OMB No. 0925-0001 and 0925-0002 (Rev. 10/2021 Approved Through 01/31/2026)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Brian Mark Anderson

eRA COMMONS USER NAME (credential, e.g., agency login): BrianMAnderson

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE  (if applicable) | Completion Date  MM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| Georgia Institute of Technology  Atlanta GA | BS | 5/2015 | Nuclear and Radiological Engineering |
| University of Texas Graduate School of Biomedical Sciences at Houston & UT MD Anderson Cancer Center (MD Anderson)  Houston, TX | S.M.S  Ph.D | 9/2017  10/2017 | Therapeutic Medical Physics  Diagnostic Imaging Medical Physics |
|  |  |  |  |
| University of California, San Diego  San Diego, CA | Residency | 07/2023 | Therapeutic Medical Physics |
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**A. Personal Statement**

Throughout my career, I have been driven by a passion for leveraging artificial intelligence (AI) and deep learning to improve patient care. My expertise lies at the intersection of medical imaging, radiation oncology, and machine learning, where I have consistently demonstrated a commitment to translating research into practical solutions.

With a foundation in AI acquired during my master’s and doctoral studies, I have continually sought to expand areas of innovation in healthcare. My early work focused on developing models to automate complex tasks in medical imaging, particularly in tissue detection and treatment delivery. My contributions in this area led to the deployment of automated segmentation algorithms for critical structures, streamlining clinical workflows and enhancing treatment precision.

Building upon this, my research has evolved to encompass predictive modeling of patient outcomes. These models not only empower clinicians with valuable insights but also enable tailored interventions that hope to optimize patient care pathways.

In addition to my research contributions, I am committed to advancing standardization efforts within the field of radiation oncology. As a member of Task Group 263 (TG-263), I have played a pivotal role in developing consensus guidelines and standardizing nomenclature for radiation therapy treatment planning. By fostering collaboration and promoting best practices, I strive to ensure consistency and quality across treatment centers, ultimately enhancing the efficacy and safety of radiation therapy for patients worldwide.

Looking ahead, my overarching goal is to continue bridging the gap between AI innovation and clinical practice, driving transformative change in healthcare delivery. Whether through the development of novel algorithms, the implementation of predictive analytics, or the advancement of standardization initiatives, I remain steadfast in my commitment to improving patient outcomes and shaping the future of healthcare through AI and deep learning.

**B. Positions, Scientific Appointments, and Honors**

**Editorial and Review Activities**

Associate Editor: The International Journal of Medical Physics Research and Practice (2023-Present)

Ad hoc Associate Editor, The International Journal of Medical Physics Research and Practice (2020-2021)

Manuscript Reviewer, The International Journal of Medical Physics Research and Practice (2019-present)

**Honors/Awards/Grants**

AAPM Jack Krohmer Early Career Investigator Competition Winner – EPIDEEP: Predicting In-Vivo EPID Transit Images – a Deep Learning Approach (2022)

Alfred G. Knudson Jr. Outstanding Dissertation Award: $5,000 Award established by MD Anderson Cancer Center to honor the late Dr. Knudson in recognition of the top selected PhD dissertation. (2021)

AAPM Practical Big Data Workshop, Early Career Investigator – Impact Award (2021)

Dr. John J. Kopchick Fellowship (2020)

Society of Interventional Radiology: Allied Scientist Grant (2019)

Science Council Session, AAPM (2019)

Association of Science Communication 2019 Oral Competition: 1st place (2019)

People’s Choice Award for Medical Physics Slam AAPM annual meeting (2018)

1st Place Medical Physics Slam for South West AAPM annual meeting (2018)

Young Investigator Award for South West AAPM annual meeting (2018)

Early Career Medical Physicist Scholar from Winter Institute of Medical Physics (WIMP) (2018)

2nd place Student Research Retreat (2017)

Graduated with Highest Honors, Georgia Institute of Technology (2015)

AAPM Summer Fellowship: Commissioning of new Elekta LINAC (2014)

Recipient of the Presidents Undergraduate Research Award (PURA) (2013-2014)

**Positions and Employment**

Graduate Student Researcher, MDA Cancer Center, Houston, TX (2015-present)

AAPM Fellowship, St. Joseph’s Hospital, Eureka, CA (2014)

Research Assistant, Georgia Institute of Technology (2013-2014)

**Invited Talks**

1. Georgia Institute of Technology, invited lecturer: “Reimagining Medical Physics: A Deeper Dive into Deep Learning” (11/2023)
2. ESTRO-AAPM, Joint Symposium Session: “Estro-AAPM: Big data, Big Headache”, Title “Dealing with public datasets” (05/2023)
3. MD Anderson, Image Guided Cancer Therapy Workshop: “Getting Started with Artificial Intelligence”, Workshop and presentation (11/2021)
4. Winter Institute of Medical Physics: “Getting Started with Deep Learning: Dicom to Predictions” Workshop and presentation (02/2020)
5. MD Anderson, Image Guided Cancer Therapy Research Program: “How to Get Started in AI”, Workshop and presentation (01/2020)
6. North Central Chapter AAPM, Keynote Lecturer: “Introduction to Deep Learning: Everything I wish I’d known sooner” (11/2019)
7. Rice University, Guest Lecturer ELEC/ COMP 576: “Introduction to Deep Learning” (09/2019)
8. MD Anderson, Invited Speaker, Nuclear Medicine Practical Seminar: “Deep Learning in the Liver and our field” (05/2019)

**Other Experience and Professional Memberships**

Member, International Society for Optics and Photonics (SPIE) (2018)

Member, Medical Physicists for World Benefit (2017-present)

Member, American Association of Physicists in Medicine (2015 – present)

Member, American Nuclear Society (2012-present)

Internship, Shadowing of Medical Physicist, Catawba Valley Medical Center (2011)

**C. Contributions to Science**

Throughout my academic journey, I've made significant strides in leveraging advanced technologies to address critical challenges in medical imaging and radiation oncology, ultimately aiming to improve patient care and outcomes.

I first became interested in machine learning during my master’s work in 2015. The goal of my project was to create an autocontouring system which would accurately identify and differentiate cervical cancer nodes on non-contrast CT images. This work was important namely because 70% of the incidence and mortality burden of cervical cancer occurs in low- and middle-income countries where PET and contrast-CT images are not often available. Overcoming the inherent limitations of non-contrast CT imaging, which offers minimal tissue distinction, required innovative approaches. Drawing from machine learning techniques, including ensemble-based models, I successfully identified unique characteristics of cervical cancer nodes, such as their ellipsoidal or spherical shape. This work underscored the potential of machine learning in resource-constrained settings and laid the foundation for my deepening interest in advanced modeling techniques.

Building upon this foundation, my doctoral research delved into the realm of deep learning and its application in oncological imaging. While initially focused on biomechanical modeling to enhance ablative treatment of liver disease, my research trajectory shifted towards harnessing the power of convolutional neural networks (CNNs) for liver segmentation. The work culminating in the development of a CNN-based segmentation model that significantly reduced the labor-intensive nature of liver segmentation. This led to the clinical implementation of the model at my institution, facilitating over 300 segmentations by the time I graduated. This innovation not only streamlined clinical workflows but also served as the corner stone for our liver biomechanical modeling endeavor.

The successful outcomes of my doctoral research have paved the way for tangible clinical impact, including the facilitation of a phase 2 clinical trial with our interventional radiology team. This pivotal milestone underscores the translational potential of my work and reaffirms my dedication to bridging the gap between research innovation and clinical practice.

My contributions extend beyond individual projects to encompass broader initiatives aimed at standardizing practices within radiation oncology. As evidenced by my involvement in Task Group 263 (TG-263), I am deeply committed to fostering collaboration and implementing standardized protocols to ensure consistency and quality across treatment centers. To this end, we’ve published a C# based program to facilitate clinics in the transition of previous templates into TG-263 standard templates. By advocating for the integration of deep learning techniques in segmentation tasks and leveraging my expertise in biomechanical modeling, I strive to advance the field towards greater precision and efficiency.

In summary, my contributions to science encapsulate a multifaceted approach encompassing machine learning, deep learning, and standardization efforts in radiation oncology. By pushing the boundaries of technological innovation and advocating for collaborative frameworks, I am committed to driving positive change in the field and ultimately enhancing patient care on a global scale.

**Papers**

Covington E, Suresh K, **Anderson B.M**, Barker M, Dess K, Price J, Moncio A, Vaccarelli M, Santanam L, Xiao Y, Mayo C *Perceptions on roadblocks to implementation of standardized nomenclature in radiation oncology: survey from TG-263U1* Radiation Oncology Physics (04/2024)

Gay S, Kisling K, **Anderson B.M,** Zhang L, Rhee D.J, Nguyen C., Netherton T., Yang J., Brock K., Jhingran A., Simonds H., Klopp A., Beadle B. M., Court L., Cardenas C. *Identifying the optimal deep learning architecture and parameters for automatic beam aperture definition in 3D radiotherapy* Radiation Oncology Physics 09/2023

Rigaud B, Weaver O.O, Dennison J. B, Awais M, **Anderson B. M,** Chiang T-Y. D, Yang W. T, Hanash S. M, Brock K. K *Deep Learning Models for Automated Assessment of Breast Density Using Multiple Mammographic Image Types* Cancers 10/2022

Woodland M, Wood J, **Anderson B.M**, Kundu S, Lin E, Koay E, Odisio B, Chung C, Kang H.C, Venkatesan A.M, Yedururi S, De B, Lin Y-M, Patel A.B, Brock K.K *Evaluating the Performance of StyleGAN2-ADA on Medical Images* Simulation and Synthesis in Medical Imaging. SASHIMI 2022. Lecture Notes in Computer Science, vol 13570. Springer, Cham 09/2022

Lin Y-M, **Anderson B.M**, et al. *Study Protocol COVER-ALL: Clinical impact of a volumetric image method for confirming tumour coverage with ablation on patients with malignant liver lesions* CardioVascular and Interventional Radiology 09/2022

He Y, **Anderson B.M**, Cazoulat G, Rigaud B, Almodovar-Abreu L, Pollard-Larkin J, Balter P, Liao Z, Mohan R, Odisio B, Svensson S, Brock KK. *Optimization of mesh generation for geometric accuracy, robustness, and efficiency of biomechanical-model-based deformable image registration* Medical Physics 08/2022

**Anderson B.M**, B. Rigaud, Y Lin, K Jones, H Kang, B Odisio, K Brock *Automated Segmentation of Colorectal Liver Metastasis and Liver Ablation on Contrast-Enhanced CT Images* Frontiers in Radiation Oncology 08/2022

Wahid K, He R, McDonald B, **Anderson B.M,** Salzillo T, Mulder S., Wang J., Sharafi C., McCoy L, Naser M., Ahmed S., Sanders K., Mohamed A., Ding Y, Wang J, Hutcheson K., Lai S., Fuller C., Van Dijk L. *MRI Intensity Standardization Evaluation Design for Head and Neck Cancer Quantitative Analysis Applications* Physics and Imaging in Radiation Oncology 10/2021

Cazoulat G, **Anderson B.M**, McCulloch MM, Rigaud B, Koay EJ, Brock KK *Detection of vessel bifurcations in CT scans for automatic objective assessment of deformable image registration accuracy* The International Journal of Medical Physics Research and Practice 08/2021

**Anderson B.M,** Lin YM, Lin EY, Cazoulat G, Gupta S, Kyle Jones A, Odisio BC, Brock KK *A novel use of biomechanical model based deformable image registration (DIR) for assessing colorectal liver metastases ablation outcomes* The International Journal of Medical Physics Research and Practice *Accepted* 07/2021

He Y, Cazoulat G, Wu C, Peterson C, McCulloch M, **Anderson B.M**, Pollard-Larkin J, Balter P, Liao Z, Mohan R, Brock K *Geometric and Dosimetric Accuracy of Deformable Image Registration between Average-Intensity Images for 4DCT-Based Adaptive Radiotherapy for Non-Small Cell Lung Cancer* Journal of Applied Clinical Medical Physics 06/2021

**Anderson B.M,** Wahid K., Brock K. *Simple Python Module for Dicom and RT: Conversions to Images and Masks, and Predictions to Dicom-RT Structures* Practical Radiation Oncology 02/2021

Rigaud B, **Anderson B.M**, Yu ZH, Gobeli M, Cazoulat G, Söderberg J, Samuelsson E, Lidberg D, Ward C, Taku N, Cardenas C, Rhee DJ, Venkatesan AM, Peterson CB, Court L, Svensson S, Löfman F, Klopp AH, Brock KK *Automatic segmentation using deep learning for online dose optimization during adaptive radiotherapy of cervical cancer* International Journal of Radiation Oncology, Biology, Physics 10/2020

Kisling K, Cardenas C, **Anderson** **B.M.**, Zhang L, Jhingran A, Simonds H, Balter P, Howell RM, Schmeler K, Beadle BM, Court L. *Automatic Verification of Beam Apertures for Cervical Cancer Radiation Therapy* Practical Radiation Oncology 09/2020

**Anderson B.M**, Lin EY, Cardenas CE, Gress DA, Erwin WD, Odisio BC, Koay EJ, Brock KK*Automated Contouring of Contrast and Non-Contrast CT Liver Images with Fully Convolutional Networks (FCNs)* Advances in Radiation Oncology 05/2020

Cazoulat G, Elganainy D, **Anderson B.M**, Zaid M, Park PC, Koay EJ, Brock KK *Vasculature-Driven Biomechanical Deformable Image Registration of Longitudinal Liver Cholangiocarcinoma Computed Tomographic Scans*. Advances in Radiation Oncology 03/2020

Jin Y, Randall J., Elhalawani H., Feghali K., Elliot A., **Anderson B.M**, Lacerda L., Tran B., Mohamed A., Brock KK, Fuller C., Chung C. “*Detection of Glioblastoma Subclinical Recurrence Using Serial Diffusion Tensor Imaging”* Cancers 02/2020

McCulloch M., **Anderson B.M**, Cazoulat G, Peterson CB, Mohamed ASR, Volpe S, Elhalawani H, Bahig H, Rigaud B, King JB, Ford AC, Fuller CD, Brock KK *Biomechanical modeling of neck flexion for deformable alignment of the salivary glands in head and neck cancer images* Physics in Medicine and Biology 07/2019

Kisling KD, Ger RB, Netherton TJ, Cardenas CE, Owens CA, **Anderson B.M**, Lee J, Rhee DJ, Edward SS, Gay SS, He Y, David SD, Yang J, Nitsch PL, Balter PA, Urbauer DL, Peterson CB, Court LE, Dube S *“A snapshot of medical physics practice patterns,”* J. Appl. Clin. Med. Phys., vol. 19, no. 6, pp. 306–315, (11/2018)

Cardenas, E.C, **Anderson B.M**, Aristophanous M, Yang J, Rhee DJ, McCarroll RE, Mohamed ASR, Kamal M, Elgohari BA, Elhalawani HM, Fuller CD, Rao A, Garden AS, Court LE *Auto-delineation of Oropharyngeal Clinical Target Volumes Using Three-Dimensional Convolutional Neural Networks* Physics in Medicine and Biology 10/2018

**Anderson B.M,** Lin E., Cazoulat G., Gupta S., Odisio B., Brock KK. *Improvement of liver ablation treatment for colorectal liver metastases*. Medical Imaging 2018: Image-Guided Procedures, Robotic Interventions, and Modeling, 2018, p. 74.

McCulloch M.M, **Anderson B.M**, Mohamed A., Volpe S., Elhalawani H., Cazoulat G., Bahig H., Fuller C., Brock KK *Deformable Image Registration for Modeling Neck Flexion in Head and Neck Cancer Patients.* Physics in Medicine and Biology 09/2019

Ger R.B, Cardenas E.C, **Anderson B.M**, Yang J, Mackin DS, Zhang L, Court LE *Guidelines and Experience Using Imaging Biomarker Explorer (IBEX) for Radiomics.* Journal of Visualized Experiments 01/2018

Court, L. E., Kisling, K., McCarroll, R., Zhang, L., Yang, J., Simonds, H., du Toit, M., Trauernicht, C., Burger, H., Parkes, J., Mejia, M., Bojador, M., Balter, P., Branco, D., Steinmann, A., Baltz, G., Gay, S., **Anderson, B.M**, Cardenas, C., Jhingran, A., Shaitelman, S., Bogler, O., Schmeller, K., Followill, D., Howell, R., Nelson, C., Peterson, C., Beadle, B *Radiation Planning Assistant – A streamlined, fully automated radiotherapy treatment planning system*. Journal of Visualized Experiments. 12/2017

Rubinstein, A. E., Ingram, S. W., **Anderson, B.M**, Gay SS, Fave XJ, Ger RB, McCarroll RE, Owens CA, Netherton TJ, Kisling KD, Court LE, Yang J, Li Y, Lee J, Mackin DS, Cardenas CE *Cost-effective immobilization for whole brain radiation therapy*. Journal of Applied Clinical Medical Physics. 04/2017