COLLEGE OF MEDICINE CURRICULUM VITAE

Yusung Kim, PhD

October 5, 2010

I. EDUCATIONAL AND PROFESSIONAL HISTORY

A. List of Institutions Attended:

Higher Education

1997 Hanyang University, B.Sc in Nuclear Engineering, Korea (*magna cum laude*)

2005 University of Wisconsin, Madison, M.Sc in Medical Physics

2007 University of Wisconsin, Madison, Ph.D in Medical Physics

Board Certification

2005 American Board of Radiology (ABR)-Therapeutic Physics in Part I

B. Professional and academic positions held:

2003-2007 Research Assistant, Departments of Human (Radiation) Oncology and Medical Physics, University of Wisconsin, Madison, WI, U.S.A.

2007 - Present **Assistant Professor**, Dept of Radiation Oncology, University of Iowa, Iowa City, IA, U.S.A.

C. Honors, Awards, Recognitions, Outstanding Achievements (least to most recent)

1992-1996 Dept. of Nuclear Engineering Scholarship (6/8 semesters), Hanyang University, Rep. of Korea (South)

1997 B.Sc Degree with the Presidential Honor, Hanyang University, Rep. of Korea (South)

1999 Distinguished Graduate (the Chief of Staff of the Korea Army (Four-Star General) Honor), Chemical, Biological, Radiological, and Nuclear (CBRN) Specialty School, Korea (South) Army.

2003 National Scholarship for Study Abroad, Korean Government (Ministry of Science and Technology)

2007 **John R. Cameron Young Investigator Award Top 10 Finalists in AAPM**

II. TEACHING

A. Teaching assignments on semester by semester basis

Year	Clinical Teaching	hrs/year
2007-present	Case conference	50

2007-*present*	Brachytherapy (BT) Treatment Planning System (TPS) quality assurance (QA) and Treatment Planning	120
2007-*present*	Imaging of Brachytherapy (C-arm imaging / CT / MRI guided BT) – simulation, verification, and quality assurance	50
2007-*present*	Linear accelerator: QA (annual & monthly)	70

Year	Classroom, Seminar, or Teaching Lab	Hours
2007-*present*	Medical Physics (77:211: Graduate Level): 2 lectures	2
2010-present	RTT Medical Physics (Undergraduate Level): 2 lectures	3

B. Students supervised

PhD Dissertation Committees

Xin Dou 2007- 2009
New Algorithms for Target Delineation and Radiation Delivery in Intensity-Modulated Radiation Therapy

Medical Physics Residency Mentorship

Hemant Shukla, M.S.	2007-2008	University of Iowa Hospitals & Clinics
Earl Nixon, M.S.	2007-2008	University of Iowa Hospitals & Clinics
William Kearney, PhD	2007-present	University of Iowa Hospitals & Clinics
Xiaofei Ying, M.S.	2008-2010	University of Iowa Hospitals & Clinics
Vibha Chaswal, PhD	2008-2010	University of Iowa Hospitals & Clinics
Junyi Xia, PhD	2008-present	University of Iowa Hospitals & Clinics
Yunfei Huang, PhD	2010-present	University of Iowa Hospitals & Clinics
Daniel Hyer, PhD	2010-present	University of Iowa Hospitals & Clinics

Students Supervised

William Monroe: MS student in Dept. of Electrical & Computer Engineering, Univ. of IOWA: "*Ventilation Sub-Lung Research Project Mentoring*". 2007 - 2009

Xin Dou: Ph.D student in Dept. of Electrical & Computer Engineering, Univ. of IOWA: "*Optimal Field Splitting IN IMRT*". 2008 – 2009

Post-doctoral Scholar Supervised

Jong Uk Kim, Ph.D.: Post-doctoral research scholar, Center for Pioneering Medical-Physics Research (CPMR), Korea Electro-technology Research Institute: "Intensity Modulated Brachytherapy". 2010

C. Other contributions to institutional programs

Year	Contribution	hrs/year
2007-present	Radiation Oncology Case conference	30
2007-present	Medical Physics Journal Club	10

III. SCHOLARSHIP

A. Publications or creative works (least to most recent)

Peer reviewed publications

1. **Kim Y**, Tomé WA. Risk-adaptive optimization: selective boosting of high-risk tumor subvolumes. *Int J Radiat Oncol Biol Phys* 2006;66(5):1528-1542.

2. **Kim Y**, Tomé WA, Bal M, McNutt TR, Spies L. The impact of dental metal artifacts on head and neck IMRT dose distributions. *Radiother Oncol* 2006;79(2):198-202.
   ****Selected as the Cover Figure Paper in Radiotherapy and Oncology Volume 79(2) 2006***

3. **Kim Y**, Tomé WA. The impact of metal artifacts on IMRT dose distributions in TCP and NTCP. *Proceedings of IOMP-International Organization for Medical Physics*, 2006;2:1635-1638

4. **Kim Y**, Tomé WA. On the radiobiological impact of metal artifacts in head-and-neck IMRT in terms of tumor control probability (TCP) and normal tissue complication probability (NTCP). *Medical & Biological Engineering & Computing* 2007;45:1045-1051.

5. **Kim Y**, Tomé WA. The impact of function imaging accuracy (sensitivity and specificity) for high-risk tumor subvolumes on a selective boosting IMRT. *Physica Medica* 2009;25-12-24.

6. **Kim Y**, Tomé WA. Is it beneficial to selectively boost high-risk tumor subvolumes? A comparison of selectively boosting high-risk tumor subvolumes versus homogeneous dose escalation of the entire tumor based on equivalent EUD plans. *Acta Oncologica* 2008;47(5):906-916.

7. **Kim Y**, Tomé WA. On Voxel Based Iso-Tumor-Control Probability and Iso-Complication Maps for Selective Boosting and Selective Avoidance Intensity-Modulated Radiotherapy. *Imaging Decisions MRI* 2008; 12(1):42-50

8. **Kim Y**, Tomé WA. Dose Painting IMRT Optimization using Biological Parameters. *Acta Oncologica* (**Invited Review Paper**: On-line published 2010 July)

9. **Kim Y**, Muruganandham M, Modrick JM, Bayouth JE. Evaluation of Artifacts of Titanium Applicators on 3 Tesla MRI for MRI Guided Brachytherapy of Women's Gynecological Cancer. *Int J Radiat Oncol Biol Phys* (Accepted)

10. Dou, X, **Kim Y**, Bayouth JE, Buatti, JM, Wu X. Orthogonal Delivery to Improve MU Efficiency for Intensity-Modulated Radiation Therapy. *Int J Radiat Oncol Biol Phys* (Review-process 2010 July)
    - Contributed analysis of Pinnacle plan experiments and results through weekly research-collaboration meeting

11. Dou, X, **Kim Y**, Bayouth JE, Buatti, JM, Wu X. Optimal Field Splitting in IMRT. *Journal of Applied Clinical Medical Physics* (Submitted 2010 July)
    - Corresponding author: wrote 80% manuscript and co-generated figures

Published Abstracts

1. **Kim Y**, Tomé WA, Bali M, McNutt T, Spies L. Dosimetric impact of dental metal artifact present in head and neck CT data sets on IMRT dose distributions, *Radiother Oncol* 2005;76:S177.
2. Ehler E, **Kim Y**, Arvison N, Nelms B, Tomé WA. On the dose delivered to a moving target when employing different IMRT delivery mechanisms. *Med Phys*, 2006;33(6):2296
3. Tomé WA, Ehler E, **Kim Y**, Arvison N, Nelms B. On the variation of dose delivered to a target undergoing respiration when using different IMRT delivery methods. *Radiother Oncol*, 2006;81(Supp 1):S45.
4. **Kim Y**, Tomé WA. On the Impact of Functional Imaging Accuracy (Sensitivity and Specificity) on Selective Boosting IMRT. *Med Phys*, 2007;34(6):2507.
5. **Kim Y**, Risk-Adaptive Radiotherapy (Ph.D Abstracts) *Med Phys*, 2007 (e-published).
6. **Kim Y**, Tomé WA. Is theragnostic image-guided, selective boosting IMRT more effective than "agnostic" boosting IMRT?: A comparison based on equivalent EUD plans. *Radiother Oncol*, 2007;84(Supp 1):S192.
7. Nixon E, **Kim Y**, Kearney WR, Modrick JM, Jacobson GM, Bhatia SK, Bayouth JE. HDR Brachytherapy Tandem and Ovoid Titanium Applicator Safety Assessment in 3T MRI. *The first World Congress of Brachytherapy (ABS and GEC-ESTRO) 2008 Conference*. Brachytherapy, 2008;7(2):135.
8. Olson A, Bhatia SK, Jacobson GM, Modrick JM, **Kim Y**, Siochi RAC. High Dose Rate Brachytherapy for Carcinoma of the Uterine Cervix: A comparison of Fractionation Schemes and Development of Acute Toxicity. *The first World Congress of Brachytherapy (ABS and GEC-ESTRO) 2008 Conference*. Brachytherapy, 2008;7(2):154.
    a. Contributed biological modeling (BED) and its calculations.

9. Xin D, Wu X, **Kim Y**, Bayouth JE, Buatti, JM. Optimal Field Splitting in IMRT. *Med Phys* 2008;35:2749.
    a. Contributed data-collecting and –analysis.
10. **Kim Y**, Nixon E, Modrick JM, Bhatia SK, Jacobson GM. On the Radiobiologic Implications for Intracavitary HDR Brachytherapy of Cervical Carcinoma: Based on 3D CT Images and GYN GEC-ESTRO Recommendations. *The first World Congress of Brachytherapy (ABS and GEC-ESTRO) 2008 Conference* Brachytherapy, 2008;7(2):168.
11. **Kim Y,** Muruganandham M, Bayouth JE , Modrick JM , Bhatia SK, Jacobson G. Evaluation of 3 Tesla MR Image Distortion and Artifacts in a Titanium Applicator Presence: Toward 3T MRI Guided HDR Brachytherapy for Cervical Cancer. *Med Phys* 2008;35(6):2970.
12. **Kim Y,** Modrick J, Bayouth J, Pennington E, Bhatia S, Jacobson G. Is a Volume-Based HDR Brachytherapy Optimization Algorithm Comparable to a Classic Line-Based One?: Toward Tumor-Volume Adaptive Brachytherapy for Cervical Cancer By 3T MRI Guidance. AAPM 2008, Medical Physics, 2008;35(6):2727.
13. **Kim Y,** Huang Y, Bayouth JE, Flynn RT, Bhatia SK, Jacobson GM, Modrick JM. Dosimetric Consequences of the Prescription Point H of ABS Recommendation in the Era of MRI Guided Brachytherapy For Cervical Cancer: Based On GYN GEC-ESTRO Recommendations Of MRI Guided Brachytherapy. *Int J Radiat Oncol Biol Phys* 2008;72(1):S586-587.
    a. Preparing a manuscript: on process (since Dec 2008)
14. Monroe W, **Kim Y**, Christensen G, Wu X, Bayouth J, Bhatia S, McGuire S, Siochi R, Waldron T. Using Small-Deformation Linear-Elastic Registration to Quantifying Ventilation-Competent Lung Imaging from Clinical 4DCT Datasets: Toward Selective Avoidance IMRT for Locally Advanced Non-Small-Cell Lung Cancer. *Med Phys* 2008;35:2724.
    a. Contributed as a primary advisor in Rad. Onc dept. collaborating with Dr. Wu, X. in ECE dept.
15. Sun W, **Kim Y**, Bhatia SK, Bayouth JE, Bett V, Pelland D, Jacobson GM. Simultaneous Boosting for Pelvic Lymph Nodes and Organ Sparing by Selective Avoidance IMRT for Cervical Cancer. *Int J Radiat Oncol Biol Phys* 2008;72(1):S587.
    a. Contributed as a primary advisor on this project
16. Siochi R, **Kim Y**, Bhatia S. Tumor Control Probability (TCP) Reduction in Phase Gated RT Treatments of Non-Small-Cell Lung Cancer (NSCLC) Tumors with Motion in Excess of Planned Motion. *Int J Radiat Oncol Biol Phys* 2008;72(1):S49.
    a. Contributed biological (TCP) modeling and its calculations
17. Q. Song, Y. Yin, M. Chen, **Y Kim**, Bayouth J., J. Buatti. Simultaneous Segmentation of Bladder and Prostate using Globally Optimal 3-D Graph Search Method. *Int J Radiat Oncol Biol Phys* 2008;72(1):S148.
18. Monroe W, **Kim Y**, Siochi R, Wu X, Quantification of Ventilation Imaging From Clinical 4DCT Datasets for Selective Avoidance IMRT in Non-Small Cell Lung Cancer. *Med Phys* 2009;36:2516.
    a. Contributed as a primary advisor in Rad. Onc dept. collaborating with Dr. Wu, X. in ECE dept.
19. **Kim Y**, Modrick JM, Bayouth JE, Bhatia KS, Jacobson GM. Logistics of Tandem and Ovoids HDR Plan Optimization in MRI-Guided Brachytherapy for Cervical Cancer: Comparisons of

Standard, Graphical, and Inverse Optimization. Brachytherapy, 2009;8(2):121-122.

20. **Kim Y**, Muruganandham M, Bayouth JE, Waldron TJ, Modrick JM , Bhatia SK, Jacobson GM. Feasibility of Source Markers for a Titanium Tandem and Ovoids Applicator in MRI Guided Brachytherapy: Implications on Source Reconstruction on 3 Tesla MR Images. Brachytherapy, 2009;8(2):121.
21. **Kim Y**, Xia J. On the Dosimetric Impact of Dose Sculpting Optimization in High Resolution (3.0 Tesla) MRI-Guided HDR Brachytehrapy for GYN Cancer: When are the Benefits Maximized? Medical Physics (Accepted. AAPM 2010).
22. **Kim Y**, Xia J., Sun W., Bhatia SK, Jacobson GM. Tandem and Ovoids Brachytherapy for Cervical Cancer When Evaluated by High Resolution (3.0 Tesla) MRI. Medical Physics (Accepted. AAPM 2010).
23. Huang Y**, Kim Y**. On the Impact of Prescription Point A on HR-CTV in MRI-Guided HDR Brachytherapy for Cervical Cancer. *Int J Radiat Oncol Biol Phys* (Accepted. ASTRO 2010).
24. **Kim Y**, Sun W, Bhatia SK, Jacobson GM. The Changes of Target Volumes between External Beam Radiotherapy and Brachytherapy and between Each Fraction of MRI-Guided Brachytherapy for GYN Cancer *Int J Radiat Oncol Biol Phys* (Accepted. ASTRO 2010).

Book Chapters

1. **Kim Y**, Tomé WA. Optimization of Radiotherapy Using Biological Parameters. In: Bentzen S, Mehta M, Harari P, Tome, W. Editors. Radiation Oncology Advances: New York: Springer: 2007. p257-278.

B. Areas of Research Interest and Current Projects

Research Interest

- Biomathematical modeling of Cancer Treatments (Tumor Control Probability, Normal Tissue Complication Probability (NTCP), and uncomplicated tumor control probability (UTCP) modeling
- Physiological Image Guided IMRT (Intensity Modulated Radiotherapy): Dose painting for high-risk (per tumor recurrence) tumor subvolume and Selective avoidance of functional subvolumes in the normal tissue
- Developing Novel Therapeutic Modality in Radiotherapy via Integrating Adaptive IGRT and Image-Guided HDR brachytherapy

C. Published reviews of scholarship

None

D. Grants received

As principal investigator (PI)

Improving Dosimetric Tumor Coverage and Normal Tissue Sparing in Titanium Brachytherapy for Women's GYN Cancer Using a High Resolution 3 Tesla MR Image

and a Hybrid Inverse-Optimization
Source: Varian Medical System, Charlottesville, VA, USA
Co-Investigators: Joseph M. Modrick and Manickam Muruganandham
Total Funds: $124,160.42 Period of Funding: 1.5 years (Approved)

Hardware and Software: Collaboration of Testing a New BrachyVision TPS v8.5
Source: Varian Medical System, Charlottesville, VA, USA
Direct Funds: $36,000 Period of Funding: 2008

As Co-principal investigator (Co-PI)

Intensity modulated brachytherapy for the treatment of cervical caner
Source: ACS (American Cancer Society
P.I: Ryan T. Flynn, Ph.D / Co-P.I.: Xiaodong Wu, Ph.D. Geraldine Jacobson, M.D.
Total Funds: $30,000 Period of Funding: 1.0 years (Aug 2010 – July 2011)

E. Invited Lectures, Conference Presentations, Visiting Professorships

1. Biological Impact of Metal Artifacts on TCP and NTCP for Head-and-Neck Cancer. *World Congress on Medical Physics and Biomedical Engineering.* **Oral Presentation**, Seoul, Korea (2006)

2. Risk-Adaptive Radiotherapy for Prostate Cancer. ***Invited Seminar***, Department of Radiation Oncology, Samsung Medical Center, Sungkyunkwan University, Seoul, Korea (South) (2006)

3. Risk-Adaptive Radiotherapy. *Medical Physics Department Seminar Series,* **Seminar Talk**, Department of Medical Physics, University of Wisconsin, Madison, WI., U.S.A. (2007)

4. The Impact of Functional Imaging Accuracy on Selective Boosting IMRT. ***John R. Cameron Young Investigator Final Competition Talk*** *in AAPM* 2007, MN, USA. (2007)

5. Risk-Adaptive Radiotherapy using Functional Imaging Modalities. *Iowa Biomedical Imaging Institute Seminar* 2007, **Seminar Talk**, University of Iowa, Iowa City, IA, USA

6. On the Integrating Radiobiologic Information into Radiotherapy: Is it Beneficial? How much. *Translational Research Meeting Seminar,* **Seminar Talk**, University of IOWA 2008, IA, USA

7. HDR Brachytherapy Tandem and Ovoid Titanium Applicator Safety Assessment in 3T MRI. ***Moderate Poster Talk and Discussion****, the first World Congress of Brachytherapy (ABS and GEC-ESTRO)* 2008, Boston, USA.

8. Evaluation of 3 Tesla MR Image Distortion and Artifacts in a Titanium Applicator Presence. *AAPM* 2008, **Oral Presentation**, TX, USA. (2008)

9. Logistics of Tandem and Ovoids HDR Plan Optimization in MRI-Guided Brachytherapy for Cervical Cancer: Comparisons of Standard, Graphical, and Inverse Optimization. *ABS 2009,* **Oral Presentation**, Toronto, Canada

10. Feasibility of Source Markers for a Titanium Tandem and Ovoids Applicator in MRI Guided Brachytherapy: Implications on Source Reconstruction on 3 Tesla MR Images. *ABS 2009*, **Oral Presentation**, Toronto, Canada

11. Dose Painting IMRT using Biological Optimization. *KMPA (Korean Med Phys Association) Spring Conference 2009*, **Invited Speaker**, Kangneung, Korea (South).

12. MRI guided HDR utilizing Titanium Applicators and 3.0 Tesla MR: The Experience of University of Iowa. *Varian User Symposium in ABS 2009* **Invited Speaker**, Toronto, Canada.

13. MRI Guided Brachytherapy for Women's GYN Cancer. ***Invited Seminars***, Department of Radiation Oncology, Samsung Medical Center, Sungkyunkwan University / ASAN Medical Center, University of Ulsan, Seoul, Korea (South) (2009)

14. Functional Imaging Guided Radiotherapy. ***Invited Lecture Seminar***, Department of Radiological Science, Yunsei University, Wonju / Department of Nuclear Engineering, Hanyang University, Seoul, Korea (South) (2009).

F. Pending decisions (grant proposals, book contracts)

As principal investigator (PI)

As Co-Investigator

IV. SERVICE

A. Memberships in Professional Organizations

- Jan 2004 – present American Association of Physicists in Medicine (AAPM): Full member
- Jan 2004 – present Radiological Society of North America (RSNA): Full member
- Jan 2008 – present American Society of Therapeutic Radiation Oncology (ASTRO): Associate member
- Jan 2008 – present European Society for Therapeutic Radiology and Oncology (ESTRO): Associate member
- Mar 2008 – present the American Brachytherapy Society (ABS): Full member
- Jan 2008 – present Korean Society for Therapeutic Radiology and Oncology (KSTRO): Full member
- Aug 2007 – present Korean Medical Physics Association (KMPA): Full member
- Aug 2007 – present Korean Association of Medical Physics in North America (KAMPINA): Full member

B. Journal refereeing of manuscripts

- Radiotherapy and Oncology (3)
- Medical Physics (1)
- Brachytherapy (2)
- Medical Dosimetry (2)

C. Committees

- 2008 Carver College of Medicine (UI) Admissions Interviewer
- 2007 – Present Medical Physics Residency Admissions Committee (UIHC)
- 2007 – Present Medical Physics Curriculum Committee (UIHC)

D. Clinical assignments since last promotion (if applicable)

- HDR Brachytherapy Physics support as a Co-Captain
- Implementing '3Tesla' MRI Guided HDR (completed) / Initiating clinical protocol of MRI Guided HDR (on-process)
- Quality control of treatment planning systems: performed a dosimetry-only-physics (DOP) support
- Daily physics support (Physics of Day: POD) for linear accelerators
- Quality control of linear accelerators: Monthly QA for Siemens machine (Univ. of Iowa Hospital and Clinics) and Varian machine (Mercy Hospital Radiation Oncology Dept in Clinton, Iowa)
- LDR Prostate Seeds Implant (PSI) Physics support