Ronald Y. Kwon, Ph.D. ***Curriculum Vitae***

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## *Education*

- **Ph.D. Mechanical Engineering**, Stanford University, *05/08*
- **M.S. Mechanical Engineering**, Stanford University, *09/05*
- **B.S. Mechanical Engineering**, University of California Berkeley, *05/02*

## *Academic and Professional Positions*

### *Academic*

- **Acting Research Assistant Professor**, University of Washington, *05/12*
- **Senior Fellow**, University of Washington (Advisor: Ted S. Gross), *01/11-05/12*
- **Postdoctoral Fellow**, La Jolla Bioengineering Institute (Advisor: John A. Frangos), *09/08-12/10*
- **Graduate Research Assistant**, Stanford University, Cell and Molecular Biomechanics Laboratory (Advisor: Christopher R. Jacobs) and Laboratory for Virtual Experiments in Mechanics (Advisor: Adrian J. Lew), *09/03-09/08*
- **Undergraduate Research Assistant**, University of California Berkeley, Orthopaedic Biomechanics Laboratory (Advisor: Tony M. Keaveny), *12/00-05/02*

### *Professional*

- **Nuclear Engineer**, Pearl Harbor Naval Shipyard, Hawaii, *08/02-08/03*
- **Process Engineer**, New United Motors Manufacturing Incorporated, California, *08/01-12/01*

## *Research Funding*

### *Previously Funded Projects*

- **"Osteocyte-independent mechanotransduction of interstitial fluid flow in bone", National Institutes of Health (Bethesda, MD), F32 AR056934 (PI, Total Costs: $92,428)**, 12/08-12/10

## *Honors*

### *Fellowships*

- **National Institutes of Health NRSA Postdoctoral Fellowship**, *12/08-12/10*
- **National Science Foundation Graduate Research Fellowship**, *09/03-09/06*

### *Awards*

- **Young Investigator Award**, American Society for Bone and Mineral Research, *10/10*
- **Young Investigator Award**, International Bone Fluid Flow Workshop, *10/10*
- **Pfizer Inc. Endowed Scholarship,** Marine Biological Laboratory**,** *08/10*
- **Plenary Poster Presentation**, 2009 American Society for Bone and Mineral Research Annual Meeting, *09/09*
- **2nd Place PhD Student Paper Competition**, 2008 ASME Summer Bioengineering Conference, *06/08*

- **Best PhD Student Presentation**, Society for Physical Regulation in Biology and Medicine 25th Annual Scientific Conference, *01/07*
- **Best PhD Student Presentation**, Society for Physical Regulation in Biology and Medicine 23rd Annual Scientific Conference, *01/05*

*Other*

- **Ad Hoc Grant Reviewer**, Health Research Board (Ireland)
- **Ad Hoc Journal Reviewer**, The FASEB Journal, Cell and Molecular Bioengineering, Journal of Biomechanics, Journal of Theoretical Biology, Journal of Biomechanical Engineering, Computer Methods in Biomechanics and Biomedical Engineering
- **Bio-X Travel Award**, Stanford University, *09/08*
- **Travel Award**, Society for Physical Regulation in Biology and Medicine, *01/05-01/07*
- **Undergraduate Research Apprentice Program Fellow**, University of California Berkeley, *09/01-05/02*

## *Training Courses*

- **Zebrafish Development and Genetics**, Marine Biological Laboratory, *08/10*
- **ORS/OREF/AAOS Grant Writing Workshop**, *01/08*

## *Teaching and Mentoring Responsibilities*

*Teaching*

- **Co-Instructor (33%)**, Stanford University (Course: Mechanics of the Cell; Responsibilities: Wrote and administered lectures, course notes, homework, and exams), *09/07-12/07*
- **Guest Lecturer**, Stanford University (Course: Orthopaedic Bioengineering), *10/04*
- **Teaching Assistant**, Stanford University (Course: Mechanics of the Cell; Responsibilities: Administered office hours and study sections, wrote and corrected homework and exams), *03/05-06/05*
- **Teaching Assistant**, Stanford University (Course: Orthopaedic Bioengineering; Administered office hours and study sections, wrote and corrected homework and exams), *09/04-12/04*
- **Tutor**, Stanford University Upward Bound, *09/03-05/04*
- **Tutor**, University of California Berkeley Upward Bound, *01/01-05/02*
- **Tutor**, East Bay Asian Youth Center, *01/00-01/01*
- **Tutor**, Americorps, *09/98-12/98*

*Students Supervised*

- **Leah Downey** (Investigating role of microRNA in muscle paralysis-induced modulation of bone homeostasis), *10/11-current*
- **Jeremiah M. Jones** (Developed tape-based tape transfer system for bone sectioning; currently attending medical school at University of Iowa), *01/09-06/09*
- **Clarence C. Quah** (Performed finite element modeling of lacunar-canalicular fluid flow)**,** *05/07-09/07*
- **Tyler R. Johnston** (Performed imaging of primary cilia; currently attending medical school at Stanford University), *06/06-09/06*
- **Oluwasheyi A. Ayeni**, Stanford Summer Undergraduate Research Experiences (Used image correlation analysis to track cellular deformations), *06/05-09/05*
- **Pablo Abad-Manterola**, Stanford Summer Undergraduate Research Experiences (Developed algorithm for quantifying angular density of cytoskeletal filaments; attended California Institute of Technology for graduate school), *06/05-09/05*

### *Professional Societies*

- **American Society for Bone and Mineral Research**, *04/10-present*
- **Orthopaedic Research Society**, *01/07-present*
- **Society for Physical Regulation in Biology and Medicine**, *01/05-present*

### *Invited Lectures*

- **University of Rochester**, Department of Mechanical Engineering, *03/10*
- **Rensselaer Polytechnic Institute**, Department of Biomedical Engineering, *02/10*
- **Lehigh University**, Department of Mechanical Engineering and Mechanics, *02/10*

### *Bibliography*

*Manuscripts in Refereed Journals*

1. **Kwon RY**, Meays DR, Jones J, Meilan AS, Miramontes R, Kardos N, Yeh JC, and Frangos JA. Skeletal adaptation to intramedullary pressure-induced interstitial fluid flow in bone is enhanced in mice subjected to targeted osteocyte ablation. *PLoS ONE, 2012, 7(3) e33336*.
2. **Kwon RY** and Frangos JA. Quantification of lacunar-canalicular fluid flow through computational modeling of fluorescence recovery after photobleaching. *Cell Mol Bioeng, 2010, 3(3) 296-306*.
3. **Kwon RY**, Temiyasathit S, Tummala P, Quah CC, and Jacobs CR. Primary-cilium dependent mechanosensing is mediated by adenylyl cyclase 6 and cyclic AMP in bone cells. *FASEB J, 2010, 24(8) 2859-2868*.
4. **Kwon RY**, Meays DR, Tang WJ, and Frangos JA. Microfluidic enhancement of intramedullary pressure increases interstitial fluid flow and inhibits bone loss in hindlimb suspended mice. *J Bone Miner Res, 2010, 25(8) 1798-1807*.
5. Arnsdorf EJ, Tummala P, **Kwon RY**, and Jacobs CR. Mechanically induced osteogenic differentiation - the role of RhoA, ROCKII and cytoskeletal dynamics. *J Cell Sci, 2009, 122(4) 546-53.*
6. Doll JC, Harjee N, Klejwa N, **Kwon RY**, Coulthard SM, Petzold BC, Goodman MB, and Pruitt BL. SU-8 force sensing pillar arrays for biological measurements. *Lab on a Chip, 2009, 9 1449-1454*.
7. **Kwon RY**, Lew AJ, and Jacobs CR. A microstructurally informed model for the mechanical response of three-dimensional actin networks. *Comput Methods Biomech Biomed Engin, 2008, 11(4) 407-18.*
8. You L, Temiyasathit S, Lee P, Kim CH, Tummala P, Yao W, Kingery W, Malone AM, **Kwon RY**, and Jacobs CR. Osteocytes as mechanosensors in the inhibition of bone resorption due to mechanical loading. *Bone, 2008 42(1) 172-9*.
9. Malone AM, Anderson CT, Tummala P, **Kwon RY**, Johnston TR, Stearns T, and Jacobs CR. Primary cilia mediate mechanosensing in bone cells by a calcium-independent mechanism. *Proc Natl Acad Sci USA, 2007, 104(33) 13325-30*.
10. **Kwon RY** and Jacobs CR. Time-dependent deformations in bone cells exposed to fluid flow in vitro: investigating the role of cellular deformation in fluid flow-induced signaling. *J Biomech, 2007, 40(14) 3162-8*.
11. Malone AM, Batra NN, Shivaram G, **Kwon RY**, You L, Kim CH, Rodriguez J, Jair K, and Jacobs CR. The role of actin cytoskeleton in oscillatory fluid flow-induced signaling in MC3T3-E1 osteoblasts. *Am J Physiol Cell Physiol, 2007, 292(5) C1830-6*.
12. Bayraktar HH, Gupta A, **Kwon RY**, Papadopoulos P, and Keaveny TM. The modified super-ellipsoid yield criterion for human trabecular bone. *J Biomech Eng, 2004, 126(6) 677-84*.

*Books*

1. Jacobs CR, Huang H, and **Kwon RY**. Introduction to Cell Mechanics and Mechanobiology. *Garland Science, in publication (June 30, 2012)*.

*Book Chapters*

1. **Kwon RY**, Hoey D, and Jacobs CR. Mechanobiology of primary cilia. In Cellular and Biomolecular Mechanics and Mechanobiology, A Gefen Ed., *Springer, 2011, 99-124*.

*Abstracts: Podium Presentations (RYK presenting author unless noted by *)*

1. **Kwon RY**, Worton LE, Srinivasan S, and Gross TS. Differential expression of transcriptional clusters and recurring ERK1/2 activation in bone cells subjected to rest-inserted dynamic fluid flow. *Trans Orthopaedic Research Society 2012, 44*.
2. Sanyal A*, Keaveny T, Gupta A, Bayraktar HH, **Kwon RY**. Shear strength behavior of human trabecular bone. *Trans Orthopaedic Research Society 2012*, 125
3. **Kwon RY**, Meays DR, Meilan AS, Kardos NL, and Frangos JA. Osteocyte-independent mechanotransduction of interstitial fluid flow. *American Society for Bone and Mineral Research Annual Meeting, 2010*.
4. **Kwon RY**, Meays DR, Meilan AS, Kardos NL, and Frangos JA*. Osteocyte-independent mechanotransduction of interstitial fluid flow. *Sun Valley Workshop on Musculoskeletal Biology, 2010*.
5. **Kwon RY**, Meays DR, and Frangos JA*. Microfluidic enhancement of intramedullary pressure increases interstitial fluid flow and inhibits hindlimb unloading-induced bone loss in mice. *Biomedical Engineering Society Annual Meeting 2009*.
6. Melchior, B, **Kwon RY**, and Frangos JA*. Inter-endothelial junctional inclination determines flow direction sense in endothelial cells. *Biomedical Engineering Society Annual Meeting 2009*.
7. **Kwon RY**, Meays DR, and Frangos JA. Microfluidic enhancement of skeletal fluid flow inhibits hindlimb unloading-induced bone loss in mice. *Society for Physical Regulation in Biology and Medicine 2009*.
8. **Kwon RY**, Temiyasathit S*, Tummala P, Quah CC, and Jacobs CR. Adenylyl cyclase 6 and cAMP mediate primary cilia-dependent mechanosensing in bone cells. *Society for Physical Regulation in Biology and Medicine 2009*.
9. **Kwon RY**, Temiyasathit S, Tummala P, Quah CC, and Jacobs CR. Adenylyl cyclase 6 mediates primary cilia-regulated decreases in cAMP in bone cells exposed to dynamic fluid flow. *American Society for Bone and Mineral Research Annual Meeting, 2008, JBMR 23:S13*.
10. **Kwon RY**, Temiyasathit S*, Tummala P, Quah CC, and Jacobs CR. Investigating the role of primary cilia in oscillatory fluid flow-induced increases in intracellular cAMP levels in MC3T3-E1 osteoblastic cells. *Trans Orthopaedic Research Society 2008*.
11. **Kwon RY**, Jacobs CR, and Lew AJ. A microstructurally informed model for the three-dimensional mechanical response of actin networks. *US National Congress on Computational Mechanics 2007*.
12. **Kwon RY**, and Jacobs CR. Viscoelasticity of bone cells exposed to fluid flow in vitro. *Trans Orthopaedic Research Society 2007, 150*.
13. Johnston TR*, **Kwon RY**, and Jacobs CR. Side view characterization of bone cells and their primary cilia using adapted fluid flow chamber. *Trans Orthopaedic Research Society 2007, 147*.
14. Clowes EJ*, **Kwon RY**, Tummala P, Carter DR, and Jacobs CR. Role of cytoskeletal tension in osteogenesis due to loading induced fluid flow. *Trans Orthopaedic Research Society 2007, 150*.
15. **Kwon RY**, and Jacobs CR. Viscoelasticity of bone cells exposed to fluid flow in vitro. *Society for Physical Regulation in Biology and Medicine 2007*.
16. **Kwon RY**, Jacobs CR, and Lew AJ. Homogenization of the actin cytoskeleton: An approach based on finite element analysis, microstructure characterization and weighted principal component analysis. *Trans Orthopaedic Research Society 2006, 363*.
17. **Kwon RY**, Ayeni, OA, and Jacobs CR. Investigation of the mechanics of bone cells exposed to fluid flow. *Trans Orthopaedic Research Society 2006, 129*.
18. **Kwon RY**, Ayeni, OA, and Jacobs CR. Mechanics of deformation of osteoblastic cells exposed to steady and oscillatory fluid flow. *Society for Physical Regulation in Biology and Medicine 2006*.

19. **Kwon RY**, Abad-Manterola P, Lew A, and Jacobs CR. Computational modeling of actin networks and the cytoskeleton. *Society for Physical Regulation in Biology and Medicine 2005*.
20. **Kwon RY**, Abad-Manterola P, Jacobs CR, and Lew A. Computational modeling of actin networks and the cytoskeleton. *California Tissue Engineering Annual Meeting 2004*.
21. Bayraktar HH*, Gupta A, **Kwon RY**, and Keaveny TM. Multiaxial failure behavior of human femoral trabecular bone. *Trans Orthopaedic Research Society 2003*, *202*.

*Abstracts: Poster Presentations*

1. Worton LE, **Kwon RY**, Gardiner EM, Gross TS and Srinivasan S. Cyclosporin A synergistically enhances acute gene expression and differentiation in MC3T3-E1 cells subjected to dynamic fluid flow. *Trans Orthopaedic Research Society 2012, 1381*.
2. Worton LE, **Kwon RY**, Gardiner EM, Gross TS, and Srinivasan S. Fluid flow-induced early response genes are selectively altered by age. *American Society for Bone and Mineral Research Annual Meeting, 2011*.
3. **Kwon RY**, Meays DR, Kardos NL, and Frangos JA. Regulation of energy metabolism by osteocytes. *American Society for Bone and Mineral Research Annual Meeting, 2010*.
4. **Kwon RY**, Meays DR, and Frangos JA. Microfluidic enhancement of intramedullary pressure increases interstitial fluid flow and protects against hindlimb unloading-induced bone loss in mice. *American Society for Bone and Mineral Research Annual Meeting, 2009*.
5. **Kwon RY**, Temiyasathit S, Tummala P, Quah CC, and Jacobs CR. Adenylyl cyclase 6 mediates primary cilia-dependent changes in cyclic adenosine monophosphate in response to dynamic fluid flow. *ASME Summer Bioengineering Conference 2009*.
6. **Kwon RY**, Meays DR, and Frangos JA. Oscillatory intramedullary pressure generated by a novel microfluidic system enhances interstitial transport and inhibits hindlimb unloading-induced bone loss in mice. *New York Skeletal Biology and Medicine Conference, 2009*.
7. **Kwon RY**, Temiyasathit S, Tummala P, Quah CC, and Jacobs CR. Primary cilia mediate intracellular cAMP responses in bone cells exposed to dynamic fluid flow. *ASME Summer Bioengineering Conference 2008, 192511*.
8. **Kwon RY**, Quah, CC, and Jacobs CR. Computational models of fluid flow through the osteocyte pericellular space show substantial loading on their cell bodies due to pressure gradients. *Trans Orthopaedic Research Society 2008*.
9. Doll JC, Harjee N, Klejwa N, **Kwon RY**, Coulthard S, and Pruitt BL. Biological measurements of C. Elegans touch sensitivity with microfabricated force sensors. *MicroTAS 2007, 0896*.
10. Klejwa N, Harjee N, **Kwon RY**, Coulthard S, and Pruitt BL. Transparent SU-8 three-axis micro strain gauge force sensing pillar arrays with biological applications. *Transducers 2007, AM0261*.
11. **Kwon RY**, Jacobs CR, and Lew AJ. A novel approach to image based modeling of the actin cytoskeleton. *ASME Summer Bioengineering Conference 2006*.
12. **Kwon RY**, Jacobs CR, and Lew AJ. Computational modeling of actin networks. *ASME Summer Bioengineering Conference 2005*.
13. **Kwon RY**, Ayeni, OA, and Jacobs CR. Mechanics of deformation of bone cells. *Biomedical Computation at Stanford 2005*.
14. Keaveny TM, Bayraktar HH, and **Kwon RY**. Shear loading is the weakest link for femoral neck trabecular bone. *Trans Orthopaedic Research Society 2002, 555*.