

CURRICULUM VITAE

SARAH MCGUIRE

December 16, 2011

I. EDUCATIONAL AND PROFESSIONAL HISTORY

A. List of institutions attended, board certification, licensure

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|---------|---------------------------------------------------------------------------------|
| 5/1998 | B.S. – Milwaukee School of Engineering, Milwaukee, WI
Biomedical Engineering |
| 11/2004 | Ph.D. – Duke University, Durham, NC
Biomedical Engineering |

Board certification

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| 2009 | Board Certified in Therapeutic Radiologic Physics by the
American Board of Radiology |
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B. Professional and Academic Positions

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| 1996 – 1997 | Internship, Packer Engineering,
Naperville, IL |
| 2004 – 2005 | Research Associate, Duke University
Durham, NC |
| 2005 – 2007 | Research Associate, Department of Radiation Oncology
Medical Physics, Duke University Medical Center
Durham, NC |
| 2007 – Present | Assistant Professor, Department of Radiation Oncology,
University of Iowa Hospitals and Clinics, Iowa City, IA |

C. Honors and Awards

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| 9/1999 | Whitaker Fellow |
| 1999 | National Science Foundation Fellowship Awardee |

II. TEACHING

A. Teaching assignments on semester by semester basis

Gave 7 lectures for the Spring 2009 and 2011 Medical Physics Lecture Series for Medical Resident course:

1. Beam modifying devices & Irregular fields
2. Special calculations & Tissue inhomogeneities
3. Isodose curve parameters & distributions
4. Electron calculations and Electron beam dose distributions
5. Imaging for RT (CT, MRI, US, PET, SPECT)
6. Image Processing (DRRs, volume rendering, registration)
7. Special topics: SRS and hyperthermia

Gave 1 lecture for the Spring 2010 RTT Radiation Biology course:

1. Radiation Interactions Review

Gave 1 lecture for the Spring 2010 Medical Physics course (MP077:211)

1. Image Guided RT

Gave 3 lectures for the Fall 2010 Imaging Physics for Diagnosis and Image Guidance

1. Radionuclide production
2. Scintillation cameras
3. PET and SPECT imaging

Co-mentor for IGRT, SRS, and Shielding Rotations for medical physics residents

B. Students supervised

Medical Physics Residents:

1. Xiaofei Ying
2. William Kearney
3. Vibha Chaswal
4. Junyi Xia
5. Dan Hyer

C. Other contributions to institutional programs

1. Reviewed 4 grant applications for M-1 Medical Student Research Program in March 2011 (0.5 hrs of education credit for each proposal reviewed)

III. SCHOLARSHIP

A. Publications or creative works

Peer Reviewed Publications

1. McGuire S and Yuan F. Quantitative analysis of intratumoral infusion of color molecules. *Am J Physiol Heart Circ Physiol.* 281: H715-H721, 2001. PMID: 11454575

Role: Designed and performed the animal experiments and wrote up the results and analysis.

2. McGuire S, Zhou S, Marks L, Dewhirst M, Yin F, and Das S. A Methodology for using SPECT to reduce intensity modulated radiation therapy (IMRT) dose to functioning lung. *International Journal of Radiation Oncology, Biology, Physics.* 66: 1543-1552, 2006. PMID: 17126212

Role: Developed a methodology for incorporating SPECT images in the treatment planning system, designed the treatment plans, and wrote up the results and analysis.

3. McGuire S, Zaharoff Z, and Yuan F. Nonlinear dependence of hydraulic conductivity on tissue deformation during intratumoral infusion. *Annals of Biomed Eng.* 34: 1173-1181, 2006. PMID: 16791492

Role: Designed and performed the animal experiments and wrote up the results and analysis.

4. McGuire S, Marks L, Yin F, and Das S. A methodology for selecting the beam arrangement to reduce intensity modulated radiation therapy (IMRT) dose to SPECT-defined functioning lung. *Phys. Med. Biol.* 55: 403-416, 2010. PMID: 20019404

Role: Developed a methodology for beam angle selection in the design of the treatment plans and wrote up the results and analysis.

5. Menda Y, Ponto L, Dornfeld K, Tewson T, Watkins G, Gupta A, Anderson C, McGuire S, Schultz M, Sunderland J, Graham M, Buatti J. Investigation of Pharmacokinetics of 3'-Deoxy-3'-[18F] Fluorothymidine (FLT) Uptake in the Bone Marrow Prior to and Early After Initiation of Chemoradiation Therapy in Head and Neck Cancer. *Nuclear Medicine and Biology.* 37: 433-438, 2010. PMID: 20447554.

Role: Collaborated with Drs. Menda and Ponto to identify an application for FLT PET imaging of bone marrow activity during chemoradiation therapy.

6. McGuire S, Menda Y, Ponto L, Gross B, Buatti J, Bayouth J. 3'-deoxy-3' [¹⁸F]fluorothymidine PET quantification of bone marrow response to radiation dose. *International Journal of Radiation Oncology, Biology, Physics*. 81(3): 888-93, 2011. PMID: 21300484

Role: Supervised the registration of the FLT PET images to the treatment planning CT, analyzed the images, and wrote up the results and analysis.

7. McGuire S, Menda Y, Ponto L, Gross B, Juweid M, Bayouth J. A methodology for incorporating functional bone marrow sparing in IMRT planning for pelvic radiation therapy. *Radiotherapy and Oncology*. 99: 49-54, 2011. PMID: 21397965

Role: Provided planning objectives, analyzed the results, and wrote up the results and analysis.

Book Sections

1. McGuire S, Zaharoff D, and Yuan F. *Interstitial Transport of Macromolecules: Implication for Nucleic Acid Delivery in Solid Tumors*. *Pharmaceutical Perspectives of Nucleic Acid-Based Therapeutics*. Eds. Mahato RI and Kim SW. Taylor and Francis. New York 2002: 434-454.

Abstracts

1. McGuire S, Zhang X, Dewhurst M, and Yuan F. A new technique for measurement of distribution volume of color molecules in solid tumors. *Annals of Biomedical Engineering*. 28(1): S-25, 2000.
2. McGuire S, Zhou S, Marks L, Dewhurst M, Yin F, Das S. Using SPECT-Guidance to Reduce Intensity Modulated Radiation Therapy (IMRT) Dose to Functioning Lung. *Medical Physics*. 33: 2645, 2006.
3. McGuire SM, Zhou S, Marks LB, Dewhurst M, Yin F, Das SK. Using SPECT-Guidance To Reduce Intensity Modulated Radiation Therapy (IMRT) Dose To Functioning Lung. *International Journal of Radiation Oncology, Biology, Physics*. 66(3): S-663, 2006.
4. McGuire S, Zhou S, Marks L, Dewhurst M, Yin F, Das S. Optimizing the Methodology for Incorporating SPECT-Guidance to Reduce Intensity Modulated Radiation Therapy (IMRT) Dose to Functioning Lung. *Medical Physics*. 34: 2654, 2007.
5. McGuire SM, Zhou S, Marks LB, Yin F, Das SK. Optimal Beam Selection to Enhance SPECT-Guided Reduction of IMRT Dose to Functioning Lung.

International Journal of Radiation Oncology, Biology, Physics. 69(3): S157-158, 2007.

6. McGuire SM, Bylund KC, Bayouth JE. Using Patient as Control to Identify the Threshold SUV for FDG-PET Tumor Delineation for Radiation Therapy in Head and Neck Cancers. International Journal of Radiation Oncology, Biology, Physics. 72(1): S593-594, 2008.
7. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Malik J, Bayouth J. Using [18F]FLT-PET Imaging in IMRT Planning to Avoid Pelvic Bone Marrow for Cervical Cancer Patients. Radiotherapy and Oncology. 94(1): S-20, 2010.
8. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Bayouth J. FLT PET imaging for weekly evaluation of bone marrow response to chemoradiation therapy in cervical cancer patients. Radiotherapy and Oncology. 99(1): S-178, 2011.
9. McGuire SM, Jacobson GM, Menda Y, Ponto LLB, Gross B, Bayouth JE. F-18 Fluorothymidine (FLT) PET Imaging for Weekly Evaluation of Tumor Response to Chemoradiation Therapy in Patients with Cervical Cancer. International Journal of Radiation Oncology, Biology, Physics. 81(2): S804-805, 2011.
10. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Bayouth J. FLT PET Imaging for Evaluating Bone Marrow Recovery after Chemoradiation Therapy in Cervical Cancer Patients. Medical Physics. 38: 3464, 2011.

B. Areas of Research Interest and Current Projects

My research interests focus on reducing systemic toxicities by improving local delivery of cytotoxic agents. Specific examples include:

1. Incorporation of FLT PET imaging in radiation treatment planning
2. Using FLT PET for radiation response assessment
3. Tumor delineation using FDG or FLT PET
4. Incorporation of SPECT imaging in lung tumor radiation treatment planning
5. Improving intratumoral delivery techniques

C. Published reviews of Scholarship

D. Grants Received

E. Invited Lectures, Conference Presentations, Visiting Professorships

Podium Presentations

1. McGuire S and Yuan F. Measurement of color molecule distribution volume in tumor tissue. 13th Annual Tumor Microcirculation Retreat. Durham, NC. March 18 – 19, 2000.
2. McGuire S and Yuan F. Effects of tissue stretching or cell shrinkage on macromolecule penetration depth in rat fibrosarcoma. The 2nd Joint meeting of the IEEE Engineering in Medicine and Biology and Biomedical Engineering Society. Houston, TX. October 23 – 26, 2002.
3. McGuire S, Zhou S, Marks L, Dewhirst M, Yin F, and Das S. Using SPECT-guidance to reduce intensity modulated radiation therapy (IMRT) dose to functioning lung. AAPM 48th Annual Meeting. Reviewers' Choice. Orlando, FL. July 30 – Aug. 3, 2006.
4. McGuire S, Zhou S, Marks L, Dewhirst M, Yin F, and Das S. Optimizing the Methodology for Incorporating SPECT-Guidance to Reduce Intensity Modulated Radiation Therapy (IMRT) Dose to Functioning Lung. AAPM 49th Annual Meeting. Minneapolis, MN. July 22 – July 26, 2007
5. McGuire S. Functional Image Guided Radiotherapy for Thoracic Targets Using SPECT. ISTRO Annual Radiation Oncology Conference. Mercy Hospital, Iowa City, IA. August 16, 2008.
6. McGuire S. FLT PET for Tumor Response Assessment and Bone Marrow Sparing in RT. ISTRO Annual Radiation Oncology Conference. University of Iowa, Iowa City, IA. September 18, 2010.

Poster Presentations

1. McGuire S, Zhang X, Dewhirst M, and Yuan F. A new technique for measurement of distribution volume of color molecules in solid tumors. BMES Annual Meeting. Seattle, WA October 12 – 14, 2000.
2. McGuire S and Yuan F. Quantitative analysis and finite element modeling of intratumoral infusion of color molecules. The Whitaker Foundation Biomedical Engineering Research Conference. La Jolla, CA. August 8 – 11, 2002.
3. McGuire S and Yuan F. Effects of ECA and mannitol on macromolecule penetration and accumulation in rat fibrosarcoma. The ASME Summer Bioengineering Conference. Key Biscayne, FL. June 26 – 29, 2003.
4. McGuire S, Zhou S, Marks L, Dewhirst M, Yin F, and Das S. Using SPECT-guidance To Reduce Intensity Modulated Radiation Therapy (IMRT) Dose To

Functioning Lung. ASTRO Annual Meeting. Philadelphia, PA. November 5 – 9, 2006.

5. McGuire S, Zhou S, Marks L, Yin F, and Das S. Optimal beam selection to enhance SPECT-guided reduction of IMRT dose to functioning lung. ASTRO Annual Meeting. Poster Discussion. Los Angeles, CA. October 28 – November 1, 2007.
6. McGuire S, Byland K, Bayouth J. A patient specific method for identifying the threshold SUV for FDG-PET tumor delineation for radiation therapy in head and neck cancers. ASTRO Annual Meeting. Boston, MA . September 21 – 25, 2008.
7. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Malik J, Bayouth J. Using [18F]FLT-PET Imaging in IMRT Planning to Avoid Pelvic Bone Marrow for Cervical Cancer Patients. ESTRO Molecular Imaging in Radiation Oncology. Brussels, Belgium. March 18 – 20, 2010.
8. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Bayouth J. FLT PET Imaging for Weekly Evaluation of Bone Marrow Compensatory Response to Chemoradiation Therapy in Cervical Cancer Patients. Cancer Imaging and Radiation Therapy Symposium. Atlanta, Georgia. April 29 – 30, 2011.
9. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Bayouth J. FLT PET Imaging for Weekly Evaluation of Bone Marrow Response to Chemoradiation Therapy in Cervical Cancer Patients. 11th Biennial ESTRO. London, United Kingdom. May 8 – 12, 2011.
10. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Bayouth J. FLT PET Imaging for Evaluating Bone Marrow Recovery after Chemoradiation Therapy in Cervical Cancer Patients. 2011 Joint AAPM/COMP Meeting. Vancouver, BC, Canada. July 31 – August 4, 2011.
11. McGuire S, Jacobson G, Menda Y, Ponto L, Gross B, Bayouth J. F-18 Fluorothymidine (FLT) PET Imaging for Weekly Evaluation of Tumor Response to Chemoradiation Therapy in Patients with Cervical Cancer. ASTRO Annual Meeting. Miami Beach, FL. October 2 – 6, 2011.

F. Pending Decisions

1. McGuire S and Yuan F. Effects of cell shrinking and killing on macromolecule transport in tumor tissues. *Nanomedicine: Nanotechnology, Biology and Medicine*. *Submitted May 31, 2011*.

IV. SERVICE

A. Memberships in Professional Organizations

American Association of Physicists in Medicine
American College of Medical Physics
American Society for Therapeutic Radiology and Oncology
Biomedical Engineering Society
European Society for Therapeutic Radiology and Oncology
Tau Beta Pi Engineering Honor Society
Alpha Eta Mu Beta Biomedical Engineering Honor Society
Biomedical Engineering Society
Institute of Electrical and Electronic Engineers

B. Committees

Radiation Oncology IT Candidate Selection Committee
Medical Physics Residency Admissions Committee
Medical Physics Curriculum Committee

C. Papers Reviewed

1. St-Hilaire J, Lavoie C, Dagnault A, Beaulieu F, Morin F, Beaulieu L, Tremblay D. Functional avoidance of lung in plan optimization with an aperture-based inverse planning system. *Radiotherapy and Oncology*. 100: 390-395, 2011. Reviewed April 27, 2011.