

Workshop for Biomedical Engineers  
on

**“PRINCIPLES AND INSTRUMENTATION OF RADIO-  
DIAGNOSTIC AND RADIOTHERAPY TECHNIQUES”**

**1 February 2020**

**Report**

**Preamble**

Vidyalankar Institute of technology (VIT) always promotes interaction with industries and research laboratories to inculcate research culture among faculty and students. In this regard VIT had conducted two workshops

1. “Application of Radiation and Radioisotopes in Diagnosis and Therapy of Cancer” on Saturday, 15 October 2016.
2. “Current Challenges in Diagnosis and Radiotherapy of Cancer” on 6 October 2018.

Biomedical Engineering Department of VIT wanted to continue interaction with the Society. In the year 2020 under the mentorship of Dr. Badri N. Pandey, Secretary, SRR, it was decided to conduct a hands on workshop for Biomedical Engineers on **“PRINCIPLES AND INSTRUMENTATION OF RADIO-DIAGNOSTIC AND RADIOTHERAPY TECHNIQUES** “an area relevant to Biomedical Engineers. The workshop was organized under aegis of SRR at **Advanced Center For Radiation Oncology (ACRO), Balabhai Nanavati Hospital, Swami Vivekanand Road, Vile Parle West, Mumbai** under guidance of Dr Nagaraj Huilgol, Chief Radiation Oncologist, ACRO and Former, President, SRR. A convenient date was proposed and agreed by VIT, Balabhai Nanavati Hospital and SRR on 1 February 2020.

**About Society for Radiation Research**

Society for Radiation Research is a Society of Scientists, Clinicians, Students, Academia and Industries having interest in field of Radiation Research. The society is started with the following objectives:

1. To promote research in the areas of:
  - Radiation biology with basic and applied aspects;
  - Clinical radiation biology and oncology;
  - Radiation hormesis and low dose radiation biology;
  - Environmental radiation biology, non-ionizing radiation effects;
  - Radiation medicine, radiation technologies;
  - Transnational research;
  - Terrestrial and space radiation biology and any other relevant research areas.

2. To facilitate integration and interaction of different radiation research areas.
3. To promote the diffusion of knowledge in these research areas through organizing meetings, conferences, workshops, awareness programs, scientific publications etc.
4. Promote discussion, interactions amongst scientist-public-industry and acting as liaison to communicate facts and research developments to public, government and regulatory bodies.
5. Integration of Society with other National and International Scientific Bodies.
6. Facilitate and promote research in areas of radiation research by various means. Encourage and promote young researchers and students to pursue research and build career in the areas of radiation research
7. Promote and facilitate education of radiation research in national Institutes and Universities.

## About Biomedical Engineering Department, VIT

The Biomedical Engineering Department of VIT has a clear vision to become a **Center of Excellence** in the field of Biomedical engineering where learners are nurtured in a scholarly environment to evolve into competent professionals to benefit society. Department has been accredited by National Board of Accreditation and has signed MoU with GE Healthcare for creating a Centre of Excellence lab under the leadership of current Head of Department Dr. Jitendra Toravi. VIT is also accredited with A+ grade by NAAC.

## About the Workshop

VIT had approached SRR to organise a hands-on workshop on Principles and Instrumentation of Radio-Diagnostic for Biomedical Engineers. Jointly a convenient date was fixed and a brochure was circulated among faculty and on SRR website. No of participants were limited to 20 as per Nanavati Hospital suggestions.

<p style="text-align: center;"><b>SOCIETY FOR RADIATION RESEARCH (SRR)</b> <i>In Association of</i> <b>Vidyalankar Institute of Technology</b> Wadala, Mumbai</p> <p style="text-align: center;"><i>organizes</i></p> <p style="text-align: center;"><b>WORKSHOP</b> <b>FOR BIOMEDICAL ENGINEERS</b> <b>ON</b> <b>PRINCIPLES AND INSTRUMENTATION OF</b> <b>RADIO-DIAGNOSTIC AND RADIOTHERAPY TECHNIQUES</b></p> <p style="text-align: center;"><b>DATE/TIME: FEBRUARY 1, 2020 (SATURDAY), 2-4 PM</b></p> <p style="text-align: center;"><i>Venue</i> Advanced Center For Radiation Oncology, Balabhai Nanavati Hospital Swami Vivekanand Road, Vile Parle West, Mumbai, Maharashtra 400056</p> <p style="text-align: center;">Limited Participants (First-Cum-First Basis)</p> <p style="text-align: center;"><b>Nanavati</b> Super Speciality Hospital <i>a passion for healing...</i></p> <p style="text-align: center;">No Registration Fee</p>	<p style="text-align: center;"><b>PROGRAM OUTLINE</b></p> <ol style="list-style-type: none"> <li>1. Brief Lecture Series on: <ul style="list-style-type: none"> <li>➤ Principle, Instrumentation and Applications of Radio-Diagnostic Techniques (SPECT-CT &amp; PET-CT)</li> <li>➤ Radiotherapy Units (Cobalt Teletherapy, Accelerators)</li> </ul> </li> <li>2. Visit to Imaging Facilities</li> </ol> <p style="text-align: center;"><b>REGISTRATION PROCESS</b></p> <ul style="list-style-type: none"> <li>➤ Workshop is mainly aimed for Students and Faculties of Biomedical Engineering.</li> <li>➤ Number of participants is limited to 20 on first-cum-first basis.</li> <li>➤ There is no registration fee.</li> <li>➤ No travel support/accommodation provided to participants.</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"> <p style="text-align: center;"><b>Contact details</b></p> <p>Prof. Geetha Narayanan, Mob: +91-9821854617 Email: geetha.narayanan@vit.edu.in Prof. Arunkumar Ram, Mob: +91 9821608918 Email: arunkumar.ram@vit.edu.in Registration can be done online <b>Last Date for Registration:</b> Jan. 25, 2020 Intimation of Selected Participants: : Jan. 27, 2020</p> </td> <td style="padding: 5px;"> <p style="text-align: center;"><b>Society for Radiation Research (SRR)</b></p> <p>(Registration No.: Maharashtra State, Mumbai 2280, 2014 68850) Registered Office: Advanced Centre for Radiation Oncology, Dr Balabhai Nanavati Hospital, Vile Parle (W), Mumbai 400 056 Email: <a href="mailto:srrindia1415@gmail.com">srrindia1415@gmail.com</a> Web page: <a href="http://www.srrindia.org">www.srrindia.org</a> Facebook: <a href="https://www.facebook.com/Society-for-Radiation-Research-SRR-771727076329168/">https://www.facebook.com/Society-for-Radiation-Research-SRR-771727076329168/</a></p> </td> </tr> </table> <p style="text-align: center;"><b>Registration Link: <a href="http://tiny.cc/SRRWS">http://tiny.cc/SRRWS</a></b></p>	<p style="text-align: center;"><b>Contact details</b></p> <p>Prof. Geetha Narayanan, Mob: +91-9821854617 Email: geetha.narayanan@vit.edu.in Prof. Arunkumar Ram, Mob: +91 9821608918 Email: arunkumar.ram@vit.edu.in Registration can be done online <b>Last Date for Registration:</b> Jan. 25, 2020 Intimation of Selected Participants: : Jan. 27, 2020</p>	<p style="text-align: center;"><b>Society for Radiation Research (SRR)</b></p> <p>(Registration No.: Maharashtra State, Mumbai 2280, 2014 68850) Registered Office: Advanced Centre for Radiation Oncology, Dr Balabhai Nanavati Hospital, Vile Parle (W), Mumbai 400 056 Email: <a href="mailto:srrindia1415@gmail.com">srrindia1415@gmail.com</a> Web page: <a href="http://www.srrindia.org">www.srrindia.org</a> Facebook: <a href="https://www.facebook.com/Society-for-Radiation-Research-SRR-771727076329168/">https://www.facebook.com/Society-for-Radiation-Research-SRR-771727076329168/</a></p>
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## Schedule of the workshop

2.00pm-2.30pm	Assembly at Nanavati Hospital
2.30pm-3.00pm	<b>“Introduction to development of Radio Diagnostics and Radiotherapy Equipment”- Dr. Nagraj Huilgol</b> , Chief Radiation Oncologist, Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine
3.00pm-3.30pm	<b>“Introduction to different techniques in treatment of Cancer”- Dr. Gopal</b> , Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine
3.30pm-3.45pm	<b>Creation of Moulds for planning treatments- Ms. Leela, Physicist</b> , Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine
3.45pm-4.15pm	<b>Demonstration of Brachytherapy machine-Ms. Anuradha, Physicist</b> , Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine
4.15pm-4.45pm	<b>Demonstration and Hands on Linear Accelerator-Mr. Gopal, Physicist</b> , Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine
4.45p-5.15pm	<b>Demonstration of Treatment planning and software-Mr. Gopal, Physicist &amp; Ms. Leela Physicist</b> , Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine <i>Followed by Q&amp;A Session and Certificate distribution</i>

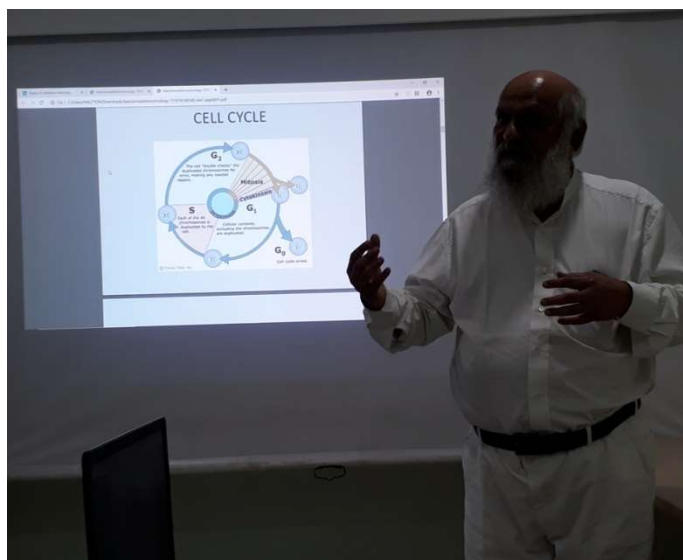
## Overview of the Workshop

The participants were assembled near Nanavati Superspeciality Hospital at 2.00 pm. After getting gate permission and permission from Centre for Hyperthermic Oncology & Medicine students were assembled in Conference Room. Later they were taken to Seminar Hall. The first session was by **Dr. Nagraj Huilgol**, Chief Radiation Oncologist, Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine. Dr. Nagraj talked about what is cancer and what are the different ways for treatment. According to him unorganised growth of cells in one’s body is said to be cancer. He was taking example of growth of foetus which is very fast and organised whereas cancer also grows almost the same rate but unorganised. There is persistent injury created in cells to repair cells in the body. But is if there is a small change in process it can create random mutations. He also explained about the various treatments like Radiotherapy, Chemotherapy, Immunotherapy, Surgery etc as possible treatments of cancer. He explained the role of Physicist and Biomedical Engineers in development and maintenance of high end equipments in Medical field.



Participants at Nanavati Super speciality hospital

The next session was on treatment methods for cancer by Dr. Gopal, Centre for Hyperthermic Oncology & Medicine. He explained the various methods as Medical Oncology, Surgical Oncology and Radiation Therapy. In his opinion all treatments are not suited for everyone. He also explained the stages of treatment as Radiotherapy, Adjuvant, Neo adjuvant, Concurrent and Palliative. He had also explained when these treatments are selected depending upon the type of cancer and patient. Later he explained about the different equipments like external beam radiation, basic linear accelerator and Brachytherapy.



Dr Nagraj Huilgol, Chief Radiation Oncologist, Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine



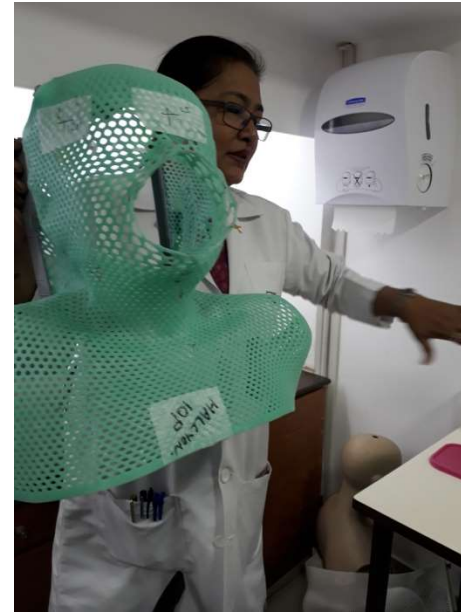
Dr. Gopal, Nanavati Super speciality Hospital and Centre for Hyperthermic Oncology & Medicine on treatment methods

This was followed by visit to various facilities available in the centre. Initially participants were taken to the treatment planning stages. In first stage before starting the treatment is creating patient's moulds using biocompatible material to exactly direct the radiation or other treatments. This was explained by Ms. Leela at the centre. There were different moulds prepared for different affected areas





Ms. Anuradha demonstrating Brachytherapy machine



Ms. Leela Demonstrating moulds

The next session was about demonstration of Brachytherapy equipment by Ms. Anuradha. She explained the process as keeping radiation material inside the body for some time. And this will provide radiation to only affected areas. But this is an invasive treatment so patients are not comfortable.

Next session was demonstration of linear accelerator by Mr. Anand. He has explained the working and hands on demonstration of the machine. He had also opened the control circuitry and explained the electronics involved. It is a robotic arm of which fins of the collimator can be moved and area of interest can be focussed. The system is based on X- rays and only the patient will be inside the room. Operators sit in the control room outside. The treatment room is having radiations so for the safety walls of the room are of radiation AERB standards like 2 metre thick. The treatment is patient specific and they do phantom study on models to verify the effectiveness.



Mr. Anand on Linear Accelerator

In the next session the participant were taken to treatment planning room where we were explained the various algorithms like AAA algorithm, Monte Carlo Algorithm. As a Special case treatment process for treating brain tumour was explained with importance of avoiding radiation in key areas

like optical nerve and hypothalamus in brain. A brief Q&A session was held where students asked about various aspects of treatment and radiation hazards etc.

This was followed by a brief discussion about conference organised by Nanavati Super speciality Hospital on "Hyperthermia". Participants were briefed about the conference and were told to attend.

A group photograph was taken at the end of the session. Later faculty had discussion with Dr. Nagraj regarding possibility of collaborative projects at the centre.



Mr. Anand on treatment planning software



Token of appreciation from VIT

All the sessions were quite interactive and the participants were involved in the demonstrations which were obvious from the level of questions asked by them. The speakers were also interested in all demonstrations as the participants were interactive and were asking specific doubts

The workshop was really useful for all the participants. The session came to a conclusion with feedbacks from the participants. This was followed by a meeting and vote of thanks by Dr. Jitendra Toravi, Head Biomedical Department and Prof. Geetha Narayanan from VIT.

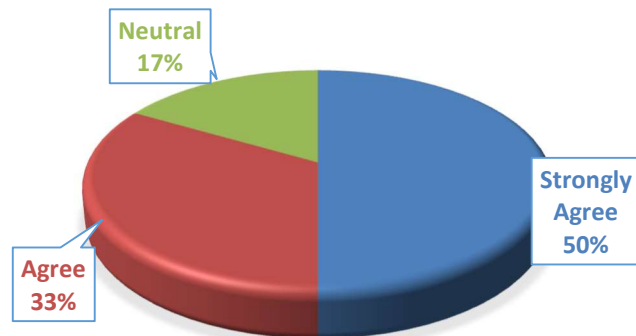
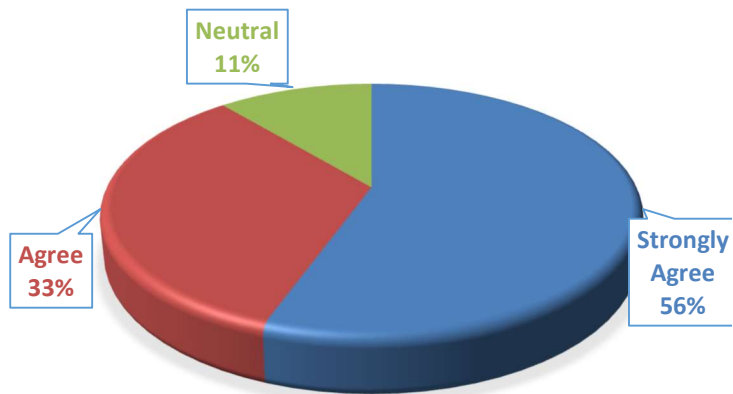


Faculty



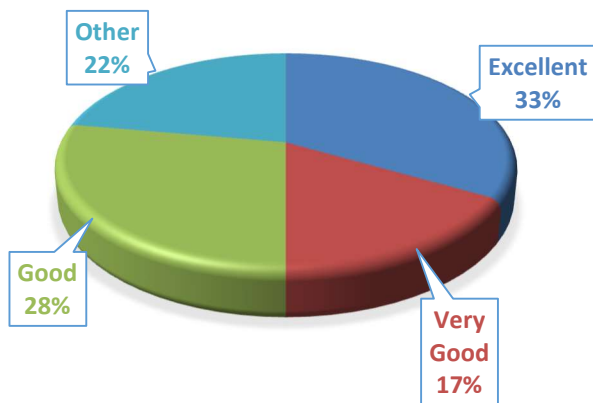
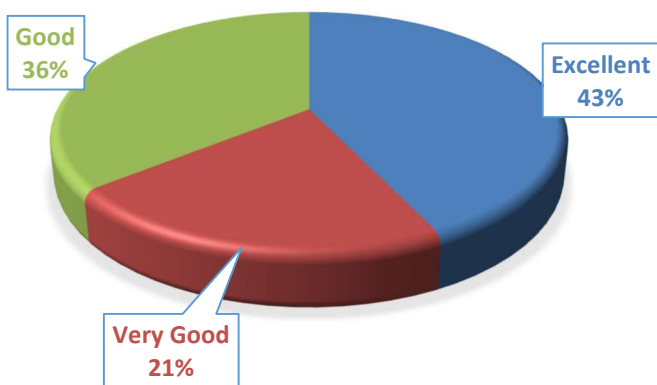
Participants with Dr. Nagraj Huilgol

## Feedbacks on various aspects of the workshop



**The Workshop helped me to understand the Concepts and Technology involved in Radio Diagnosis and Radiotherapy**

**The Resource Person and Experts were able to explain the concepts and helped solve my queries**



**Rate the quality of visit to Imaging Facilities**

**How would you rate the workshop overall**

Convener

Head Biomedical Engineering