



**“Radiation Biology and its Clinical Applications” (Virtual Mode)**  
**Global Initiative of Academic Networks**  
 (GIAN) course  
**March 26<sup>th</sup>-31<sup>st</sup>, 2022**  
 Organized by  
**Special Centre for Molecular Medicine**  
**Jawaharlal Nehru University, New Delhi**



Day and Time	Technical Sessions	Resource Persons
<b>Day 1:</b> <b>10 a.m. to 5:00 p.m.</b> <b>26<sup>th</sup> March</b>	<b>10.00 -11.30 am</b> <b>Inauguration ceremony</b>	<b>Prof. G. K. Rath</b>
	<b>11:30 -1:00 pm</b> <b>Lecture 1</b> An introductory overview to radiation biology, radiation physics and radiation chemistry.	<b>Dr. B. S. Dwarakanath</b>
	<b>1:00 pm-2.00 pm</b> <b>Lunch break</b>	<b>Dr. Vikram Bhadrasain</b>
	<b>2:00-3:30 pm</b> <b>Lecture 2</b> <ul style="list-style-type: none"> <li>• Ionizing and non –ionizing radiation</li> <li>• Radiation sources, detection,</li> <li>• Radiation quantities and unit, Radiation dosimetry.</li> <li>• Low dose radiation and its effect in biological system</li> </ul>	<b>Dr. Rajasekar Mahalingam</b>
	<b>3:30-5:00 pm</b> <b>Tutorial 1</b> Interactive session for radiation biology basics and ionizing radiation classification, interaction of radiation with biomolecules	<b>Prof. Vibha Tandon</b>
<b>Day 2:</b> <b>10:00 a.m. to 5:00 p.m.</b> <b>27<sup>th</sup> March</b>	<b>10:00 – 11:30 am</b> <b>Lecture 3</b> <b>Cellular effect of radiation and Clinical radiation biology</b> <ul style="list-style-type: none"> <li>• Overview of interactions of Radiation with the biological system: Molecules to Biosphere</li> <li>• Chemical basis of biological effects of radiation</li> <li>• Factors influencing biological radiation effects</li> <li>• Radiobiological cell death: Dose response and biophysical models</li> </ul>	<b>Prof. G. K. Rath</b>  <b>Dr. B. S. Dwarakanath</b>
	<b>11.30 am-1.00 pm</b> <b>Lecture 4</b> <ul style="list-style-type: none"> <li>• Cellular effects of radiation damage: DNA damage and repair; Chromosome damage</li> <li>• Growth inhibition and perturbations of cell cycle progression</li> <li>• Bystander effect; induction of stem phenotype and senescence;</li> </ul>	<b>Dr. Prashanth Giridhar, MD</b>  <b>Dr. Pat Prasanna</b>
	<b>01:00 -02:00 pm ; Lunch break</b>	

	<p><b>02:00-03:30 pm</b>  <b>Lecture 5</b></p> <ul style="list-style-type: none"> <li>• Tumour Radiobiology</li> <li>• Radiobiological bases for fractionated radiotherapy</li> <li>• Five Rs of radiotherapy Tumour microenvironment, inflammation and immune responses</li> </ul>	<p>Dr. Anant Narayan Bhatt</p> <p>Prof. Vibha Tandon</p>
	<p><b>03:30 -05:00 pm</b>  <b>Tutorial 2</b></p> <p>Radiation damage assessment and interactive session for the techniques used for identification of radiation damage. Interactive session for different model used for radiation therapy.</p>	
<p><b>Day 3:</b>  <b>10:00 a.m. to 5:00 p.m.</b>  <b>28<sup>th</sup> March</b></p>	<p><b>10:00 -11:30 am</b>  <b>Lecture 6</b>  <b>Biological dosimetry for radiation exposure</b></p> <p>Radiation-induced cytogenetic damage : Chromosome aberrations, Micronuclei formation, Mutation assays</p>	<p>Prof. G. K. Rath</p> <p>Dr. B. S. Dwarakanath</p>
	<p><b>11:30 -01:00 pm</b>  <b>Lecture 7 Radiation-induced normal tissue injury</b></p> <ul style="list-style-type: none"> <li>• Systemic effects of Radiation</li> <li>• Acute, delayed and late radiation effects</li> <li>• Hematopoietic, gastrointestinal. and CNS syndromes</li> </ul>	<p>Dr. Vikram Bhadrasain</p> <p>Dr. Pat Prasanna</p>
	<p><b>01:00 -02:00 pm : Lunch break</b></p>	<p>Dr. Rajasekar Mahalingam</p>
	<p><b>02:00 -3.30 pm</b>  <b>Lecture 8</b></p> <ul style="list-style-type: none"> <li>• Radiation damage to normal tissues II</li> </ul> <p><b>3:30 – 05:00 pm</b>  <b>Tutorial 3</b></p> <p>Demonstration of tissue section showing radiation induced damage in different organs and their protection. Monitoring and damage assessment.</p>	<p>Dr. Anant Narayan Bhatt</p> <p>Prof. Vibha Tandon</p>
<p><b>Day 4:</b>  <b>10:00 am to 05:00 pm</b>  <b>29<sup>th</sup> march</b></p>	<p><b>10:00 -11:30 am</b>  <b>Lecture 9</b>  <b>Modification of cellular and systemic responses to radiation</b></p> <ul style="list-style-type: none"> <li>• Radiosensitization and radioprotection</li> <li>• Applications of radiosensitizers and radioprotectors in radiotherapy</li> </ul>	<p>Prof. G. K. Rath</p> <p>Dr. B. S. Dwarakanath</p>
	<p><b>11.30-1.00 pm</b>  <b>Lecture 10</b></p> <ul style="list-style-type: none"> <li>• Assessment of radiation-induced damage to normal tissues</li> <li>• Tumor response to radiation including assessment of damage following <i>in vivo</i> irradiation</li> </ul>	<p>Dr. Vikram Bhadrasain</p> <p>Dr. Anant Narayan Bhatt</p>
	<p><b>01:00 -02:00 pm : Lunch break</b></p>	<p>Prof. Vibha Tandon</p>
	<p><b>02:00- 3.30 pm</b>  <b>Lecture 11</b></p>	

	<p><b>Current status and practise of radiotherapy</b></p> <ul style="list-style-type: none"> <li>• Three dimensional Conformal Radiation Therapy (3DCRT)</li> <li>• Stereotactic radiosurgery</li> <li>• Intensity modulated radiation therapy (IMRT), IGRT, ARC therapy</li> <li>• Brachytherapy</li> <li>• Particle Radiotherapy (Proton, Carbon etc.)</li> </ul> <p><b>3.30 -5.00 pm</b> <b>Lecture 12</b> Upcoming approaches in Radiotherapy (SBRT, FLASH, GRID)</p>	
<p><b>Day 5:</b> <b>10:00 am to 05:00 pm</b> <b>30<sup>th</sup> March</b></p>	<p><b>10:00 -11:30 am</b> <b>Lecture 13</b> <b>Radiation safety and protection</b></p> <ul style="list-style-type: none"> <li>• Radiation emergencies and management : Leakage, transport of radioactive materials, radiation hazard evaluation and control</li> <li>• Time, dose and shielding</li> <li>• ALARA ( As Low As Reasonably Achievable ) principles</li> <li>• Risk estimates of radiation exposure</li> <li>• Radiation measuring instrument for personal monitoring</li> </ul> <p><b>11:30 -01:00 pm</b> <b>Lecture 14</b> Applications of Ionizing radiation in Agriculture, Industry and other areas</p> <p><b>01:00 -02:00 pm : Lunch break</b></p> <p><b>02:00-03.:30 pm</b> <b>Tutorial</b> 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.</p>	<p>Prof. G. K. Rath</p> <p>Dr. B. S. Dwarakanath</p> <p>Dr. Vikram Bhadrasain</p> <p>Dr. Rajasekar Mahalingam</p> <p>Dr. Anant Narayan Bhatt</p> <p>Prof. Vibha Tandon</p>
<p><b>Day 6:</b> <b>10:00 am to 05:00 pm</b> <b>31<sup>st</sup> March</b></p>	<p><b>10.00-11.30 am</b> <b>Lecture 15</b> Introduction to Radiography techniques</p> <p><b>11.30 -1;00 pm</b></p> <ul style="list-style-type: none"> <li>• X-ray Diagnosis &amp; Conventional Imaging</li> <li>• Digital X-ray imaging and Computed Tomography</li> <li>• Magnetic Resonance Imaging (MRI) Ultrasound Imaging</li> </ul> <p><b>01:00 -02:00 pm : Lunch break</b></p> <p><b>02:00 – 04:00 pm</b> <b>Tutorial 5 (Practical Session)</b> Demonstration of basic techniques used for screening of radio sensitizer and radioprotectors like clonogenic assay, survival assay and data interpretation.</p> <p><b>4:00-5:30 pm</b> <b>Tutorial 6</b> Visit of radiation oncologist and Interaction session with the radiation oncologist from hospitals for the current radiotherapy techniques and patient follow up study.</p>	<p>Prof. G. K. Rath</p> <p>Dr. B. S. Dwarakanath</p> <p>Dr. Vikram Bhadrasain</p> <p>Dr. Rajasekar Mahalingam</p> <p>Dr. Anant Narayan Bhatt</p> <p>Prof. Vibha Tandon</p>

