ASHOK TIWARI, PhD

(ABR Board Eligible)

838 Blake St APT I, Indianapolis, IN 46202

Phone: (605) 202-1567 | Email: atiwari7@iuhealth.org, tiwarias@yahoo.com

Website: https://ashok-tiwari.github.io/

Date: 10/15/2024

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**
Department of Radiation Oncology
Wake Forest University School of Medicine, Winston-Salem, NC 27109

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, Lalitpur, 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 1
(Issued 2024)

RESEARCH INTERESTS

Radiation Physics, Radiopharmaceutical Dosimetry, Monte Carlo Simulations, Nuclear Medicine

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 QAs
  - IMRT/VMAT patient-specific QAs
    - Phantom-based (ArcCHECK and MapCHECK)
    - Portal dosimetry (EPID)
  - Initial, weekly, and End-of-Treatment chart checks
  - MU Calculation with RadCalc
  - Backup and primary Physicist of the Day (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 Brachytherapy (in progress)
- Commissioning and acceptance testing
  - Commissioning of Siemens go.Open Pro CT simulator
  - Commissioning of Varian TrueBeam linac
- PET/CT scanners experience
  - Experience with 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 Physics Instructor
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 (HPC): research computing, big data handling
  - SGE and SLURM batch scheduler
  - 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 ^{67}Cu, *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 ^{67}Cu. *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. Assessment of impact of activity extravasation of radiopharmaceutical in PET imaging. **Tiwari A.,** Andriotty M., Agasthya G., Sunderland J., Osborne D., and Kapadia A. (SNMMI Annual Meeting 2024)
21. Decreasing Pitch Reduces 4DCT Motion Artifacts for Increased ITV Fidelity. Campos D.D., **Tiwari A.**, Huang K.C., Ng S.K., and Yue Y. (AAPM 66th Annual Meeting 2024)
20. Transitioning from OSLD to TLDs for In-Vivo Dosimetry in Total Skin Electron Therapy: A Clinical Perspective. **Tiwari A.**, Huang C., Ng S.K., Rivera J., Campos D., Oderinde O., Njeh C., and Yue Y. (AAPM 66th Annual Meeting 2024)
19. Validation of Monte Carlo simulations to assess DNA damage from ^{225}Ac for radiopharmaceutical therapy. **Tiwari A.**, Gonzalez M., Davern S., Agasthya G., and Kapadia A. (AAPM 66th Annual Meeting 2024 – Oral presentation)
18. Experimental validation of Monte Carlo simulations for quantifying DNA damage in breast cancer cells exposed to ^{225}Ac. **Tiwari A.**, Gonzalez M. T., Andriotty M., Agasthya G., and Kapadia A. (17th ICRR Meeting 2023)

17. Absorbed doses from accidental extravasation of radiotracers in PET imaging. **Tiwari A.**, Andriotty M., Agasthya G., Osborne D., and Kapadia A. (AAPM 65th Annual Meeting 2023 – Oral presentation)
16. Estimation of DNA damage from radionuclide irradiation in a single cell. **Tiwari A.**, Andriotty M., Inman P., Agasthya G., and Kapadia A. (SEAAPM Scientific Meeting, Feb 2-4, 2023 – Oral presentation)
15. Evaluation of therapeutic alpha emitters for their potential to be used in FAPI compounds. **Tiwari A.**, Graves S., Merrick MJ., and Sunderland J. (SNMMI Annual Meeting 2022)
14. Longitudinal PET/CT Imaging of ^{64}Cu for Radiopharmaceutical Therapy Dosimetry. Merrick M., Dunnwald L., **Tiwari A.**, Sunderland J., and Graves S. (AAPM 63rd Annual Meeting 2021)
13. A Comprehensive PET-CT scanner characterization performance assessment paradigm and database. Sunderland J. and **Tiwari A.**, Journal of Nuclear Medicine, May 2021, 62 (supplement 1) 1398, (SNMMI Annual meeting 2021)
12. Evaluation of a scalable qSPECT calibration method for radiopharmaceutical dosimetry. Graves S., Merrick M., **Tiwari A.,** and Sunderland J., Journal of Nuclear Medicine, May 2021, 62 (supplement 1) 143, (SNMMI Annual meeting 2021)
11. Monte Carlo simulation of 4-ring Discovery MI PET/CT scanner and its extended axial field-of-view to 2 m. **Tiwari A.**, Merrick M. J., Graves S. A., and Sunderland J., Journal of Nuclear Medicine May 2021, 62 (supplement 1) 1150, (SNMMI Annual Meeting 2021 – Oral presentation)
10. Experimental validation of Monte Carlo-generated beta absorbed doses for 3D voxelwise dosimetry. **Tiwari A.**, Graves S., Strand S. and Sunderland J., Journal of Nuclear Medicine May 2020, 61 (supplement 1) 533, (SNMMI Annual Meeting 2020)
9. Monte Carlo validation of convolution-based voxelwise dosimetry. Graves S., **Tiwari A.**, Kruzer A., Nelson A., Mirando D., Dewaraja Y., and Sunderland J., Journal of Nuclear Medicine May 2020, 61 (supplement 1) 1019, (SNMMI Annual Meeting 2020)
8. Collapsed-cone convolution superposition for improved accuracy of voxelwise dosimetry. Graves S., **Tiwari A.**, and Sunderland J., Journal of Nuclear Medicine May 2020, 61 (supplement 1) 535, (SNMMI Annual Meeting 2020)
7. Production, SPECT Imaging, and Initial Evaluation of ^{67}Cu for Theranostic Applications. Merrick M. J., Rotsch D., **Tiwari A.**, Nolen J., Brossard T., Song J., Wadas T. J., Sunderland J. J., Graves S. A., (AAPM Annual Meeting 2020)
6. Measurements of dose point kernels using GATE Monte Carlo toolkit for personalized convolution dosimetry. **Tiwari A.**, Graves S., Sunderland J., Journal of Nuclear Medicine 60 (supplement 1), 274-274, (SNMMI Annual Meeting 2019, CA – Oral presentation)
5. Impact of Kernel Truncation On ^{177}Lu-DOTATATE and ^{131}I-MIBG Voxelwise Dosimetry. Graves S., **Tiwari A.**, Hyer D., Flynn R., Buatti J., Sunderland J., *Medical Physics* 46 (6), E316-E316 (AAPM Annual Meeting 2019)
4. Toward best practice voxel-wise ^{177}Lu dosimetry: kernel generation, scanner characterization, and convolution-based dose calculation. Graves S., **Tiwari A.,** Menda Y., Madsen M., Sunderland J., Journal of Nuclear Medicine 60 (supplement 1), 119, (SNMMI Annual Meeting 2019, CA)
3. The study of the correlation between (alpha, gamma) induced events with respect to Radon annual modulation. **Tiwari A.**, Zhang C. and Mei D. M., (APS Meeting 2017, Washington DC – Oral presentation)
2. (alpha, gamma) reaction induced background events for rare event experiments. **Tiwari A.**, Zhang C., and Mei D. M., (APS Division of Nuclear Physics Meeting 2016, Vancouver, Canada – Oral presentation)
1. Gravitational radiation from a particle in bound orbit around black hole; relativistic correction. **Tiwari A.** and Khanal U, (11th Edorado Amaldi Conference on Gravitational Waves 2015, Gwangju, South Korea – Oral presentation)

INVITED AND RECENT TALKS

4. Dose point kernels and their potential application in labeling FAPI-compounds. **Tiwari A.,** Merrick MJ., Graves S., and Sunderland J. 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. Simulations of therapeutic alpha-emitting radionuclides in various tissues. **Tiwari A.** and Sunderland J., OpenGATE Virtual Meeting, Nov 18, (2021).
2. GATE simulation of Discovery MI PET scanner and its extended version. **Tiwari A.** and Sunderland J., GATE Scientific Meeting, Virtual Edition, May 10 (2021).
1. Dosimetry of therapeutic beta emitters using GATE Monte Carlo simulation and its experimental validation for radiopharmaceutical therapy. **Tiwari A.**, 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
  Associate Professor of Radiation Oncology
  Medical Physics Residency Director
  Department of Radiation Oncology
  Indiana University School of Medicine, Indianapolis IN 46202
  Email: cnjeh@iuhealth.org | Phone: (903) 422-0449

- David Campos, PhD, DABR
  Assistant Professor of Radiation Oncology
  Assistant Medical Physics Residency Director
  Department of Radiation Oncology
  Indiana University School of Medicine, Indianapolis IN 46202
  Email: dcampos1@iuhealth.org | Phone: (302) 740-4446

- Yong Yue, PhD, DABR
  Associate Professor
  Associate Director of Informatics
  Department of Radiation Oncology
  Indiana University School of Medicine, Indianapolis IN 46202
  Email: yongyue@iu.edu | Phone: (317) 962-3549

- John J. Sunderland, PhD, MBA, FSNMMI
  Professor of Radiology, Physics and Astronomy, Radiation Oncology

Department of Radiology
University of Iowa, Iowa city, IA 52242
Email: john-sunderland@uiowa.edu | Phone: (319) 541-5817

- Greg Bartlett, CMD
Dosimetrist Lead
Department of Radiation Oncology
Indiana University School of Medicine, Indianapolis IN 46202
Email: gbartlet@iuhealth.org | Phone: (812) 219-8808