

## **Curriculum Vitae**

Nrusingh C. Biswal, Ph.D, DABR  
Assistant Professor, Department of Radiation Oncology  
University of Maryland School of Medicine

**Date** March 10, 2023

### **Contact Information**

Business Address: Maryland Proton Treatment Center  
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Foreign Languages: Odia (Fluent), Hindi (Fluent)

### **Research Interests**

Clinical safety, workflow and efficiency improvement during proton therapy, Molecular Imaging for studying tumor microenvironment, Image-guided proton therapy, Therapeutic response assessment, Imaging and treatment of tumor Hypoxia, Tumor Hyperthermia.

### **Education**

1995 - 1998 B.Sc., Physics, Utkal University, Bhubaneswar, India  
1998 - 2000 M.Sc., Physics, Ravenshaw University, Cuttack, India  
2001 - 2003 M. Tech., Laser Technology, Indian Institute of Technology, Kanpur, India  
2005 - 2010 Ph.D., Electrical Engineering, University of Connecticut  
Thesis Advisor – Quing Zhu, Ph.D.  
“Diffuse Fluorescence Tomography for Mapping Tumor Vasculature and Tumor Hypoxia”

### **Post Graduate Education and Training**

2000 - 2001 Research Fellow, Ravenshaw University, Cuttack, India  
2003 - 2004 Senior Research Fellow, Indian Institute of Technology, Kanpur, India  
Mentor: Asima Pradhan, Ph.D.  
2004 - 2005 Senior Research Fellow, Indian Institute of Science, Bangalore, India  
Mentor: R. M. Vasu, Ph.D.  
2010 - 2011 Postdoctoral Research Fellow, Baylor College of Medicine  
Mentor: Amit Joshi, Ph.D.  
2011 - 2012 Research Associate, Baylor College of Medicine  
Mentor: Amit Joshi, Ph.D.

- 2012 - 2015 Residency, Therapeutic Medical Physics, Rush University Medical Center (CAMPEP Accredited)  
Mentor: James C. H. Chu, Ph.D., FAAPM, FACR
- 2015 Chief Medical Physics Resident, Department of Radiation Oncology, Rush University Medical Center

### **Certifications**

- 2017 American Board of Radiology in Therapeutic Medical Physics
- 2019 New York State License for Therapeutic Medical Physics

### **Employment History**

### **Academic Appointments**

- 2016 - 2019 Assistant Professor, Radiation Oncology, Rutgers- Robert Wood Johnson Medical School. Rutgers, The State University of New Jersey
- 2019 - present Assistant Professor, Radiation Oncology, University of Maryland School of Medicine

### **Other Employment**

- 2015 Medical Physicist, Advanced Medical Physics, Inc. Houston, TX

### **Professional Society Memberships**

- 2004 - 2011 Member, Society for Photo-Instrumentation Engineers (SPIE)
- 2012 - present Member, American College of Radiology (ACR)
- 2014 - 2015 Member, Radiation Research Society (RRS)
- 2015 – 2016 Member, American Brachytherapy Society (ABS)
- 2015 - present Member, American Association of Physicists in Medicine (AAPM)
- 2017 - present Member, American Society for Radiation Oncology (ASTRO)

### **Honors and Awards**

- 2001 Scholarship from Ministry of Human Resource Development (MHRD), India, awarded for Graduate Aptitude Test in Engineering
- 2006 Pre-doctoral research award from Department of Defense US Army Medical Research
- 2008 Department of defense US Army Breast Cancer Era of Hope Meeting Travel Award
- 2008 International Society for Optics and Photonics (SPIE) Student Travel Award
- 2010 Doctoral dissertation award, School of Engineering (SOE), University of Connecticut
- 2010 Doctoral dissertation fellowship award, Graduate School, University of Connecticut
- 2011 Department of defense US Army Breast Cancer Era of Hope Meeting Travel Award
- 2011 Travel award for World Molecular Imaging Congress (WMIC-2011)
- 2012 Travel award for World Molecular Imaging Congress (WMIC-2012)
- 2013 Young investigator award (3rd Position) in the AAPM Midwest Chapter Spring Meeting, Chicago, IL
- 2014 Travel award for Radiation Research Society Annual Meeting, Las Vegas, NV

2018 AAPM Summer School Scholarship, Vanderbilt University, Memphis, TN

### **Clinical Activities**

Current clinical physics faculty position in the Department of Radiation Oncology, University of Maryland School of Medicine, Maryland Proton Treatment Center (MPTC), Baltimore, MD.  
Clinical focus on all aspects of therapeutic medical physics (Radiation Oncology Physics).  
Significant Role in departmental direction and MPTC physics clinical project development.

### **Clinical Expertise**

With more than 10 years of clinical experience, ABR certified medical physicist since 2017.  
Implementation of new technologies.  
Proven clinical project management skills.  
Strengths in quality management and quality improvement.  
Proven documenting clinical physics workflow and procedures at MPTC.  
Proven demonstrating leadership in training junior physicists and visiting fellows.

### **Scope of Clinical Practice**

- 2015 Advanced Medical Physics, Inc, Houston, TX
- Provided all aspects of clinical physics services to a facility treated 35 patients per day on a LINAC  
~ 70 % FTE
  - Provided physics services at a dermatology center for treating skin cancers using Xofigo and Esteya Electronic Brachytherapy. 20 patients/week  
~ 30 % FTE
- 2016 - 2019 Full time clinical physicist at Robert Wood Johnson Medical School, New Brunswick, NJ
- Provided all aspects of medical physics services at Robert Wood Johnson University Hospital at New Brunswick and Hamilton
- 2019 - present Full time clinical physicist at University of Maryland Medical Center, Maryland Proton Treatment Center
- Provide all aspects of medical physics services at Maryland Proton Treatment Center
  - Serving a large community, which advances diversity, equity, inclusion and antiracism.

### **Development of Clinical Programs and Clinical Projects**

#### **Robert Wood Johnson University Hospital, Rutgers University, New Brunswick, NJ**

- 2017 Assisted the Robert Wood Johnson University Hospital (RWJUH) Hamilton's Radiation Oncology Department for implementing EMR (transition from paper based to electronic) system.
- 2017 Developed Dose Volume Histogram constraint power tables (for H&N, Thoracic, Abdomen, Pelvis, Prostate) for a dosimetrist road map and physician's evaluation of IMRT plans. Which helped the dosimetrist to generate better treatment plans in short

- time. Also helps doctors to take the right decision based on the plan accuracy.
- 2017 - 2018 Took complete Physics responsibility from the ground breaking to first treatment, on the expansion of RWJUH Hamilton's Cancer center, which brought a fully loaded new Truebeam 2.7 (with Gating features and OSMS) to a new vault and a PET-CT simulator with 4DCT features. The responsibilities included Planning and helping contractors and architectures, purchasing the new equipment, shielding calculation, acceptance testing, radiation survey and registration with state, commissioning, verification, End-to-End test, QA procedures, training to staffs, etc. In coordination with RWJUH Hamilton's management team, vendor's and IT support, was able to complete this mission in timely manner.
  - 2018 Developed standard systematic check list to perform physics chart check and that had been used across all of RWJ clinical centers.
  - 2018 Initiated Prone Breast treatment program at RWJUH Hamilton. Took full responsibility on this project starting from purchasing the equipment, arranging the trainings, developing simulation documents, planning and treatment delivery.
  - 2018 Initiated VMAT treatment program and planned the first VMAT plan at RWJUH Hamilton and trained the dosimetrist.
  - 2018 Developed policies and procedures at RWJUH Hamilton.

**Maryland Proton Treatment Center, University of Maryland School of Medicine, Baltimore, MD**

- 2019 - present Helping dosimetrists in getting patient's outside data into our treatment planning systems for cases with unusual scenarios.
- 2020-2021 Comparison of the dosimetric accuracies of proton breast plans delivered with VisionRT and CBCT setup for clinical confidence of using VisionRT for breast cancer treatments (Clinical Research Director's choice as the best IRB submission from physics faculty)
- 2020 - 2021 Necessity of kV imaging after couch kick during proton treatment delivery of head and neck cancer patients: Toward optimal imaging frequency
- 2021 Commissioned new range shifters for clinical use at Maryland Proton Treatment Center (MPTC)
- 2021 Developed clinical physics workflows and procedures at MPTC
- 2021 Implemented the new QACT guidelines for head and neck, brain and prostate patients treated at MPTC
- 2021 Commissioned Rough Steering Mode of beam at MPTC, delivered to clinic on 06/28/2021
- 2022 Developed new guidelines for QACT for all the anatomic sites being treated at Maryland Proton Treatment Center.
- 2022 Commissioned RT-SPOT Markers for clinical use at MPTC. Delivered to the clinic on 12/08/2022. These markers save dosimetrists time and mitigate the error due to improper assignment of density values.
- 2022 Developed proton specific planning guidelines for head-and-neck and CSI treatments.
- 2022 - present Commissioning Eclipse Monte Carlo (AcurosPT) treatment planning at MPTC. This will be used for calculation based Intensity Modulated Proton Therapy (IMPT) patient QAs, which makes the Physics Dosimetry work flow more efficient and efficient use of physics resources.
- 2022 - present Commissioning model based patient-specific QA for proton therapy, using myQA iON
- 2022 Working on a project "Physics evaluates QACT plans". Upon implementation of

this, physicists will evaluate QACT plans and pass to the attending on those cases that needs physician's attention. This will help for efficient use of physician resources at MPTC.

- 2022 Working on Raystation AI based treatment planning for head-and-neck cancer.
- 2023 Working on adoption of a single HU to stopping power look for table for patient treatment planning at MPTC
- 2023 Working on in-vivo dosimetry procedures and workflows and establishing standard imaging dose for each anatomic site and imaging protocols.

### **Administrative Service**

#### **Institutional Service: Current Institution**

- 2020 Medical Physics Residency application review team, Radiation Oncology, University of Maryland School of Medicine
- 2020 - present Maintaining Proton Physics documents in SharePoint for MPTC
- 2020 - present Interviewer, UMSOM Medical student admission
- 2020 – present Physics Responsible person for proton physics/dosimetry safety notices from vendors
- 2021 – present Coordinator of biweekly Progress of Physics Projects meetings at MPTC
- 2021 – present Coordinator of biweekly Proton physics in-service meetings at MPTC
- 2022 – present Proton Physics Member of DICOM committee, Department of Radiation Oncology, University of Maryland School of Medicine
- 2022 - present Proton Physics Member of EMR committee, Department of Radiation Oncology, University of Maryland School of Medicine
- 2023 Medical Physics Residency application review team, Radiation Oncology, University of Maryland School of Medicine

#### **Institutional Service: Prior Institution**

- 2016 - 2019 Interviewer, Medical Physics Residency Admission Committee, Rutgers- Robert Wood Johnson Medical School
- 2017 - 2019 Member, Treatment Planning Committee - Clinical Integration, Department of Radiation Oncology, Rutgers- Robert Wood Johnson Medical School
- 2018 - 2019 Member, Safety Committee, Department of Radiation Oncology, Rutgers- Robert Wood Johnson Medical School

#### **National and International Service**

- 2010 - present Ad Hoc Reviewer, *Journal of Biomedical Optics* (2x/yr)
- 2010 - present Ad Hoc Reviewer, *Optical Engineering* (1x/yr)
- 2010 - present Ad Hoc Reviewer, *Optics Express* (2x/yr)
- 2010 - present Ad Hoc Reviewer, *Optics Letters* (2x/yr)
- 2010 - present Ad Hoc Reviewer, *Biomedical Optics Express* (2x/yr)
- 2011 - present Ad Hoc Reviewer, *Technology in Cancer Research and Treatment* (4x/yr)
- 2014 Session Chair and Moderator for Annual Meeting, Radiation Research Society (RRS)
- 2017 - present Ad Hoc Reviewer, *Practical Radiation Oncology* (6x/yr)
- 2018 - present Ad Hoc Reviewer, *Journal of Applied Clinical Medical Physics* (3x/yr)
- 2019 - present Associate Editor, *American Journal of Biomedical Science & Research*

2020 - present Managing Editor, *Asian Journal of Physics*  
2021 – present Group leader for AAPM’s multi-institutional journal club (MIJC) of 10 residents across 4 institutes  
(This service advances diversity, equity, inclusion and anti-racism)

### **Local Service**

2004 - 2005 President, Student Chapter of SPIE (International Society for Optics and Photonics), Indian Institute of Science, Bangalore, India  
2005 - 2010 Chairman, Chapter of SPIE, University of Connecticut  
2008 - 2010 Undergraduate Summer Internship Facilitator, University of Connecticut

### **Teaching Service**

#### **Undergraduate Student Teaching**

2003 Mentor, Indian Institute of Technology, Kanpur, India  
Summer Research Training Program  
1 undergraduate, daily contact for the summer  
2004 Mentor, Indian Institute of Technology, Kanpur, India  
Summer Research Training Program  
1 undergraduate, daily contact for the summer  
2007 Instructor, University of Connecticut  
Electrical and Computer Engineering  
Electromagnetic Fields and Waves (ECE 3001)  
48 senior undergrads, 35 contact hours/semester  
2008 Instructor, University of Connecticut  
Electrical and Computer Engineering  
Optical Engineering Laboratory (ECE 3225)  
8 senior undergrads, 25 contact hours/semester  
2008 Instructor, University of Connecticut  
Electrical and Computer Engineering  
Electrical and Computer Engineering Principles (ECE 3002)  
75 junior undergrads, 30 contact hours/semester  
2009 Instructor, University of Connecticut  
Electrical and Computer Engineering  
Electrical Circuits (ECE 2001W)  
38 junior undergrads, 30 contact hours/semester  
2009 Instructor, University of Connecticut  
Electrical and Computer Engineering  
Electrical Circuits (ECE 2001W)  
38 junior undergrads, 30 contact hours/semester  
2010 Mentor, University of Connecticut  
Summer Research Training Program  
2 undergraduates, daily contact for the summer  
2011 Mentor, Baylor College of Medicine

2018 Summer Research Training Program  
1 undergraduate, daily contact for the summer  
Mentor, Rutgers University  
Summer Research Training Program  
1 undergraduate, daily contact for the summer

### **Graduate and Post-Graduate Teaching and Advisorship**

2018 Radiological Physics and Dosimetry (16:750:686)  
1 Medical Physics Certificate Student, 12 contact hours/semester

2018 Co-Advisor, MS Thesis Dissertation  
Department of Applied Physics and Ballistics, F.M. University, Balasore, India  
2 MS students, 2 hours/week  
(Serving an underprivileged community, it advances diversity, equity, inclusion)

01/2021 – 06/2021 Co-Advisor, MS Thesis  
Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India  
2 MS students, 2 hours/week

01/2022 – 06/2022 Co-Advisor, MS Thesis  
Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India  
3 MS students, 3 hours/week

05/2021 – present Doctoral Committee, PhD Thesis  
Department of Physics and Applied Physics, College of Sciences, University of  
Massachusetts, Lowell, MA, USA  
1 PhD student, 1 hour/week

08/2021 – present Doctoral Committee, PhD Thesis  
Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India  
1 PhD student, 1 hour/week

01/2023 – present Co-Advisor, MS Thesis  
Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India  
2 MS students, 2 hours/week

08/2022 - present Co-Advisor, PhD Thesis Dissertation  
Department of Applied Physics and Ballistics, F.M. University, Balasore, India  
3 PhD students, 3 hours/week  
(Serving an underprivileged community, it advances diversity, equity, inclusion)

### **Medical Student Teaching**

2014 Research Mentor, Rush University Medical Center  
Summer Research Training Program  
1 student, daily contact for the summer

### **Resident and Fellow Teaching**

2015 Instructor, Rush University Medical Center  
Introduction to Medical Physics for Radiation Oncology Residents  
8 residents, 4 contact hours/yr

- 2016 - 2018 Instructor, Rutgers University  
Introduction to Medical Physics for Radiation Oncology Residents  
10 residents, 12 contact hours/yr
- 2017 - 2018 Residency Rotation Mentor, Rutgers University  
Medical Physics clinical rotations (Basic and Advanced Treatment Planning)  
2 medical physics residents, 30 hrs/yr
- 2019-2020 Instructor, University of Maryland School of Medicine  
Introduction to Medical Physics for Radiation Oncology Residents and Dosimetry  
Students  
9 residents & 4 Dosimetry students, 4 contact hours/yr
- 2020 Research Mentor of Physics Resident, University of Maryland School of Medicine  
1 Resident, 2 hours/week
- 2020 New trainee orientation (residents and dosimetry students), Department of Radiation  
Oncology, University of Maryland, School of Medicine. 1 hour
- 2020-2021 Instructor, University of Maryland School of Medicine  
Introduction to Medical Physics for Radiation Oncology Residents and Dosimetry  
Students  
11 residents & 4 Dosimetry students, 4 contact hours/yr
- 2021 New trainee orientation (residents and dosimetry students), Department of Radiation  
Oncology, University of Maryland, School of Medicine. 1 hour
- 2021-2022 Instructor, University of Maryland School of Medicine  
Introduction to Medical Physics for Radiation Oncology Residents and Dosimetry  
Students  
11 residents & 4 Dosimetry students, 2 contact hours/yr
- 2022 New trainee orientation (residents and dosimetry students), Department of Radiation  
Oncology, University of Maryland, School of Medicine. 1 hour
- 2022-2023 Instructor, University of Maryland School of Medicine  
Introduction to Medical Physics for Radiation Oncology Residents and Dosimetry  
Students  
11 residents & 4 Dosimetry students, 2 contact hours/yr

### **Practice School Teaching/Training**

- 2019 Thermal Oncology Practice School at Maryland Proton Treatment Center  
6 hours total of practical hands on training on Deep Thermal Therapy (DTT) to a total of  
14 trainees in 2 groups
- 2019 Varian School on Proton Therapy Physics QA at Maryland Proton Treatment Center  
2 hours total, 2 trainees
- 2019 Physics Lectures for Dosimetry students at University of Maryland School of Medicine  
4 students, 3 hours/year
- 2020 Physics Lectures for Dosimetry students at University of Maryland School of Medicine  
4 students, 3 hours/year
- 2020-2021 Mentored a junior Physics faculty (15 hours)
- 2021-2022 Trained 2 physicists from Singapore Advanced Medicine Proton Therapy PTE LTD  
(30 hours)
- 2022 Lecturer, Resident Hyperthermia and Brachytherapy Workshop, UMSOM, Baltimore



- 2022 Workshop “Deep hyperthermia workshop using phantoms” on 5/17/22 (45 min)  
 2022 Trained Medical Physics Assistants at MPTC (10 hours).  
 2022 Speaker, Hyperthermia Therapy practice school, UMSOM, Baltimore  
 “Deep hyperthermia therapy practical course” on 10/07/22 (3 hours)  
 2022-2023 Mentored a postdoctoral fellow for clinical shadowing (10 hours)  
 2023 - Mentor for the medical physics resident’s research project (1 hr/week)  
 2023 - Clinical Curriculum Design for the Medical Physics Certificate Program in the  
 Department of radiation Oncology at University of Maryland School of Medicine,  
 Baltimore.

### **Advisory and Supervisory Graduate Student Committees**

- Member, supervisory committee, Department of Applied Physics and Ballistics, F.M. University, Balasore, India MS Thesis Dissertation, 2 MS students, 01/2018 – 05/2018.  
 Member, supervisory committee, Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India, 2 MS students, 01/2021 – 06/2021.  
 Member, supervisory committee, Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India, 3 MS students, 01/2022 – 06/2022.  
 Member, doctoral committee, Department of Physics and Applied Physics, College of Sciences, University of Massachusetts, Lowell, MA, USA, 1 PhD student, 05/2021 – present  
 Member, Doctoral Committee, Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India, 1 PhD student, 08/2021 – present.  
 Member, supervisory committee, Department of Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, India, 2 MS students, 01/2023 – present.  
 Member, Doctoral Committee, Department of Applied Physics and Ballistics, F.M. University, Balasore, India, 3 PhD students, 08/2022 – present.

### **Grant Support** **Completed Grants**

- 2006 - 2007 (PI, 50%)  
*“Fluorescence Imaging of Near Infrared Diffusive Light with the Localization of Ultrasound”*  
 Department of Defense-US Army Breast Cancer Research Program  
 Predoctoral Award.  
 Annual Direct Costs: \$32,000  
 Total Direct Costs: \$32,000
- 2010 - 2012 (Co-Inv 25%)  
*“Targeted Probes for Breast Tumor Hypoxia Imaging”*  
 Connecticut Department of Public Health Research Grant  
 Annual Direct Costs: \$100,000  
 Annual Indirect Costs: \$55,000
- 2019 - 2020 (Co-PI 25%)  
*“Development of a quality assurance phantom for three-dimensional deep thermal therapy treatment planning”*  
 University of Maryland School of Medicine, Department of Radiation Oncology

Seed Grant  
Annual Direct Cost: \$20,000  
2021-2022 (PI)  
“Innovative REMI (Raman Encoded Molecular Imaging) Combined with Lipidomics to Prognosticate Castration Resistant Prostate Cancer Recurrence and Treatment Response in Preclinical Model”  
University of Maryland School of Medicine, Department of Radiation Oncology  
Seed Grant  
Annual Direct Cost: \$14,962

### **Patents and Patent Applications**

1. Invention Disclosure: Joshi, A. and **Biswal, N. C.**, Absolute phase measurement technique for homodyne mode frequency domain fluorescence optical tomography, 2012.

### **Publications**

#### **Peer-reviewed journal articles**

1. **Biswal, N. C.**, Gupta, S., Ghosh, N., Pradhan, A. Recovery of turbidity free fluorescence from measured fluorescence: an experimental approach. *Optics Express*. 2003 Dec 1; 11 (24): 3320-3331.
2. Gupta, S., Nair, M. S., Pradhan, A., **Biswal, N. C.**, Agarwal, N., Agarwal, A., Panigrahi, P. K. Wavelet based characterization of spectral fluctuations in normal, benign and cancerous human breast tissues. *J. of Biomedical Optics*. 2005; 10(05): 054012(1-8).
3. Gamelin, J., Yang, Y., **Biswal, N. C.**, Chen, Y., Yan, S., Zhang, X., Karemeddini, M, Brewer, M., Zhu, Q. A prototype hybrid intraoperative probe for ovarian cancer detection; *Optics Express*. 2009; 17(9): 7245-7258.
4. **Biswal, N. C.**, Gamelin, J. K., Yuan, B., Becker, M. V., Becker, J. M., Zhu, Q. Fluorescence imaging of vascular endothelial growth factor tumors for mice embedded in turbid medium; *J. of Biomedical Optics*. 2010; 15(1): 016012 (1-11).
5. Yang, Y., Wang, T., **Biswal, N. C.**, Wang, X., Sanders, M., Brewer, M., Zhu, Q. Optical scattering coefficient estimated by OCT correlates with collagen content in ovarian tissue. *J. of Biomedical Optics*. 2011; 16(9): 090504(1-30).
6. Pavlik, C., **Biswal, N. C.**, Gaenzler, F. C., Morton, M. D., Kuhn, L. T., Claffey K. P., Zhu, Q., Smith, M. B. Synthesis and fluorescent characteristics of Imidazole-Indocyanine Green conjugates. *Dyes and Pigments*. 2011; 89(1): 9-15.
7. Yang, Y., **Biswal, N. C.**, Wang, T., Kumavor, P., Karimeddin, M., Vento, J., Sanders, M., Brewer, M., Zhu, Q. Potential role of a hybrid intraoperative probe based on OCT and positron detection for ovarian cancer detection and characterization; *Biomedical Optics Express*. 2011; 2(7): 1918-1930.
8. **Biswal, N. C.**, Pavlik, C., Smith, M. B., Aguirre, A., Xu, Y., Zanganeh, S., Kuhn, L. T., Claffey, K. P., Zhu, Q. Imaging tumor hypoxia by near-infrared fluorescence tomography. *J. Biomedical Optics*. 2011; 16(6): 066009 (1-8).
9. Ardeshirpour, Y., **Biswal, N. C.**, Aguirre, A., Zhu, Q. Artifact reduction method in diffuse optical tomography using exogenous contrast agents. *J. Biomedical Optics*. 2011; 16(4): 046015 (1-11).
10. **Biswal, N.C.**, Xu, Y., Zhu, Q. Imaging tumor oxyhemoglobin and deoxyhemoglobin concentrations with ultrasound-guided diffuse optical tomography. *Technology in Cancer Research and Treatment*. 2011; 10(5): 417-429.

11. **Biswal, N. C.**, Ayala-Orozco, C., Halas, N. J., Joshi, A. Calibrating the photo-thermal response of magneto-fluorescent gold nanoshells. *IEEE Engineering in Medicine and Biology*. 2011; FrA19.5: 4776-4779.
12. Gharekhan, A., **Biswal, N. C.**, Gupta, S., Panigrahi, P. K., Pradhan, A. Characteristic spectral features of the polarized fluorescence of breast cancer in the wavelet domain. *Applied Spectroscopy*. 2012; 66(7): 820-827.
13. Chen, W., Ayala-Orozco, C., **Biswal N. C.**, Perez-Torres, C., Bartels, M., Bardhan, R., Stinnet, G., Liu, X., Ji, B., Deorukhkar, A., Brown, L. V., Guha, S., Pautler, R. G., Krishnan, S., Halas, N.J., Joshi, A. Targeting of pancreatic cancer with magneto-fluorescent theranostic gold nanoshells. *Nanomedicine*. 2013; 9(8): 1209-1222.
14. Abuteen, A., Zanganeh, S., Akhigbe, J. Samankumara, L., Aguirre, A., **Biswal, N.C.**, Braune, M. Vollrtsen, A. Roder, B., Bruckner, C., Zhu, Q. The evaluation of NIR-absorbing porphyrin derivatives as contrast agents in photoacoustic imaging. *Physical Chemistry Chemical Physics*. 2013; 15: 18502-18509.
15. Fu, X., Creighton, C. J., **Biswal, N. C.**, Kumar, V., Shea, M., Herrera, S., Contreras, A., Gutierrez, C., Wang, T., Nanda, S., Giuliano, M., Morrison, G., Nardone, A., Karlin, K., Westbrook, T., Heiser, L., Anur, P., Spellman, P., Guichard, S., Smith, P., Davies, B., Klinowska, T., Lee, A., Mills, G., Rimawi, M., Hilsenbeck, S., Gray, J., Joshi, A., Osborne, C., Schiff, R.. Overcoming endocrine resistance due to reduced PTEN levels in ER-positive breast cancer by cotargeting mTOR, AKT, or MEK. *Breast Cancer Research*. 2014; 16:430 (1-17).
16. **Biswal, N. C.**, Swan, B., McKenna, M., Singh, R. UroLift as a surrogate for fiducial markers in IGRT planning of prostate cancer in BPH patient. *Practical Radiation Oncology*. 2018; 8(4): e231- e233.
17. Zhang, A., Deek, M. P., Kim, S., Sayan, M., Grann, A., Wagman, R. T., Malhotra, U., Hathout, L., **Biswal, N. C.**, Zhang, Y., Langenfeld, J., Kennedy, T., August, D. A., Jabbour, S. K. Vertebral body irradiation during chemoradiation therapy for esophageal cancer contributes to acute bone marrow toxicity. *Journal of Gastrointestinal Oncology*. 2019; 10(3):513-522. Doi: 10.21037/jgo.2019.01.20.
18. Jagtap, J., Joshi, A., **Biswal, N. C.** *Nanomedicine: Development and Challenges in Cancer Treatment*. *American Journal of Biomedical Science & Research*. 2019; 6(3): 234-236. DOI: 10.34297/AJBSR.2019.06.001036.
19. **Biswal, N.C.**, Fu, X., Jagtap, J., Shea, M.J., Kumar, V., Lords, T., Roy, R., Schiff, R., Joshi, A. In vivo Longitudinal Imaging of RNAi Induced Endocrine Therapy Resistance in Breast Cancer. *Journal of Biophotonics*. 2020; 13(1): e201900180 (1-9). DOI: 10.1002/jbio.201900180.
20. Dwivedi, A., McGarry, T., Bond, L., Braver, J.K., **Biswal, N.C.** Variation of V105% between pre- and postmerged subfields in field-in-field Hypofractionated breast radiotherapy plans. *Medical Dosimetry*. 2020; 45: 19-20. DOI: 10.1016/j.meddos.2019.04.002.
21. Biswal, S. S., Amarnath, T., Panigrahi, P. K., **Biswal, N. C.** Application of machine learning to predict diseases based on symptoms in rural India. In: Dehuri S., Mishra B., Mallick P., Cho SB., Favorskaya M. (eds) *Biologically Inspired Techniques in Many-Criteria Decision Making*. BITMDM 2019. *Learning and Analytics in Intelligent Systems*. 2020; Vol. 10: 55-61. DOI: 10.1007/978-3-030-39033-4\_5.
22. Yao, W., Schweitzer, N., **Biswal, N. C.**, Polf, J., Farr, J., Vujaskovic, Z. A retrospective study of bowel and rectum air effect on target dose with intensity modulated proton therapy plans. *Acta Oncologica*. 2020; 59(10): 1186-1192. DOI: 10.1080/0284186X.2020.1769859.
23. **Biswal, N.C.**, Maslowski, A., Jagtap, J., Wareing, T., McGhee, J., Joshi, A. Measuring absolute phase in homodyne mode frequency domain fluorescence optical tomography. *Asian Journal of Physics*. 2020; 29(5-7): 483-490.

24. Biswal, S. S., Amarnath, T., Panigrahi, P. K., **Biswal, N. C.** Machine learning to diagnose common diseases based on symptoms. In: Sharma N., Chakrabarti A., Balas V.E., Martinovic J. (eds) Data Management, Analytics and Innovation (ICDMAI-2020). Advances in Intelligent Systems and Computing (AISC) Series of Springer. 2021; 1175: 237-245. DOI: 10.1007/978-981-15-5619-7\_16.
25. Zhang, Y., Jabbour, S. K., Zhang, A., Liu, B., Yue, N. J., **Biswal, N. C.** Proton beam therapy can achieve lower vertebral bone marrow dose than photon beam therapy during chemoradiation therapy of esophageal cancer. *Medical Dosimetry*.2021; 46(3): 229-235. DOI: 10.1016/j.meddos.2020.12.003.
26. MacFarlane, M.J., Jiang, K., Mundis, M., Nichols, E., Chen, S., **Biswal, N.C.** Comparison of the dosimetric accuracies of proton breast plans delivered with VisionRT and CBCT setup. *Journal of Applied Clinical Medical Physics*. 2021; 22: 153-158. DOI: 10.1002/acm2.13357.
27. **Biswal, N. C.**, Rodrigues, D. B., Yao, W., Witek, M. E., Molitoris, J. M., Chen, S. Evaluation of intra-fraction couch shifts for proton treatment delivery of head and neck cancer patients: Toward optimal imaging frequency. *Journal of Applied Clinical Medical Physics*. 2022; e13795: 1-8. DOI: 10.1002/acm2.13795.

### **Submitted / In-Revision Peer-reviewed journal articles**

1. Sheikh, E., Agarwal, K., Roy, S.K., Burk, D., Donnarumma, F., Ko, Y.H., Guttula, P.K., Shukla, H.D. \*, Gartia, M.R. \*, **Biswal, N.C. \***: Raman-Encoded Molecular Imaging and Lipidomic Profiling of Pancreatic Cancer Microenvironment in Response to an Antiglicolytic Drug. *Theranostics* (Submitted)
2. Tu, K.J., Roy, S.K., Gartia, M.R., Shukla, H.D. \*, **Biswal, N.C. \***: Docetaxel sensitizes castration resistant prostate cancer to radiotherapy: associated mechanisms in G2/M arrest, immune activation, and oxidative stress. *Radiation Research* (Submitted)
3. **Biswal, N.C.**, Zhang, B., Nichols, E., Witek, M., Regine, W.F., Yi, B.Y.: Beam Path Length From Isocenter to Skin On Cone-Beam CT Images as An Adaptive Planning Indicator in Proton Therapy for Extremity Tumors. *Int. J. of Particle therapy Technical Report* (Submitted).
4. **Biswal, N. C.**, Zakhary, M. J., Mogilnay, R., Nichols, E. M., Witek, M. E., Yi, B. Statistical Approaches to Optimize QACT Frequency during Proton Therapy: a Single Institution Study. *Practical Radiation Oncology* (Submitted).

### **Abstracts and Conference Proceedings**

1. **Biswal, N. C.**, Gupta, S., Pradhan, A.; Extraction of biochemical information from intrinsic fluorescence; National Laser Symposium, IIT Kharagpur, WB, India, 12/22/2003; #621-622
2. Gupta, S., **Biswal, N. C.**, Ghosh, N., Pradhan, A.; Detection of milk adulteration using fluorescence spectroscopy; National Laser Symposium, IIT Kharagpur, WB, India, 12/22/2003; #619-620.
3. Gharekhan, A. H., **Biswal, N. C.**, Gupta, S., Pradhan, A., Bhaskaran, S. M., Panigrahi, P. K.; Characterization of cancer and normal tissue fluorescence through wavelet transform and singular value decomposition; SPIE Photonics West, San Jose, CA, 01/19/2008; #6853
4. **Biswal, N. C.**, Yuan, B., Gamelin, J., Zhu, Q.; In-vivo small animal near infrared fluorescence imaging with prior anatomical information; Era of Hope Department of Defense Breast Cancer Research Program Meeting, Baltimore, MD, 06/25/2008; #P8-16
5. **Biswal, N. C.**, Gamelin, J., Yuan, B., Becker, J. M., Zhu, Q.; Near infrared fluorescence imaging of small animals with simultaneously estimated structural information; SPIE Photonics West, San Jose, CA, 01/24/2009; #717416

6. Yang, Y., **Biswal, N. C.**, Kumavor, P., Wang, T., Karimedдини, M., Sanders, M., Brewer, M., Zhu, Q.; A miniature prototype hybrid intraoperative probe for ovarian cancer detection; OSA Biomedical Optics Topical Meeting, Miami, FL, 04/10/2010; #BSuC7
7. Ardeshirpour, Y., **Biswal, N. C.**, Zhu, Q.; Improvement of NIR diffuse optical tomography in patients with a small amount breast tissue by using contrast agents; OSA Biomedical Optics Topical Meeting, Miami, FL, 04/10/2010; #JMA79
8. **Biswal, N. C.**, Pavlik, C., Smith, M. B., Kuhn, L. T. , Claffey, K. P., Zhu, Q.; Nitroimidazole indocyanine Green conjugates for breast cancer hypoxia imaging; Optical Society of America (OSA) Biomedical Optics Topical Meeting, Miami, FL, 04/10/2010; #JMA92
9. **Biswal, N. C.**, Zhu, Q.; Diffuse optical imaging for mapping tumor hypoxia; 2nd North American International Optical Society of America (OSA) Network of Students Conference, Tucson, AZ, 09/2010
10. **Biswal, N. C.**, Bartels, M., Chen, W., Ayala-Orozco, C., Bardhan, R., Schiff, R., Deorukhkar, A., Krishnan, S., Joshi, A.; Dynamic pharmacokinetics of breast cancer theranostic nanoparticles; 8th Annual Duncan Cancer Center Symposium, Baylor College of Medicine, Houston, TX, 11/05/2010
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12. Yang, Y., **Biswal, N. C.**, Wang, T., Kumavor, P., Karimedдини, M., Sanders, M., Brewer, M., Zhu, Q.; A hybrid positron and OCT intraoperative probe for ovarian cancer detection and characterization; SPIE Photonics West, San Francisco, CA, 01/22/2011; #7892DY
13. **Biswal, N. C.**, Pavlik, C., Smith, M. B., Aguirre, A., Zanganeh, S., Xu, Y., Kuhn, L. T., Claffey, K. P., Zhu, Q.; Tumor hypoxia fluorescence imaging using 2-nitroimidazole bis-carboxylic acid indocyanine dye conjugate; SPIE Photonics West, San Francisco, CA, 01/22/2011; #78962R
14. **Biswal, N. C.**, Xu, Y., Zhu, Q.; Breast tumor hypoxia mapping using ultrasound guided diffuse optical tomography; SPIE Photonics West, San Francisco, CA, 01/22/2011; #78962N
15. **Biswal, N. C.**, Xu, Y., Zhu, Q.; Breast tumor hemoglobin oxygenation measurement and hypoxia mapping by diffuse optical and diffuse fluorescence imaging; Era of Hope DOD Breast Cancer Program Meeting, Orlando, FL, 08/02/2011; #P17-18
16. Chen, W., Ayala-Orozco, C., **Biswal, N. C.**, Krishnan, S., Schiff, R., Halas, N., Joshi, A.; Magneto-fluorescent gold nanoshells for pancreatic cancer imaging and therapy; World Molecular Imaging Congress (WMIC), San Diego, CA, 09/07/2011, #T094
17. **Biswal, N. C.**, Fu, X., Shea, M. J., Westbrook, T. F., Schiff, R., Joshi, A.; In vivo imaging of RNAi induced endocrine therapy resistance in breast cancer; World Molecular Imaging Congress (WMIC), San Diego, CA, 09/07/2011; #P290
18. **Biswal, N. C.**, Ayala-Orozco, C., Halas, N., Joshi, A.; Calibration of theranostic response of magneto-fluorescent gold nanoshells embedded in scattering medium; World Molecular Imaging Congress (WMIC), San Diego, CA, 09/07/2011; #T085
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- endocrine resistance model in vitro and in vivo by inducible PTEN knockdown; San Antonio Breast Cancer Symposium, San Antonio, TX, 12/06/2011; P4-01-03
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  24. Yang, Y., Wang, T., **Biswal, N. C.**, Wang, X., Sanders, M., Brewer, M., Zhu, Q.; Assessment of collagen changes in ovarian tissue by extracting optical scattering coefficient from OCT images; Proc. SPIE Photonics West, San Francisco, CA; 2012; #8213 (82130C)
  25. **Biswal, N. C.**, Fu, X., Westbrook, T. F., Osborne, C. K., Schiff, R., Joshi, A.; Longitudinal imaging of RNAi induced endocrine therapy resistance in breast cancer; Imaging in 2020, Jackson Hole, WY, 2012
  26. **Biswal, N. C.**, Ayala-Orozco, C., Halas, N., Joshi, A.; Molecularly targeted theranostics of aberrant vasculature in pancreatic cancer; World Molecular Imaging Congress (WMIC), Dublin, Ireland, 09/05/2012
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  28. **Biswal, N. C.**, Anderson, J., Sun, J., Bernard, D., Jegier, B., Wu, Z., Dandekar, V., Yao, R., Darwish, N., Woloschak, G. E., Griem, K. L., Chu, J. C. H.; Early detection of radiation skin reactions by changes in thermal effusivity; AAPM Midwest Chapter Spring Meeting (Young Investigator's Symposium), Chicago, IL, 04/27/2013, #2
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  34. **Biswal, N. C.**, Zhen, H., Chu, J. C. H., Turian, J.; Commissioning aS1000 electronic portal imaging device, EPID, for patient specific IMRT QA on a Varian Trilogy machine; AAPM Midwest Chapter Spring Meeting (Young Investigator's Symposium), Chicago, IL, 04/25/2015; #1

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39. **Biswal, N.C.**, Swann, B., McKenna, M., Singh, R.; Implanted UroLift Device Works as Fiducial Markers in IGRT Planning of Patients with Benign Prostatic Hyperplasia: A Case Study; AAPM Annual Meeting 2018, Nashville, TN, 07/29/2018. Presentation No. SU-I-GPD-J-13. *Medical Physics*, 45(6): E223, 2018.
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45. Yao, W., Schweitzer, N., **Biswal, N. C.**, Polf, J., Farr, J., Vujaskovic, Z. A Retrospective Study of Bowel and Rectum Air Effect on Dose Coverage in Prostate, Colon, Gynecologic and Embryonal Rhabdomyosarcoma Tumors Treated with Robust Intensity-Modulated Proton Therapy; ASTRO's 62<sup>nd</sup> Annual Meeting, 2020 (poster # 2615). *International Journal of Radiation Oncology, Biology, Physics*, 108 (3), e275, 2020.
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52. **Biswal, N.C.**, Zakhary, M., Mogilnay, R., Nichols, E.M., Witek, M.E., Yi, B.Y.: Statistical Approaches to Optimize QACT Frequency during Proton Therapy: A Single Institution Study; ASTRO's 63<sup>rd</sup> Annual Meeting, 2021 (Abstract ID # 3035), Poster Viewing Q&A - Session 9, 10/27/2021. *International Journal of Radiation Oncology, Biology, Physics*, 111 (3), e497-e498, 2021.
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56. Zhang, B., Yao, W., **Biswal, N.C.**, Zhou, J., Xu, J., Xu, H., Chen, S., Yi, B.Y.: Variation of Bragg Peak Positions in Cone-Beam CT as An Indicator of Adaptive Planning of the Head and Neck IMPT Treatments; AAPM 64<sup>th</sup> Annual Meeting, 2022 (Abstract Number # 65094). Interactive e-poster on 07/10/2022.
57. **Biswal, N.C.**, Zhang, B., Nichols, E., Witek, M., Regine, W.F., Yi, B.Y.: Beam Path Length From Isocenter to Skin On Cone-Beam CT Images as An Adaptive Planning Indicator in Proton Therapy for Extremity Tumors; AAPM 64<sup>th</sup> Annual Meeting, 2022 (Abstract Number # 65203). General e-poster viewing.
58. Han, D., **Biswal, N.C.**, Zhang, B., Witek, M., Yi, B.Y.: The Pearson Correlation Coefficient of Target and the Beam Path Length Using Cone-Beam CT Images as Adaptive Planning Indicators of Head and Neck Patients Undergoing Proton Therapy; AAPM 64<sup>th</sup> Annual Meeting, 2022 (Abstract Number # 66576). General e-poster viewing.



59. Sheikh, E., Agrawal, K., Roy, S., Gartia, M.R., Shukla, H.D., **Biswal, N.C.**: Raman-Encoded Molecular Imaging and Lipidomics as Predictors of Pancreatic Cancer Microenvironment Changes during Treatment with 3-Bromopyruvate; AAPM 64<sup>th</sup> Annual Meeting, 2022 (Abstract Number # 64791). Blue Ribbon e-poster session on 07/12/2022.
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61. KS, S., Selvan, T., Agarwal, S.K., Nayak, J.K., Shukla, H.D., Prema, P., **Biswal, N.C.**: Analytical expression of normal tissue complication probability and tumor control probability calculation for ultra-high dose rate radiation (FLASH) based on linear-quadratic model; Radiation Research Society's 68<sup>th</sup> Annual International Meeting, 2022 (Abstract Number # 22-A-426-RRS).
62. Tu, K.J., Roy, S.K., Gartia, M.R., Shukla, H.D., **Biswal, N.C.**: Castration-resistant prostate cancer cells are sensitized to radiation after treatment with docetaxel; Radiation Research Society's 68<sup>th</sup> Annual International Meeting, 2022 (Abstract Number # 22-A-93-RRS).
63. Selvan, T., Ramesh, K. Sreekumar, K., Samal, T., Preethi, R., Agarwal, S.K., Nayak, J.K., Prema, P., and **Biswal, N.C.**: Calculation of Positron Emitter Production in Proton Beam Therapy; 23<sup>rd</sup> National Symposium on Radiation Physics (NSRP-23), Mysuru, India, 19-21 January 2023.
64. Hamza, M., Chen, L., Cohen, J., Rodrigues, D.B., Mossahebi, S., **Biswal, N.C.**, Zakhary, M., Kunaprayoon, D., Rana, Z., Molitoris, J.K.: Clinical outcomes of re-irradiation with concurrent deep hyperthermia therapy for prostate cancer; 38<sup>th</sup> Annual Society for Thermal Medicine (STM) Meeting 2023.
65. Molitoris, J.K., Cohen, J., Hamza, M., Mossahebi, S., Zakhary, M., **Biswal, N.C.**, Lehman, K., Rodrigues, D.B.: Long term results of initial cohort treated with pencil beam scanning proton therapy and deep thermal therapy; 38<sup>th</sup> Annual Society for Thermal Medicine (STM) Meeting 2023.
66. Rodrigues, D. B., Cohen, J., Mossahebi, S., **Biswal, N.C.**, Zakhary, M., Kunaprayoon, D., Rana, Z., Molitoris, J.K.: Superficial and internal thermometry assessment in patients treated with deep hyperthermia concurrent with proton beam therapy for lower gastrointestinal malignancies; 38<sup>th</sup> Annual Society for Thermal Medicine (STM) Meeting 2023.
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70. Hamza, M., Chen, L., Cohen, J., Rodrigues, D.B., Mossahebi, S., **Biswal, N.C.**, Zakhary, M., Kunaprayoon, D., Rana, Z., Molitoris, J.K.: Concurrent radiation and deep hyperthermia therapy for the treatment of recurrent prostate cancer; ASTRO's 65th Annual Meeting 2023.

71. **Biswal, N.C.**, Zhang, H., Mossahebi, S., Regine, W.F., Tran, P., Mohindra, P., Kunaprayoon, D., Mishra, M., Kwok, Y., Zaker, R., Molitoris, J.K., Nichols, E.N., Witek, M.E., Yi, B.Y., Zakhary, M.J.: Physics involvement in QACT review during proton therapy; ASTRO's 65th Annual Meeting 2023, Abstract #56418.
72. Hamza, M.A., **Biswal, N.C.**, Assif, J.W., Yi, B.Y., Zhang, B., Alicia, D., Redell, D., Eggleston, C., Van-Eck, R., Ferris, M.J., Mohindra, P., Rana, Z.; Patterns of Adaptive Re-planning in Proton Therapy for Thoracic Malignancies; ASTRO's 65th Annual Meeting 2023.
73. **Biswal, N.C.**, Zhang, B., Zakhary, M., Rosette, G., Olis, S., Yao, W., Mossahebi, S., Yi, B.Y.: Commissioning a calculation based patient specific QA using myQA iON for patients treated with proton beam therapy; 1st Annual Radiation Oncology Research Symposium 2023, Department of Radiation Oncology, University of Maryland, School of Medicine, Baltimore, MD.
74. **Biswal, N.C.**, Jatzcak, J., Zhang, B., Vasani, S., Nichols, E., Yao, W.: Effects of range shifter and maximum-minimum energy layers related surface dose with skin toxicity of breast and chest-wall cancer patients treated with proton beams; 1st Annual Radiation Oncology Research Symposium 2023, Department of Radiation Oncology, University of Maryland, School of Medicine, Baltimore, MD.
75. Tu, K.J., Roy, S.K., Shukla, H.D., **Biswal, N.C.**: Castration-resistant prostate cancer cells are sensitized to radiation after treatment with docetaxel; 1st Annual Radiation Oncology Research Symposium 2023, Department of Radiation Oncology, University of Maryland, School of Medicine, Baltimore, MD.
76. **Biswal, N.C.**, Jatzcak, J., Zhang, B., Vasani, S., Nichols, E.N., Yao, W.: LET-Dependent RBE Dose As Predictor for Acute Skin Toxicity in Breast Cancer Patients Undergoing Proton Beam Therapy; AAPM's 65<sup>th</sup> Annual Meeting 2023, Abstract # 4444.
77. Yi, B.Y., Jatzcak, J., Houser, T., Mundis, M., Han, D., **Biswal, N.**, Yao, W., Mossahebi, S.: A Practice Guideline for Minimum Monitor Units (mMU) for Pencil Beam Proton Treatments; AAPM's 65<sup>th</sup> Annual Meeting 2023.
78. **Biswal, N.C.**, Zhang, B., Zakhary, M.J., Olis, S., Gonzalez, R.M., Polf, J.C., Yao, W., Mossahebi, S., Yi, B.Y.: Verification of planning dose calculation and its effect of spot position uncertainty towards calculation based patient specific QA using a commercially available Monte Carlo code (myQA iON); AAPM's 65<sup>th</sup> Annual Meeting 2023, Abstract # 4066.
79. Rana, Z., Cherng, H.R.R., Alicia, D., Manuel, E., Hamza, M.A., Zhang, B., Mogilnay, R., Sun, K., Yi, B.Y., Mohindra, P., Ferris, M.J., **Biswal, N.C.**: Treatment planning parameters as predictors for adaptive replanning for thoracic cancer patients undergoing proton therapy; AAPM's 65<sup>th</sup> Annual Meeting 2023, Abstract # 6405.

## **Major Invited Speeches**

### Local

1. **Biswal, N. C.**, Role of Imaging in Cancer Theranostics; Workshop on Quantitative Methods in Cancer Genomics, Center for Systems and Computational Biology, Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, 2016
2. **Biswal, N.C.**, Applications of Nuclear Imaging (PET & SPECT) in Radiation Oncology, Department of Biomedical Engineering, New Jersey Institute of Technology, Newark, NJ, 12/2018

### National

3. **Biswal, N. C.**, Intrinsic Fluorescence from tissues and tissue phantoms, Banaras Hindu University, Varanasi, India, 2004
4. **Biswal, N. C.**, Diffuse fluorescence tomography for mapping tumor vasculature and hypoxia, Wellman Center for Photomedicine, Harvard Medical School, Boston, MA, 2010
5. **Biswal, N. C.**, Tumor hypoxia fluorescence imaging using 2-nitroimidazole bis-carboxylic acid indocyanine dye conjugate, Department of Biomedical Engineering, Texas A&M University, College Station, TX, 2010
6. **Biswal, N. C.**, Skin thermal effusivity changes as predictor for radiation exposure, Department of Radiation Oncology, Baylor Scott and White Clinic, Temple, TX, 2014
7. **Biswal, N. C.**, Multi-modal molecular and functional imaging techniques for effective diagnosis and treatment of breast cancer, Miller School of Medicine, University of Miami, Miami, FL, 2015
8. **Biswal, N.C.**, Nuclear Imaging (PET & SPECT) in Radiation Oncology, Department of Biomedical Engineering, New Jersey Institute of Technology, Newark, NJ, 04/2020
9. **Biswal, N.C.**, Imaging for radiation Oncology Clinics: A Biomedical Engineer Perspective, Department of Biomedical Engineering, University of Texas, Arlington, TX, 09/30/2022

#### International

10. **Biswal, N. C.**, Optical diagnosis of tumors, Erasmus University Medical Center, Rotterdam, The Netherlands, 2004
11. **Biswal, N. C.**, Theranostic responses of magneto-fluorescent gold nanocomplexes for breast Cancer, Department of Physics, Indian Institute of Technology (IIT), Ropar, India, 2014
12. **Biswal, N. C.**, Role of Physicists in Medicine and Biology, Invited lecture at PG Department of Applied Physics and Ballistics, Fakir Mohan University, Balasore, India. 2017
13. **Biswal, N. C.**, Nuclear Physics and applications in Medicine, Invited chief speaker for the international webinar series conducted by PG Department of Applied Physics and Ballistics, Fakir Mohan University, Balasore, India. 07/30/2020 – 08/01/2020.
14. **Biswal, N. C.**, Nuclear Physics in Cancer Theranostics, Keynote speaker at International Seminar Series in Applied Physics, conducted by Department of Physics, Amity School of Applied Sciences, Amity University, Mumbai, India. 02/13/2021 – 02/14/2021.
15. **Biswal, N. C.**, Fight against deadly diseases with your technical expertise: Health Physics, Invited speaker at off-beat careers in Sciences Seminar Series, conducted by Department of Physics, Amity School of Applied Sciences, Amity University, Mumbai, India. 07/31/2021.
16. **Biswal, N. C.**, Imaging for Radiation Oncology Clinics, Invited speaker at Three-day online workshop on recent trends in Biomedical Imaging and Applications, Department of Applied Sciences, Indian Institute of Information Technology Allahabad (IIITA), Prayagraj, India. 08/19/2021 – 08/21/2021.
17. **Biswal, N. C.**, Applications of Physics in solving Biological problems, invited and keynote speaker at Faculty Development Program on Advances and Challenges in Physics, conducted by the PG Department of Applied Physics and Ballistics, Fakir Mohan University, Balasore, India. 12/13/2021-12/18/2021.

#### Conferences, Journal clubs and Symposia Organized and/or Lead

1. Session Chair and Moderator, 60th Annual meeting of Radiation Research Society (RRS), Las Vegas, NV, 09/21/2014.
2. Group leader, AAPM's multi-institutional journal club (MIJC) of 10 residents across 4 institutes, 09/2021 – present.