

## **DEPARTMENT OF RADIATION PHYSICS**

### **About the department:**

The Radiation Physics Department is a well-equipped department of Kidwai Memorial Institute of Oncology with qualified teaching faculty and supporting staff. The department provides medical physics support to Radiation Oncology, Nuclear Medicine, Radio-diagnosis departments of KMIO and Regional Centre for Radiopharmaceuticals, BRIT, KMIO campus. The department is recognized to carry out research in the field of medical physics by Rajiv Gandhi University of Health Sciences, Karnataka- the first of its kind in the entire state. At present about 5 candidates are pursuing their Ph.D. degree in the department in various challenging topics in the field. The department conducts M.Sc. (Radiation Physics) programme affiliated to Rajiv Gandhi University of Health Sciences, Karnataka and approved by Atomic Energy Regulatory Board (AERB), Mumbai with intake of 5 students per year. Series of classes were also taken by expert faculty members of the department for M.D. (Radiotherapy), D.M.R.T., M.Sc. (Nursing), B.Sc. Radiotherapy Technology and Radio-Diagnosis technology programmes. The department is also recognized as one of the approved centers by AERB to conduct one year Internship programme for Medical Physics students as partial fulfillment of their curriculum for appearing for Radiological Safety Officer (RSO) examinations conducted by AERB. Every year students from Babha Atomic Research Centre- Mumbai and from many other universities/Institutes all over India undergo their field training programme in the department for a period of 1-2 months.

### **Facilities available in the Department:**

**Information to Patients:**

<i>Name of Equipment</i>	<i>Year of Purchase</i>	<i>Status</i>
Clinac- DHX linear accelerator	2006	Functional
Clinac- DBX linear accelerator	2012	Functional
Cobalt -60 teletherapy units –Th-780C	1986	Functional
Cobalt -60 teletherapy units –Th-780E	2000	Functional
Cobalt -60 teletherapy units –Th-780E	2000	Functional
3D Radiation Field Analyzer	2006	Functional
Eclipse treatment planning system-3 Nos	2006	Functional
Aria networking system	2006	Functional
Brachyvision treatment planning system	2006	Functional
Gammamed Plus HDR brachytherapy unit	2002	Functional
Dose1 electrometer, Farmer& PP type chambers	2006	Functional
Capintec electrometer, Farmer & PP chambers	1996	Functional
Alderson Rando Phantom	1996	Functional
TLD reader & furnace	1996	Functional
Clear & white polystyrene phantoms	2006	Functional
Mini water phantom for absolute dosimetry	2006	Functional
IMATRIX array detector	2006	Functional
Well-type ion chamber	2011	Functional
Radiation survey & monitoring instruments	2006	Functional

OPD timings : 9 am – 4 pm on all working days  
 9 am – 12 pm on all Government holidays

Tackling of radiation emergencies during treatment executions and treatment of emergency patients round the clock.

**Department Faculty:**

Sl.No.	Name	Qualification	Designation
1	Dr.M.Ravikumar	M.Sc. Dip.R.P., Ph.D.	Professor and Head
2	Dr.SanjayS.Supe	M.Sc. Dip.R.P., Ph.D.	Professor
3	Dr.K.M.Ganesh	M.Sc.(Med.Phy), Ph.D., FUICC	Associate Professor
4	Dr.S.Sathiyam	M.Sc. Dip.R.P., Ph.D., FUICC	Associate Professor
5	Dr.Shwetha B	M.Sc. Dip.R.P., Ph.D.	Assistant Professor
6	Dr.C.Varatharaj	M.Sc. Dip.R.P., M.Phil., Ph.D., FUICC	Assistant Professor

**Students:**

**a) Ph.D students:**

Sl.No.	Name	Date of Admission
1	SenthilManikandan	July 2008
2	Rekha Reddy B	July 2012
3	Mary Joan	July 2012
4	Henry Finley Godson	January 2013
5	Retna John	July 2013

\* 7 students are pursuing their Ph.Ds on part-time basis

**b) Interns (Post M.Sc. and Dip.R.P students):**

Sl.No.	Name	Date of Admission
1	JerishM.Jose	01.09.2013
2	B.Rekha Reddy	01.09.2013
3	Mary Joan	01.09.2013
4	SupriyaWalunj	01.09.2013
5	Prasobh.C	01.09.2013
6	K.Mageshraja	01.09.2013

**c) P.G. Students (M.Sc. Radiation Physics):**

Sl.No.	Name	Date of Admission
1	Ivan Noel Miranda	July 2013
2	Priyanka Rosy Ekka	July 2013
3	Pradeep	July 2013

**Department Staff List:**

Sl.No.	Name	Designation
1	S.D.Annaiah	Bio Medical Engineer
2	M.Venkataswamy	Graduate Technician
3	Mamatha Rani N	Graduate Technician
4	T.Vijayareddy	Mould Room Technician
5	C.N.Manjunath	Plant Operator

**Medical Education:**

- Routine Radiation Safety programmes and CME are conducted for Medical Physicists and Radiotherapy Technologists

**Weekly Academic Schedule:**

Day	9-10AM	10.30- 11.30 AM	11.30-12.30 PM	2.00-3.00PM	3.00-4.00PM
Monday	2 <sup>nd</sup> Yr. UG (RT&RD)	M.Sc. Classes	M.Sc. Classes	Seminar for Interns	Classes for Nursing students
Tuesday	3 <sup>rd</sup> Yr. UG (RT&RD)	M.Sc. Classes	M.Sc. Classes	Classes for M.Ds.	Classes for trainees
Wednesday	1 <sup>st</sup> Yr. UG (RT&RD)	M.Sc. Classes	M.Sc. Classes	Classes for M.Ds.	Journal club
Thursday	2 <sup>nd</sup> Yr. UG (RT&RD)	M.Sc. Classes	M.Sc. Classes	Classes for trainees	Journal club
Friday	2 <sup>nd</sup> Yr. UG (RT&RD)	M.Sc. Classes	M.Sc. Classes	Practical for UG and PG students	
Saturday	Seminar for Interns	M.Sc. Classes	M.Sc. Classes	Practicals for UG and PG students	

**Ongoing Research Activity:**

1. Estimation of forward and backscattered photons when different materials are irradiated by various energy photons in a homogenous phantom and its implications.
2. Effect of backscattered photons into the beam monitor chamber from various intervening materials in the beam for different energy photons.
3. Accuracy of dose delivery with an electron beam from a Linear Accelerator at low monitor unit setting.
4. Validation and verification of machine and patient specific QA checks with multi array ionization chambers.
5. Verification of planning, computation and dose delivery accuracy of Intensity Modulated Radiation Therapy techniques using AAPM TG 119 protocol.
6. Consistency, reproducibility and measurement accuracy of various commercially available detector systems such as Map check, EDR2 film, Delta array detectors, David and I-Matrix.
7. Characterization of electronic portal imaging device as a tool to verify dose delivery accuracy in modern radiotherapy.
8. Estimation of peripheral dose with various beam defining systems and beam modifiers.
9. Accuracy of calibration procedures in evaluating the source strength in high dose rate brachytherapy.
10. Comparison of brachytherapy planning outcome with various plan optimization techniques.
11. Development and validation of indigenous Radiation Field Analyzer for the evaluation of physical parameters for commissioning of linear accelerators and telecobalt machines.

**Publications:**

### **List of publications during 2012-2013**

1. S.Sathiyar,C.Varatharaj, M. Ravikumar, Sridhar. Comparison of individual and composite field analysis using array detector for Intensity Modulated Radiotherapy dose verification. *Rep PractOncol Radiother.*17(3), 2012; 157-162
2. B. Shwetha, M. Ravikumar, Sanjay S. Supe, S. Sathiyar, V. Lokesh and S. L. Keshava. Dosimetric evaluation of two treatment planning systems for high dose rate brachytherapy applications. *Medical Dosimetry*, 2012; 37: 71-75.
3. Arunkumar T, Sanjay S Supe,M Ravikumar. Impact of cut-out off-axis on electron beam dosimetric parameters. *Tech. in Cancer Res Treat.*2012; 11:141-147.
4. K.M. Ganesh, A. Pichandi, R.M.Nehru, M. Ravikumar. Design and Testing of Indigenous Cost effective three dimensional radiation field analyzer (3D-RFA). *Tech. in Cancer Res Treat.*2013; Accepted for publication.

### **List of publications during 2011-2012**

1. C.Varatharaj, M.Ravikumar, S.Sathiyar, Sanjay S Supe. Peripheral dose from a dual energy linear accelerator equipped with tertiary multileaf collimators and enhanced dynamic wedge. *G. J. O.* 9; 2011.
2. Varatharaj C, Sotirios S, Ravikumar M, Carlos E, Sanjay SS, Papanikolaou N. Consistency and reproducibility of the VMAT plan delivery using three independent validation methods. *J Appl Clinical Med Phys.* 12 (1): 129 -140; 2011.
3. Shwetha B, M. Ravikumar, Siddanna R.P, Sanjay Supe, Sathiyar S. Dosimetric comparison of high dose rate brachytherapy and IMRT for cervical carcinoma. *J. Med. Phys.* 36(1), 111- 116; 2011.
4. Sathiyar S, Ravikumar M, Varatharaj C. Plan evaluation and dosimetric comparison of IMRT using AAPM TG119 test suites and recommendations. *AustralasPhysEngSci Med.* 34(1): 55-61. 2011.
5. Varatharaj C, Sotirios S, Ravikumar M, Carlos E, Sanjay SS, Papanikolaou N. Comparison of four commercial devices for RapidArc and sliding window IMRT QA. *Appl Clinical Med Phys.* 2011; 12 (2): 1-12.
6. C.Varatharaj, M.Ravikumar, S.Sathiyar, Sanjay S Supe. Variation of beam characteristics between three different wedge systems. *J. Med. Phys.* Vol.36(3),2011:

133-137.

7. S. Sathiyar, M. Ravikumar, A.L. Boyer, J. Shoales. Comparison of IMRT and Rapidarc treatment plans using AAPM task group test suites. *Gulf Journal of Oncology*. 11-17. 2011.
8. Sundaram T., Jayakumar S., Govindarajan K. N., Supe S. S., Nagarajan V., Nagarajan M. Influence of photon energy on the quality of prostate intensity modulated radiation therapy plans based on analysis of physical indices., *Jr. Med. Phy.* 36:29-34,2011.

### **List of publications during 2010-2011**

1. Sathiyar S, M Ravikumar, Varatharaj C, S. S.Supe. Dosimetric study of 2D ion chamber array matrix for the modern radiotherapy treatment verification. *J Appl Clinical Med Phys*. 11 (2): 116-127; 2010.
2. S. Sathiyar, M. Ravikumar, C. Varatharaj, S.S. Supe, S.L. Keshava. IMRT Implementation and patient specific dose verification with film and ion chamber array detectors. *G. J. O.* 8; 2010.
3. C.Varatharaj, M. Ravikumar, S.Sathiyar,S.S. Supe, T.R.Vivek, A. Manikandan. Dosimetric verification of brain and head and neck intensity-modulated radiation therapy treatment using EDR2 films and 2D ion chamber array matrix. *J. Cancer. Res. Ther.* 6(2), 179-184, 2010.
4. BondelShwetha, ManickamRavikumar, AradhanaKatke, Sanjay S. Supe,GolhalliVenkataGiri, Nanda ramanand, Tanvir Pasha. Dosimetric comparison of various optimization techniques for high dose rate brachytherapy of interstitial cervix implants *J. Appl. Clinic. Med Phys*. 11(3), 1-6, 2010.
5. C.Varatharaj, Eugenia Moretti, M. Ravikumar,Maria rosaMalisan, S.S. Supe, A. Manikandan. Implementation and validation of commercial portal dosimetry software for intensity-modulated radiation therapy pre-treatment verification. *J. Med. Phys.* 35(4), 189-196; 2010.
6. T.Arunkumar, Sanjay S Supe, M.Ravikumar, K.M.Ganesh, S.Sathiyar.Electron beam characteristics at extended source to surface distances for irregular cutouts. *J. Med. Phys.* 35(4), 207-214;2010.

7. Sellakumar P., Arun C., Supe S. S., Ramesh S. B. Comparison of monitor units calculated by radiotherapy treatment planning system and an independent monitor unit verification software. *Phys. Med.*, 2010.
8. Joseph B., Supe S. S., Aruna R. Cyberknife: A double edged sword? *Rep. Pract. Oncol. Radiother.*, 15:93-97,2010.
9. Tyagi A., Supe S. S., Sandeep S., Singh M. P. A dosimetric analysis of 6 MV versus 15 MV photon energy plans for intensity modulated radiation therapy (IMRT) of carcinoma of cervix., *Rep. Pract. Oncol. Radiother.*, 15:125-131,2010.
10. Supe S. S. Mobile phones and sleep – A review. *Pol. Jr. Med. Phy. Eng.* 16:1-10,2010.
11. Thomas S., Sampath S., Indiradevi B., Bhanumathy G., Supe S. S., Musthafa M. A novel technique to evaluate the geometrical accuracy of CT-MR image fusion in Gamma Knife radiosurgery procedures. *Pol. Jr. Med. Phy. Eng.* 16:55-66,2010.