

Curriculum Vitae

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

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Contact Information

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Foreign Languages: English, Hindi, Odia

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

Clinical Expertise

Clinical focus on all aspects of therapeutic medical physics (Radiation Oncology Physics)

Research focuses are in the areas of image-guided radiation therapy (IGRT), Treatment planning, Image analysis for therapeutic response evaluation, Proton therapy, Tumor hyperthermia, etc.

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
~ 65% FTE
 - Provided physics services at a dermatology center for treating skin cancers using Xofig and Esteya Electronic Brachytherapy. 20 patients/week
~ 35% FTE
- 2016 - 2019 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
~ 80 % FTE Clinical, ~ 10 % FTE Research, ~ 10 % FTE Teaching
- 2019 - present University of Maryland Medical Center
- Provide all aspects of medical physics services at Maryland Proton Treatment Center
~ 80 % FTE Clinical, ~ 10 % FTE Research, ~ 10 % FTE Teaching AND Community Service

Development of any Clinical Programs

- 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 has

- 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.
 - 2020 Standardized technique for treating rare Pericardial Mesothelioma using proton beam Therapy
 - 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 Commissioning Eclipse Monte Carlo (AcurosPT) treatment planning at MPTC

Administrative Service

Institutional Service

- 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
- 2020 Medical Physics Residency application review team, Radiation Oncology, University of Maryland School of Medicine
- 2020 - present Maintaining Proton Physics documents in SharePoint
- 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

Local and National Service

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)

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, 3 hours/week

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

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

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
 2020-2021 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
 2021-2022 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

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

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, 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.
24. **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.

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.

Submitted / In-Revision / Under preparation Peer-reviewed journal articles

1. **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: Towards optimal imaging frequency. *Journal of Applied Clinical Medical Physics (In-Revision)*.

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., Karimedini, 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
11. Zanganeh, S. Aguirre, A., **Biswal, N. C.**, Pavlik, C., Smith, M. B., Alqasemi, U., Li, H., Zhu, Q.; Hypoxia targeted carbon nanotubes as a sensitive contrast agent for photoacoustic imaging of tumors; SPIE Photonics West, San Francisco, CA, 01/22/2011, #78991S

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
19. **Biswal, N. C.**, Fu, X., Shea, M., Roy, R., Lords, T., Westbrook, T. F., Schiff, R., Joshi, A.; Sensitive in-vivo fluorescence imaging of endocrine therapy resistance in breast cancer; 9th Annual Duncan Cancer Center Symposium, Houston, TX, 11/04/2011
20. **Biswal, N. C.**, Ayala-Orozco, C., Dowell, A. E., Halas, N. J., Joshi, A.; Theranostic responses of magneto-fluorescent gold nanoshells in breast cancer models; 9th Annual Duncan Cancer Center Symposium, Houston, TX, 11/04/2011
21. Fu, X., Shea, M., **Biswal, N. C.**, Mitchell, T., Giuliano, M., Healy, N. A., Meerbrey, K. L., Joshi, A., Westbrook, T., Hilsenbeck, S., Osborne, C. K., Schiff, R.; Establishment and characterization of 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
22. Dowell, A. E., Chen, W., **Biswal, N. C.**, Ayala-Orozco, C., Giuliano, M., Schiff, R., Halas, N., Joshi, A.; Calibrating the imaging and therapy performance of magneto-fluorescent gold nanoshells for breast cancer; SPIE Photonics West, San Francisco, CA, 01/21/2012; #8233
23. Yang, Y., Wang, T., **Biswal, N. C.**, Kumavor, P., Wang, X., Karimedдини, M., Vento, J., Sanders, M., Brewer, M., Zhu, Q.; An intraoperative probe combining positron detection and OCT imaging for ovarian cancer detection and characterization; Proc. SPIE Photonics West, San Francisco, CA; 2012; #8220-13
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

27. **Biswal, N. C.**, Fu, X., Shea, M., Mitchel, T., Schiff, R., Joshi, A.; Longitudinal imaging of RNAi induced endocrine therapy resistance in breast cancer; World Molecular Imaging Congress (WMIC), Dublin, Ireland, 09/05/2012
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
29. Chu, J.C.H., **Biswal, N. C.**, Anderson, J., Darwish, N., Sun, J., Bernard, D., Woloschak, G., Gegier, B., Wu, Z., Dandekar, V., Griem, K.; Three-Dimensional Thermal Tomography as Predictor for Radiation-induced Skin Reactions; EPR 2013 Conference Proceedings, Dartmouth College, Hanover, NH, June 22-28, 2013
30. Darwish, N., **Biswal, N. C.**, Sun, J., Bernard, D., Dandekar, V., Yao, R., Jegier, B. J., Woloschak, G. E., Griem, K. L., Chu, J. C. H.; Blood perfusion of the skin as an indicator of radiation induced skin reaction; AAPM 55th Annual Meeting, Indianapolis, IN, 08/04/2013; TH-A-WAB-10. Medical Physics, 40:522, 2013
31. **Biswal, N. C.**, Sun, J., Anderson, J., Bernard, D., Dandekar, V., Yao, R., Darwish, N., Wu, Z., Jegier, B. J., Woloschak, G. E., Griem, K. L., Chu, J. C. H.; Thermal effusivity changes predict radiation exposure; AAPM 55th Annual Meeting, Indianapolis, IN, 08/04/2013; #SU-E-CAMPUSJ-03. Medical Physics, 40:378, 2013.
32. Anderson, J., Kiel, K., Yao, R., Liao, Y., Bernard, D., **Biswal, N. C.**, Turian J., Chu, J.C.H.; PET Image-Guided Dose Escalation Study for Cervical Cancer Patients Receiving HDR Brachytherapy; AAPM 55th Annual Meeting, Indianapolis, IN, 08/04/2013. Medical Physics, 40:309, 2013
33. **Biswal, N. C.**, Wu, Z., Sun, J., Anderson, J., Bernard, D., Dandekar, V., Jegier, B., Woloschak, G., Griem, K. L., Chu, J. C. H.; Skin thermal effusivity changes as predictor for radiation exposure; 60th Annual meeting of Radiation Research Society (RRS), Las Vegas, NV, 09/21/2014; #399
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
35. **Biswal, N. C.**, Wu, Z., Sun, J., Chu, J. C. H.; Skin temperature recovery rate and thermal effusivity as predictors for radiation-induced skin reactions; AAPM 57th Annual Meeting, Anaheim, CA, 07/11/2015; #SU-E-J-273. Medical Physics, 42:3329, 2015
36. **Biswal, N. C.**, Cifter, G., Sun, J., Sen, D., Wang, D., Diaz, A., Griem, K., Chu, J. C. H.; Early prediction of radiotherapy induced skin reactions using dynamic infrared imaging; AAPM 58th Annual Meeting, Washington, DC, 08/03/2016; WE-FG-202-1. Medical Physics, 43:3826, 2016
37. Zhang, A., Deek, M.P., Kim, S., Grann, A., Wagman, R.T., Malhotra, U., Hathout, L., **Biswal, N.C.**, Zhang, Y., Langenfeld J., Kennedy T., August, D. A., Jabbour, S.; Vertebral Body Irradiation During Chemoradiation Therapy for Esophageal Cancer can Promote Acute Bone Marrow Toxicity; ASTRO Annual Meeting 2017, San Diego, CA, 09/26/2017. Presentation No. 2492
38. Liu, B., **Biswal, N. C.**, Wang, X., Nie, K., Zhang, A., Yue, N., Jabbour, S., Zhang, Y.; Dosimetric Comparison of radiotherapy Plans Using Proton Therapy, VMAT and Static IMRT for Chemoradiation Therapy of Esophageal Cancer; AAPM Annual Meeting 2018, Nashville, TN, 07/29/2018. Presentation No. SU-I-GPD-T-124. Medical Physics, 45(6): E267, 2018.
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.

40. **Biswal, N.C.**, Zhang, A., Jabbour, S.; Assessment of Radiation Therapy Response in Esophageal Cancer Using Weekly CBCT Data; AAPM Annual Meeting 2018, Nashville, TN, 07/29/2018. Presentation No. SU-I-GPD-J-69. *Medical Physics*, 45(6): E236, 2018.
41. Dwivedi, A., McGarry, T., Bond, L., Braver, J. K., **Biswal, N.C.**; Comparison of Breast V105% Between Pre- and Post-Merged Subfields in Field-In-Field Hypofractionated Breast Radiation Treatment Plans; AAPM Annual Meeting 2019, San Antonio, TX, 07/14/2019. *Medical Physics*, 46(6): E624, 2019.
42. Dwivedi, A., Ip, W., McGarry, T., Bond, L., Braver, J. K., **Biswal, N. C.**; Comparison of Single-Iso VMAT verses Multi-Iso Dynamic Conformal Arc for Multi-Met SRS Plans; AAPM Annual Meeting 2019, San Antonio, TX, 07/14/2019. *Medical Physics*, 46(6): E657, 2019.
43. Biswal, S. S., Amarnath, T., Panigrahi, P. K., **Biswal, N. C.** Application of machine learning to predict diseases based on symptoms in rural India. Springer International Conference on Biologically Inspired Techniques in Many-Criteria Decision Making (BITMDM-2019). Paper ID: BITMDM-FMU-016. Oral Presentation. Balasore, India, 20th - 21st December, 2019.
44. Biswal, S. S., Amarnath, T., Panigrahi, P. K., **Biswal, N. C.** Machine learning to diagnose common diseases based on symptoms. Springer 4th International Conference on Data Management, Analytics & Innovation (ICDMAI-2020). Paper ID: ICDMAI_2020_Paper_441. Oral Presentation. New Delhi, India, 18th January, 2020.
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 62nd Annual Meeting, 2020 (poster # 2615). *International Journal of Radiation Oncology, Biology, Physics*, 108 (3), e275, 2020.
46. Molitoris, J. K., Rodrigues, D. B., Snider, J. W., Rao, A, Mossahebi, S., Zakhary, M., **Biswal, N. C.**, Lehman, K., Vujaskovic, Z.; Concurrent Deep Locoregional Thermal Therapy with Pencil Beam Scanning Proton Therapy Results in Modest Toxicity with the Promise of Increased Efficacy; ASTRO's 62nd Annual Meeting, 2020 (poster # 2841). *International Journal of Radiation Oncology, Biology, Physics*, 108 (3): e372-e373, 2020.
47. MacFarlane, M. J., Jiang, K., Mundis, M., Nichols, E., Chen, S., **Biswal, N. C.**: Comparison of the Dosimetric accuracy of proton breast plans delivered with VisionRT and CBCT setup; AAPM joint (AAPM/COMP) Annual Meeting 2020, Vancouver, Canada. 07/12/2020. (Oral presentation # WE-A-TRACK 3-4). *Medical Physics*, 47 (6): E339, 2020.
48. **Biswal, N. C.**, Rodrigues, D. B., Yao, W., Chen, S.: Analysis of couch shifts for each field for proton treatment delivery of head and neck cancer patients: Towards optimal imaging frequency; AAPM joint (AAPM/COMP) Annual Meeting 2020, Vancouver, Canada. 07/12/2020. (ePoster # PO-GeP-M-59). *Medical Physics*, 47 (6): E578, 2020.
49. MacFarlane, M. J., Jiang, K., Mundis, M., Nichols, E., Chen, S., **Biswal, N. C.**: Comparison of the Dosimetric accuracy of proton breast plans delivered with VisionRT and CBCT setup; 2020 Mid-Atlantic Chapter (MACAAPM-2020) Fall Meeting.
50. Molitoris, J. K., Rodrigues, D. B., Snider, J. W., Rao, A, Mossahebi, S., Zakhary, M., **Biswal, N. C.**, Lehman, K., Vujaskovic, Z.: Pencil beam scanning proton therapy with deep thermal therapy is safe with potential for increased efficacy in advanced abdominopelvic malignancies; PTCOG-2020.
51. Molitoris, J.K., Rodrigues, D., Kunaprayoon, D., Mossahebi, S., **Biswal, N.C.**, Zakhary, M., Witek, M., Vujaskovic, Z.; Novel combination of Proton Therapy with Deep Thermal Therapy is safe with potential for increased efficacy: 2021 National Association for Proton Conference, 2021 Apr 15-16.

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 63rd 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.
53. Mohindra, P., Risher, H, Pollock, A., Zakhary, M., **Biswal, N.C.**, Nichols, E.M.: Intensity Modulated Proton Therapy for Gynecological Malignancies: Initiation of a Program; PTCOG 59, 2021 (Abstract Number: PTC59-2281).
54. **Biswal, N.C.**, Zhang, B., Molitoris, J.K., Witek, M.E., Yi, B.Y.: Beam path length from isocenter to skin on cone beam CT images as an adaptive planning indicator of head and neck patients undergoing proton therapy; AAPM 63rd Annual Meeting, 2021 (Abstract Number # 58014, Oral presentation on 07/27/2021). *Medical Physics*, 48 (6), 2021.
55. Cohen, J., Macatee, C., Rodrigues, D., Mossahebi, S., **Biswal, N.C.**, Zakhary, M., Kunaprayoon, D., Rana, Z., Regine, W.F., Vujaskovic, Z., Molitoris, J.K.: Clinical outcomes of re-irradiation with concurrent deep hyperthermia therapy of lower gastrointestinal malignancies; Accepted for oral presentation at 37th Annual Society for Thermal Medicine (STM) Meeting.
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 64th Annual Meeting, 2022 (Abstract Number # 65094).
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 64th Annual Meeting, 2022 (Abstract Number # 65203).
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 64th Annual Meeting, 2022 (Abstract Number # 66576).
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 64th Annual Meeting, 2022 (Abstract Number # 64791).
60. **Biswal, N.C.**, Nichols, E., Witek, M., Yi, B.Y.: Optimal QACT Frequency During Proton Therapy: A Single Institution Study; AAPM 64th Annual Meeting, 2022 (Abstract Number # 65211).

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

International

9. **Biswal, N. C.**, Optical diagnosis of tumors, Erasmus University Medical Center, Rotterdam, The Netherlands, 2004
10. **Biswal, N. C.**, Theranostic responses of magneto-fluorescent gold nanocomplexes for breast Cancer, Department of Physics, Indian Institute of Technology (IIT), Ropar, India, 2014
11. **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
12. **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.
13. **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.
14. **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.
15. **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.
16. **Biswal, N. C.**, Applications of Physics in solving Biological problems, invited speaker at Faculty Development Program on Advances and Challenges in Physics, conducted by the PG Department of Applied Physics and Balistics, Fakir Mohan University, Balasore, India. 12/13/2021-12/18/2021.

Explanation of Time Gaps on CV

11/2015-01/2016 Spent time with parents in India