TATA MEMORIAL CENTRE

Office of the Director Academics

Fellowship Program in Thoracic Oncology

Unit / Department	:	Thoracic Oncology under Department of Surgical Oncology
Duration	:	1 Year
Eligibility	:	MS General Surgery / DNB Surgery

PREAMBLE

Thoracic oncology encompasses a wide variety of sub sites:

- Lung Cancer
- Esophageal Cancer
- Mediastinal Masses
- Chest Wall Tumours
- Pulmonary Metastases
- Airway Lesions

The diagnostic and management pathways for each of these are diverse, nuanced and most often need to be tailored to each individual patient.

India is the second largest consumer and third largest producer of tobacco in the world. Expectedly, lung and esophageal cancer remain a significant proportion of cancer burden in the country. With increased awareness and opportunistic screening, the number of patients diagnosed with curable stage cancer is on the upswing. With tuberculosis still being a common diagnosis in most parts of the country, a big proportion of lung cancer gets misdiagnosed causing unpardonable treatment delays. Thoracic malignancies are aggressive and unforgiving when it comes to treatment delays and they mandate efficient diagnostic and management pathways. Though mediastinal and chest wall tumours are relatively rare, their management involves multiple modalities of treatment. Surgery in such tumours is challenging and is best performed at centres with experience in treating these malignancies.

Very few centres in India give an insight into thoracic surgery as a part of their General Surgery curriculum. (MS or DNB) Training in cardiovascular and thoracic surgery (CVTS) in most centres focuses predominantly on cardiac surgery and to some extent, vascular surgery. After obtaining a degree in cardiovascular and thoracic surgery, very few surgeons are equipped with the know how of dealing with the intricacies of thoracic malignancies.

Surgical Oncology as a super specialty has seen a tremendous gain in popularity in India over the last two decades. Residency in surgical oncology involves rotations through diverse sub sites like Head Neck, Thoracic, Breast, Gynaecology, Urology, GI surgery, etc. over a short period of 3 years. As a part of Surgical Oncology training, a resident generally rotates through Thoracic Services for a total of 3 to 6 months. This short stint is usually insufficient to meet the level of proficiency, which is required to practice safe and oncologically sound thoracic surgery, where the margin for error is very low. Thoracic oncology involves multiple modalities of treatment with equal input from all specialties like surgeons, radiation and medical

oncologists, pulmonologists, anesthesiologists and intensivists. This is possible only in established high volume centre's, which have also shown to have better outcomes. Training in thoracic.

Surgical oncology should also be designed with the same ethos and guiding principles. Keeping in mind the increasing incidence of thoracic malignancies and multidisciplinary care making cure an achievable possibility; the time is ripe for India to design its first ever, dedicated thoracic surgical oncology program.

Tata Memorial Hospital is the largest tertiary cancer care centre in India and caters to patients from all over India and the Indian subcontinent. This institution has been at the forefront of all aspects related to cancer care since its inception in 1941. Focusing on thoracic oncology, this service sees close to 5,500 new registrations every year with lung and oesophageal cancer at the top of the list. The thoracic surgical unit performs approximately 180 oesophageal resections, 150 lung resections, 50 chest wall tumours, 30 mediastinal masses and 30 resections for airway tumours in a year. Approximately 30 percent of the resections are minimally invasive. All treatment related decisions are taken in multidisciplinary joint clinics.

TMH also leads the country with respect to research in the field of thoracic oncology and laying the evidence base for the same. With experts in the field, the sheer patient profile and a work culture steeped in evidence based medicine; it provides a ground fertile for promoting young researchers. There are several ongoing randomized controlled and other prospective trials in the thoracic surgical unit.

SUBJECT SPECIFIC OBJECTIVES

The aims of sub-specialisation in Thoracic Surgical Oncology are:

1) To create a work force of specialist surgeons trained in the field of Thoracic Oncology
2) To improve practice, knowledge and research in the field of Thoracic Oncology
3) To improve standards of care for patients suffering from thoracic cancers in India
4) To encourage co-ordinated management of thoracic malignancies as a multidisciplinary approach; with understanding of allied fields like medical and radiation oncology and pulmonology

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as per details given below:

A. Cognitive domain (theoretical knowledge):

The post graduate student should acquire knowledge in the following areas by the end of the training program:

- Anatomy of the thorax: lungs, esophagus, great vessels, nerves, thoracic inlet, upper abdomen
- Physiology of the cardiovascular and respiratory systems
- Pathology of premalignant and malignant conditions of the lung and esophagus
- Appropriate staging of thoracic malignancies
- Reading the radiology related to thoracic malignancies and formulating a surgical plan
- Understanding and interpretation of pulmonary function tests
- Pre-operative assessment and optimization of a patient for thoracic surgery
- Surgical principles in the management of various thoracic cancers
- Postoperative care including ICU management, ventilator management, fluid electrolyte and nutrition, prophylaxis against venous thromboembolism
- Basic principles of medical and radiation oncology in thoracic malignancies
- Rehabilitation after surgery for thoracic malignancies including speech swallow evaluation

Research:

By the end of the training program, the post graduate student should be able to:

- Design a research protocol, implement the same and interpret the results of the research study
- Evaluate the relevant literature critically
- Use of a data management platform like SPSS with basic skills
- Publish/submit two original articles related to the specialty in an indexed journal

Medical Statistics:

The post graduate student should acquire knowledge in the following areas of medical statistics:

- Type of data & Sampling
- Principles of statistical inference & comparing groups
- Survival analysis
- Phases of clinical trials
- Designing a clinical trial including sample size calculation and selecting suitable end-points
- Ethics and Informed consent

B. Affective Domain:

The post graduate student should:

1. Be able to function as a part of a team and develop an attitude of cooperation with colleagues
2. Adopt ethical principles and maintain proper etiquette in dealing with patients, caregivers and other health personnel
3. Respect the rights of the patient including the right to information and second opinion.

4. Communicate to the patient and relatives the nature of disease, the extent of disease, the treatment options available and expected outcome following management of the disease
5. Develop communication skills to word reports and professional opinions as well as to interact with patients, caregivers, peers and paramedical staff and for effective teaching.
6. Execute the planned treatment with the help of other colleagues in the specialty.
7. Attend at least one course dedicated to communication skills being conducted either in the same institution or by a recognized institution.

C. Psychomotor domain

At the end of the course, the student should acquire following practical and clinical skills:

1. Esophageal cancer
   - Diagnosis and staging
   - Surgical Planning
   - All types of surgery for Ca esophagus including minimally invasive surgery
   - Planning and docking a robot for surgery for ca esophagus
   - Routine post-operative management and management of complications

2. Lung cancer
   - Diagnosis and staging
   - Flexible and rigid bronchoscopic procedures
   - Invasive mediastinal staging: EBUS and Mediastinoscopy
   - Anatomical resection for ca lung including Video Assisted Thoracic Surgery
   - Planning and docking a robot for robotic lung resections
   - Routine post-operative management and management of complications
   - Management of malignant pleural effusion including pleurodesis

3. Lung metastases from other primary sites:
   - Understanding the radiology
   - Indications and contraindications of pulmonary metastasectomy
   - Open and minimally invasive pulmonary metastasectomies
   - Integrating systemic therapy

4. Chest wall tumours:
   - Understanding the radiology and planning a biopsy
   - Chest wall resection including sternal resection
   - Semi-rigid and rigid reconstruction techniques
   - Management of post-operative complications

5. Mediastinal masses:

- Work up and treatment algorithms of mediastinal germ cell tumours, thymomas and posterior mediastinal masses
- Understading radiology and planning suitable approach for surgery including sternotomy and VATS
- Planning and docking a robot for robotic thymectomy
- Routine post-operative management and management of complications

6. Management of central airway obstruction
7. Routine follow up and diagnoses of recurrence and its management algorithms
8. Planning and executing great vessel involvement, retrosternal involvement, mediastinal adenopathy in head and neck malignancies

SYLLABUS

Course contents:

- General principles of oncology to include cancer surgery, medical and radiation oncology
- Initial work-up and staging of site-specific thoracic malignancies
- Surgically relevant thoracic radiology
- Multidisciplinary joint clinics for oncological pathways
- Pre-operative work-up and optimisation for thoracic surgery
- High Risk Joint Clinics for evaluation and optimization of surgical risk
- Supervised, hands-on training in major and minor thoracic surgical procedures
- Management of post-operative complications
- Management of clinical data and clinical research methodology
- Exposure to palliative care and counselling of advanced thoracic malignancies

At the end of the course, the candidate will be in a position to evaluate, investigate and stage a patient with thoracic malignancy; formulate and safely execute an evidence based treatment plan. She/ he will also be trained to deal with the social aspects of cancer care, counselling and rehabilitation.

1. Diagnostic techniques and staging:

- Reading a CECT thorax, abdomen and pelvis
- Indications and interpretation of PET CECT, MRI brain, MRI thoracic inlet
- Indications and interpretation of special radiotracer scans
- Rigid and flexible bronchoscopic procedures
- Bronchoscopic biopsy

- Supraclavicular lymph node biopsy
- Core biopsy from chest wall lesions
- Principles of image guided biopsy
- Endobronchial Ultrasound for mediastinal staging
- Mediastinoscopy
- Pleuroscopy
- Planning image guided biopsies from metastatic sites
- Assessing need and interpreting follow up imaging
- Understanding upper GI endoscopy, mapping esophageal lesions
- Concept of endoscopic management of in situ/ early esophageal cancers, premalignant lesions
- Interpretation of tumour markers
- Interpretation of routine blood tests, coagulation profile
- Interpretation of pulmonary function tests and need for referral for pulmonary/ cardiac optimization or optimization of other co-morbid conditions.
- Formulating stage appropriate management protocols within a multidisciplinary team

2. Surgery for thoracic malignancies

- Pre-operative evaluation for fitness for thoracic surgery
- Pre-operative optimisation
- Need for pulmonary, nutritional rehabilitation
- Pre-operative preparation and starvation protocols
- Prophylaxis against venous thromboembolism
- Informed consent for routine and high risk surgery
- Planning the surgery, indications and contraindications for minimally invasive procedures
- Executing routine surgeries for thoracic malignancies
- Management of intra-operative events
- Post-operative care including intensive care, fluid and nutrition management
- Diagnosis and management of common post-operative complications

Over a period, the candidate is expected to gain proficiency in the following procedures:

- Esophagectomy: transthoracic, Ivor Lewis, Left thoraco-abdominal approaches, Video Assisted Thoracoscopic Surgery an laparoscopy, basics of robotic esophagectomy
- Lung resections: Anatomical and non-anatomical resections including VATS, basics of robotic lung resection, systematic mediastinal lymph node dissection
- Chest wall resection including sterna resection with semi rigid/ rigid reconstruction
- Mediastinal mass excision including VATS approach and basics of robotic thymectomy
- Open and VATS pulmonary metastasectomy
- Rigid and flexible bronchoscopic procedures

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Office of the Director Academics

Fellowship Program in Thoracic Oncology

The candidate will be expected to maintain a logbook of procedures performed and assisted including the following:

- Type of surgery
- Role performed
- Intraoperative events
- Postoperative complications
- Histopathology

3. Principles of Radiation Oncology

- Radiobiology principles
- Basics of radiation oncology planning and treatment delivery
- Indications of radiation in thoracic malignancies
- Early and late post radiation complications

4. Principles of Medical Oncology

- Principles of chemotherapy, targeted therapy and immunotherapy
- Indications of systemic therapeutic agents in thoracic malignancies
- Response assessment
- Post chemotherapy complications
- Role of molecular markers, Next Generation Sequencing and liquid biopsies

5. Basics of Pulmonology

- Pulmonary function tests
- Calculating post-operative predicted values
- Understanding the need for pulmonology referrals and bronchodilators
- Basic radiology for lung parenchymal disease

6. Post-operative Rehabilitation

- Speech and swallow assessment
- Management of aspiration and oropharyngeal dysphagia
- Chest physiotherapy

7. Basics of palliative care

- Symptom management in advanced/ metastatic disease

- Counseling of patients and caregivers
- End of life care
- Competency in breaking bad news

8. Basics of pathology of common thoracic malignancies

COURSE STRUCTURE

1. Ward rounds: The candidate will be expected to present/ attend ward rounds of all admitted patients
2. Joint Clinics: The candidate will be a part of the multi-disciplinary team formulating the treatment plan for each patient
3. High Risk Joint Clinic: The candidate will be a part of the high risk JC for discussion and planning of high risk surgical candidates
4. Journal Club: Will be conducted once a week , where the candidate will be expected to present/ partake in the discussion of recent advances in the field of thoracic oncology
5. Academic session: Will be conducted once a week where the candidate will be expected to present/ partake in the discussion of any clinical/ theoretical topic of interest, surgical video demonstrations.
6. Clinical case presentation: Will be organized once in 2 weeks where the candidate will present a case or partake in the discussion
7. Covering emergencies: the candidate will be expected to cover emergencies on a rotation basis with a covering consultant
8. Specialty conferences/ workshops: the candidate will be encouraged to present posters/ oral papers or videos at specialty conferences. The post graduate student will be required to have presented at a minimum of 3 conferences (national and/or international) during her/his tenure.
9. Operative log book: the post graduate student will be expected to maintain a logbook with details of all procedures performed or assisted. This will be periodically checked by the faculty.
10. Simulation for bronchoscopy, skill lab for minimal access surgery will be conducted on a periodic basis

COURSE TOPICS AND LECTURES

- Premalignant diseases of the esophagus
- Diagnosis and staging of esophageal cancer
- Neoadjuvant therapy in esophageal cancer
- Surgical approaches for esophageal cancer
- Management of post esophagectomy complications
- Treatment of locally advanced and metastatic esophageal malignancy
- Screening for lung cancer
- Diagnosis and staging of lung cancer

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Office of the Director Academics

Fellowship Program in Thoracic Oncology

- Management of early stage lung cancer: mediastinal staging and surgical technique
- Management of locally advanced lung cancer
- Management of metastatic lung cancer: systemic therapy, role of palliative radiotherapy.
- Oligometastatic lung cancer
- Management of carcinoids
- Small cell lung cancer
- Malignant pleural mesothelioma management
- Diagnosis and management of chest wall tumours
- Diagnosis, staging and management of mediastinal masses and its associated emergencies
- Principles and technique of pulmonary metastasectomy
- Assessing quality of life
- Pain management and palliative care in advanced thoracic malignancies
- Role of interventional radiology in thoracic malignancies

SUGGESTED JOURNALS

- New England Journal of Medicine (NEJM)
- Lancet Oncology
- Journal of Clinical Oncology (JCO)
- Journal of Surgical Oncology (JSO)
- Cancer
- The Annals of Thoracic Surgery
- Journal of Thoracic Oncology
- Thoracic Cancer
- European Journal of Surgical Oncology
- Indian Journal of Surgical Oncology

SUGGESTED BOOKS FOR READING

- Devita, Hellman and Rosenberg's Cancer, 11th edition
- IASLC thoracic oncology 2nd edition
- NCCN guidelines for thoracic malignancies
- Shields General Thoracic Surgery 8th edition
- Pearson's Thoracic and Esophageal Surgery 3rd edition
- Nesbitt's Thoracic Surgical Oncology

SUGGESTED READING

Lung cancer

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Fellowship Program in Thoracic Oncology

Sr.No	Name of the trial	Important conclusions
1	NLST- National Lung Screening Trial	LDCT vs Chest radiography in screening for lung cancer NLST criteria has been widely adopted as the standard screening criteria 20% reduction in mortality in screened patients
2	NELSON trial for lung	24% reduction in mortality in screened patients.
3	LCSG- Lung cancer study group- 1995 Lobectomy vs. wedge resection for T1 lung cancers	3- fold increase in local recurrence rate with sublobar resections
4	LACE- Lung adjuvant Cisplatin Evaluation	Adjuvant therapy beneficial in tumors >4 cm or node positive status
5	Intergroup 139- N2 disease- Def CTRT alone vs CTRT f/b Surgery- Albain et al	Surgery beneficial if pneumonectomy can be avoided.
6	Roth et al- induction chemo with surgery vs surgery alone Rosel et al- NACT f/b surgery vs surgery alone)	OS better in induction chemo arm
7	EORTC 08941- induction chemo f/b RT vs induction chemo f/b surgery	OS similar in both groups
8	ESPATUE- N2 disease- induction chemo with CRT f/b CRT boost vs induction CRT and surgery	OS similar in both groups
9	ADAURA- adjuvant Osimertinib in completely resected lung cancer FLAURA- first line Osimertinib in	PFS significantly better in Osimertinib arm. OS not shown
10	PACIFIC trial- Adjuvant Durvalumab after Definitive CT/RT in N2 disease	Improvement in both PFS and OS
11	Lung ART- post operative radiotherapy in N2 disease(only abstract)	No survival benefit seen with PORT
12	JCOG 0802- segmentectomy vs lobectomy for stage IA lung cancer	Better OS with segmentectomy
13	VIOLET trial- VATS vs Open surgery for lung cancer (abstract only)	Length of hospital stay reduced with VATS- no difference in oncological outcomes

14	ROSEL STARS RTOG 1021- all 3 trials comparing SBRT vs Surgery for early stage lung cancer- trials abandoned due to poor accrual.	3 year interim analysis from STARS trial showed SBRT to be superior- but small sample size and small follow up period.
15	Checkmate 816	Neo adjuvant chemo plus immunotherapy for operable lung cancer
16	ImPower 010	Adjuvant immunotherapy for resectable lung cancer
17	Gomez et al	Oligomets in Lung cancer- treatment with definitive radical therapy improves OS

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Office of the Director Academics

Fellowship Program in Thoracic Oncology

Esophageal cancer trials

Sr.No	Name of the trial	Important conclusions
1	MAGIC- ECF Regimen- Periopchemo vs Surgery alone	5 year OS- 36% vs 23% in surgery alone arm
2	FFCD- Cis + 5-FU- Periop chemo vs Surgery alone	5 years OS- 38% vs 24%
3	FLOT 4- AIO- docetaxel based regimen- Peri-op chemo vs Surgery alone	Median OS- 35 vs 50 months
4	CROSS- Chemoradiation vs Surgery alone 2 yr 5 yr 10 yr	Median OS-48.6 vs 24.0 months
5	NEO-CRTEC- only SCC- Chinese trial- CTRT vs surgery alone	Median OS- 100 vs 66.5 months
6	NEO-RES- NACT vs NACRT	38.9% vs 33.0 % (not significant) @ 5y
7	Burmeister- NACT vs NACRT	49% vs 52 %(not significant)
8	Stahl (POEM)	39.5 vs 24.4% @ 5 y
9	Neo-AEGIS- MAGIC/FLOT vs CROSS	57% vs 56 % @ 3y
10	ICAN trial- cervical vs thoracic anastomosis	Leak rates significantly lesser with cervical anastomosis
11	Hulscher et al- Transhiatal vs Transthoracic esophagectomy	Lesser pulmonary complications with transhiatal. But better results when lymph nodes involved with transthoracic
12	MIRO- MIS vs Open	@ 2y MIS had better QoL
13	TIME- MIS vs Open	DFS and OS similar in both
14	SANO and preSANO cohort studies- to determine accurate methods to assess response after n CRT	Final results awaited

TEACHING AND LEARNING METHODS

- Practical teaching in operating rooms
- Journal club every Monday and Thursday morning
- Tuesday evening case presentations (as part of SO training)
- Allied branches rotation
- Opportunities to conduct various research activities, protocol development course, retrospective and prospective studies
- Participation in trial related activities as per duty delegation

Clinical rotations during the proposed tenure:

- 1 month in Radiation Oncology

TATA MEMORIAL CENTRE

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Fellowship Program in Thoracic Oncology

- 1 month in Medical Oncology
- 1 week in speech and swallow rehab
- 1 week in palliative care services
- 2 weeks in medical gastroenterology
- 2 weeks in pulmonology

RESEARCH

Each trainee will be expected to undertake a prospective clinical project that has to be completed prior to her/his final evaluation. In addition, the trainee will be a part of all ongoing clinical trials in the unit. Academic activities and journal clubs will be conducted twice a week and the trainee will be expected to present specified topics of interest at these meetings. She/ he will also be encouraged to present papers and surgical videos at national and international conferences.

ACCREDITATION CRITERIA

Primary faculty of Thoracic Surgical Oncology:

1) Dr. C.S. Pramesh MS, FRCS
   Professor and Chief, Thoracic Services

2) Dr. Sabita Jiwnani MS, MRCS, MCh Surgical Oncology
   Professor

3) Dr. Virendrakumar Tiwari MS, DNB, MCh Surgical Oncology
   Associate Professor

4) Dr. DevayaniNiyogi MS, Mch Surgical Oncology
   Associate Professor

Associated Faculty:

1) Members of the Departments of:
2) Medical Oncology
3) Radiation Oncology
4) Anaesthesiology, Pain and Critical care
5) Pulmonology
6) Radio-diagnosis and Interventional Radiology
7) Palliative Medicine
8) Pathology & Microbiology
9) Speech and Swallow Therapy

HOSPITAL INFRASTRUCTURE AND FACILITIES

- Total hospital bed strength: 474

- Total ICU capacity: 48
- Day care: 43
- At any given point, we have approximately 15 to 20 patients admitted under the thoracic surgical service.

OPERATION THEATRES AND EQUIPMENT

- 7 fully equipped Operation Theatres per week are for dedicated thoracic surgical work
- State of the art equipment for minimally invasive surgery including the 3D and 4K optical systems
- Da Vinci xi Robotic system
- Facility for Endo Bronchial UltraSound
- Minor Operation Theatres 3 days a week for bronchoscopies and minor surgical procedures

SUPPORTING SERVICES

- In house departments of Medical and Radiation Oncology
- Fully equipped surgical ICU
- Fully equipped 24 bed intermediate care/ recovery area
- In house 24 hour facility for CT scan, MRI, PET CT and interventional radiology
- Fully equipped blood bank with a dedicated plasma fractionation unit
- In house Medical Social Worker Service with a hospice for patients needing prolonged rehabilitation/ supervised care.

SPECIAL PARAMEDICAL STAFF

Trained operation theatre staff
Dedicated physiotherapist and occupational therapist
Speech and swallow therapist
Acute and chronic pain team

ASSESSMENT

1) Formative assessment: Should be a continuous process assessing the medical knowledge, patient care, procedural and clinical skills and interpersonal skills.
2) Periodic assessment: Quarterly assessment based on a Work Based Assessment form capturing the procedures performed by the candidate, the ongoing research projects and the guide's evaluation of the candidate's progress in various clinical and non clinical domains. It will also incorporate the candidate's plan for the next quarter to be discussed with the guide.
3) Annual theory assessment
4) Annual practical assessment: including case presentation, clinical case scenarios, radiology and pathology

5) Summative assessment: at the end of tenure as per the Post Graduate Medical Education Regulations, 2000.

It will include the following:

Theory assessment

Paper 1: Basic sciences and epidemiology of thoracic malignancies
Paper 2: Screening, diagnosis, staging and treatment algorithms in thoracic malignancies
Paper 3: Details of surgical management, basics of radiation and medical oncology in thoracic malignancies
Paper 4: Recent advances and biostatistics

A) Practical Assessment

- 1 long case: history taking, examination findings, working diagnosis, radiology, treatment planning
- 2 short cases: short history, relevant clinical findings, management algorithms
- Radiology
- Case scenarios
- Surgical pathology
- Instruments
- Surgical procedures

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	

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POSTGRADUATE STUDENT APPRAISAL FORM

Name of the Department/Unit:

Name of the PG Student:

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

FUTURE PERSPECTIVE

Worldwide, surgical training is moving in the direction of being specialised and site specific. For a field like thoracic surgical oncology, which demands surgical skill and technical know-how with a very low margin for error, where multidisciplinary care is a must: this becomes all the more relevant. With this program, we aim to train and equip a generation of thoracic surgical oncologists who can then shoulder this mandate in the institutions they move on to, making quality thoracic cancer care a possibility across the nation.

TATA MEMORIAL CENTRE

Office of the Director Academics

Fellowship Program in Thoracic Oncology

Assessments	:	Intra-Departmental.
Completion Certificate	:	Will be issued upon successful completion of tenure.

Contacts

Head of Department	:	Prof. Sabita Shambhulal Jiwnani
Academics Department	:	For Technical / Documentation / Joining Support / Virtual Assistance

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