

ASHOK TIWARI, PhD

(ABR Board Eligible)

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Date: 10/24/2024

EDUCATION

- 12/2023 - **Medical Physics Residency**
Department of Radiation Oncology
Indiana University School of Medicine, Indianapolis, IN 46202
- 8/2022 - 5/2023 **Certificate in Medical Physics (CAMPEP)**
Department of Radiation Oncology
Wake Forest University School of Medicine, Winston-Salem, NC 27157
- 8/2017 - 5/2022 **PhD in Physics**
Thesis: "*Monte Carlo Simulations and Phantom Measurements towards more Quantitative Dosimetry and Imaging in Nuclear Medicine*"
Advisor: John Sunderland, PhD
Department of Physics
University of Iowa, Iowa City, IA 52242
- 8/2015 - 5/2017 **MS in Physics, Magna Cum Laude**
Department of Physics
University of South Dakota, Vermillion, SD 57069
- 9/2008 - 9/2012 **MSc in Physics**
Central Department of Physics
Tribhuvan University, Kathmandu, Nepal
- 8/2005 - 8/2008 **BSc in Physics**
National Multiple College
Tribhuvan University, Kathmandu, Nepal

POST DOCTORAL TRAINING

- 8/2022-11/2023 **Postdoctoral Research Associate**
Advanced Computing for Health Sciences
Computational Sciences and Engineering Division
Oak Ridge National Laboratory, Oak Ridge, TN 37830
Research: Monte Carlo for simulations for radionuclide dosimetry and radiobiology
- PET imaging extravasation dosimetry
 - Investigation of DNA damage from ^{225}Ac radionuclide
- 7/2022 - 8/2022 **Postdoctoral Research Scholar**
Department of Radiology
University of Iowa City, Iowa City, IA 52242

LICENSES & CERTIFICATIONS

ABR Certificate in Therapeutic Medical Physics (Part I - Passed 8/2024)

ABR Certificate in Therapeutic Medical Physics (Part II - Approved)

RESEARCH INTERESTS

Radiation Physics, Treatment planning, Radiopharmaceutical Therapy, Monte Carlo Simulations

CLINICAL EXPERIENCE

- **Treatment simulation with CT simulator**
 - Experience with Philips Big Bore & Siemens go.Open Pro CT simulators
 - Daily/Monthly QA of CT simulators, CTDI_{vol} measurements
- **Treatment planning**
 - Six months of experience in photon and electron planning using *Eclipse v15.6*
 - IMRT/VMAT, SRS, SBRT, 3D & DCA planning for various anatomical sites
- **In-vivo dosimetry**
 - Calibration and absorbed dose measurements using TLDs, nanodots & Gafchromic films
 - Photons and Radiopharmaceutical dosimetry with Gafchromic EBT3 films
- **Oncology information system**
 - ARIA record and verify system
- **Clinical Quality Assurance (QA)**
 - IMRT/VMAT and SRS/SBRT patient-specific QAs
 - Phantom-based QA (ArcCHECK/MapCHECK phantoms)
 - Portal dosimetry with EPID - Varian
 - Initial, weekly, and End-of-Treatment chart checks
 - MU Calculation with RadCalc
 - Backup (and primary) POD roles
- **Machine quality assurance**
 - Daily/Monthly/Annual QA of Varian linacs (with QMP oversight)
 - Experience with Varian TrueBeam, TrueBeam Edge, and Varian iX Clinac
- **Special Procedures**
 - Total Skin Electron Therapy
 - Total Body Irradiation
 - Framed and frameless SRS
 - Gamma Knife and LDR & HDR Brachytherapy (in progress)
 - GammaTile Therapy (in progress)
- **Commissioning and acceptance testing**
 - Commissioning of Siemens go.Open Pro CT simulator
 - Commissioning of Varian TrueBeam linac
- **Nuclear and Molecular imaging**
 - Experience with PET/CT scanners: GE Discovery MI, Siemens Vision and Biograph mCT
 - Phantom scan for research and PET/CT QA
- **Radioactive source handling and dose calibrator**
 - ^{90}Y , ^{177}Lu for absorbed dose measurements
 - ^{18}F , ^{89}Zr , ^{68}Ga for PET imaging

TEACHING EXPERIENCE

- 6/2024 - 9/2024 **Medical Physics Teaching Assistant**
 Department of Radiation Oncology
 Indiana University, Indianapolis, IN
 Course: *The Physics of Radiation Therapy by Faiz Khan (RAON 604/605)*
 (Collaborated with medical physics faculties to teach radiation oncology residents)
- 8/2017 - 8/2018 **Teaching Assistant**
 Department of Physics
 University of Iowa, Iowa City, IA
 Course: *General physics lab*

3/2013 - 1/2015 Physics Lecturer

SS College, Bhaktapur, Nepal

Course: *Introductory Nuclear Physics, Heat and Thermodynamics, and Mechanics*

GRADUATE RESEARCH AND PROFESSIONAL EXPERIENCE

9/2021 - 7/2022 Programmer (Monte Carlo), SPECT Project

Department of Radiology

University of Washington, Seattle, WA

8/2018 - 5/2022 Graduate Research Assistant

Department of Physics and Radiology

University of Iowa, Iowa City, IA

8/2015 - 5/2017 Graduate Research Assistant

Department of Physics

University of South Dakota, Vermillion, SD

1/2012 - 5/2012 Radiographer

Sunshine Medical Center, Kathmandu, Nepal

HONORS, AWARDS AND SCHOLARSHIPS

- AAPM Ohio Valley Chapter Meeting 2024, 2nd best presentation, (Cash Prize \$200)
- 11th Annual ORPA Research Symposium 2023 – People’s Choice Award
- Ballard and Seashore Dissertation Fellowship, Spring 2022 (\$10,500), University of Iowa
- Research Assistantship, Department of Physics and Radiology, University of Iowa
- Teaching Assistantship, Department of Physics, University of Iowa
- Teaching Assistantship, Department of Physics, University of South Dakota
- Graduate Studentship, Central Department of Physics, Tribhuvan University, Nepal
- Scholarship from Ministry of Environment, Science and Technology (Cash NPR 25,000), Nepal
- Travel award (\$1000), Seoul National University to attend “11th Edoardo Amaldi Conference on Gravitational Waves”, June 21-26 (2015), Gwangju, South Korea
- Travel award (\$800), International graduate summer school in Aeronautics and Astronautics, July 15 - 23 (2014), Beihang University, Beijing, China

COMPUTATION SKILLS

- High Performance Computing: research computing, big data handling
 - SLURM and SGE job schedulers
 - Bash scripting
- Operating systems: Linux, Windows, MacOS
- Programming and software skills
 - Monte Carlo Simulation: Geant4, GATE, TOPAS toolkit
 - ROOT data analysis framework
 - Programming: MATLAB, Python, C++
 - Interactive computing: Jupyter Notebook (Pandas, Numpy, Matplotlib)
 - JSON, Qt widget toolkit
 - Image analysis tools: ITK-SNAP, ImageJ, Amide, 3D Slicer and DICOM
 - Image reconstruction software: STIR, CASToR
 - Github, DOCKER
 - AutoCAD modeling

JOURNAL PUBLICATIONS (Most recent to earliest)

12. **Tiwari A.**, Andriotty M., Agasthya G., Sunderland J., Osborne D., and Kapadia A. Dosimetric and biological impact of activity extravasation of radiopharmaceuticals in PET imaging. *Med Phys*, (in review), 2024.
11. **Tiwari A.**, Merrick M., Graves S., and Sunderland J. J. Alpha dose point kernels and their potential application in labelling FAPI-radiotherapeutics. *Med Phys*, (in review), 2023.
10. **Tiwari A.**, Merrick M., Graves S., and Sunderland J. J. Monte Carlo evaluation of hypothetical long axial field-of-view PET scanner using GE Discovery MI PET front-end architecture, *Med Phys*, 49:1139-1152, 2022.
9. Graves S., Martin M., **Tiwari A.**, Merrick M., and Sunderland J. J. SIR-Spheres® activity measurements reveal systematic miscalibration, *JNM*, 63 (8) 1131-1135, 2022; DOI: <https://doi.org/10.2967/jnumed.121.262650>.
8. Graves S., **Tiwari A.**, Merrick M. J., Hyer D., Flynn R., Kruzer A., Nelson A., Dewaraja Y., Mirando D., and Sunderland J. J. Accurate resampling of radial dose point kernels to a Cartesian matrix for voxelwise dose calculation, *Med Phys*, (in review), 2023.
7. Merrick M. J., Rotsch D. A., **Tiwari A.**, Nolen J., Brossard T., Song J., Wadas T. J., Sunderland J. J., and Graves S. A. Half-Life of ⁶⁷Cu, *J. Phys. Commun.* 5 085007, 2021.
6. **Tiwari A.**, Sunderland J., Graves S., Strand S., and Flynn R. Absorbed dose distributions from beta-decaying radionuclides: experimental validation of Monte Carlo tools for radiopharmaceutical dosimetry. *Med Phys*, 47(11):5779-5790, 2020.
5. Merrick M. J., Rotsch D. A., **Tiwari A.**, Nolen J., Brossard T., Song J., Wadas T. J., Sunderland J. J., and Graves S. A. Imaging and Dosimetric Characteristics of ⁶⁷Cu. *Phys Med Biol* 66, 035002, 2021.
4. **Tiwari A.**, Graves S., and Sunderland J. The Impact of Tissue Type and Density on Dose Point Kernels for Patient-Specific Voxel-Wise Dosimetry: A Monte Carlo Investigation. *Radiat Res*, 193 (6): 531–542, 2020.
3. Zhang C., Mei D.-M., **Tiwari A.**, and Cushman P. Reply to “Comment of ‘Observation of annual modulation induced by γ rays from (α , γ) reactions at the Soudan Underground Laboratory’”, *Phys Rev C* 101, 049802, 2020.
2. **Tiwari A.**, Zhang C., Mei D.-M., and Cushman P. Observation of annual modulation induced by γ rays from (α , γ) reactions at the Soudan Underground Laboratory, *Phys Rev C*, Vol. 96, No. 4, 2017.
1. **Tiwari A.**, and Khanal U., Gravitational radiation from a particle in bound orbit around the black hole; relativistic correction, *J. Phys.: Conf. Ser.* 716, 012024, 2016.

CONFERENCE PRESENTATIONS AND ABSTRACTS (Peer reviewed)

22. **Tiwari A.**, Andriotty M., Agasthya G., Sunderland J., Osborne D., and Kapadia A. Assessment of impact of activity extravasation of radiopharmaceutical in PET imaging. *Journal of Nuclear Medicine*, 65 (supplement 2) 242321. SNMMI Annual Meeting (2024).
21. Campos D.D., **Tiwari A.**, Huang K.C., Ng S.K., and Yue Y. Decreasing Pitch Reduces 4DCT Motion Artifacts for Increased ITV Fidelity. AAPM 66th Annual Meeting (2024).
20. **Tiwari A.**, Huang C., Ng S.K., Rivera J., Campos D., Oderinde O., Njeh C., and Yue Y. Transitioning from OSLD to TLDs for In-Vivo Dosimetry in Total Skin Electron Therapy: A Clinical Perspective. AAPM 66th Annual Meeting (2024).
19. **Tiwari A.**, Gonzalez M., Davern S., Agasthya G., and Kapadia A. Validation of Monte Carlo simulations to assess DNA damage from ²²⁵Ac for radiopharmaceutical therapy. AAPM 66th Annual Meeting (2024) – Oral presentation.

18. **Tiwari A.**, Gonzalez M. T., Andriotty M., Agasthya G., and Kapadia A. Experimental validation of Monte Carlo simulations for quantifying DNA damage in breast cancer cells exposed to ^{225}Ac . 17th ICRR Meeting (2023).
17. **Tiwari A.**, Andriotty M., Agasthya G., Osborne D., and Kapadia A. Absorbed doses from accidental extravasation of radiotracers in PET imaging. AAPM 65th Annual Meeting (2023) – Oral presentation.
16. **Tiwari A.**, Andriotty M., Inman P., Agasthya G., and Kapadia A. Estimation of DNA damage from radionuclide irradiation in a single cell. SEAAPM Scientific Meeting, Feb 2-4, (2023) – Oral presentation.
15. **Tiwari A.**, Graves S., Merrick MJ., and Sunderland J. Evaluation of therapeutic alpha emitters for their potential to be used in FAPI compounds. *Journal of Nuclear Medicine*, 63 (supplement 2) 2815. SNMMI Annual Meeting (2022).
14. Merrick M., Dunnwald L., **Tiwari A.**, Sunderland J., and Graves S. Longitudinal PET/CT Imaging of ^{64}Cu for Radiopharmaceutical Therapy Dosimetry. AAPM 63rd Annual Meeting (2021).
13. Sunderland J. and **Tiwari A.** A Comprehensive PET-CT scanner characterization performance assessment paradigm and database. *Journal of Nuclear Medicine*, 62 (supplement 1) 1398. SNMMI Annual meeting (2021).
12. Graves S., Merrick M., **Tiwari A.**, and Sunderland J. Evaluation of a scalable qSPECT calibration method for radiopharmaceutical dosimetry. *Journal of Nuclear Medicine*, 62 (supplement 1) 143. SNMMI Annual meeting (2021).
11. **Tiwari A.**, Merrick M. J., Graves S. A., and Sunderland J. Monte Carlo simulation of 4-ring Discovery MI PET/CT scanner and its extended axial field-of-view to 2 m. *Journal of Nuclear Medicine*, 62 (supplement 1) 1150. SNMMI Annual Meeting (2021) – Oral presentation.
10. **Tiwari A.**, Graves S., Strand S. and Sunderland J. Experimental validation of Monte Carlo-generated beta absorbed doses for 3D voxelwise dosimetry. *Journal of Nuclear Medicine*, 61 (supplement 1) 533. SNMMI Annual Meeting (2020).
9. Graves S., **Tiwari A.**, Kruzer A., Nelson A., Mirando D., Dewaraja Y., and Sunderland J. Monte Carlo validation of convolution-based voxelwise dosimetry. *Journal of Nuclear Medicine*, 61 (supplement 1) 1019. SNMMI Annual Meeting (2020).
8. Graves S., **Tiwari A.**, and Sunderland J. Collapsed-cone convolution superposition for improved accuracy of voxelwise dosimetry. *Journal of Nuclear Medicine*, 61 (supplement 1) 535. SNMMI Annual Meeting (2020).
7. Merrick M. J., Rotsch D., **Tiwari A.**, Nolen J., Brossard T., Song J., Wadas T. J., Sunderland J. J., Graves S. A. Production, SPECT Imaging, and Initial Evaluation of ^{67}Cu for Theranostic Applications. AAPM Annual Meeting (2020).
6. **Tiwari A.**, Graves S., Sunderland J. Measurements of dose point kernels using GATE Monte Carlo toolkit for personalized convolution dosimetry. *Journal of Nuclear Medicine*, 60 (supplement 1), 274-274. SNMMI Annual Meeting (2019) – Oral presentation.
5. Graves S., **Tiwari A.**, Hyer D., Flynn R., Buatti J., Sunderland J. Impact of Kernel Truncation On ^{177}Lu -DOTATATE and ^{131}I -MIBG Voxelwise Dosimetry. *Medical Physics* 46 (6), E316-E316. AAPM Annual Meeting (2019).
4. Graves S., **Tiwari A.**, Menda Y., Madsen M., Sunderland J. Toward best practice voxel-wise ^{177}Lu dosimetry: kernel generation, scanner characterization, and convolution-based dose calculation. *Journal of Nuclear Medicine*, 60 (supplement 1), 119. SNMMI Annual Meeting (2019).
3. **Tiwari A.**, Zhang C. and Mei D. M. The study of the correlation between (alpha, gamma) induced events with respect to Radon annual modulation. APS Meeting, Washington DC (2017) – Oral presentation.
2. **Tiwari A.**, Zhang C., and Mei D. M. (alpha, gamma) reaction induced background events for rare event experiments. APS Division of Nuclear Physics Meeting, Vancouver, Canada (2016) – Oral presentation.

1. **Tiwari A.** and Khanal U. Gravitational radiation from a particle in bound orbit around black hole; relativistic correction. 11th Edorado Amaldi Conference on Gravitational Waves, Gwangju, South Korea (2015) – Oral presentation.

INVITED AND RECENT TALKS

5. **Tiwari A.** DNA Damage estimations from ²²⁵Ac for Radiopharmaceutical Therapy: Experiment vs Monte Carlo study. AAPM POWV-ORVC Joint Fall chapter meeting, Columbus OH, Sep 14 (2024).
4. **Tiwari A.**, Merrick MJ., Graves S., and Sunderland J. Dose point kernels and their potential application in labeling FAPI-compounds. ARIA Workshop on “Evolving Targeted Therapies for Cancer”, Oak Ridge National Laboratory, Nov 2-3, (2022). <https://aria-workshop.ornl.gov/speakers/ashok-tiwari/>
3. **Tiwari A.** and Sunderland J. Simulations of therapeutic alpha-emitting radionuclides in various tissues. OpenGATE Virtual Meeting, Nov 18, (2021).
2. **Tiwari A.** and Sunderland J. GATE simulation of Discovery MI PET scanner and its extended version. GATE Scientific Meeting, Virtual Edition, May 10 (2021).
1. **Tiwari A.** Dosimetry of therapeutic beta emitters using GATE Monte Carlo simulation and its experimental validation for radiopharmaceutical therapy. GATE Technical Meeting, Virtual Edition, Sep 10 (2020).

PROFESSIONAL MEMBERSHIPS

- *Associate Member* - American Association of Physicist in Medicine - AAPM (2019 - 2024)
- *Associate Member* - Society of Nuclear Medicine and Molecular Imaging - SNMMI (2023 - 2024)

JOURNAL REVIEWER

- Medical Physics

LEADERSHIP ROLES

- Vice President, Nepalese Student Association, University of Iowa (2017 - 2021)

REFERENCES

- Christopher Njeh, PhD, DABR, FAAPM
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Medical Physics Residency Director
Department of Radiation Oncology
Indiana University School of Medicine, Indianapolis IN 46202
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- John J. Sunderland, PhD, MBA, FSNMMI
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