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EDUCATION AND TRAINING

- 2009 – present Postdoctoral Fellowship. Chemical & Biological Engineering, Molecular Biology, Princeton University
- 2007 – 2009 Postdoctoral Fellowship. Institutes for Cell Engineering and Genetic Medicine, Johns Hopkins University School of Medicine
- 2002 – 2007 Ph.D. Cell and Molecular Biology, Michigan State University
- 1998 – 2000 M.Sc. Life Science and Biotechnology, Korea University, Seoul, Korea
- 1994 – 1997 B.Sc. Life Science and Biotechnology, Korea University, Seoul, Korea

RESEARCH EXPERIENCE

- 2009 – present **Postdoctoral Research Associate**, Laboratory of Celeste M. Nelson, Ph.D. Departments of Molecular Biology and Chemical & Biological Engineering Princeton University, NJ
- Epithelial-mesenchymal transition (EMT) during mammary epithelial branching morphogenesis and invasion
 - The role of mechanical properties of the extracellular matrix (ECM) in regulating EMT
 - Regulating mammary stem cells fate by matrix compliance
 - Characterize anti-cancer activity of engineered nanoparticles and protein peptides
 - The functional interactions between hypoxia and the ECM mechanics in cancer
- 2007 – 2009 **Postdoctoral Fellow**, Laboratory of Gregg L. Semenza, MD/Ph.D. Vascular Program in Institute for Cell Engineering and McKusick–Nathans Institute of Genetic Medicine, Johns Hopkins University, Baltimore, MD
- Evaluate inhibitors of hypoxia-inducible factor (HIF) as anticancer agents
 - The effect of HIF1-activated bone marrow angiogenic cells on limb ischemia
- 2003 – 2007 **Graduate Research Assistant**, Laboratory of John J. LaPres, Ph.D. Cell & Molecular Biology Program and Department of Biochemistry & Molecular Biology, Michigan State University, MI
- The hypoxia signaling pathways and tumorigenesis
 - Proteomic analysis of aryl hydrocarbon receptor (AhR) interacting proteins
- 2000 – 2002 **Research Scientist**, Laboratory of Sang-Chul Park, Ph.D. Cancer Research Institute, Seoul National University Hospital, Seoul, Korea
- Aging-related apoptotic response and MAPKs signaling to genotoxic stress
- 1998 – 2000 **Graduate Research Assistant**, Laboratory of Zin-Soo Kim, Ph.D. Division of Life Science and Biotechnology, Korea University, Seoul, Korea
- The genomic variation of natural population in *Pinus koreanasis*
- 1997 – 1998 **Research Scientist**, Laboratory of Yong-pyo Hong, Ph.D. Division of Molecular Genetics Agriculture Research Institute, Suwon, Korea
- The genomic variation of *Ginkgo biloba*

TEACHING EXPERIENCE

- 09/2004 – 12/2004 Graduate Teaching Assistant, Experiment in Molecular Biology (Biochem. 472) Michigan State University
- 08/1999 – 12/1999 Instructor, Statistics in Biology, Korea University
- 08/1999 – 12/1999 Graduate Teaching Assistant, Molecular Population Genetics, Korea University
- 08/1998 – 12/1998 Graduate Teaching Assistant, Molecular Population Genetics, Korea University

FELLOWSHIPS and AWARDS

- 2008 – 2009 Foundations for Advanced Research in the Medical Sciences Research Fellowship KangAe Lee (Principle Investigator), “Developing of high-throughput HIF1 dimerization assay to screen small molecular inhibitors of HIF1 signaling for cancer therapy”
- 2007 Dissertation Completion Fellowship, Michigan State University, MI
- 2002 – 2003 Van Andel Research Institute Fellowship
- 1994– 1997 Academic Scholarships, Korea University, Seoul, Korea

PUBLICATIONS

23. Zhang SY*, **Lee K**, Nelson CM, Link J. (2012) Affinity Maturation of a Minimal Bim BH3 Peptide: Engineering of Potent Cytotoxic Stapled Peptides.(in review)
22. Boghaert E, Gleghorn JP, **Lee K**, Radisky DC, Nelson CM. Host epithelial geometry regulates breast cancer invasiveness. (in review)
21. **Lee K**, Chen Q, Lui C, Cichon MA, Radisky DC, Nelson CM. (2012) Matrix compliance control epithelial plasticity by regulating Rac1b localization, NADPH oxidase assembly, and EMT. (in revision)
20. Chung J, **Lee K**, Neikirk C, Zhang C, Nelson CM, Priestley RD. (2012) Photo-responsive coumarin-stabilized polymeric nanoparticles as a sensible drug carrier. *Small*.8:1693-700.
19. Lui C, **Lee K**, Nelson CM. (2012) Matrix compliance and RhoA direct differentiation of mammary progenitor cells. *Biomech. Model Mechanobiol.* (E-publication ahead of print, December, 2011)
18. **Lee K**, Nelson CM. (2012) New insight into the regulation of epithelial-mesenchymal transition and tissue fibrosis. *Int. Rev. Cell Mol. Bio.* 294:169-219.
17. **Lee, K**, Gjorevski, N, Boghaert, E, Radisky, DC, Nelson, CM. (2011) Snail, Slug, and E47 mammary epithelial branching morphogenesis. *EMBO J.* 30(13);2662-2674
(highlighted in *Mammary Cell News*; article introduced by *BRIC* for “The best Korean Scientist”)
16. Tappenden DM, Lynn SG, Crawford RB, **Lee K**, Vengellur A, Kaminski NE, Thomas RS, LaPres JJ. (2011) The Aryl Hydrocarbon Receptor interacts with ATP5 α 1, a subunit of the ATP synthase complex, and modulates mitochondrial function. *Toxicol. Appl. Pharm.* 254(3);299-310
15. Guan Y, Reddy KR, Zhu Q, Li Y, **Lee K**, Weerasinghe P, Prchal J, Semenza GL, Jing N. (2010) G-rich oligonucleotides inhibit HIF1 α and HIF2 α and block tumor growth. *Mol. Ther.* 18(1);188-197
14. **Lee K**, Zhang H, Qian DZ, Rey S, Lui JO, Semenza GL. (2009) Acriflavine inhibits HIF1 dimerization, tumor growth, and vascularization. *Proc. Natl. Acad. Sci. U.S.A.* 106 (42);17910-

13. Rey S, **Lee K**, Wang JC, Gupta K, Chen S, McMillan A, Bhise N, LevchenkoA, Semenza GL. (2009) Synergistic effect of HIF-1 α gene therapy and HIF-1-activated bone marrow angiogenic cells in a mouse model of limb ischemia. *Proc. Natl. Acad. Sci. U.S.A.* 106 (48);20399-20404
12. **Lee K**, Qian DZ, Rey S, Wei H, Liu JO, Semenza GL. (2009) Anthracycline chemotherapy inhibits HIF-1 transcriptional activity and tumor-induced mobilization of bone marrow-derived cells. *Proc. Natl. Acad. Sci. U.S.A.* 106(7);2353-2358
(highlighted in *Journal of the National Cancer Institute News* (2009) 101;368-370)
11. **Lee K**, Lynd JD, O'Reilly S, Kiupel M, McCormick JJ, LaPres JJ. (2008) The biphasic role of the Hypoxia-Inducible Factor Prolyl-4-Hydroxylase, PHD2, in modulating tumor-forming potential. *Mol. Cancer Res.* 6(5);829-842
10. Zhang H, Qian DZ, Tan YS, **Lee K**, Gao P, Ren YR, Rey S, Hammers H, Chang D, Pili R, Dang CV, Liu JO, Semenza GL. (2008) Digoxin and other cardiac glycosides inhibit HIF-1 α synthesis and block tumor growth. *Proc. Natl. Acad. Sci. U.S.A.* 105(50);19579-19586.
9. **Lee K**, Roth RA, LaPres JJ. (2007) Hypoxia, drug therapy and toxicity. *Pharm. Ther.* 113;229-246
8. **Lee K**, Burgoon LD, Lamb L, Dere E, Zacharewski TR, Hogenesch JB, LaPres, JJ. (2006) Identification and characterization of genes susceptible to transcriptional cross-talk between the hypoxia and dioxin signaling cascades. *Chem. Res. Toxicol.* 19;1248-1293.
7. Hirsch HA, Jawdekar GW, **Lee K**, Gu L, Henry RW. (2004) Distinct mechanisms for repression of RNA polymerase III transcription by the retinoblastoma tumor suppressor protein. *Mol. Cell. Biol.* 21;5989-5999.
6. Suh Y, **Lee K**, Kim W, Han B, Vijg J, Park S. (2002) Aging alters the apoptotic response to genotoxic stress. *Nat. Med.* 8;3-4.
5. Park S, **Lee K**, Suh Y. (2001) Cellular responses to alkylating agents: Implication for cancer and aging. *Mutat. Res.* 483;24-28.
4. Suh Yousin, **Kang-Ae Lee**, and Sang Chul Park. (2001) Differential activation of mitogen-activated protein kinases by methylmethanesulfonate (MMS) in the kidney of young and old rats. *Exp.Mol.Med.*33; 7-9.
3. Suh Yousin, **Kang-Ae Lee**, Woo-Ho Kim, Bok-Ghee Han, Jan Vijg, and Sang Chul Park. (2001) Aging alters the apoptotic response to genotoxic Stress. *Exp. Mol. Med.* 33; 9-10.
2. Suh Yousin, **Kang-Ae Lee**, and Sang Chul Park. (2001) Age-specific changes in expression, activity, and activation of the c-jun NH2-terminal kinase and p38 mitogen-activated protein kinases by methylmethanesulfonate (MMS) in Rats. *Exp. Mol. Med.* 34; 11-13.
1. **Lee K**, Suh Y. (2000) Aging-related expression profiling using tissue array. In: The 1st Tissue array workshop. Lee, W (ed) Vol 1. pp 151-168. Academy Press.

CONFERENCE PROCEEDINGS AND PRESENTATIONS

22. **Lee K**, Chen Q, Lui C, Cichon M, Radisky DC, Nelson CM. Matrix compliance regulates epithelial-mesenchymal transition. December 2011. American Society of Cell Biology. Denver, CO (Invited presentation)
21. **Lee K**, Gjorevski N, Lui C, Nelson CM. Tissue tension controls spatially patterned invasion of mammary epithelial tissue by regulating EMT. December 2011. American Society of Cell Biology. Denver, CO (Poster)
20. **Lee K**, Chen Q, Lui C, Radisky DC, Nelson CM. Mechanical properties of the microenvironment regulate epithelial-mesenchymal transition. October 2011. American Institute of Chemical Engineers. Minneapolis, MN (Podium presentation)
19. **Lee K**, Chen Q, Lui C, Radisky DC, Nelson CM. Matrix compliance regulates epithelial-mesenchymal transition. October 2011. Biomedical Engineering Society. Hartford, CT (Poster)
18. **Lee K**, Nelson CM. Regulation of epithelial-mesenchymal transition by mechanical signals from the microenvironment. April 2011. The Biology of Cancer: Microenvironment, Metastasis & Therapeutics. Cold Spring Harbor, NY. (Poster)
17. **Lee K**, Nelson CM. EMT-related transcription factors promote spatially patterned invasion of mammary epithelial tissue. February 2011. Clinical & Experimental Metastasis. 28(2); 181. GZ Dordrecht, Netherland. (Invited presentation)
16. **Lee K**, Nelson CM. E-box-binding Transcription factors promote branching morphogenesis of mammary epithelial tissues. December 2010. American Society for Cell Biology. Philadelphia, PA. (Poster)
15. **Lee K**, Nelson CM. Defining the gene expression changes required for morphogenesis of engineered tissues. October 2010. Biomedical Engineering Society. Austin, TX (Podium presentation)
14. **Lee K**, Nelson CM. EMT-related transcription factors promote spatially patterned invasion of mammary epithelial tissues. September 2010. AACR Metastasis and Tumor microenvironment. Philadelphia, PA. (Poster)
13. **Lee K**, O'Reilly S, McCormick JJ, LaPres JJ. The biphasic role of prolyl hydroxylase domain protein 2 (PHD2/EGLN1) in modulating tumor-forming potential. April 2007. America Association for Cancer Research. Los Angeles, CA. (Poster)
12. **Lee K**, LaPres JJ. The effect of altered PHD expression levels on the tumorigenicity of various cell lines. Michigan State University, Cell and Molecular Biology Research Forum. November 2005. (Podium presentation)
11. **Lee K**, LaPres JJ. Identification of proteins capable of interacting with the Aryl Hydrocarbon Receptor (AhR) using Tandem Affinity Purification. August 2005. Biochemistry and Molecular Biology Poster Session. Michigan State University. (Poster)
10. **Lee K**, LaPres JJ. The role of the HIF1 signaling pathway in tumorigenesis. Michigan State University Carcinogenesis Forum. February 2005. (Podium presentation)
9. **Lee K**, LaPres JJ. The role of hypoxia signaling pathway in tumorigenesis. Michigan State

- University Cell and Molecular Biology Research Forum. September 2004. (Podium presentation)
8. **Lee K**, Park S, Suh Y. Differential activation of mitogen-activated protein kinases by methylmethanesulfonate in the kidney of young and old rats. October 2001. The Annual Meeting of the Korea Society for Molecular and Cellular Biology. Seoul, Korea. (Invited presentation)
 7. **Lee K**, Kim W, Han B, Viji J, Park S, Suh Y. Aging alters the apoptotic response to genotoxic stress. October 2000. The Annual Meeting of the Korea Society for Molecular and Cellular Biology. Seoul, Korea. (Invited presentation)
 6. **Lee K**, Park S and Suh Y. Age-specific changes in expression, activity, and activation of the c-jun NH2-terminal kinase and p38 mitogen-activated protein kinases by methylmethanesulfonate (MMS) in rats. August 2000. The Asian Society of Toxicology. Cheju, Korea. (Podium presentation)
 5. Suh Y, **Lee K**, Park S. Cell signaling pathways of genotoxic stress in cancer and aging. In: The 17th Congress of the International Association of Gerontology in the Symposium "Carcinogenesis and aging", Vancouver, Canada, July 2001. (Invited presentation)
 4. Suh Y, **Lee K**, Park S. Cellular responses to alkylating agents: implications for cancer and aging. In: Japan-Korea Cancer Research Symposium; Investigation on the balanced cooperation of cancer cells with the human body, Omiya, Japan, February 2001. (Invited presentation)
 3. **Lee K**, Suh Y. Aging-related expression profiling using tissue array. In: The 1st Tissue Array Workshop 2000, Seoul National University College of Medicine, Seoul, Korea. July 2000. (Invited presentation)
 2. Suh Y, **Lee K**, Park S. Tissue arrays in aging research: cellular responses to genotoxic stress. In: The 2000 Annual Meeting of Gerontology Society of America in the Symposium of "The Blue Sky Technology Revolution and Aging Research", Washington DC, USA, November 2000. (Invited presentation)
 1. Suh Y, **Lee K**, Park S. Cellular responses to alkylating agents: implications for cancer and aging. In: Symposium of The Korean Society for Gerontology-Stress Response and Aging. Bukyung University, Pusan, Korea, August 2000. (Invited presentation)

INVENTIONS AND PATENTS

1. Report of Invention (JHU Ref # C10515): Identification of a class of drugs that blocks tumor growth by blocking the binding of HIF-1 to DNA and method of use. 2008
2. Report of Invention (JHU Ref # 10600): Screen for inhibitors of HIF-1 dimerization. 2009