

CURRICULUM VITAE

JESS GERRIT SNEDEKER, PH.D.

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EDUCATION

Undergraduate: Lehigh University
College of Engineering and Applied Science
B.S. (Highest Honors) Mechanical Engineering, May 1995

Graduate: Pennsylvania State University
College of Engineering
M.S. Bioengineering, August 2000

Swiss Federal Institute of Technology, (ETH) Zurich
Department of Mechanical Engineering
Ph.D. Mechanical Engineering, April 2004

EXECUTIVE SUMMARY

History: Jess Snedeker has served as Assistant Professor of Orthopedic Biomechanics at the University of Zurich (Uniklinik Balgrist, Laboratory for Orthopedic Research) since September 2006, and at the Swiss Federal Institute of Technology (ETH) Zurich (Department of Mechanical Engineering, Institute for Biomechanics) since August 2008. Dr. Snedeker received his B.S. in Mechanical Engineering from Lehigh University in 1995. After several years in industrial research and development in fluid dynamics of air filtration, Dr. Snedeker returned to academia to earn his M.S. in Bioengineering from Penn State University in 2000, and his Ph.D. in Mechanical Engineering from the ETH Zurich in 2004. He then completed a postdoctoral fellowship within the European Union Integrated Project: "GENOSTEM: Adult mesenchymal stem cell therapies for connective tissue disorders". The Snedeker group has received various awards, and the laboratory currently has over 30 peer reviewed original publications accepted or in print, and over 60 peer reviewed conference proceedings.

Focus: The Snedeker laboratory focuses its research in three primary areas: mechanical/biological based understanding of tendon disease and healing; micro-mechanical cell-biomaterial interactions and their implications therapeutic success; and clinical biomechanics for improving existing orthopedic implant design and for the development of novel implants.

Approach: The laboratory relies heavily on imaging-based mechanical experiments as input to complementary numerical models. These models are biophysics based (finite element, mass-spring, statistical mechanics) and permit parametric investigation of mechanically and/or biologically based hypotheses regarding biosystem function. These models have proven useful in addressing clinical problems at the joint and tissue level, and more fundamental questions at the cellular level.

Impact: The biomechanics laboratory at the Uniklinik Balgrist has realized early success in addressing key clinical orthopedic questions related to the shoulder, ankle, hand, and knee through in-house collaborative work with world leading orthopedic surgeons. In basic research, the laboratory has established itself as a world-leader in investigating

proteoglycan contribution to tendon structure-function. This work has since led to the broader exploitation of collagen cross-linking in novel clinical therapies addressing tendon degeneration. The laboratory has also emerged as a leader in the development of novel functional imaging approaches that give insight into tendon micro-mechanics. These imaging modalities are unique, and are being developed to explore cell-matrix interaction in living animals. This work is accompanied by in vitro studies of cell-matrix interactions, where the basic nature of cell-matrix binding, and its biological consequences are being probed in human mesenchymal stem cells and osteosarcoma.

AWARDS AND HONORS

2009	European Society of Biomaterials - SSB Student Award (Y. Loosli & J.G. Snedeker)
2009	Swiss - Japanese Workshop on Biomechanics – SJB Student Award, (G. Bartalena & J.G. Snedeker)
2009	Swiss Society for Orthopedics – Best Poster, (P. Favre, M. Tobler, J.G. Snedeker, N. Espinosa)
2008	American Foot and Ankle Society – Best Poster, (N. Espinosa, M. Walti, P. Favre, J.G. Snedeker)
2005	IRCOBI – Best Paper by Young Investigator, (KU Schmitt & J.G. Snedeker)
2003	De Dombal Award - European Society of Engineering and Medicine: Outstanding Young Scientist
1998	Penn State Bioengineering Fellowship
1996	Lehigh Presidential Scholar (one year full tuition merit based scholarship).
1995	Elected Phi Beta Kappa
1993	General Motors Scholar (two year full-tuition merit based scholarship)
1992	Elected Tau Beta Pi
1991	Lehigh University Trustee Scholar (four year full-tuition merit based scholarship)
1990	US National Merit Scholar

PROFESSIONAL APPOINTMENTS

2008 – Present	Assistant Professor, Department of Mechanical Engineering, Institute for Biomechanics, ETH Zürich
2007 – Present	Associated Faculty, Department of Information Technology and Electrical Engineering, ETH Zürich
2006 – Present	Assistant Professor, University of Zurich, Department of Orthopedics, Uniklinik Balgrist
2004 – 2006	Post Doctoral Research Fellow, ETH Zürich, Institute of Biomedical Engineering, Müller Lab
2000 – 2004	Graduate Research Assistant, ETH Zürich, Institute of Biomedical Engineering, Advisor: Prof. Peter Niederer
1998 – 2000	Graduate Research Assistant, Pennsylvania State University, Center for Locomotion Studies, University Park, PA. Advisor: Prof. Peter Cavanagh
1996 – 1998	Product Design / Process Development Engineer, W.L. Gore and Associates, Industrial Products Division, Newark DE
1995 – 1996	Teaching Assistant, Lehigh University, Department of Mechanical Engineering, Bethlehem PA
1992 – 1995	Manufacturing Process Engineer, General Motors, GM Tech Center, Warren MI and Lordstown Assembly Plant, Lordstown OH.
1991	Apprentice machinist and welder, Freedom Components Inc., Lewistown PA

EXTERNAL FUNDING SOURCES

2009 – 2012	Robert Mathys Foundation, "Biophysical models for predicting cell phenotype evolution through focal adhesion mediated mechanotransduction". 150 kCHF. Principal investigator.
2009 – 2012	Chinese Research Council (CRC) Doctoral Fellowship, "A cell mechanics approach to improving tendon to bone healing". 85 kCHF. Principal investigator.
2009	Institute for Refractive und Ophthalmological Surgery (IROC), Industrial funded subcontract. 12 kCHF. Subcontractor.
2008 – 2010	Swiss National Science Foundation, (Grant No. 205321-118036.), "In vivo biomechanical characterization of soft tissue mechanics using endoscopic cellular microscopy: 3D cell tracking and reconstruction of tissue properties". 300 kCHF. Principal investigator.
2008 – 2009	ResOrtho Foundation, "Developing a model of rat rotator cuff tendon to bone healing". 50 kCHF. Principal investigator.
2008 – 2009	Bonizzi-Theler Foundation, "Gradient matrices for directing stem cell differentiation". 300 kCHF.

- Principal investigator.
- 2007 – 2009 Kuros Biosurgery, Industrial funded subcontract. 25 kCHF. Subcontractor.
- 2007 European Union, Integrated Project (GENOSTEM LSH-2003-503161), "Adult mesenchymal stem cell engineering for connective tissue disorders. From the bench to the bed side". 90 kCHF. Subcontractor.
- 2004 – 2008 ETH BEC (Bioengineering Cluster) – Nanomechanics Research Vector (03/4), "The biomechanical influence of ultrastructure on tendon strength: A nano-scale numerical modeling study". 200 kCHF. Co-Principal investigator.

EDITORIAL POSTS

- 2008 – Present Editorial Board: Biomedizinische Technik / Biomedical Engineering

REVIEWER

- 2005 – Present Journal of Biomechanics
- 2008 – Present Cells, Tissues, Organs
- 2008 – Present Annals of Anatomy
- 2008 – Present Medical Engineering & Physics
- 2008 – Present Tissue Engineering
- 2009 – Present Spine
- 2009 – Present Journal of the Mechanical Behavior of Biomedical Materials
- 2010 – Present Biomechanics and Modeling in Mechanobiology

SCIENTIFIC COMMITTEES

- 2009 Organizing Committee, European Society of Biomechanics, Workshop on Soft Tissue Biomechanics.
- 2009 Swiss Scientific Committee, Switzerland-Japan Workshop on Biomechanics
- 2009 International Scientific Committee, World Congress Medical Physics and Biomedical Engineering
- 2009 International Scientific Committee, European Society of Biomechanics, Soft Tissue Workshop
- 2008 International Scientific Committee, European Society of Biomechanics Annual Meeting

SUPERVISED DOCTORAL THESES

- 2010 – Present "A cell mechanics based understanding of tendon degeneration", Jennifer Cadby, Doctoral Candidate, university of Utrecht, Holland.
- 2009 – Present "A cell mechanics approach to improving tendon to bone healing", Xiang Li, Doctoral Candidate, Mechanical Engineering ETH, Swiss Federal Institute of Technology (ETH), Zurich.
- 2008 – Present "Quantifying cell-matrix force exchange", Guido Bartalena, Doctoral Candidate, Mechanical Engineering ETH, Swiss Federal Institute of Technology (ETH), Zurich.
- 2008 – Present "Analyzing constitutive properties of cells and their matrix from bioimage datasets", Yufei Li, Doctoral Candidate, Mechanical Engineering ETH, Swiss Federal Institute of Technology (ETH).
- 2008 – Present "Biophysical models of cell and tissue differentiation", Yannick Loosli, Doctoral Candidate, Mechanical Engineering ETH, Swiss Federal Institute of Technology (ETH), Zurich.
- 2007 – Present "A computational model to study active glenohumeral stability". Philippe Favre, Doctoral Candidate, Mechanical Engineering ETH, Swiss Federal Institute of Technology (ETH), Zurich.
- 2005 – Present "The ultrastructural determinants of tendon strength". Samuela Rigozzi, Doctoral Candidate Mechanical Engineering ETH, Swiss Federal Institute of Technology (ETH), Zurich.

SUPERVISED MASTER'S THESES

- 2010 – 2011 "Finite element modelling of the passive stabilizing structures of the shoulder." Jasmin Hipp, MS Mechanical Engineering, University of Stuttgart, Germany.
- 2010 – 2011 "Strains and micromotions induced by the reverse reverse total shoulder arthroplasty: a finite element study." Omiros Exarchos, MS Biomedical Engineering, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2010 – 2011 "Toward characterizing cell-matrix force exchange." Anna Naef, MS Movement Science, ETH,

- Swiss Federal Institute of Technology (ETH) Zurich.
- 2010 – 2011 “The role of cell mechanics basis of osteosarcoma metastasis.” Marlis Isler, MS Movement Science, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 – 2010 “Exogenous crosslinking for arresting tendon tear propagation.” Jeremy Wernli, MS Biomedical Engineering, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 – 2010 “An experimentally validated finite element model of the human scapulae.” Marco Senteler, MS Mechanical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 – 2010 “Assessing primary in – vitro stability of glenoid components in reverse total shoulder arthroplasty”, Scott Perala, MS Biomedical Engineering, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2008 – 2009 “Intracellular forces and cytoskeleton stiffness using elastomeric microbeams”, Fabrizio Kunz, MS Biomedical Engineering, ETH 2009, Swiss Federal Institute of Technology (ETH) Zürich.
- 2008 – 2009 “A parametric finite element study of hallux valgus correction”, Manuela Tobler, MS Biomedical Engineering, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2008 – 2009 “Assessing primary in – vitro stability of glenoid components in reverse total shoulder arthroplasty”, Peter Vogel, MS Biomedical Engineering, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2007 – 2008 “Osteosarcoma cell stiffness and metastatic potential”, She Wenhao, MS Biomedical Physics, KTH University, Stockholm, Sweden.
- 2007 – 2008 “Viscoelastic characterization of tissue engineered intervertebral discs”, Javier Ratia-Garcia, MS Biomedical Engineering, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2007 – 2008 “Artificial ankle joint misalignment: A combined computational and experimental study”, Martin Walti, MS Biomedical Engineering,, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2007 – 2008 “The role of proteoglycans in tensile tendon mechanics”, Gion Fessel, MS Movement Science, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2007 – 2008 “Biomechanics of the rat supraspinatus tendon in tendon to bone healing”, Mirjam Schuppisser, MS Movement Science, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2006 “Development and validation of a software algorithm for inferring mechanical properties of tendon by analyzing cell displacements in confocal fluorescence endomicroscopy”, Evelyne Huber, MS Applied Mathematics, ETH, Swiss Federal Institute of Technology (ETH) Zurich.
- 2005 – 2006 “The design and implementation of a tendon bioreactor for investigating the effects of mechanical load on tissue homeostasis”, Daniel Thommen, MS Mech. Eng., ETH, Swiss Federal Institute of Technology (ETH) Zurich.

SUPERVISED UNDERGRADUATE THESES & SEMESTER PROJECTS

- 2010 “Ultrasound Elastography for Assessing Flexor Tendon Adhesions”, Nina Verstraete, BS Biomedical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2010 “Variations in shoulder muscles function with changes in humerus position”. Judith Roost, BS Mechanical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2010 “Characterizing a novel fixation technique for ACL reconstruction”, Robert Wienert-Aplin, BS Biomedical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 “Biologic resurfacing of glenoid: Biomechanical testing of a new concept.” Alexandra Krause, BS Biomedical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 “Real-time cell tracking and positional feedback in live cell imaging.” Pascal Bissig, Michael Bieri, Reto Grieder, BS Electrical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 “A finite element model of the human scapulae.” Simon Scherrer, BS Mechanical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 “Suitability of Thiel preserved tendons as a biomechanical test surrogate.” Kevin Frey, BS Mechanical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 “Suitability of Thiel preserved tendons as a biomechanical test surrogate.” David Wochener, BS Mechanical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2009 “Toward intraoperative measurement of rotator cuff tendon mechanics.” Sebastian Colson, BS

- Biomedical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2008 "Establishment and characterization of an elastomeric microbeam system to measure cell traction forces", Fabrizio Kunz, MS Biomedical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2008 "Experimental validation of a finite element model of first metatarsal osteotomies to correct hallux valgus", Marc Farine, MS Biomedical Engineering, Swiss Federal Institute of Technology (ETH) Zurich.
- 2007 "The role of proteoglycans in tensile tendon mechanics", Gion Fessel, BS Movement Science, ETH 2008, Swiss Federal Institute of Technology (ETH) Zurich.
- 2007 "Biomechanics of the rat supraspinatus tendon in tendon to bone healing", Mirjam Schuppisser, BS Movement Science, ETH 2008, Swiss Federal Institute of Technology (ETH) Zurich.
- 2005 "Image-based computational model of loaded articular cartilage", Jörg Helfenstein, MS Mech. Eng., ETH, 2005, Swiss Federal Institute of Technology (ETH).
- 2005 "Image guided failure assessment of tendon using 3d stereoscopic laser interferometry" Girish Singhal, Dipl. ECE, 2006, Indian Institute of Technology, Guwahati.
- 2005 "Development and validation of a software algorithm for analyzing laser speckle interferometric images", Friederike Gerhard, Dipl. Informatik, 2006, Friedrich-Alexander-Universität Erlangen.
- 2004 "Development of a mechanical testing apparatus for the functional assessment of tendon". Daniel Thommen, MS Mech. Eng., ETH, 2006, Swiss Federal Institute of Technology (ETH).
- 2004 "Development of a mechanical testing apparatus for the functional assessment of tendon". Emmanuel Vinit, MS Mech. Eng., ETH, 2006, Swiss Federal Institute of Technology (ETH).
- 2004 "The biomechanics of renal injury: an experimental study". Adam Tuttle, BS Biomed. Eng., 2005, Northwestern University, Chicago Ill.
- 2003 "The creation of a finite element model of the spine and ribcage for use in trauma research". Henri Hagenmüller, MS Mech. Eng., ETH, 2004 Swiss Federal Institute of Technology (ETH).
- 2002 "The Development Of A Dynamic Bone Testing Apparatus". Giuseppe Dastoli, MS Mech Eng., ETH, 2004, Swiss Federal Institute of Technology (ETH).
- 2002 "Determining The Time Dependent Properties Of The Porcine Renal Capsule". Florent Besson, MS Mech Eng., ETH, 2003, Swiss Federal Institute of Technology (ETH).
- 2002 "Determining The Time Dependent Properties Of The Porcine Renal Capsule". Roman Voide, MS Mech Eng., ETH, 2003, Swiss Federal Institute of Technology (ETH).
- 2001 "Creating a Finite Element Mesh of the Liver and Spleen for Use in an Abdominal Trauma Model". Joeri Rogelj, MS. Mech. Eng., 2003, University Leuven, Belgium.

TEACHING APPOINTMENTS

- 2009 – Present ETH Zurich & University of Zurich – Undergraduate lectures in joint biomechanics (Biomechanics IA, D-MAVT ETH Zurich).
- 2008 – Present ETH Zurich – Graduate level lectures on computational biomechanics and orthopedics. (Introduction to Biomedical Engineering I, D-MAVT ETH Zurich)
- 2006 – Present ETH Zurich – Graduate level lectures on cellular mechanics and biopolymers. (Introduction to Biomedical Engineering I, D-MAVT ETH Zurich)
- 2004 – 2006 ETH Zurich – Team lecturer in undergraduate level lectures on musculoskeletal biomechanics, tissue engineering and regenerative medicine.
- 2004 – 2006 ETH Zurich – Organizer and discussion mediator for "Bioengineering Journal Club" a biweekly research discussion group. Forms part of the ETH pps series, mandatory for all undergraduates.
- 2001 – Present ETH Zurich – Guest lecturer delivering several lectures on bio-fluids/mechanics to seventh-semester undergraduates. Organized and supervised accompanying numerical/experimental laboratory exercises.
- 1999 – 2000 Penn State University – Teaching assistant within an introductory kinesiology course. Instructed undergraduate students on the use of instrumentation in biomechanics research.
- 1995–1996 Lehigh University - Teaching assistant for undergraduate (Senior and Sophomore levels) SDRC Ideas CAD/CAM classes.

ORIGINAL PEER REVIEWED ARTICLES

28. RI Sharma and **JG Snedeker**. (2010) "Biochemical and biomechanical gradients for directed bone marrow stromal cell differentiation toward tendon and bone", *Biomaterials*, In Press.
27. D Sheyn, M Rütthemann, O Mizrahi, I Kallai, Y Zilberman, W Tawackoli, LEA Kanim, L Zhao, H Bae, G Pelled, **JG Snedeker**, D Gazit, (2010) "Genetically modified mesenchymal stem cells induce mechanically stable posterior spine fusion", *Tissue Engineering Part A*, In Press.
26. M Farshad, **JG Snedeker**, C Gerber, DC Meyer. (2010) "Helical cutting as a new method for tendon-lengthening in continuity ", *Journal of Bone and Joint Surgery*, In Press.
25. P Favre, M Farine, **JG Snedeker**, GJ Maquieira, N Espinosa. (2010) "Biomechanical consequences of first metatarsal osteotomy in treating hallux valgus." *Clinical Biomechanics*, In Press.
24. JM Kelm, V Lorber, **JG Snedeker**, D Schmidt, A Broggioli-Tenzer, M Weisstanner, B Odermatt, A Mol, G Zünd, SP Hoerstrup. (2010) "A novel concept for scaffold-free vessel tissue engineering: self-assembly of microtissue building blocks." *Journal of Biotechnology*, e-pub ahead of print.
23. P Favre, C Gerber, **JG Snedeker**. (2010) "Automated muscle wrapping using finite element contact detection." *Journal of Biomechanics*, e-pub ahead of print.
22. S Rigozzi, R Müller, **JG Snedeker**. (2010) "Collagen fibril morphology and mechanical properties of the Achilles tendon in two inbred mouse strains", *Journal of Anatomy*, e-pub ahead of print.
21. Y Loosli, R Luginbuehl, **JG Snedeker**. (2010) "Cytoskeleton reorganization of spreading cells on micropatterned islands: a functional model", *Philos Transact A Math Phys Eng Sci.*, 368(1920):2629-52.
20. N Espinosa, M Walti, P Favre, **JG Snedeker**. (2010) "Total Ankle Component Misalignment Can Induce High Joint Contact Pressures", *Journal of Bone and Joint Surgery*, 92(5):1179-87.
19. G Fessel and **JG Snedeker**. (2009) "Evidence against proteoglycan mediated collagen fibril load transmission and dynamic viscoelasticity in tendon", *Matrix Biology*; 28(8):503-10.
18. A Schweizer, BK Moor, L Nagy, **JG Snedeker**. (2009) "Static and dynamic human flexor tendon - pulley interaction", *Journal of Biomechanics*; 42(12):1856-61.
17. **JG Snedeker**, A Ben Arav, G Pelled, Y Zilberman, D Gazit. (2009) "Functional fibered confocal microscopy: a promising tool for assessing tendon regeneration", *Tissue Engineering C: Methods*, 15(3):485-491.
16. S Rigozzi, R Müller, **JG Snedeker**. (2009) "Local strain measurement reveals a varied regional dependence of tensile tendon mechanics on glycosaminoglycan content", *Journal of Biomechanics*, 42(10):1547-1552.
15. BK Moor, L Nagy, **JG Snedeker**, A Schweizer. (2009) "Friction between finger flexor tendons and the pulley system in the crimp grip position", *Clinical Biomechanics*; 24(1):20-5.
14. P Favre, **JG Snedeker**, and Gerber C. (2009) "Numerical modelling of the shoulder for clinical applications." *Philosophical Transactions of the Royal Society A*; 367(1895):2095-118.
13. **JG Snedeker**, G Pelled, Y Zilberman, A Ben Arav, E Huber, R Müller, D Gazit. (2009) "An analytical model for elucidating tendon tissue structure and biomechanical function from in vivo cellular confocal microscopy images", *Cells, Tissues, Organs*; 190(2):111-119.
12. P Favre, B Moor, **JG Snedeker**, C Gerber. (2008) "Influence of component positioning on impingement in conventional total shoulder arthroplasty". *Clinical Biomechanics*, 23(2):175-183.
11. **JG Snedeker**, M Farshad, P Niederer, FR Schmidlin. (2007) "A comprehensive renal injury concept based on a validated finite element model of the human abdomen". *Journal of Trauma*, 62(5):1240-1249.
10. **JG Snedeker**, G. Pelled, Y. Zilberman, F. Gerhard, R Müller, D. Gazit. (2006) "Endoscopic Cellular Microscopy for In Vivo Biomechanical Assessment of Tendon Function". *Journal of Biomedical Optics*, 11: 06040-10.
9. **JG Snedeker**, FH Walz, MH Muser, G Schroeder, TL Mueller and R Müller. (2006) "Microstructural insight into pedestrian pelvic fracture as assessed by high-resolution computed tomography". *Journal of Biomechanics*. 39: 2709-2713.
8. K.-U. Schmitt and **JG Snedeker**. (2006) "Analysis of the biomechanical response of kidneys under blunt impact". *Journal of Traffic Injury Prevention*. 7: 171-181.
7. K.-U. Schmitt and **JG Snedeker**. (2006) "Kidney injury: an experimental investigation of blunt renal trauma". *Journal of Trauma*. 60: 880-884.
6. K.-U. Schmitt, S. Varga and **JG Snedeker**. (2006) "Comparing the biomechanical response of human and porcine kidneys to blunt trauma". *Journal of Trauma*. 60: 885-887.

5. **JG Snedeker**, P Niederer, FR Schmidlin, M Farshad. (2005) "Failure behavior of the kidney; quasi-static tests on human tissue, impact tests on porcine organs, and comparison with a finite element model". *Journal of Biomechanics* 38: 993-1001.
4. **JG Snedeker**, P Niederer, FR Schmidlin, M Farshad, CK Demetropoulos, JB Lee, KH Yang. (2005) "Strain-rate dependent material properties of the porcine and human kidney capsule". *Journal of Biomechanics* 38: 1011-1021.
3. **JG Snedeker**, M.H. Muser, F. Walz. (2003) "Assessment of pelvis and upper leg injury risk in car-pedestrian collisions: Comparison of accident statistics, impactor tests and a human body finite element model". *STAPP Car Crash Journal* 47: 437-457.
2. **JG Snedeker**, M Bajka, JM Hug, G Székely, P Niederer. (2002) "The creation of a high-fidelity finite element model of the kidney for use in trauma research". *Journal of Visualization and Computer Animation* 13: 53 - 64.
1. **JG Snedeker**, PR Cavanagh. (2000) "Measurement of muscle actions and foot reaction forces from crew members during entire working days on the International Space Station", *Proceedings of the American Institute of Physics*, 504: 160-165, 2000.

REVIEW ARTICLES AND BOOK CHAPTERS

4. Y Li and **JG Snedeker**. (2010) "Elastography: Modality specific approaches, clinical applications, and research horizons", *Skeletal Radiology*, e-pub ahead of print.
3. R Voide, GH van Lenthe, P Schneider, PJ Thurner, P Wyss, U Sennhauser, M Stampanoni, M Stauber, **JG Snedeker** and R Müller. (2006) "Functional microimaging: an integrated approach for advanced bone biomechanics and failure analysis". In A. Manduca, editor, *Physiology, Function, and Structure from Medical Images*, SPIE Vol. 6143.
2. M Hollenstein, A Nava, D Valtorta, **JG Snedeker**, E Mazza. (2006) "Mechanical Characterization of the Liver Capsule and Parenchyma". In *Lecture Notes In Computer Science*, Springer, Heidelberg, Germany.
1. **JG Snedeker**, P Niederer, M Farshad, M Farshad. (2005) "Biomechanics of renal trauma: Understanding injury through numerical simulation", In: *Recent Research Developments in Biomechanics*, TRN Publishers, Trivandrum, India.

ABSTRACTS AND PROCEEDINGS

62. P Favre, M Tobler, N Espinosa, **JG Snedeker** (2010). "How degree of correction affects first metatarsal osteotomy biomechanics in hallux valgus treatments". SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. St. Gallen, Switzerland.
61. DC Meyer, PP Koch, **JG Snedeker**, M Farshad (2010). "Graft fixation using direct insertion of an interference screw or additional interposition of a bone wedge for reconstruction of the anterior cruciate ligament– the pressure on the graft". SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. St. Gallen, Switzerland.
60. CC Würgler-Hauri, MC Schuppisser, R Ursprung, A Nalkara, F Nichols, N Cesarovic, M Hilbe, C Gerber, **JG Snedeker**. (2010) Gene expression profiles in healing rat supraspinatus tendon". SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. St. Gallen, Switzerland.
59. RI Sharma and **JG Snedeker** (2010). "Mesenchymal stromal cell sensitivity to substrate compliance and ligand chemistry: Toward engineering a functional tendon to bone tissue transition". 18th European Orthopaedic Research Society Annual Conference. Davos Switzerland.
58. G Fessel, J Wernli, Y Li, C Geber, **JG Snedeker** (2010). "Assessing the Potential of Exogenous Collagen Cross-linking to Arrest Tendon Tear Propagation". 18th European Orthopaedic Research Society Annual Conference. Davos Switzerland.
57. Y Li, J Wernli, **JG Snedeker** (2010). "Toward a quantitative endoscopic assessment of partial tendon tears". 18th European Orthopaedic Research Society Annual Conference. Davos Switzerland.
56. P Favre, N Espinosa, M Farine, M Tobler, **JG Snedeker** (2010). "First metatarsal osteotomy in hallux valgus treatment: understanding intervention through experiments and models". 18th European Orthopaedic Research Society Annual Conference. Davos Switzerland.
55. P Favre, P Vogel, JR Goff, S Fucntese, C Gerber, **JG Snedeker** (2010). "Improved method for testing reverse

- glenoid components". In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
54. M Farshad, C Gerber, **JG Snedeker**, D Meyer (2010). "Tendon-lengthening in continuity: Description of a new method of helical cutting". In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
 53. G Fessel, K Frey, M Calcagni, O Ulrich, **JG Snedeker**. (2010). "Assessment of suitability of Thiel embalmed human flexor tendons for biomechanical investigations". In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
 52. Y Loosli, **JG Snedeker** (2010). "A predictive model of cytoskeleton reorganization during initial cell adhesion to bioactive substrate". In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
 51. Sharma R, **Snedeker JG**. (2010). "Fibronectin binding modulates cell response to substrate compliance and enhances osteogenic differentiation of bone marrow stromal cells". In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
 50. Sharma R, **Snedeker JG**. (2010). "Biochemical and Biomechanical Gradients for Directed Bone Marrow Stromal Cell Differentiation toward Tendon and Bone". In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
 49. M Farshad, C Gerber, **JG Snedeker**, T Frauenfeld, D Meyer (2010). Behavior of chronically retracted tendon after single stage or staged repair with continuous musculotendinous re-lengthening: An experimental study." In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
 48. G Pelled, **JG Snedeker**, A Ben-Arav, Y Zilberman, Z Gazit, S Rigozzi, R Müller, D Gazit (2010). "Stem Cell-Based Tissue Regeneration Induces Accelerated Recovery of Tendon Biomechanical Properties." In: 56th Annual Meeting of the Orthopaedic Research Society. New Orleans, USA.
 47. Y Loosli, **JG Snedeker** (2009). "Cytoskeleton reorganization of spreading cells on micropatterned islands: a functional model". Fourth International Conference on Computational Bioengineering, Bertinoro, IT.
 46. P Favre, **JG Snedeker** (2009). "Muscle wrapping using finite element contact definitions". Fourth International Conference on Computational Bioengineering, Bertinoro, IT.
 45. Favre P, Farine M, Maquieira G, **Snedeker JG**, Espinosa N (2009). "Biomechanical implications of first metatarsal osteotomy design in treating hallux valgus". SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. Geneva, Switzerland.
 44. Favre P, Vogel P, Goff JR, Fucentese S, **Snedeker JG**, Gerber C (2009). "In Vitro Primary Stability of Glenoid Components in Reverse Total Shoulder Arthroplasty: Improved Methods and Insights". SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. Geneva, Switzerland.
 43. Diederich V, Sharma R, Lattuada M, Storti G, **Snedeker JG**, Morbidelli M (2009). "Design of polymer hydrogels used as support material for compliance-induced differentiation of stem cells" AICHE Annual Meeting: Nashville, TN, USA.
 42. Fessel G and **Snedeker JG**. (2009). "Glycosaminoglycans Do not Influence Collagen Fibril Load Transmission or Dynamic Viscoelasticity in Tendon". Summer Workshop, European Society for Biomechanics, Zurich, Switzerland.
 41. Li Y, Wuergler-Hauri CC, Gerber C, **Snedeker JG** (2009). "Toward Intraoperative Functional Imaging of the Rotator Cuff Tendons". Summer Workshop, European Society for Biomechanics, Zurich, Switzerland.
 40. P Favre, **JG Snedeker**. (2009). "A Novel Method to Compute Muscle Moment Arms". Summer Workshop, European Society for Biomechanics, Zurich, Switzerland.
 39. Espinosa N, Walti M, Favre P, **Snedeker JG**. (2009). "Ankle Arthroplasty Misalignment: A Combined Computational and Experimental Study". In: 55th Annual Meeting of the Orthopedic Research Society. Las Vegas, USA.
 38. Gazit D, Sheyn D, Ruethemann R, Pelled G, Zilberman Y, Ben Arav A, **Snedeker JG**. (2009). "Genetically Modified Mesenchymal Stem Cells Can Induce Mechanically Stable Posterior Spine Fusion" In: 55th Annual Meeting of the Orthopedic Research Society. Las Vegas, USA.
 37. Rigozzi S, Mueller R, **Snedeker JG**. (2009). "Relating Tendon Function to Ultrastructure: Collagen Fibril Morphology and Mechanical Properties of the Achilles Tendon in Two Inbred Mouse Strains". In: 55th Annual Meeting of the Orthopedic Research Society. Las Vegas, USA.
 36. Sharma R, She W, Muff R, Fuchs B, **Snedeker JG**. (2009). "Toward a Rapid Cell Mechanics Based Diagnostic Tool for Cancer". In: 55th Annual Meeting of the Orthopedic Research Society. Las Vegas, USA.
 35. Würgler-Hauri CC, Schuppisser MC, Ursprung R, Gerber C, **Snedeker JG**. (2009) "Healing Tendon Shows

- Characteristic Expression of Extracellular Matrix Proteins in a Supraspinatus Tendon Injury and Repair Rat Model". In: American Academy of Orthopaedic Surgeons, Annual Meeting. Las Vegas, USA.
34. Würgler-Hauri CC, Schuppisser MC, Ursprung R, Nalkara A, Nichols F, Cesarovic N, Hilbe M, Gerber C, **Snedeker JG**. (2009) "Placing Growth Factor Expression in Context: Protein Expression Profiles Correlated to Structure and Function in the Healing Rat Supraspinatus Tendon". In: 55th Annual Meeting of the Orthopedic Research Society. Las Vegas, USA.
 33. G Fessel and **JG Snedeker**. (2008) "Decorin Mediated Collagen Fibril Load Sharing in Tendon; Protein Level Models and Experiments". Annual Meeting European Society for Biomechanics, Lucerne Switzerland.
 32. P Favre, B Moor, A Djahangiri, C Gerber, **JG Snedeker**. (2008) "A Prominent Humeral Calcar Can Lead to Impingement in Shoulder Arthroplasty". Annual Meeting European Society for Biomechanics, Lucerne Switzerland.
 31. G Pelled, **JG Snedeker**, Y Zilberman, A Ben Arav, R Müller, D Gazit. (2008) "Micro imaging system for analyzing the biomechanics of engineered tendons in vivo". TERMIS Annual Meeting, San Diego, CA.
 30. CC Wuergler-Hauri, MC Schuppisser, C Gerber, **JG Snedeker**. (2008) "Relating Tendon Structure and Function to Temporal Protein Expression Profiles in the Healing Rat Supraspinatus Tendon". SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. Basel, Switzerland.
 29. CC Wuergler-Hauri, MC Schuppisser, C Gerber, **JG Snedeker**. (2008) "Endoscopic Measurement of Compromised Rotator Cuff Tendon Function in a Rat Supraspinatus Injury Model", SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. Basel, Switzerland.
 28. CC Wuergler-Hauri, MC Schuppisser, C Gerber, **JG Snedeker**. (2008) "Quantifying Passive Rotator Cuff and Capsulo-Ligamentous Stabilization of the Shoulder: In Vivo Progressive Dissection in a Rat Shoulder Model", SGO (Schweizerische Gesellschaft für Orthopädie und Traumatologie), Annual Meeting. Basel, Switzerland.
 27. **JG Snedeker**, G Pelled, Y Zilberman, A Ben Arav, R Müller, D Gazit. (2008) "An Analytical Model for Elucidating Tendon Tissue Structure and Biomechanical Function from In Vivo Cellular Confocal Microscopy Images". 54th Annual Meeting of the Orthopedic Research Society, San Francisco, USA.
 26. M Rütthemann, D Sheyn, Y Zilberman, G Pelled, D Gazit, **JG Snedeker** (2008) "Assessing the Stiffness of Lumbar Spinal Fusion in a Murine Model". 54th Annual Meeting of the Orthopedic Research Society, San Francisco, USA.
 25. P Favre, S Bouaicha, **JG Snedeker**, N Espinosa. (2008) "First Metatarsal Osteotomies for Correction of Hallux Valgus: A Finite Element Model". 54th Annual Meeting of the Orthopedic Research Society, San Francisco, USA.
 24. CC Wuergler-Hauri, MC Schuppisser, C Gerber, **JG Snedeker**. (2008) "Non-Destructive Endoscopic Assessment of Biomechanical Behavior in the Rat Supraspinatus Tendon; A pilot study. " 54th Annual Meeting of the Orthopedic Research Society, San Francisco, USA.
 23. P Favre, B Moor, **JG Snedeker**, C Gerber. (2007) "Factors affecting impingement in conventional shoulder arthroplasty: a rigid body simulation". Jahrestagung Schweizerischen Gesellschaft für Orthopädie und Traumatologie, Montreux, Switzerland.
 22. G Fessel and **JG Snedeker**. (2007) "Mechanical stiffness of tendon fascicles is dependent on temperature". Annual Meeting, Swiss Society for Biomedical Engineering, Neuchatel, Switzerland.
 21. M Schuppisser, C Würgler and **JG Snedeker**. (2007) "Toward an *in vivo* biomechanical characterization of the rat supraspinatus tendon". Annual Meeting, Swiss Society for Biomedical Engineering, Neuchatel, Switzerland.
 20. S Rigozzi, R Müller and **JG Snedeker**. (2007) "Non-homogeneous ultrastructure and function in murine achilles tendon under tensile load". Annual Meeting, Swiss Society for Biomedical Engineering, Neuchatel, Switzerland.
 19. S Rigozzi, **JG Snedeker** and R Müller. (2007) "Local strain measurement reveals a varied regional dependence of tensile tendon properties on glycosaminoglycan content". 53rd Annual Meeting of the Orthopedic Research Society, San Diego, USA.
 18. S Rigozzi, **JG Snedeker** and R Müller. (2006) "Mechanical role of glycosaminoglycans in whole tendon and midsubstance tensile biomechanics: a local investigation of properties". Proc. Gemeinsame Jahrestagung der Deutschen, Österreichischen und Schweizerischen Gesellschaft für Biomedizinische Technik V014:1-2., Zürich, Switzerland.
 17. **JG Snedeker**, G Pelled, Y Zilberman, F Gerhard, R Müller, D Gazit. (2006) "A novel cell tracking method for in vivo biomechanical assessment of healing murine tendon: a pilot study". World Congress of Biomechanics,

- Munich, Germany.
16. S Rigozzi, **JG Snedeker** and R Müller. (2006) "Investigation of the mechanical influence of tendon components via selective digestion of glycosaminoglycans". Abstracts 5th World Congress of Biomechanics, Munich, Germany.
 15. **JG Snedeker**, P Niederer, M Farshad, FR Schmidlin. (2006) "A comprehensive, modeling based, renal injury concept". World Congress of Biomechanics, Munich, Germany.
 14. **JG Snedeker**, S Rigozzi, and R Müller. (2006) "Glycosaminoglycan depleted tendon shows increased mechanical stiffness; Rethinking the tendon structure-function paradigm of proteoglycan mediated load sharing". 52nd Annual Meeting of the Orthopedic Research Society, Chicago, USA.
 13. S Rigozzi, **JG Snedeker**, and R Müller. (2005) "The determinants of connective tissue behavior: examining the mechanical role of proteoglycans". Annual Meeting, Swiss Society for Biomedical Engineering, Lausanne, Switzerland.
 12. S. Rigozzi, J. Snedeker, A. Stemmer and R. Müller. (2005) "An experimental nanomechanical study of connective tissue function: examining the role of ultrastructure". Proceedings Second Japan-Switzerland Workshop on Biomechanics - New Trends in Biomechanics: From Biomolecules to Tissue, Kyoto, Japan.
 11. PR Cavanagh, KO Genc, CC Maender, RS Ochia, **JG Snedeker**, AJ Rice. (2005) "Lower Extremity Loading During Entire Days of Space Flight". 20th International Society of Biomechanics, Cleveland, USA.
 10. KU Schmitt and **JG Snedeker**. (2005) "Analysis of the Biomechanical Response of Kidneys under Blunt Impact". IRCOBI, Prague, Czechoslovakia.
 9. **JG Snedeker**, MH Muser, F Walz, CLanz, G Schroeder. (2005) "Assessing femur and pelvis injury risk in car-pedestrian collisions: comparison of full body PMTO impacts, and a human body finite element model." 19th ESV, Washington DC, USA.
 8. Cavanagh, PR, Maender, C, Rice, AJ, Gene, KO, Ochia, RS, **Snedeker, JG**. (2004) "Lower-Extremity Loading During Exercise on the International Space Station", 50th Annual Meeting of the Orthopedic Research Society, Chicago, USA.
 7. **JG Snedeker**, M Farshad, F Schmidlin, P Niederer. (2004) "A three dimensional finite element model of the human abdomen developed for investigating renal trauma". Annual Meeting of the European Society of Biomechanics, s' Hetogenbosch, The Netherlands.
 6. **JG Snedeker**. (2003) "Numerical models in trauma research" (Poster). Joining Forces Symposium, ETH Zürich, Zurich, Switzerland.
 5. **JG Snedeker**, J Rogelj, M Farshad, F Schmidlin, P Niederer. (2002) "Finite element models of abdominal organs for use in trauma research". World Congress of Biomechanics, Calgary, Canada.
 4. **JG Snedeker**, R Voide, M Farshad, F Schmidlin, P Niederer. (2002) "Time-dependent material properties of the porcine kidney capsular membrane". World Congress of Biomechanics, Calgary, Canada.
 3. **JG Snedeker** and PR Cavanagh. (2001) "Quantifying activity in men aged 70 and older; Effects of daily activity level on bone and muscle". 18th International Society of Biomechanics, Zurich, Switzerland.
 2. **JG Snedeker**, PR Cavanagh.(2000) "Measurement of muscle actions and foot reaction forces from crew members during entire working days on the International Space Station", Space Technology and Applications International Forum, Albuquerque USA.
 1. **JG Snedeker** and PR Cavanagh. (1999) "A method for the design of a heel cushioning insole". Annual Meeting of the American Society of Biomechanics, Pittsburgh USA.

INVITED TALKS & KEYNOTE LECTURES

16. **JG Snedeker**. (2010) "Collagen fibril load sharing in tendon - basic mechanisms and potential for therapeutic exploitation", Tendon Structure-Function Symposium Keynote, World Congress of Biomechanics, Singapore 2010.
15. **JG snedeker**. (2010) "Moving intelligently toward novel cell and biomaterial based approaches to orthopedic disease and therapy", Cell-matrix interaction lecture series, Vogel laboratory, ETH April 2010.
14. **JG Snedeker**. (2009) "Functional imaging of tendon using fibered confocal microscopy", 3rd Switzerland-Japan Workshop on Biomechanics. Plenary Lecture. September 2009.
13. **JG Snedeker**. (2009) "Etiology of Rotator Cuff Tendon Tears and Biomechanics of their Repair", European Society of Biomechanics, Summer Workshop. Plenary Lecture. June 2009.

12. **JG Snedeker.** (2008) "Stem Cell Mechanics", Regenerative Medicine Symposium, University Hospital, University of Zurich, August 2008.
11. **JG Snedeker.** (2007) "Form and function: Multiscale models and experiments for exploring Nature's skeletal designs", University of Zurich, April 2007.
10. **JG Snedeker.** (2007) "From organs to cells: Multiscale models and experiments in biomechanics", Center for Experimental Rheumatology, University Hospital, University of Zurich, April 2007.
9. **JG Snedeker.** (2007) "Imaging Based In Vivo Biomechanics for Stem Cell Therapy", Institute for Spinal Disorders, Cedars-Sinai Hospital, Los Angeles CA USA.
8. **JG Snedeker.** (2007) "Studying the role of mechanics in Stem Cell Biology: Newton meets Hooke", International Stem Cell Institute, Cedars-Sinai Hospital, Los Angeles CA USA.
7. **JG Snedeker.** (2006) "In vivo methods for assessing healing in mesenchymal stem cell therapies for connective tissue disorders", Hadassah Medical Center, Hebrew University, Jerusalem, Israel, November 2006.
6. **JG Snedeker.** (2006) "Better living through biomechanics." Sibley School of Mechanical and Aerospace Engineering, Spring Lecture Series, Cornell University, Ithaca NY, USA May 2006.
5. **JG Snedeker.** (2006) "Structure function in soft tissue connective tissues: a multi-scale investigation." ETH Zurich, Department of Mechanical Engineering, Zurich, Switzerland, February 2006.
4. **JG Snedeker.** (2006) "The value of an engineering perspective in the clinic." University of Zurich, Uniklinik Balgrist, Zurich, Switzerland January 2006.
3. **JG Snedeker.** (2005) "Multi-scale modeling and experiments in biomechanics: Exploring structure function relationships in biology", Mechanical Engineering Department Fall Lecture Series, University of Virginia, Charlottesville VA, USA September 2005.
2. **JG Snedeker.** (2005) "Understanding injury and healing through multi-scale numerical simulation", Autumn Seminar Series, University of Michigan, Ann Arbor MI, USA September 2005.
1. **JG Snedeker.** (2001) "Mathematical models for use in trauma biomechanics". 3eme Cycle Romand d'Informatique - Virtual Reality and Medicine, Geneva, Switzerland, October 2001.

ACTIVE INTERNATIONAL COLLABORATIONS

Prof. Pierre Charbord, INSERM, Hôpital Paul Brousse

Prof. Dan Gazit, Department of Surgery, Cedars Sinai Medical Center, Los Angeles, California

Prof. Toshiro Ohashi, Hokkaido university, Sapporo Japan

Prof. René van Weeren, Faculty of Veterinary Medicine, Utrecht University, The Netherlands

ACTIVE SWISS COLLABORATIONS

Dr. Marc Bohner, Robert Mathys Stiftung, Bettlach

Dr. Norman Espinosa, University of Zurich, Department of Orthopedics

Prof. Bruno Fuchs, University of Zurich, Department of Orthopedics

Prof. Christian Gerber, University of Zurich, Department of Orthopedics

Prof. Christopher Hierold, Micro and Nanosystems, ETH Zurich

Prof. Simon Hoerstrup, University Hospital Zurich

Dr. Reto Luginbuehl, Robert Mathys Stiftung, Bettlach

Dr. Dominik Meyer, University of Zurich, Department of Orthopedics

Prof. Massimo Morbidelli, ETH Zurich, Institute for Biochemical Engineering

Prof. Brigitte von Rechenberg, University of Zurich, Vetsuisse-faculty, Dept. of Equine Surgery

Dr. Andreas Schweizer, University of Zurich, Department of Orthopedics

Dr. Urs Ziegler, Center for Microscopy and Image Analysis University of Zurich

ACTIVE LABORATORY MEMBERS

Philippe Favre (Group Leader Clinical Biomechanics)

Dr. Ram Sharma (Group Leader Cell Biomechanics)

Hansruedi Sommer (Machinist/technician)

Gion Fessel (Research assistant)

Jeremy Wernli (Research assistant)

Guido Bartalena (PhD Candidate)

Jennifer Cadby (PhD Candidate)

Yufei Li (PhD Candidate)

Xiang Li (PhD Candidate)

Yannick Loosli (PhD Candidate)

Samuela Rigozzi (PhD Candidate)

INTERNAL LABORATORY RESOURCES

Approximately 80 sq. m. (620 sq.ft.) of laboratory space in the University Hospital Balgrist.

Static and dynamic equipment for the characterization of tissue mechanical properties,

High speed video cameras with telecentric optics

Machine shop.

Histology, cell culture, and microscopy facilities.

Basic molecular biology tools (e.g. RT-PCR).