Global Initiative of Academic Networks (GIAN)

26th – 31st March 2022,

Special Centre for Molecular Medicine

Jawaharlal Nehru University, New Delhi

सत्यमेव जयते
Government of India
Ministry of Human Resource Development

GIAN
GLOBAL INITIATIVE OF ACADEMIC NETWORKS

RADIATION BIOLOGY AND ITS CLINICAL APPLICATIONS

Distinguished Faculties

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Ex – Distinguished Scientist,
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Prof. G.K. Rath
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Dr. A. N. Bhatt
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Dr. Prashanth Giridhar
Radiation oncologist
Tata Memorial Centre, Varanasi

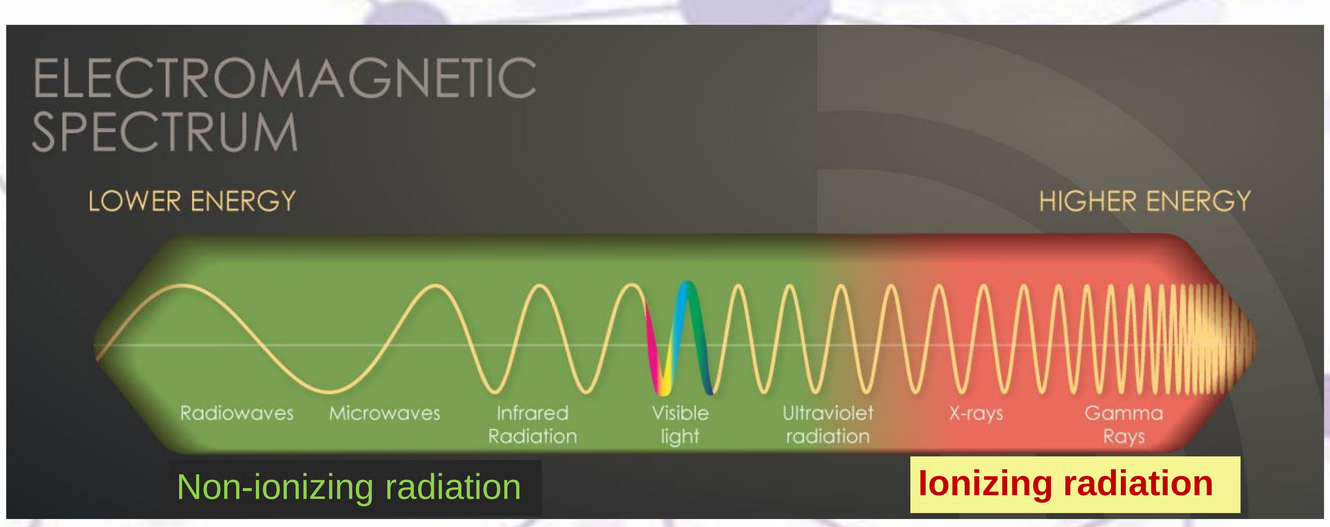
Dr. R. Mahalingam
Medical Physics Consultant
Formerly Asst. Director
EMSPL, Gurugram

Overview

- The Radiation Biology aims at providing a platform for biological research and its translation into clinical radiation oncology and radiotherapy.
- The course includes lectures and hands on on the cellular responses towards ionizing irradiation, their underlying mechanisms, novel techniques, radiation medicine, assessment of radiation effect.

Objectives

- Understand the fundamentals of radiation biology, radiation physics and radiation chemistry.
- Understand the biological response of ionizing radiation and medical counter measure against radiation exposures.
- Become more familiar with common laboratory techniques and the model used in the field of radiation biology.
- Have an idea of medical imaging principle and their advancements in the field of radiation oncology and radiotherapy and their clinical perspective in cancer.



Date	Broad Topic of Lecture
26th March, 2022 (Lecture 1, 2)	Introduction to radiation biology, types of radiation, dosimetry and effect of radiation on biological system. **(Lecture+ Tutorial)**
27th March, 2022 (Lecture 3-5)	Cellular effect of radiation and Clinical radiation biology; techniques used for identification of radiation damage **(Lecture+ Tutorial)**
28th March, 2022 (Lecture 6-8)	Biological dosimetry for radiation exposure, Radiation-induced cytogenetic damage and tissue injury **(Lecture+ Tutorial)**
29th March, 2022 (Lecture 9-12)	Medical counter measures against radiation, countermeasure programs for protecting soldiers and civilians from radiation/nuclear events. **(Lecture+ Tutorial)**
30th March, 2022 (Lecture 13 & 14)	Radiation emergencies and management; Industrial applications of radiation. **(Lecture+ Tutorial)**
31st March, 2022 (Lecture 15)	Radiography techniques; Medical imaging and modern trends in radiotherapy; interaction with radiation oncologists and patient follow up. **(Lecture+ Tutorial)**

Registration

Participants	Course fees
JNU Undergrad, M.Sc. and MTech. students	Free
JNU research students (M.Phil. & Ph.D.)	Rs. 1000
JNU Faculty	Rs. 2000
Other Institutions (research students)	Rs. 2000
Other Institutions (faculty)	Rs. 5000
Industry and private institutions	Rs. 10,000
Participants from outside India	USD $ 200

The registration fees is Rs. 500/- mandatory to all the participants which facilitates lifetime membership to GIAN. Register at: http://www.gian.iitkgp.ac.in/GREGN/index. Followed by registration for course at RegGIAN Website: http://www.jnu.ac.in/GIAN/

Organized by

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"Radiation Biology and its Clinical Applications" (Virtual Mode)

Global Initiative of Academic Networks

(GIAN) course

March 26th-31st, 2022

Organized by

Special Centre for Molecular Medicine
Jawaharlal Nehru University, New Delhi

Day and Time	Technical Sessions	Resource Persons
Day 1: **10 a.m. to 5:00 p.m.** **26th Mrach**	**10.00 -11.30 am** **Inauguration ceremony**	Prof. G. K. Rath Dr. B. S. Dwarakanath Dr. Vikram Bhadrasain Dr. Rajasekar Mahalingam Prof. Vibha Tandon
	11:30 -1:00 pm **Lecture 1** An introductory overview to radiation biology, radiation physics and radiation chemistry**.**	
	1:00 pm-2.00 pm **Lunch break**	
	2:00-3:30 pm **Lecture 2** • Ionizing and non –ionizing radiation • Radiation sources, detection, • Radiation quantities and unit, Radiation dosimetry. • Low dose radiation and its effect in biological system	
	3:30-5:00 pm **Tutorial 1** Interactive session for radiation biology basics and ionizing radiation classification, interaction of radiation with biomolecules	
Day 2: **10:00 a.m. to 5:00 p.m.** **27th March**	**10:00 – 11:30 am** **Lecture 3** **Cellular effect of radiation and Clinical radiation biology** • Overview of interactions of Radiation with the biological system: Molecules to Biosphere • Chemical basis of biological effects of radiation • Factors influencing biological radiation effects • Radiobiological cell death: Dose response and biophysical models	Prof. G. K. Rath Dr. B. S. Dwarakanath Dr. Prashanth Giridhar, MD Dr. Pat Prasanna
	11.30 am-1.00 pm **Lecture 4** • Cellular effects of radiation damage: DNA damage and repair; Chromosome damage • Growth inhibition and perturbations of cell cycle progression • Bystander effect; induction of stem phenotype and senescence;	
	01:00 -02:00 pm ; Lunch break	

	02:00-03:30 pm **Lecture 5** • Tumour Radiobiology • Radiobiological bases for fractionated radiotherapy • Five Rs of radiotherapy Tumour microenvironment, inflammation and immune responses	Dr. Anant Narayan Bhatt Prof. Vibha Tandon
	03:30 -05:00 pm **Tutorial 2** Radiation damage assessment and interactive session for the techniques used for identification of radiation damage. Interactive session for different model used for radiation therapy.	
Day 3: **10:00 a.m. to 5:00 p.m.** **28th March**	**10:00 -11:30 am** **Lecture 6** **Biological dosimetry for radiation exposure** Radiation-induced cytogenetic damage : Chromosome aberrations, Micronuclei formation, Mutation assays	Prof. G. K. Rath Dr. B. S. Dwarakanath Dr. Vikram Bhadrasain Dr. Pat Prasanna Dr. Rajasekar Mahalingam Dr. Anant Narayan Bhatt Prof. Vibha Tandon
	11:30 -01:00 pm **Lecture 7 Radiation-induced normal tissue injury** • Systemic effects of Radiation • Acute, delayed and late radiation effects • Hematopoietic, gastrointestinal. and CNS syndromes	
	01:00 -02:00 pm : Lunch break	
	02:00 -3.30 pm **Lecture 8** • Radiation damage to normal tissues II **3:30 – 05:00 pm** **Tutorial 3** Demonstration of tissue section showing radiation induced damage in different organs and their protection. Monitoring and damage assessment.	
Day 4: **10:00 am to 05:00 pm** **29th march**	**10:00 -11:30 am** **Lecture 9** **Modification of cellular and systemic responses to radiation** • Radiosensitization and radioprotection • Applications of radiosensitizers and radioprotectors in radiotherapy **11.30-1.00 pm** **Lecture 10** • Assessment of radiation-induced damage to normal tissues • Tumor response to radiation including assessment of damage following *in vivo* irradiation	Prof. G. K. Rath Dr. B. S. Dwarakanath Dr. Vikram Bhadrasain Dr. Anant Narayan Bhatt Prof. Vibha Tandon
	01:00 -02:00 pm : Lunch break	
	02:00- 3.30 pm **Lecture 11**	

	Current status and practise of radiotherapy • Three dimensional Conformal Radiation Therapy (3DCRT) • Stereotactic radiosurgery • Intensity modulated radiation therapy (IMRT), IGRT, ARC therapy • Brachytherapy • Particle Radiotherapy (Proton, Carbon etc.) **3.30 -5.00 pm** **Lecture 12** Upcoming approaches in Radiotherapy (SBRT, FLASH, GRID)	
Day 5: **10:00 am to 05:00 pm** **30th March**	**10:00 -11:30 am** **Lecture 13** **Radiation safety and protection** • Radiation emergencies and management : Leakage, transport of radioactive materials, radiation hazard evaluation and control • Time, dose and shielding • ALARA (As Low As Reasonably Achievable) principles • Risk estimates of radiation exposure • Radiation measuring instrument for personal monitoring **11:30 -01:00 pm** **Lecture 14** Applications of Ionizing radiation in Agriculture, Industry and other areas **01:00 -02:00 pm : Lunch break** **02:00-03.:30 pm** **Tutorial** Demonstration and interactive session for radiation prevention and radiation leakage along with the interactive session with radiation safety officer explaining the precaution and steps used in accidental radiation leakage.	Prof. G. K. Rath Dr. B. S. Dwarakanath Dr. Vikram Bhadrasain Dr. Rajasekar Mahalingam Dr. Anant Narayan Bhatt Prof. Vibha Tandon
Day 6: **10:00 am to 05:00 pm** **31st March**	**10.00-11.30 am** **Lecture 15** Introduction to Radiography techniques **11.30 -1;00 pm** • X-ray Diagnosis & Conventional Imaging • Digital X-ray imaging and Computed Tomography • Magnetic Resonance Imaging (MRI) Ultrasound Imaging **01:00 -02:00 pm : Lunch break** **02:00 – 04:00 pm** **Tutorial 5 (Practical Session)** Demonstration of basic techniques used for screening of radio sensitizer and radioprotectors like clonogenic assay, survival assay and data interpretation. **4:00-5:30 pm** **Tutorial 6** Visit of radiation oncologist and Interaction session with the radiation oncologist from hospitals for the current radiotherapy techniques and patient follow up study.	Prof. G. K. Rath Dr. B. S. Dwarakanath Dr. Vikram Bhadrasain Dr. Rajasekar Mahalingam Dr. Anant Narayan Bhatt Prof. Vibha Tandon