

Department of Radiation Oncology  
& Molecular Radiation Sciences

***MEDICAL PHYSICS RESIDENCY IN  
RADIATION ONCOLOGY***

**RESIDENCY HANDBOOK v.6  
October 2022**

Johns Hopkins Radiation Oncology  
Harry and Jeanette Weinberg Building  
401 North Broadway  
Baltimore, MD 21231

 **THE SIDNEY KIMMEL  
COMPREHENSIVE CANCER CENTER  
AT JOHNS HOPKINS**

## INTRODUCTION

Welcome to the Johns Hopkins University residency in Medical Physics Radiation Oncology. The resources of the Johns Hopkins University, Johns Hopkins Medical Institutions and the Sidney Kimmel Comprehensive Cancer Center, combined with the talents of the faculty of the Department of Radiation Oncology and Molecular Radiation Sciences, will provide you with a unique opportunity to prepare for a career in academic and/or clinical medical physics.

The transition into medical physics is not easy and involves acquiring a large body of new knowledge. This handbook outlines the design of the two/three-year residency program and provides information regarding policies, procedures and educational goals. The program is challenging, but should not be overwhelming. If you have any concerns, you should feel at ease to speak to any of the faculty, especially the program director and steering committee.

Program Director:

**Todd McNutt, PhD**

Associate Professor of Medical Physics and Director of Clinical Informatics, Radiation Oncology

Associate Program Director:

**Khadija Sheikh, PhD**

Assistant Professor, Radiation Oncology—Sibley

Steering Committee:

**Xun Jia, PhD**

Professor and Director of Medical Physics, Radiation Oncology

**Michael Roumeliotis, PhD**

Director of Brachytherapy, Radiation Oncology

**Heng Li, PhD**

Associate Professor and Chief Proton Physicist, Radiation Oncology – Sibley

**Ana Kiess, MD**

Assistant Professor and Director of the Radiation Oncology Residency, Radiation Oncology

**Leslie Bell, CMD**

Senior Dosimetrist, Radiation Oncology

Department Chair:

**Akila Viswanathan, MD**

Chair, Professor of Radiation Oncology

Physics Residency Supervisory Staff in Addition to Steering Committee

**Kai Ding, PhD**

**Lin Su, PhD**

**Mohammad Rezaee, PhD**

**Rachel Ger, PhD**

**Robert Hobbs, PhD**

**William Thomas (Tom) Hrinivich, PhD**

## **CORE PROGRAM**

The core program is a two-year residency with an optional one additional year of concentrated research. The program utilizes the facilities of the Department of Radiation Oncology and Molecular Radiation Sciences at the Sidney Kimmel Comprehensive Cancer Center (SKCCC) at the Weinberg building in East Baltimore. The program stresses core clinical competency. Two years of the residency will be spent in required core clinical rotations. The resident is expected to demonstrate proficiency at the end of each rotation. For those residents who wish to pursue an academic career with research focus, they can apply for the research year under the guidance of a faculty mentor which is preferred to be the second year of residency.

The program is intended to prepare residents for eligibility for board certification by the American Board of Radiology. Therefore, by the time they complete the two-year clinical program, each resident must master the fundamentals of clinical medical physics at the level outlined in the Task Group #79 report from the American Association of Physicists in Medicine (AAPM). Any deficiencies in a resident's background will be identified at the outset of the residency and addressed. Core courses may be required and these include radiobiology, radiation physics, imaging, introduction to clinical oncology and anatomy.

All residents are required to participate in the standard didactic offerings of the department which include: physics academic seminar series which cover journal club, research reports and grant preparations (once per week), patient chart rounds (site specific – weekly calendar), grand rounds (approximately monthly). Residents will also regularly participate in conferences with the resident physicians including the following: resident journal club (once per month), morning academic conferences (offered three days per week, 8-9 am) and resident radiation physics and radiobiology classes.

Each physics resident is expected to participate in the quality assurance program of the department. He or she will also be engaged in developmental efforts during the two years of clinical training. The subject matter may take the form of a treatment planning study, implementation of a new treatment technology, analysis of a treatment approach or the like. Each resident will be required to submit their research work for the national AAPM and/or ASTRO meetings. Each resident is expected to submit at least one peer-reviewed journal article for publication

The optional third year of the program allows the resident to conduct intensive research to enrich his or her resume. Funding is made available primarily through sponsored research programs. The resident is expected to identify a substantive research project and an appropriate faculty mentor during the initial two-year of the program. The research topic would enrich the department's academic initiatives such as advanced image guidance, molecular imaging, informatics research, pre-clinical radiation research. Research on the project cannot be performed in lieu of the clinical training during the first two-year. The resident maintains clinical skills in the research year by providing 20% full-time equivalent clinical service. In addition to substantive academic productivity, the resident will also receive training in grant writing under an evolving mentorship program.

The program director will function as a faculty advisor for each resident upon arrival into the program. The advisor assists the resident in the transition period, provides advice on professional and personal matters and helps the resident in developing career goals. As the resident develops particular academic or research interests, additional mentors will be added to suit his/her needs.

## ROTATION SCHEDULE

Table 1 shows an example schedule for rotations for a resident who begins the program in July. At the beginning of each clinical rotation the resident will receive an outline describing the goals for that rotation. Each rotation will be supervised by an assigned staff physicist(s). Each resident must keep a record of all patients treated and procedures performed throughout the residency. These records will be kept on a password-protected network drive. Rotation 5 on quality assurance is continuous involvement and participation in the quality assurance program.

Year 1	July 2023	Rotation 1: Clinical Rotation Introduction
	August 2023	Rotation 2: Treatment planning 1 Conformal RT, Emergency Planning, electrons and basic IMRT
	September 2023	
	October 2023	
	November 2023	Rotation 3: Treatment planning 2 IMRT, VMAT, Tomotherapy, Special Procedures
	December 2023	
	January 2024	
	February 2024	Rotation 7: Brachytherapy
	March 2024	
	April 2024	
May 2024	Rotation 8: Radiation Safety	
Year 2	July 2024 – June 2025	Research Concentration (80%)/Clinical Service (20%)
Year 3	July 2025	Rotation 9: Imaging in RT MRI, PET/CT, Fusion, and Adaptive Radiotherapy
	August 2025	Rotation 4: SRS, SBRT and IGRT
	September 2025	
	October 2025	
	November 2025	Rotation 11: Proton Therapy (optional)
	December 2025	(Or option to extend Brachytherapy or Stereotactic rotations to 16 weeks)*
	January 2025	Rotation 6: Acceptance, Commissioning, QA and Safety
	February 2025	
	March 2025	
	April 2025	Rotation 10: Supervised Clinical Service Brachytherapy, Treatment Planning, SRS, SBRT
	May 2025	
	June 2025	Catch up focus month

\*If the resident does not opt to extend brachytherapy or SRS/SBRT rotation by one month, the resident may extend the proton therapy rotation by one month

## **EVALUATIONS**

At the end of each clinical rotation, the resident will receive a formal 60 min evaluation from the clinical rotation supervisor as well as other physics faculty. This is accomplished by a review of the tasks conducted by the resident in the rotation and proficiency with which these tasks are performed. Failure of any required rotation will result in a minimum of additional mentoring/instruction. The rotation may need to be repeated prior to promotion.

During the latter portion of training period, a series of 4-6 refresher oral exams will be given to the resident by a faculty committee. An annual Mock Exam will be completed after the resident has been a trainee for at least 9 months. These exams will be structured to simulate the oral board experience. Since the topics for examination will be known well in advance, the results will be used as part of the overall evaluation of each resident's progress within the program. Residents must pass each Mock Exam at the discretion of the examiners given their experience (a 70 or higher is considered pass in the oral exam; failing more than one question in a category is a fail for that category; failing two categories is a failure overall). Annual practice examinations in radiobiology (RABEX) and radiation physics (RAPHEX) are also administered. In addition, the resident will receive an annual performance review by program director and designees which will include an evaluation of their performance to date, the identification of weak points and plans for future work. The discussion will also include future rotation plans / research projects and career planning

The majority of difficulties with resident performance can be handled via informal means such as counseling or additional instruction with a mentor. If significant problems persist, however, a resident may be placed on probation in accordance with institutional policy.

## **DIDACTIC EDUCATION**

By the completion of the program, the resident will be competent in the fundamental aspects of medical physics at the graduate level as described in AAPM Report Number 79, "Academic Program Recommendations for Graduate Degrees in Medical Physics." Upon entry into the program the program director will evaluate which additional courses are required and formulate a plan to remediate the educational deficiencies.

In particular it is expected that the resident will have completed the following courses or their equivalent:

1. Anatomy and Physiology (02.375 or equivalent)
2. Introduction to Oncology ("Fundamentals of Cancer: Cause to Cure").
3. Radiation Therapy Physics (Directed self-study.)
4. Advanced Radiological Physics (Directed self-study in conjunction with the Academic Seminar Series.)
5. Radiobiology (Dept of Radiation Oncology.)
6. Imaging Physics (520.343 or equivalent)

## **BOARD CERTIFICATION EXAMINATIONS**

Board examinations (written and oral) are administered by the American Board of Radiology. Residents should apply for Part 1 of the written board examination as soon as they are qualified (typically in the first September after entering the residency program). Complete information regarding board examinations is available from the Program Director and from the American Board of Radiology ([www.TheABR.org](http://www.TheABR.org)).

## LEAVE POLICY

The following guidelines should be followed when planning leave. These leave policies are modeled directly on the physician residency program and the ABR training policy rules effective as of July 2005.

Maximum leave (and sick) time per year is 20 work days. This includes vacation; sick days; and personal, family, and medical leave. If a longer leave of absence is granted, the required period of residency education must be extended accordingly.

Under circumstances, including but not limited to maternity leave, family leave, and other extenuating absences, the program director may, at his/her discretion and in conformance with institutional policies, allow up to an additional six weeks of leave during the course of training before a candidate is required to make up the absent time by extending his or her training.

Typically, the maximum amount of leave per rotation **should not exceed 5 work-days**. Longer periods of leave may be approved in special circumstances. Leave dates must be approved by the program director. When possible, residents should give notice of intended leave one month in advance so that clinic schedules may be modified if necessary.

Residents requiring an extended leave of absence due to illness, pregnancy or other circumstances must obtain approval from the program director. Every effort will be made to allow residents to make up missed time, but depending upon the amount the resident's training may need to be extended.

**PARENTAL / MATERNITY LEAVE:** excerpts from the Hospital/University policy are provided below. Please see the GME policy for full information.

### PARENTAL LEAVE

For Postdoctoral Trainees who are paid by JHU, up to one week of PAID leave will be granted following the birth or adoption of a child. Postdoctoral Trainees who plan to utilize parental leave are expected to notify their Training Program Director as soon as they know they will need to use parental leave to facilitate appropriate scheduling. The period of time allocated for parental leave is in addition to allotted vacation and sick time

### MATERNITY LEAVE

For Postdoctoral Trainees who are paid by JHU, a total of eight (8) weeks of paid leave is granted, typically taken two weeks prenatal and six weeks postpartum, of which seven weeks is typically allocated to sick leave and one week is paid parental leave. This is adjusted as individual circumstances require.

### EXTENDED PARENTAL LEAVE

If a Postdoctoral Trainee wishes to extend leave for up to 12 weeks under the Family and Medical Leave Act, the additional leave will be charged to vacation and then to leave without pay. If both parents are employed by the University, they are eligible for a total of 12 weeks of Family and Medical Leave between them in any 12 month period following the birth of a child.

## TRAVEL TO CONFERENCES

Residents are encouraged to prepare research projects for presentation at scientific societies. The department will fund up to one trip (\$2000/year) per year to either AAPM or ASTRO if the resident is making a presentation. Residents will generally be expected to share hotel rooms when more than one same-sex resident is attending a meeting. Additional days taken off prior to or after the meeting must be requested and taken as vacation time. For meetings outside of AAPM or ASTRO where the resident has a presentation, the resident must have funding to attend the conference. For research conducted outside of JHU (e.g. PhD work, prior post-doctoral work) may not be funded by the department-if this is to be funded by the department, it must fall within the educational stipend for that year. As stated above, the leave per rotation **should not exceed 5 work-days**.

## RESOURCES

Each resident is provided with a laptop computer for use during the three-year residency period and a fixed docking station with access to the department network and the internet. Programs for word processing, spread-sheet formatting, Powerpoint presentations, etc. are available on each computer. Residents will be provided with instruction in the use MOSAIQ computer patient record system during new resident orientation.

The Welch Medical Library is available for resident use. The Welch Library maintains an extensive on-line journal collection that can be accessed from any department computer. Residents may have articles electronically requested and delivered through the Welch Web service and PubMed. Selected reference materials are maintained within the resident office. Staff files, journals and texts are also generally available for resident use.

## WORK-HOUR REGULATIONS

Work-hour regulations are modeled after the physician residency program which complies with the ACGME regulations governing resident work hours. Time spent in the clinic/hospital performing patient care counts towards the 80 hour/week maximum. The most recent survey of Hopkins housestaff indicated the average number of hours worked per week by the Radiation Oncology residents was 62. The program director should be notified immediately if any resident is being asked to work more than 80 hours per week. Residents must have 10 hours off between duty periods, therefore they will be excused from morning conference / clinic if they were required to remain on duty past 10 PM of the prior day. Work hours will be monitored in accordance with JHU institutional policies/procedures.

The ACGME regulations are as follows:

- Residents are limited to a **maximum of 80 duty hours per week, including in-house call, averaged over four weeks**. In certain cases, starting in July 2004, residency programs will be allowed to increase duty hours by 10 percent if doing so is necessary for optimal resident education and the program receives approval from the appropriate RRC.
- Residents must be given **one day out of seven, averaged over four weeks, free** from all clinical and educational responsibilities.
- Residents cannot be scheduled for in-house call more than once every three nights, averaged over four weeks.
- Duty periods cannot last for more than 24 hours, although residents may remain on duty for six additional hours to transfer patients, maintain continuity of care or participate in educational activities.
- Residents should be given **at least 10 hours for rest and personal activities between daily duty periods** and after in-house call.
- In-house moonlighting counts toward the weekly limit. In addition, program directors must ensure that external and internal moonlighting does not interfere with the resident's achievement of the program's educational goals and objectives.

## EDUCATIONAL STIPEND

Every year, each resident will be allotted \$2000/year. This may be used towards conferences, membership fees, and textbook purchases.

## APPENDIX A

### RESOURCES ON THE WEB

The following are a list of websites related to the Johns Hopkins Department and to medical physics more generally.

[www.radonc.jhmi.edu](http://www.radonc.jhmi.edu)

[www.aapm.org](http://www.aapm.org)

[www.theabr.org](http://www.theabr.org)

[www.campep.org](http://www.campep.org)

#### Journals

Medical Physics: [www.medphys.org](http://www.medphys.org)

Int J Radiat Oncol Biol Phys (the “red journal”): [www.sciencedirect.com/science/journal/03603016](http://www.sciencedirect.com/science/journal/03603016)

Physics in Medicine and Biology: [www.iop.org/EJ/journal/PMB](http://www.iop.org/EJ/journal/PMB)



## APPENDIX B: BENEFITS (Johns Hopkins Post-doctoral Office)

### ACGME SUBSPECIALTY FELLOWS THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

#### VACATION POLICY, STIPEND LEVELS, AND SUMMARY OF BENEFITS AS OF JULY 1, 2007

##### VACATION POLICY

The vacation policy is 2 weeks to one month as determined by the training program director.

##### STIPEND LEVELS

Stipend levels will be consistent with University guidelines for years of relevant experience using the NIH stipend levels as a minimum and the Johns Hopkins University School of Medicine stipends as a maximum. Training program directors will determine the exact stipend using these guidelines. The stipend policy is provided at the end of this document

##### HEALTH INSURANCE COVERAGE POLICY FOR POSTDOCTORAL FELLOWS

All postdoctoral students, their spouses, and dependent children must be covered by hospitalization insurance. It is required that postdoctoral students subscribe to the School of Medicine student insurance plan. Spouses and dependent children may be covered under equivalent insurance, but all equivalent insurance plans must be reviewed and approved by the School of Medicine Registrar's Office. Foreign insurance is not accepted.

Complete descriptions of the dental insurance, health insurance, disability insurance, and life insurance plans are on the following website: <http://www.hopkinsmedicine.org/som/gme/fellows/index.html>. You may also access information regarding the 403(b) Retirement Program and the Summary of Health Benefits for Postdoctoral Fellows and Students from this website.

Descriptions of the benefit plans will be mailed to you with membership cards and insurance certificates.

##### STUDENT HEALTH PROGRAM (SHP) (Effective date determined by completion date of application) (Through Johns Hopkins Employer Health Programs (EHP))

For full-time and part-time fellows, spouses, same-sex domestic partners and dependent children. Enrollment must take place within 30 days of appointment. Changes in enrollment can be made during the July open enrollment period or as a result of a qualified "life event" provided application is made within 30 days of the qualifying event.

##### I. HOSPITALIZATION INSURANCE – STUDENT HEALTH PROGRAM

Preceptors are required to provide Individual health insurance for all fellows. The cost difference between Individual and 2-party or Family coverage is the responsibility of the fellow. Reasonable and Customary charges are determined by EHP

##### A. Hospitalization

All inpatient care - 30 day semi-private room at 100% of Reasonable & Customary charges; then 80% of Reasonable & Customary charges, after deductible  
Outpatient Surgical Facility Charges – 100% of Reasonable & Customary charges

##### B. Out-of-Pocket Maximum – Calendar Year

Individual	\$3,000
Family	\$9,000

The out-of-pocket limit includes the deductible and coinsurance but does not include: penalties, prescription drug coinsurance and expenses; Program maximums; any charges for services which are not covered, or mental health and substance abuse charges, including treatment of alcoholism.

##### C. Diagnostic Tests

For diagnostic tests performed in a physician's office or hospital outpatient department:

1. X-ray examinations, radioisotope studies (made by qualified X-ray specialist or radiologist upon referral from another physician or by a specialist qualified to make such examination in his own field), electrocardiograms and electroencephalograms.
2. Pathology examinations including the study of surgically removed tissue, blood tests, analysis of urine, spinal fluids, etc.

##### Prescription Plan

Benefits are paid for most prescription drugs, injectable insulin, diabetic supplies and other medicines and supplies. You can receive a 30 day supply. The prescription plan is a three tier formulary with a \$10, \$20 and \$35 co-pay for each 30 day supply.

When you go to a pharmacy, show your membership card and pay only your portion of the cost of a prescription. A cost saving 90 day supply of medication may be obtained by mail with a 2 co-pay payment. Details on the mail order program are included in the Student Health Program brochure. Prescribed oral contraceptives are covered under the Prescription Plan.

- E. Maximum Lifetime Benefit - \$1,000,000  
Subject to a \$100 deductible per member (\$300 per family), per calendar year. The Program will pay 80% of Reasonable & Customary charges for all other eligible expenses up to the \$1,000,000 lifetime maximum. (Except substance abuse care which has a \$250,000 lifetime maximum)

## VII. SUPPLEMENTAL DISABILITY BENEFITS

- F. Mental Health Services  
The program provides benefits for outpatient mental health service when provided in a psychiatrist's office, or in a hospital outpatient department or clinic. These benefits are coordinated with the benefits available under the Student Mental Health Services program as described in the Summary of Health Benefits for Postdoctoral Fellows and Students brochure.
- G. Case Management Component  
Elective (non-emergency) hospitalizations require certification by the Johns Hopkins Student Health Program prior to admission. Emergency care must be reported to the Johns Hopkins Student Health Program within 48 hours.
- H. Pre-Existing Condition Exclusion (applies only to subscribers who have not presented a valid Certificate of Health Coverage from a prior health plan)  
Benefits will be limited to \$10,000 during the first year of the policy for any condition, except pregnancy, for which a new subscriber has received medical treatment in the 90 days preceding effective date of policy.

## II. UNIVERSITY HEALTH SERVICE (Effective date of Student Health Program coverage)

The University Health Service Health Center (UHSHC) offers comprehensive adult ambulatory medical services to eligible fellows, spouses, and same-sex domestic partners. Ambulatory care is provided for a dependent child through a pediatrician of your choice. To be eligible for these services spouses, same-sex domestic partners and dependent children **must** be covered by the Student Health Program. UHS Health Center services are provided by faculty and professional staff of the School of Medicine. Each adult will be assigned a UHS Health Center primary care physician. The UHS Health Center is located at 401 N. Caroline Street and their website is <http://www.hopkinsmedicine.org/uhs/>.

## III. STUDENT MENTAL HEALTH SERVICES

Student Mental Health offers a confidential source for fellows and their spouses/same-sex domestic partners seeking mental health help. Services are rendered by physicians and professional staff of the Johns Hopkins Psychiatry Department. The mental health benefit provides unlimited visits if care is received through Student Mental Health Services. The Student Health Program is billed for mental health visits with the balance supplemented by UHS/SMHS.

## IV. FACULTY & STAFF ASSISTANCE PROGRAM (FASAP)

The FASAP program is available to fellows and their immediate families. Services include identification, assessment and diagnosis of personal problems, referral to appropriate service or treatment resources; brief counseling, preventive and educational sessions, and support and discussion groups.

## THE FOLLOWING BENEFITS APPLY TO THE POSTDOCTORAL FELLOW ONLY

- V. DENTAL PLAN (Provided at no cost to fellow; covers postdoctoral fellow only)  
Coverage is effective the first of the month following month of appointment.  
A basic CareFirst BlueCross BlueShield dental plan with a co-payment requirement. A membership card and summary of benefits will be mailed to your home.
- VI. LONG TERM DISABILITY INSURANCE (Provided at no cost to fellow; covers postdoctoral fellow only.)  
Enrollment Form Required. Effective date is determined by completion date of application. Details of the plan will be mailed approximately 6 weeks after your enrollment form is received.
- A. The policy is noncancellable and guaranteed renewable for your lifetime.  
B. The monthly benefit of \$2,750 per month applies to new appointments 7/01/05 and beyond.  
For appointments prior to 7/01/05, the monthly benefit is \$2,250 per month.  
C. Benefits are payable after the 90th day of your disability.  
D. The policy can be maintained and increased by you after you leave Hopkins by the continuation of premium payments.

In addition to the above benefit a Supplemental Disability Insurance Plan may be purchased by the fellow on a direct pay basis. The plan provides a \$1,000 additional monthly benefit at guaranteed rates. Enrollment information will be mailed to your home by UnumProvident.

## VIII. LIFE INSURANCE (Provided at no cost to fellow; covers postdoctoral fellow only)

Coverage is effective as of date of appointment. No enrollment form required; completion of beneficiary form required.

\$100,000 of group life coverage under a policy underwritten by Unum Life Insurance Company of America.

IX. RETIREMENT PLAN 403(b)

The Johns Hopkins University has a voluntary retirement plan for postdoctoral fellows. This plan allows you to voluntarily tax shelter a portion of your taxable income received as taxable compensation (i.e. salary/wages). That portion of income received in the form of fellowships (stipends) is excluded from 403(b) eligibility. Any contribution you make is unmatched by the University. The minimum voluntary contribution is \$15 per month and may not exceed \$15,500 of your taxable compensation for the calendar year 2007. Thereafter, the maximum contribution will be indexed in \$500 limits annually. The effective date of your participation will be the first day of the month after the Office of Benefits Administration receives all appropriate enrollment forms. Enrollment forms are available in the Registrar's Office, Broadway Research Building, Suite 147, School of Medicine.

X. EXEMPTIONS

Postdoctoral Fellows rotating to Johns Hopkins whose primary training appointment is in a non Johns Hopkins affiliated Baltimore metropolitan area hospital, fellows whose primary Johns Hopkins University appointment is not in a School of Medicine department and fellows on active military duty are exempt from these requirements as their primary institutions are responsible for their health care benefits. Some postdoctoral fellows may be exempted from the life insurance and disability insurance programs if equivalent coverage is provided by their funding agencies and such coverage is reviewed and approved by the Registrar's Office.