Hania A. Al-Hallaq, Ph.D.

The University of Chicago
Department of Radiation and Cellular Oncology
Section of Medical Physics
5758 S Maryland Ave., MC 9006
Chicago, IL 60637
Office: (773)-702-3309
Email: hal-hallaq@radonc.uchicago.edu

ACADEMIC APPOINTMENTS

2004-2008 Instructor, Department of Radiation Oncology, University of Chicago
2008-present Assistant Professor, Department of Radiation Oncology, University of Chicago

Ph.D.-Granting Committee, Program, Institute, and Center Appointments
2005-present Committee on Medical Physics, University of Chicago
2011-present Director, Certificate Program in Medical Physics, University of Chicago

ACADEMIC TRAINING

1990-1994 A.B., Physics, Bryn Mawr College, Bryn Mawr, PA
1994-2000 Ph.D., Medical Physics, University of Chicago, Chicago, IL
2000-2002 Residency, Section of Medical Physics, University of Chicago, Chicago, IL

BOARD CERTIFICATION

2003 American Board of Radiology (ABR), Therapeutic Physics

PROFESSIONAL EXPERIENCE

2002-2004 Clinical Physicist, Advocate Lutheran General Hospital, Park Ridge, IL

SCHOLARSHIP

(a) Peer-reviewed publications in the primary literature, exclusive of abstracts:

1. KS Corbin, PL Dorn, **HA Al-Hallaq**, Y Hasan, SJ Chmura, "Hypofractionated radiotherapy does not increase acute toxicity in large breasted women: results from a prospectively collected series," *American Journal of Clinical Oncology*, **37**(4):322-326, 2014. http://dx.doi.org/10.1097/COC.0b013e31827b45b7

2. L Padilla, H Kang, Y Hasan, M Washington, SJ Chmura, **HA Al-Hallaq**, "Assessment of inter-fractional variation of the breast surface following conventional patient positioning for whole-breast radiotherapy," *Journal of Applied Clinical Medical Physics*, **15**(5):177-189, 2014. http://dx.doi.org/10.1120/jacmp.v15i5.4921

3. AR Cunliffe, SG Armato III, C Straus, R Malik, **HA Al-Hallaq**, "Lung texture in serial thoracic CT scans: Correlation with radiologist-defined severity of acute changes following radiation therapy," *Physics in Medicine and Biology*, **59**: 5387-5398, 2014. http://dx.doi.org/10.1088/0031-9155/59/18/5387

4. S Rudra, **HA Al-Hallaq**, C Feng, SJ Chmura, Y Hasan, "Effect of RTOG breast/chest wall guidelines on dose-volume histogram parameters," *Journal of Applied Clinical Medical Physics*, **15**(2):127-137, 2014. http://dx.doi.org/10.1120/jacmp.v15i2.4547.

5. AR Cunliffe, SG Armato III, XM Fei, RE Tuohy, **HA Al-Hallaq**, "Lung texture in serial thoracic CT scans: registration-based methods to compare anatomically matched regions," *Medical Physics*, **40**(6):061906, 2013. http://dx.doi.org/10.1118/1.4805110.

6. AM Wood, M Medved, ID Bacchus, **HA Al-Hallaq**, A Shimauchi, GM Newstead, OI Olopade, SS Venkataraman, MK Ivancevic, GS Karczmar, "Classification of breast lesions pre-contrast injection using water resonance lineshape analysis," *NMR in Biomedicine*, **26**(5):569–577, 2013. http://dx.doi.org/10.1002/nbm.2893

7. PL Dorn*, **HA Al-Hallaq***, F Haq, M Goldberg, H Abe, MD; Y Hasan, SJ Chmura, "A prospective study on the utility of MRI in determining candidacy for partial breast irradiation," *International Journal of Radiation Oncology, Biology, and Physics*, **85**(3): 615–622,2013. (*Authors contributed equally.) http://dx.doi.org/10.1016/j.ijrobp.2012.06.014

8. AR Cunliffe, **HA Al-Hallaq**, ZE Labby, CA Pelizzari, C Straus, W Sensakovic, M Ludwig, SG Armato III, "Lung texture in serial thoracic CT scans: assessment of change introduced by image registration," *Medical Physics*, 39(8):4679-4690, 2012. http://dx.doi.org/10.1118/1.4730505

9. J Li, RD Wiersma, CJ Stepaniak, KJ Farrey, **HA Al-Hallaq**, "Improvements in dose accuracy delivered with static-MLC IMRT on an integrated linear accelerator control system," *Medical Physics*, 39(5):2456-62, 2012. http://dx.doi.org/10.1118/1.3701778

10. PL Dorn, KS Corbin, **HA Al-Hallaq**, Y Hasan, SJ Chmura, "Feasibility of hypofractionated whole breast radiation in large-breasted patients," *International Journal of Radiation Oncology, Biology, and Physics*, 83(1):79-83, 2012. http://dx.doi.org/10.1016/j.ijrobp.2011.05.074

11. SL Liauw, RR Weichselbaum, C Rash, D Correa, **HA Al-Hallaq**, CA Pelizzari, AB Jani, "Biochemical control and toxicity after intensity-modulated radiation therapy for prostate cancer," *Technology in Cancer Research and Treatment*, 8(3):201-6, 2009. PMID:19445537

12. **HA Al-Hallaq**, LK Mell, JA Bradley, LF Chen, AN Ali, RR Weichselbaum, GM Newstead, SJ Chmura, "Magnetic Resonance Imaging (MRI) Identifies Multifocal and Multicentric Disease in Breast Cancer Patients Eligible for Partial Breast Irradiation (PBI)," *Cancer*, 113(9):2408-14, 2008. http://dx.doi.org/10.1002/cncr.23872

13. **HA Al-Hallaq**, CS Reft, JC Roeske, "The dosimetric effects of tissue heterogeneities in intensity-modulated radiation therapy (IMRT) of the head and neck," *Physics in Medicine and Biology*, 51(5):1145-56, 2006. http://dx.doi.org/10.1088/0031-9155/51/5/007

14. R Singh, **H Al-Hallaq**, CA Pelizzari, GP Zagaja, A Chem, AB Jani, "Dosimetric quality endpoints for low-dose-rate prostate brachytherapy using biological effective dose (BED) vs. conventional dose," *Medical Dosimetry*, 28(4): 255-259, 2003. http://dx.doi.org/10.1016/j.meddos.2003.04.001

15. X Fan, JN River, M Zamora, **HA Al-Hallaq**, GS Karczmar, "Effect of carbogen on tumor oxygenation: combined fluorine-19 and proton MRI measurements," *International Journal*

of Radiation Oncology, Biology, and Physics, 54(4): 1202-1209, 2002. http://dx.doi.org/10.1016/S0360-3016(02)03035-3

16. BB Williams, **H Al-Hallaq**, GV Chandramouli, ED Barth, JN Rivers, M Lewis, VE Galtsev, GS Karczmar, HJ Halpern, "Imaging spin probe distribution in the tumor of a living mouse with 250 MHz EPR: correlation with BOLD MRI," *Magnetic Resonance in Medicine*, 47(4): 634-638, 2002. http://dx.doi.org/10.1002/mrm.10089

17. **HA Al-Hallaq**, X Fan, M Zamora, JN River, JE Moulder, GS Karczmar, "Spectrally inhomogeneous BOLD contract changes detected in rodent tumors with high spectral and spatial resolution MRI," *NMR in Biomedicine*, 15(1): 28-36, 2002. http://dx.doi.org/10.1002/nbm.728

18. **HA Al-Hallaq**, MA Zamora, BL Fish, A Farrell, JE Moulder, GS Karczmar, "MRI measurements correctly predict the relative effect of tumor oxygenating agents on hypoxic fraction in rodent BA1112 tumors," *International Journal of Radiation Oncology, Biology, and Physics*, 47(2): 481-488, 2000. http://dx.doi.org/10.1016/S0360-3016(00)00445-4

19. GS Karczmar, X Fan, **HA Al-Hallaq**, JN River, M Zamora, C Rinker-Schaeffer, P Losco, K Tarlo, K Kellar, "Uptake of a superparamagnetic contrast agent imaged by MR with high spectral and spatial resolution," *Magnetic Resonance in Medicine*, 43(5): 633-639, 2000. http://dx.doi.org/10.1002/(SICI)1522-2594(200005)43:5<633::AID-MRM3>3.0.CO;2-R

20. ML Giger, **HA Al-Hallaq**, Z Huo, C Moran, DE Wolverton, CW Chan, W Zhong, "Computerized analysis of lesions in ultrasound images of the breast," *Academic Radiology*, 6: 665-674, 1999. http://dx.doi.org/10.1016/S1076-6332(99)80115-9

21. **HA Al-Hallaq**, JN River, M Zamora, H Oikawa, GS Karczmar, "Correlation of magnetic resonance and oxygen microelectrode measurements of carbogen-induced changes in tumor oxygenation," *International Journal of Radiation Oncology, Biology, and Physics*, 41(1): 151-159, 1998. http://dx.doi.org/10.1016/S0360-3016(98)00038-8

22. DA Kovar, **HA Al-Hallaq**, MA Zamora, JN River, GS Karczmar, "Fast spectroscopic imaging of water and fat resonances to improve the quality of MR images," *Academic Radiology*, 5(4): 269-275, 1998. http://dx.doi.org/10.1016/S1076-6332(98)80226-2

23. H Oikawa, **HA Al-Hallaq**, MZ Lewis, JN River, DA Kovar, GS Karczmar, "Spectroscopic imaging of the water resonance with short repetition time to study tumor response to hyperoxia," *Magnetic Resonance in Medicine*, 38(1): 27-32, 1997. http://dx.doi.org/10.1002/mrm.1910380106

24. PA Beckmann, **HA Al-Hallaq**, AM Fry, AL Plofker, BA Roe, JA Weiss, "Solid state proton spin relaxation and methyl and t-butyl reorientation," *Journal of Chemical Physics*, 100(1): 752-753, 1994. http://dx.doi.org/10.1063/1.466946

25. **HA Al-Hallaq** and PA Beckmann, "Proton spin relaxation, internal motion and structure in solid 1,2,4,5-Tetraisopropylbenzene," *Journal of the Chemical Society Faraday Transactions*, **89**(20): 3801-3804, 1993. http://dx.doi.org/10.1039/ft9938903801

(b) Peer-reviewed works accepted or in press

1. CH Feng, E Gerry, SJ Chmura, Y Hasan, **HA Al-Hallaq**, "An image-guided study of setup reproducibility of post-mastectomy breast cancer patients treated with inverse-planned intensity-modulated radiation therapy (IMRT)," *International Journal of Radiation Oncology, Biology, and Physics*, in press, 2014. http://dx.doi.org/10.1016/j.ijrobp.2014.09.007
2. AR Cunliffe , C Contee , SG Armato III , B White , J Justusson , R Malik , **HA Al-Hallaq**, "Effect of deformable registration on the dose calculated in radiation therapy planning CT scans of lung cancer patients," *Medical Physics*, in press, 2014.

(c) Patents

1. ML Giger, **HA Al-Hallaq**, DE Wolverton, U Bick, "Method and system for the automated analysis of lesions in ultrasound images," U.S. Patent # 5,984,870, Issued November 16, 1999.

2. C Stepaniak, **HA Al-Hallaq**, L Arbash Meinel, "A System for Integrated Radiation Oncology Workflow," U.S. Patent # 61,301,671, Filed Feb 5, 2010 (pending approval).

(d) Conference Proceedings

1. GS Karczmar, X Fan, **H Al-Hallaq**, JN River, K Tarlo, KE Kellar, M Zamora, C Rinker-Schaeffer, MJ Lipton, "Functional and anatomic imaging of tumor vasculature: high-resolution MR spectroscopic imaging combined with a superparamagnetic contrast agent," *Academic Radiology*, 9(Suppl 1): S115-118, 2002. http://dx.doi.org/10.1016/S1076-6332(03)80414-2

2. **HA Al-Hallaq**, MA Zamora, BL Fish, HJ Halpern, JE Moulder, GS Karczmar, "Using high spectral and spatial resolution BOLD MRI to choose the optimal oxygenating treatment for individual cancer patients," *Advances in Experimental Medicine and Biology*, 530: 433-440, 2003.

3. E Pearson, **HA Al-Hallaq**, X Pan, C Pelizzari, "Dynamic region-of-interest cone-beam CT for image-guided postmastectomy radiotherapy," *Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC) IEEE*, 3187-3190, 2011. http://dx.doi.org/10.1109/NSSMIC.2011.6153654

4. B Knoll, A Cunliffe, **HA Al-Hallaq**, R Malik, SG Armato, "Investigating the dose dependence of median pixel value in CT lung images of patients undergoing stereotactic body radiation therapy," *Proceedings of SPIE*, 8315, 2012. http://dx.doi.org/10.1117/12.911744

5. A Cunliffe, **HA Al-Hallaq**, X Fei, R Tuohy, SG Armato, "Comparison of demons deformable registration-based methods for texture analysis of serial thoracic CT scans," *Medical Imaging 2013: Computer-Aided Diagnosis, Proceedings of SPIE*, 8670, 2013. http://dx.doi.org/10.1117/12.2007046

(d) Published Abstracts

1. JN River, **HA Al-Hallaq**, MZ Lewis, H Oikawa, GS Karczmar, "MR imaging and microelectrode measurements: evidence that MR imaging depicts increased tumor pO2," *Radiology*, 201P: 276, 1996.

2. **HA Al-Hallaq**, GS Karczmar, “1H spectroscopic MR imaging of the water and fat resonances in human breast improves image quality,” *Radiology*, 205P:164, 1997.

3. BC Penney, **HA Al-Hallaq**, RK Keast, JW Ryan, "Summing rapid SPECT acquisitions reduces bladder filling artifacts", *Journal of Nuclear Medicine*, 37(5):S936, 1996.

4. J Ryan, B Penney, **HA Al-Hallaq**, I Weissman, “Rapid acquisition sequence (RAS) imaging with dual or triple head gamma cameras reduces bladder filling artifacts,” *European Journal of Nuclear Medicine*, 25(8):910, 1998.

5. ML Giger, CJ Moran, DE Wolverton, **HA Al-Hallaq**, “Computer-aided diagnosis in ultrasound: classification of breast lesions,” *Radiology,* 209P: 353, 1998.

6. **HA Al-Hallaq**, V Sehgal, MA Zamora, GS Karczmar, “MR spectroscopic imaging of the water and fat with high spectral and spatial resolution in brain,” *Radiology*, 209P: 351-352, 1998.

7. **HA Al-Hallaq**, MA Zamora, BL Fish, JN River, JE Moulder, GS Karczmar, “MRI may be used to evaluate the effects of tumor oxygenating agents on radiosensitivity,” *Radiology*, 213P: 372-373, 1999.

8. **HA Al-Hallaq**, MA Zamora, GS Karczmar, “Inhomogeneous spectral changes degrade GRE image quality: Advantages of High Spectral and Spatial resolution (HiSS) MRI,” *Radiology*, 213P: 404, 1999.

9. GS Karczmar, JN River, KS Tarlo, K Kellar, X Fan, **HA Al-Hallaq**, “Imaging tumor vasculature with a superparamagnetic contrast agent and high spectral and spatial resolution MRI,” *Radiology*, 213P: 404, 1999.

10. R Singh R, **HA Al-Hallaq**, S Johnson, R Heimann, “A three-dimensional (3D) analysis of the conventional supraclavicular field in breast cancer,” *The Cancer Journal*, 8(6):495, 2002. http://dx.doi.org/10.1097/00130404-200211000-00047

11. A Jani, R Singh, **HA Al-Hallaq**, GP Zagaja, AA Chen, CA Pelizzari, “Dosimetric quality endpoints for prostate brachytherapy using conventional versus biological effective dose (BED)”, *Radiology*, 225(S):192-193,2002.

12. **HA Al-Hallaq**, C Reft, D Haraf, J Roeske, “The dosimetric effects of tissue heterogeneities in IMRT of the head and neck,” Medical Physics, 29(6):1315, 2002.

13. **HA Al-Hallaq**, J Bian, A Wood, “Accounting for tissue heterogeneities in head and neck IMRT plans increases planning target volume and spinal cord doses,” *Medical Physics*, 33(6):2065, 2006. http://dx.doi.org/10.1118/1.2240999

14. **HA Al-Hallaq**, LK Mell, S Advani, S Hellman, G Newstead, S Chmura, ”Magnetic resonance imaging (MRI) identifies multifocal and multicentric disease in breast cancer patients eligible for the NSABP B-39/RTOG 0413 partial breast irradiation (PBI) trial,” *International Journal of Radiation Oncology, Biology, and Physics* 66(3): S179-S180, 2006. http://dx.doi.org/10.1016/j.ijrobp.2006.07.351

15. B Aydogan, H Tiryaki, **HA Al-Hallaq**, J Roeske, "Verification of lung tumor doses calculated by Eclipse AAA and Pinnacle CC algorithms," *Medical Physics*, 34(6):2521, 2007. http://dx.doi.org/10.1118/1.2761235

16. T Wu, Z Labby, **HA Al-Hallaq**, K Yenice, "Commissioning and validation of the BrainLab Monte Carlo dose calculation algorithm," *Medical Physics*, 35(6):2953, 2008. http://dx.doi.org/10.1118/1.2962778

17. PL Dorn, **HA Al-Hallaq**, A Chaudhary, G Vlacich, SJ Chmura, "Utility of Breast Magnetic Resonance Imaging in Determining Candidacy for Partial Breast Irradiation," *International Journal of Radiation Oncology, Biology, and Physics,* 75(3): S186, 2009. http://dx.doi.org/10.1016/j.ijrobp.2009.07.433

18. **HA Al-Hallaq**, PL Dorn, J Steber, Y Hasan, SJ Chmura, "IMRT for simultaneous irradiation of right-sided breast cancer and bilateral internal mammary nodes," *2010 Breast Cancer Symposium*. http://meetinglibrary.asco.org/content/60670-100

19. KS Corbin, PL Dorn, **HA Al-Hallaq**, Y Hasan, S Chmura, "Impact of patient size on acute skin toxicity of hypofractionated breast radiation," *2010 Breast Cancer Symposium*. http://meetinglibrary.asco.org/content/60493-100

20. PL Dorn, **HA Al-Hallaq**, M Goldberg, Y Hasan,N Jaskowiak,G Newstead, SJ Chmura, "Initial Report of UCCRC 3443: A Prospective Study on the Utility of Magnetic Resonance Imaging (MRI) in Determining Candidacy for Partial Breast Irradiation (PBI), " *International Journal of Radiation Oncology, Biology, and Physics,* 78(3): S3, 2010. http://dx.doi.org/10.1016/j.ijrobp.2010.07.049

21. K Farrey, M Sadinski, DW Golden, G Redler, KM Yenice, DJ Haraf, CA Pelizzari, JK Salama, **HA Al-Hallaq**, "Cone-Beam CT (CBCT) May be Necessary to Ensure Planned Spinal Cord Doses are not Exceeded in Head and Neck (H&N) Patients Treated with Intensity Modulated Radiotherapy (IMRT)," *International Journal of Radiation Oncology, Biology, and Physics,* 78(3): S680, 2010. http://dx.doi.org/10.1016/j.ijrobp.2010.07.1580

22. S Rudra, **HA Al-Hallaq**, JL Steber, PL Dorn, SJ Chmura, Y Hasan, "Analysis of Coverage of the RTOG Breast Target Volumes with Conventional Breast Fields," *International Journal of Radiation Oncology, Biology, and Physics*, 78(3): S744, 2010. http://dx.doi.org/10.1016/j.ijrobp.2010.07.1723

23. M Surucu, EE Klein, **HA Al-Hallaq**, CA Pelizzari, KM Yenice, "Implementation of Modulated Electron Beams and Photon IMRT using a Commercially Available Treatment Planning System," *International Journal of Radiation Oncology, Biology, and Physics*, 78(3): S817, 2010. http://dx.doi.org/10.1016/j.ijrobp.2010.07.1891

24. J Li, H Kang, T Wu, K Farrey, S Chmura, **HA Al-Hallaq**, "Correlation of 3D surface matching with AlignRT and MV imaging for whole-breast radiotherapy," *Medical Physics*, 38(6):3539, 2011. http://dx.doi.org/10.1118/1.3612178

25. C Stepaniak, J Li, K Farrey, K Yenice, **HA Al-Hallaq**, "Improvements in step-and-shoot dose delivery accuracy on Varian TrueBeam," *Medical Physics*, 38(6):3588, 2011. http://dx.doi.org/10.1118/1.3612388

26. A Cunliffe, HA Al-Hallaq, Z Labby, C Pelizzari, W Sensakovic, S Armato, "Evaluation of CT texture feature changes following deformable lung registration," *Medical Physics*, 38(6):3396, 2011. http://dx.doi.org/10.1118/1.3611575

27. PL Dorn, **HA Al-Hallaq**, H Farah, M Goldberg, N Jaskowiak, G Newstead, , Y Hasan, SJ Chmura, "A predictive index for determining the utility of MRI in partial breast irradiation," *International Journal of Radiation Oncology, Biology, and Physics*, 81(2): S202-203, 2011. http://dx.doi.org/10.1016/j.ijrobp.2011.06.367

28. **HA Al-Hallaq**, E Gerry, "A study of the correlation of 3D surface matching and kV imaging for chestwall IMRT," *Medical Physics*, 39(6):3668, 2012. http://dx.doi.org/10.1118/1.4734905

29. M Ludwig, A Cunliffe, **HA Al-Hallaq**, S Armato, "Evaluation of image registration using landmark matching and texture analysis," *Medical Physics*, 39(6):3895, 2012. http://dx.doi.org/10.1118/1.4735899

30. HA Al-Hallaq, D Modgil, E Gerry, SJ Chmura, Y Hasan, "An image-guided study of setup reproducibility of chestwall patients treated with inverse-planned IMRT," *International Journal of Radiation Oncology, Biology, and Physics*, 84(3): S725, 2012. http://dx.doi.org/10.1016/j.ijrobp.2012.07.1942

31. S Rudra, HA Al-Hallaq, S Chmura, Y Hasan, "Contouring of breast and axillary nodal volumes per RTOG guidelines improves dose coverage at a single institution," *International Journal of Radiation Oncology, Biology, and Physics*, 84(3): S808, 2012. http://dx.doi.org/10.1016/j.ijrobp.2012.07.2162

32. L Padilla, H Kang, M Washington, Y Hasan, S Chmura, **HA Al-Hallaq**, "Surface imaging for breast patients," *Medical Physics*, 40(6): 162, 2013. http://dx.doi.org/10.1118/1.4814268

33. A Cunliffe, S Armato, X Fei, R Tuohy, **HA Al-Hallaq**, "Investigation of Demons Deformable Registration-Based Methods to Measure Lung CT Texture Change Over Time," *Medical Physics*, 40(6): 482, 2013. http://dx.doi.org/10.1118/1.4815558

34. T Eckhause, **HA Al-Hallaq**, T Ritter, J DeMarco, K Farrey, G Kim, R Popple, V Sharma, M Perez, S Park, J Booth, R Thorwarth and J Moran, "Automating Linac QA for delivery and analysis," *Medical Physics*, 40(6): 492, 2013. http://dx.doi.org/10.1118/1.4815598

35. A Cunliffe, C Contee, B White, J Justusson, S Armato, R Malik, **HA Al-Hallaq**, "Effect of Radiation Therapy Planning Scan Registration On the Dose in Lung Cancer Patient CT Scans," *Medical Physics*, 41(6): 471, 2014. http://dx.doi.org/10.1118/1.4889321

36. A Cunliffe, S Armato, R Castillo, N Pham, T Guerrero, **HA Al-Hallaq**, "Quantitative Texture Features Calculated in Lung Tissue From CT Scans Demonstrate Consistency Between Two Databases From Different Institutions *Medical Physics*, 41(6): 450, 2014. http://dx.doi.org/10.1118/1.4889250

37. T Giaddui, Y Cui, W Chen, J Yu, Y Gong, T Craig, L Dawson, **H Al-Hallaq**, S Chmura, F Yin, J Galvin and Y Xiao, "Image Guided Radiation Therapy (IGRT): Review of Technical

Standards and Credentialing in Radiotherapy Clinical Trials," *Medical Physics*, 41(6): 387, 2014. http://dx.doi.org/10.1118/1.4889024

FUNDING

(a) Past:

1. American Cancer Society Internal Grant for University of Chicago. **PI: HA Al-Hallaq**. My role: PI. Title: "Investigating image-guided intensity-modulated radiation therapy (IMRT) of the breast with a prone immobilization device." Total direct costs: $20,000. Annual effort: 10%. Project period: 2005-2006.

2. Cancer Research Foundation Grant. **PI: HA Al-Hallaq**. My role: PI. Title: "Correlating Cu-ATSM positron emission tomography images of tumor hypoxia with oxygen tension images measured by electron paramagnetic resonance." Total direct costs: $50,000. Annual effort: 5%. Project period: 2006-2008.

3. The University of Chicago Breast Cancer SPORE Career Development Award. **PI: HA Al-Hallaq**, My role: PI. Title: "Can functional BOLD imaging increase the specificity of breast MRI screening?" Total direct costs: $75,000. Annual effort: 5%. Project period: 2007-2009.

4. NIH R01-CA120540. PI: X Pan. My role: Collaborator. Title: "Optimized cone-beam CT for image-guided radiation therapy". Total direct costs: $250,000. Annual salary recovery or effort: 5%. Project period: 07/27/07–05/31/12.

5. University of Chicago Institute for Translational Medicine Pilot Study Award. **PI: HA Al-Hallaq**. My role: PI. Title: "CT texture analysis of normal lung tissue response to radiation." Total direct costs: $39,640. Annual effort: 5%. Project period: Project period: 09/2013-09/2014.

(b) Current:

None

HONORS, PRIZES, AND AWARDS

1993-1994	Marshall Teaching and Research Fellowship, Bryn Mawr College, Bryn Mawr, PA
1994	Summa cum laude, Bryn Mawr College, Bryn Mawr, PA
1994	Distinction in Physics, Bryn Mawr College, Bryn Mawr, PA
1996-1997	Department of Radiology Paul C. Hodges Research Grant, University of Chicago
1998	Bernard Smaller Magnetic Resonance Research Award, University of Chicago
1999	Best Journal Club Presentation, Graduate Program in Medical Physics
2006	The Kurt Rossmann Award for Excellence in Medical Physics Graduate Teaching
2009	The Franca Kuchnir Award for Excellence in Physics Residency Teaching

INVITED SPEAKING

International

1996	Educational seminar, "Medical imaging," Jordan University, Department of Physics, Amman, Jordan.

National

2011 Educational seminar (providing CME credits), “Clinical commissioning and acceptance of a 3D surface matching system,” American Association of Physicists in Medicine (AAPM) Annual Meeting, Vancouver, British Columbia, Canada

2012 Educational seminar (providing CME credits), “The emerging role of image guidance for breast radiotherapy,” American Association of Physicists in Medicine (AAPM) Annual Meeting, Charlotte, NC

2013 Educational seminar (providing CME credits), “Clinical applications of surface imaging”, American Association of Physicists in Medicine (AAPM) Annual Meeting, Indianapolis, IN

2014 Educational seminar (providing CME credits), “Image-guidance for breast radiotherapy,” American Society for Radiation Oncology (ASTRO) 2014 State of the Art Radiation Therapy: Practical Treatment, Biology, and Imaging Meeting, San Antonio, TX

Regional

2009 Educational seminar (providing CME credits), “Prone breast positioning for radiotherapy,” The Chicago Area Radiation Therapists (CART) Chapter Meeting, Chicago, IL

Institutional

2006 Educational seminar, “Improving breast cancer radiotherapy through intensity-modulated radiation therapy: the clinical, biological and physical basis,” University of Chicago Breast Cancer Seminar

2009 Educational seminar, “Use of functional magnetic resonance imaging to assess response to therapy,” University of Chicago Cancer Center

INVITED, ELECTED, OR APPOINTED EXTRAMURAL SERVICE

2005- Reviewer of peer-written manuscripts on breast cancer radiotherapy: *International Journal of Radiation Oncology, Biology, Physics*

2007 Moderator, Radiological Society of North America Annual Meeting, Chicago, IL

2008- Reviewer of peer-written medical physics and imaging manuscripts: *Magnetic Resonance in Medicine*, *Medical Physics*, *Radiotherapy and Oncology*, *Journal of Applied Clinical Medical Physics*, *PLOS One*

2009 Susan G. Komen Grant Reviewer, Investigator-Initiated Breast Cancer Research Proposals

2008-2010 Item Writer, American Board of Radiology, Topic: Physics for Radiation Oncology Initial Certification and Maintenance of Certification

2010- Reviewer of abstracts submitted to American Association of Physicists in Medicine (AAPM) Annual meeting

2011 Moderator, American Association of Physicists in Medicine, Vancouver, BC

2012 Radiological Society of North America Research and Education Foundation, Radiation Oncology Research Study Section, Chicago, IL

2012 Examiner, American Board of Radiology, Therapeutic Physics Oral Exams, Louisville, KY

2012-2015 Item Writer and Written Examination Committee, American Board of Radiology, Topic: Physics for Medical Physics Initial Certification and Maintenance of Certification

2013 Department of Defense Breast Cancer Research Program, Idea Expansion Award: Detection, Diagnosis and Prognosis Study Section, Reston, VA

2013- NRG Oncology, Medical Physics Co-Chair for:

1) "*NRG-BR001*: A Phase 1 study of stereotactic body radiotherapy (SBRT) for the treatment of multiple metastases"
2) "*NRG-BR002*: A Phase II/III stereotactic body radiotherapy (SBRT) and/or surgical ablation for newly oligometastatic breast cancer"

2014 Member, Working Group on Clinical Trials, American Association of Physicists in Medicine

2014 Invited Journal Associate Editor, *Medical Physics*

PROFESSIONAL SOCIETIES

Membership:

American Association of Physicists in Medicine
American Society for Radiation Oncology

EDUCATION

The College (B.A., B.S.):

None

Graduate programs (Ph.D.):

(a) Didactic

2004- MPHYS 350: "Interactions of Radiation with Matter"
Duties: a) Instructor for 50% of the course (13.5 direct contact hours/year for 3-6 students), b) organize, update, and distribute articles assigned to students for presentation based on course material

2005-2007 MPHYS 344: "Radiation Therapy Practicum"
Duties: a) Instructor for 50% of the laboratory course (20-25 direct contact hours/year for 3-4 student), b) Developed a new experiment based on Monte Carlo techniques to modernize course

2005- Examiner, Annual Medical Ph.D. Candidacy Written and Oral Examinations

2007- MPHYS 344: "Radiation Therapy Practicum"
Duties: Instructor for 25% of the laboratory course (approximately 9-12 direct contact hours/year for 3-6 students)

Pritzker School of Medicine (M.D.):

None

Graduate medical education (residency and clinical fellowships):

(a) Didactic

2004- Examiner for quarterly oral examinations of medical physics residents

2005- Educational seminar, "A system of dosimetric calculations"
Target audience: entering radiation oncology residents (3 contact hours/year)

(b) Clinical

2004- Primary mentor for 1 resident for 1 quarter in each academic year

2004- Clinical training of residents for brachytherapy, quality assurance, commissioning of new equipment

Continuing medical education:

Educational Seminars CME-Accredited by American Society of Radiologic Technologists (ASRT)

2009 "Prone breast positioning for radiotherapy"

2009 "Image-guided radiotherapy for head and neck cancer"

2012 "Breast radiotherapy planning"

Departmental education:

2005 Educational seminar, "Breast intensity-modulated radiotherapy"
Target audience: radiation oncology staff.

2006 Educational seminar, "Breast IMRT"
Target audience: oncology nursing staff.

Research trainees:

(a) Undergraduate (B.A., B.S.)

2009 Meredith Sadinski, University of Chicago. Summer Research Experience
Presently Ph.D. candidate, Committee on Medical Physics, University of Chicago

2011-12 Emily Gerry, University of Chicago. Undergraduate Research Experience

2013 Clay Contee, Hampshire College, Minority Undergraduate Research Experience (MUSE) sponsored by AAPM

(b) Medical (M.D.)

Summer Research Program Mentor, Pritzker Medical School, University of Chicago

2013- Christine Feng, Summer Research Experience
Presently M.D. candidate, Pritzker Medical School, University of Chicago

(c) Residents-in-training

2011-12 Ji Li, Ph.D., University of Chicago, Medical Physics Resident
Current Position: Clinical physicist, University of Chicago

2010-12 Paige Dorn, M.D., University of Chicago, Radiation Oncology Resident
Current Position: Practicing radiation oncologist in Illinois

2010-13 Sonali Rudra, M.D., University of Chicago, Radiation Oncology Resident
Current Position: Attending radiation oncologist, Georgetown University

(d) Graduate (Ph.D.)

Member of Dissertation Committee, Committee on Medical Physics, University of Chicago

08/2008 Michalis Aristophanous, "Automated PET-based tumor volume definition for radiotherapy of lung cancer"
Current Position: Assistant Professor, University of Texas MD Anderson Cancer Center

12/2008 Sean Foxley, "Analysis of Fourier components of high spectral and spatial resolution MRI for improve early cancer detection"
Current Position: Post-doctoral researcher with Heidi Johansen-Berg, University of Oxford

08/2011 Abbie Wood, "Pre-contrast classification of breast lesions using water resonance lineshape analysis"
Current Position: Medical physicist, Loyola University

05/2012 Elizabeth Hipp, "Magnetic resonance guidance focused ultrasound internal tattoo marking for breast cancer"
Current Position: Medical physicist, University of Vermont

06/2013 Erik Pearson, “Development and application of advanced Conebeam CT acquisition strategies for image-guided therapies”
Current Position: Post-doctoral researcher, University of Toronto Princess Margaret Hospital

Pending Federico Pineda, “Quantitative dynamic contrast enhanced MRI of the breast: concentration of contrast media and proton density images”

06/2014 Gage Redler, “Enhanced dynamic electron paramagnetic resonance imaging of in vivo physiology”
Current Position: Medical physics resident at Rush University

Principal Supervisor, Committee on Medical Physics, University of Chicago

2009- Alexandra Cunliffe, “Thoracic CT image texture analysis for assessment of radiation-induced lung tissue damage and early identification of radiation pneumonitis,” Ph.D. expected December 2014

(e) Postdoctoral (Ph.D.)

2007-2009 Ian Bacchus, Ph.D. Current position: Medical physics resident, Northwestern University

(f) Certificate (Ph.D.)

2012-2013 Ryan Manger. Ph.D. Current position: Medical physics resident, University of California at San Diego

2012-2013 Peng Wang. Ph.D. Current position: Medical physics resident, University of Pennsylvania

2012-2013 Tatsiana Ratnikova. Ph.D. Current position: Medical physics resident, University of Minnesota

2013-2014 Michael Reilly. Ph.D. Current position: Medical physics resident, Washington University

2013-2014 Abdul Mroue. Ph.D. Current position: Medical physics resident, University of Chicago

CLINICAL

University of Chicago

2005- Lead Physicist, Breast Radiotherapy Service, Responsibilities include: overseeing treatment planning, dosimetric evaluation of delivery techniques, consultation on specific patient treatments

2005- Lead Physicist, Quality Assurance (QA) for 1 LINAC, Responsibilities include: routine monthly, annual QA

2005-2007 Clinical Physicist, Cranial Radiosurgery Service (Radionics)

2005 Lead Physicist, Commissioned LDR brachytherapy (Pinnacle)

2005- Clinical Physicist, LDR Intracavitary and Interstitial Brachytherapy Service

2005 Lead Physicist, Implemented prone breast radiotherapy

2006 Lead Physicist, Implemented field-in-field IMRT for breast irradiation

2006 Lead Physicist, Commissioned 5 electron beams on Varian Trilogy LINAC

2006 Lead Physicist, Commissioned treatment planning algorithm for electrons (Pinnacle)
2006- Lead Physicist, Commissioned secondary dose calculation system (Radcalc), Responsibilities include: ongoing maintenance, backup, upgrades
2007 Lead Physicist, Implemented step-and-shoot multiple-field IMRT in Pinnacle, Responsibilities include: ongoing dosimetric evaluation of delivery accuracy
2008 Lead Physicist, Implemented electronic charting for annual QA procedures
2009- Lead Physicist, Commissioning of 3D surface imaging system for patient positioning (AlignRT)
2009 Lead Physicist, Implemented step-and-shoot multiple-field IMRT for treatment of breast/chestwall including internal mammary nodal irradiation
2011- Clinical Physicist, Transitioning to TG-142 Service, Responsibilities include: Updating QA procedures to TG-142 standards, implementation, and testing
2010- Lead Physicist, Radiotherapy Clinical Trials Service, Responsibilities include: administration of and credentialing for clinical trials
2011-2012 Co-Lead Physicist, Commissioned 2 TrueBeam LINACs and corresponding dose calculation algorithm for photons and electrons for 3D/IMRT treatment
2012- Lead Physicist, Commissioning and Implementation of HDR intra-cavitary and intra-operative brachytherapy (VariSource iX)
2013- Lead Physicist, Commissioning and Implementation of Deep-inspiration breath-hold (DIBH) radiotherapy for breast cancer using AlignRT surface imaging

SERVICE

University of Chicago

Committee membership:

2005- Admissions Committee, Committee on Medical Physics
2005- Curriculum Committee, Committee on Medical Physics
2005 Head of Curriculum Sub-Committee tasked with developing guidelines for written summaries of first-year quarterly research rotations in Medical Physics
2009- Faculty Representative to Graduate Minority Committee, Biological Sciences Division
2012- Diversity & Inclusion Representative to BSD, Department of Radiation Oncology
2014- Diversity Committee Chair, Committee on Medical Physics

Leadership:

2011- Director, Medical Physics Certificate Program (https://grahamschool.uchicago.edu/content/medical-physics)
Responsibilities include: developing and administering post-graduate didactic program to allow physicists to re-train into medical physics
2010- Lead Physicist for National Clinical Trials
Responsibilities include: ensuring national trials (RTOG, CALGB, ACOSOG) involving radiation treatment are in accordance with the specified physics requirements, credentialing our equipment and techniques for specified protocols (3D, IMRT, IGRT, SBRT)
2012- Lead Physicist for Implementation of HDR Brachytherapy
Responsibilities include: implementation of mobile HDR (VariSource iX) brachytherapy in out-patient (DCAM) and in-patient (NHP) settings, developing adequate workflows to maximize efficient use of system
2014- Medical Physics Liaison to University of Chicago Comprehensive Cancer Center
Responsibilities include: supporting NCI-sponsored trials at the University of Chicago funded by the U10 grant