SOLs, Bronchial and Vascular concepts and liver endobronchial/ vascular interventions
- Abdomen: Liver anatomy with emphasis on vascular concepts and liver transplant evaluation, Renal anatomy and transplant anatomy etc
- Other: Osteoid osteoma and vascular malformations etc

F. SPECIFIC ENDOVASCULAR TRAINING MODULES

Section A: Non-vascular interventions in Chest, Gastrointestinal tract and Hepatobilliary systems

- Image Guided Biopsy (Excluding MSK)
- Image guided aspiration and drainage of collections and abscess
- Gastrointestinal interventions
- Enteral Tube Placement (Gastrostomy, Gastro – Jejunostomy, Jejunostomy and Caecostomy)
- Gastrointestinal stenting
- Hepato-pancreatico biliary (HPB) intervention

Section B: Intervention of the Genito urinary tract and renal transplants

- Pelvicalyceal and Ureteric obstruction
- Renal stone disease
- Renal masses and perirenal collections
- Genito – Urinary interventions
- Prostatitis (Abscess)
- Renal transplant interventions
- Section C: Interventional radiology of the musculoskeletal system
- Image guide biopsy
- Percutaneous ablation of bone and soft tissue lesions
- Intra-articular injections under image guidance
- Percutaneous osteoplasty
- Spinal interventions
- Interventions in vertebral body compression fracture (VBCF)
- Spinal procedures for disc, Nerves and Facet joints
- Section D: Interventional Oncology
- Fundamental Interventional Oncology
- Vascular Interventional Oncology
- Non-vascular Interventional Oncology
- Section E: Vascular diagnosis and intervention
- Arterial disease
- Peripheral arterial disease
- Aortic and upper extremity arterial disease

- Aortic dissection and aneurysmal disease
- Supra-aortic disease
- Vascular malformations
- Vascular trauma
- Visceral arterial disease
- Arterial problems in Obstetrics and Gynecology
- Prostate artery embolization (PAE)
- Priapism
- Section F: Venous disorders
- Venous thrombosis and insufficiency
- Pulmonary thromboembolic disease
- Disease of the superior and inferior venacava
- Portal and hepatic venous interventions
- Portal venous disease and transjugular intrahepatic portosystemic shunt (TIPS) and balloon occluded retrograde transvenous obliteration (BRTO)
- Hepatic venous disease and Budd-chiari syndrome
- Gonadal venous interventions
- Hemodialysis access
- Central venous access
- Venous sampling
- Section G: Important Neuro interventional procedures
- Carotid stenting
- ECA territory embolization
- Brain aneurysm management
- Other brain vascular malformations
- Stroke management

PRACTICALS

Physics

- Effectiveness of Lead Apron and other protective devices
- Physics of DSA/ Angiography an Fluoroscopic techniques

- Quality control in DSA/ Interventional radiology lab

  Practical training in DSA/ Interventional radiology lab
- Basic table movements and DSA/ Fluoroscopic controls
- Radiographic views used in various interventions
- Contrast agents being used for procedures
- Post processing and use of other advanced angiographic techniques

  Anatomy
- Relevant gross and angiographic anatomy for various Interventional procedures

## Teaching - Learning methods and Academic Activities

| Teaching - Learning method | Academic Activities |
|---|---|
| Experiential learning | Case presentation |
| Integrated/Inter-disciplinary learning | Scientific society meetings/ Clinical Meet, Grand round |
| Participatory learning | Journal club, Seminar and interactive lectures |
| Problem-solving methodologies | Clinical Audit |
| Self-directed learning | Research work, Logbook |
| Patient-centric and Evidence-based learning | Case presentation |
| Project-based learning | Research work |
| Any other : Visits to institutes | Visits to other institution of excellence<br><br>Visit to laboratories, diagnostic facilities, affiliated clinical units and other areas. |

# Scheme of Examination

Internal Assessment (Frequency, Pattern-Theory and Practical)

Formative assessment: -Assessment of academic activities like journal club, seminar, case presentation, clinical meets and clinical audits, etc

Internal Assessment: Theory 100 Marks and Practical Examination of 50 marks

Theory paper will consist of 10 long essay questions

## University Examination (Pattern-Theory and Practical)

The final Examination: Theory 200 Marks (100 marks two papers) and Practical Examination of 100 marks. Each theory paper will consist of 10 long essays

| | |
|---|---|
| Paper – I - Basics of interventions – 40 marks<br>Instrumentations – 30 marks<br>Physics – 30 marks | 100 Marks |
| Paper – II – Advanced interventional procedures-1 | 100 Marks |
| Total | **200 Marks** |

Duration of Theory Papers: 3 hours

Practical Examination: -

| | |
|---|---|
| OSCE<br>(Objective Structured Clinical Examination)<br>3 Stations with one observation station | 30 Marks |
| Practical Skills Demonstration<br>(Simulation lab, Skills demonstration in cath lab, USG, MDCT)<br>Simulated case | 30 Marks |

| | |
|---|---|
| Viva Voce:<br><br>Discuss case scenarios, complex concepts, clarity of subject, case-based discussions, etc. | 30 Marks |
| Portfolio | 10 Marks |
| Total | 100 Marks |

## Eligibility to appear for University Examination

Minimum 80% attendance

At least one presentation/poster in international/national/state conferences.

Minimum 40% marks in Internal Assessment examination

Logbook submission

## Criteria for pass

Minimum 50 % marks in Theory

Minimum 50 % marks in Practical.

## Declaration of Results

Declared by the Yenepoya (Deemed to be University)/ Yenepoya Medical College

## Logbook/Portfolio (if applicable)

Portfolio should record the learning experiences with reflections and which must be countersigned by the course director

# Recommended books


- Abrams textbook of angiography and interventional radiology
- Diagnostic Neuro angiography by Anne Osborne
- Vascular and Interventional radiology: The requisites Kaufmann & Lee
- Radiation Protection in medical Radiography: Mary alicestatkiewengsherer (5thed)
- Handbook of interventional Radiologic procedure: Krishna Kandarpa (4th ed)
- Angiography interventional Radiology: Stanely Baum – IInd ed
- Text book of gastrointestinal Radiology - George & Levine (3rd ED- Vol- I)
- Text book of gastrointestinal Radiology: George & Levine (3rd ED- Vol- II)

- Surgical neuroangiographyVoL –I, II and III: P. Lasjaunias, A. Berenstein and K.G. Ter Brugge.
- Practical Neuroangiography: Pearse Morris.
- Tutorials in Endovascular Neurosurgery and Interventional Neuroradiology: James Vincent Byrne (Springer).
- Textbook of interventional neurology: Adnan I. Qureshi
- Interventional Neuroradiology: Robert W Hurst and Robert H. Rosenwasser. Informa healthcare.
- Cerebral angiography (normal anatomy and vascular pathology): Gianni Boris Bradac (Springer)
- Diagnostic Cerebral angiography: Anne G Osborn (Lippincott William and Wilkins)
- Indian Council of Medical Research. National Ethical Guidelines for Biomedical and Health Research involving Human Participants. New Delhi; 2017. Available from: https://icmr.nic.in/guidelines/ICMR_Ethical_Guidelines_2017.pdf


## Physics:


MRI The Basics: Ray H hashemi, William G. Bradley

MRI in Practice: Catherine Westbroook and Carolyn Kaut.

Susceptibility Weighted Imaging in MRI Basic Concepts and Clinical Applications: Haacke, Mark E. / Reichenbach, Jürgen

Radiology and Imaging Physics

PACS and IT in imaging

## Journals

- Seminars in interventional radiology
- Journals of vascular and interventional radiology (JVIR)
- Cardiovascular and interventional radiology
- Journal of Neuro-interventional surgery (JNIS) for Neuro intervention
- RSNA journals – dedicated articles/ sections for interventions
- AJNR (American journal of Neuro radiology)

## Any other information

During the training program, patient safety is of paramount importance, therefore,skills are to be learnt initially on the models in the simulation laboratory and on large animals, later to be performed under supervision followed by performing independently.

# ANNEXURE

## Blueprint for Theory and Practical Examination

| Topic | Content Weightage | Type of assessment Reasoning/Analytical | No./Type of questions/Marks |
|---|---|---|---|
| Basic Interventions | 40% | 100% | 10 marks x 4 questions |
| Instrumentations | 30% | 100% | 10 marks x 3 questions |
| Physics | 30% | 100% | 10 marks x 3 questions |
| Basic Interventions | 40% | 100% | 10 marks x 4 questions |
| Total | 100% | | 10 LEQs<br>100 Marks |

## Blueprinting for theory paper: Paper 2

| Topic | Content Weightage | Type of assessment Reasoning/Analytical | No./Type of questions/Marks |
|---|---|---|---|
| Advanced Interventional procedures | 100% | 100% | 10 marks x 10 questions |
| Total | 100% | 100% | 10 LEQs<br>100 rks |

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# Question paper layout for theory examinations

## INTERVENTIONAL RADIOLOGY

## FINAL EXAMINATION – PAPER 1

**Time**: 3 hours

Your answer shall be **specific** to question asked.

Draw neat-labeled diagrams **wherever** necessary.

Answer **all** questions.

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(10 x 10 marks each)

1. Preparations, techniques and post procedure follow up of arterial and venous access
2. Preparation, hematological criteria and general conditions in the pre evaluation of interventional procedures
3. Basics of biliary interventions with reference to internal and external biliary drainage.
4. Percutaneous cross sectional image guided interventions
5. Classify endoluminal stents and its applications
6. Classify embolic agents and its applications in vascular interventions
7. Therapeutic drugs used in interventional procedures
8. DSA – basic physics, applications and its recent advances in the instrumentations
9. Radiation exposures and safety involved in the interventional DSA procedures with reference to health care personnel and patients
10. Classify different types of catheters and its recent developments

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## INTERVENTIONAL RADIOLOGY

## FINAL EXAMINATION- PAPER 2

**Time**: 3 hours

Your answer shall be **specific** to question asked.

Draw neat-labeled diagrams **wherever** necessary.

Answer **all** questions.

---

(10 x 10 marks each)

1. Hepatic tumor ablation with reference to recent developments
2. Interventions in biliary strictures
3. Transjugular intrahepatic portosystemic shunt (TIPS)
4. TACE versus TARE
5. Bronchial artery embolization. Indications, procedures and its complications
6. Uterine artery embolization. Its indications and procedures
7. Prostatic artery embolizatoin. Its indications and techniques
8. Stenting in peripheral artery disease
9. Complications of renal biopsy. Role of interventions in managing the complications
10. Interventions in Gastrointestinal bleed.

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## Logbook template (if applicable)

## Portfolio template










**YENEPOYA MEDICAL COLLEGE**

**A unit of Yenepoya (Deemed to be University)**

**University Road, Deralakatte, Mangaluru – 575018**

**Portfolio**

Name of the Fellow :

Department :

University Registration No :

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## STUDENT PROFILE

PHOTO

| | |
|---|---|
| Name of the Department | |
| Name of the Student | |
| University Registration Number | |
| Batch | |
| Contact No | |
| Email I D | |
| Guardian/ Parent | |
| Name of the Guide | |
| Name of the Nodal faculty | |
| Name of the Head of the Department | |

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**Clinical Posting at----------**

**Department:** **Postings from:** **to :**

| Date | ACTIVITIES DONE FOR THE DAY – Observed (O), Assisted (A), Performed (P) | Signature of the health facility in |
|---|---|---|
| | | |
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**Reflections**

**Reflective Writing:**

**What happened?**

**So What?**

**Then What?**

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# Seminars/Journal Club/Case Presentation

| Sl. No | Topics | Date | Signature of the Teacher |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |

## EVALUATION OF PRESENTATIONS

| Sl. No | Criteria for marks | Max. Marks 10 |
|---|---|---|
| 1 | Topic discussion with the concerned staff before | 1 |

| | | |
|---|---|---|
| | **presentation** | |
| **2** | **Gives adequate introduction** | 2 |
| **3** | **Quality of content** | 3 |
| **5** | **Quality of Presentation** | 2 |
| **6** | **Topic discussion (Q/A )** | 2 |

| Grade | Marks |
|---|---|
| **A** | 8-10 |
| **B** | 5-7 |
| **C** | 1-4 |

# CME/Conferences attended and Presentations

| S. No. | Date | Type of activity | Venue & Event |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |

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**Signature of Teacher**

## Any other Checklists/Formats for assessment