Stanford



Marc Levenston

Associate Professor of Mechanical Engineering and, by courtesy, of Radiology (Radiological Sciences Laboratory)

Bio

BIO

Dr. Levenston's primary research interests relate to the function, degeneration and repair of articular cartilage and fibrocartilage, with an emphasis on understanding the complex interactions between biophysical and biochemical cues in controlling cell behavior. Current areas include the mechanisms and functional implications of cell mediated tissue degeneration in cartilage and meniscus, novel imaging techniques for nondestructive assessment of cartilage composition, and interactions between mechanical, chemical and matrix-supplied cues in controlling the development of engineered tissues.

ACADEMIC APPOINTMENTS

- Associate Professor, Mechanical Engineering
- Associate Professor (By courtesy), Radiology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Wu Tsai Human Performance Alliance
- Member, Maternal & Child Health Research Institute (MCHRI)

HONORS AND AWARDS

- Professor of the Year, Society of Latino Engineers (2016)
- Associate Editor, Cellular and Molecular Bioengineering (2009)
- Editorial Consultant, Journal of Biomechanics (2009)
- Fellow, American Society of Mechanical Engineers (2009)
- Tau Beta Pi Award for Excellence in Undergraduate Teaching, Tau Beta Pi (2007, 2011)
- Frederick E. Terman Fellow, Stanford University (2007)
- Docteur Honoris Causa, Université Henri Poincaré (2005)
- Editorial Board, Biorheology (2005)
- Negma-Lerads International Prize for Research on Mechanobiology of Cartilage and Chondrocyte, Negma-Lerads (2005)
- Lockheed Martin Dean's Award for Teaching Excellence, Georgia Tech (2004)
- NIH Skeletal Biology Structure and Regeneration Study Section, NIH (2003-2007)
- CETL/BP Junior Faculty Teaching Excellence Award, Georgia Tech (2001)

PROFESSIONAL EDUCATION

- Postdoctoral Fellow, MIT , Bioengineering

- PhD, Stanford University , Mechanical Engineering (1995)
- MS, Stanford University , Mechanical Engineering (1990)
- BS, University of Florida , Mechanical Engineering (1989)

LINKS

- Soft Tissue Biomechanics Lab: http://stbl.stanford.edu

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

My lab's research involves the function, degeneration and repair of musculoskeletal soft tissues, with a focus on meniscal fibrocartilage and articular cartilage. We are particularly interested in the complex interactions between biophysical and biochemical cues in controlling cell behavior, the roles of these interactions in degenerative conditions such as osteoarthritis, and development of tissue engineered 3D model systems for studying physical influences on primary and progenitor cells.

Teaching

COURSES

2026-27

- Introduction to Biomechanics and Mechanobiology: BIOE 282, ME 283 (Spr)
- Mechanics of Materials: ME 80 (Aut)
- Orthopaedic Bioengineering: BIOE 381, ME 381 (Win)

2025-26

- Intro to Solid Mechanics: ENGR 14 (Aut)
- Introduction to Biomechanics and Mechanobiology: BIOE 282, ME 283 (Spr)
- Orthopaedic Bioengineering: BIOE 381, ME 381 (Win)

2024-25

- Intro to Solid Mechanics: ENGR 14 (Aut)
- Introduction to Deformable Bodies: ME 80A (Win)
- Mechanics of Materials: ME 80 (Win)

2023-24

- Mechanics of Biological Tissues: ME 287 (Win)
- Mechanics of Materials: ME 80 (Aut)
- Orthopaedic Bioengineering: BIOE 381, ME 381 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Cole Allan, Alex Esclamado, Michelle Joyce, Jeremy McCulloch, Raleigh Slyman

Doctoral Dissertation Advisor (AC)

Ethan Darwin

Master's Program Advisor

Senching Hsia, John Kroeger, Aliya Polisky, Christopher Rieping, Lauren Woolsey, Alan Zhao, Mia van de Heetkamp

Doctoral Dissertation Co-Advisor (AC)

Queenie Lin

Doctoral (Program)

Benjamin LeRoy, Valerie Perez Medina

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Bioengineering (PhD Program)

Publications

PUBLICATIONS

- **Pediatric Meniscotibial Ligament Complex Anatomy and Biomechanics.** *Orthopaedic journal of sports medicine*
  van Deursen, W. H., Johnstone, T. M., Cuellar-Montes, A., Baird, D. R., Chan, C. K., Hollyer, I., Rohde, M. S., Tompkins, M., Ellis, H. B., Ganley, T. J., Yen, Y. M., Schmitz, M. R., Pham, et al
  2025; 13 (9): 23259671251367060

- **Texture profile analysis and rheology of plant-based and animal meat.** *Food research international (Ottawa, Ont.)*
  Dunne, R. A., Darwin, E. C., Perez Medina, V. A., Levenston, M. E., St Pierre, S. R., Kuhl, E.
  2025; 205: 115876

- **Increasing Spatial Resolution in Photon Counting CT by Exploiting the Non-Linear Partial Volume Effect**
  Li, B., Yang, Y., Wang, S., Darwin, E., Stevens, G., Levenston, M., Wang, A. S.
  edited by Sabol, J. M., Li, K., Abbaszadeh, S.
  SPIE-INT SOC OPTICAL ENGINEERING.2025

- **The mechanical and sensory signature of plant-based and animal meat.** *NPJ science of food*
  St Pierre, S. R., Darwin, E. C., Adil, D., Aviles, M. C., Date, A., Dunne, R. A., Lall, Y., Parra Vallecillo, M., Perez Medina, V. A., Linka, K., Levenston, M. E., Kuhl, E.
  2024; 8 (1): 94

- **Discovering the mechanics of artificial and real meat** *COMPUTER METHODS IN APPLIED MECHANICS AND ENGINEERING*
  St Pierre, S. R., Rajasekharan, D., Darwin, E. C., Linka, K., Levenston, M. E., Kuhl, E.
  2023; 415

- **Validating MRI-Derived Myocardial Stiffness Estimates Using In Vitro Synthetic Heart Models.** *Annals of biomedical engineering*
  Kolawole, F. O., Peirlinck, M., Cork, T. E., Levenston, M., Kuhl, E., Ennis, D. B.
  2023

- **Contrast solution properties and scan parameters influence the apparent diffusivity of computed tomography contrast agents in articular cartilage.** *Journal of the Royal Society, Interface*
  Hall, M. E., Wang, A. S., Gold, G. E., Levenston, M. E.
  2022; 19 (193): 20220403

- **Validation of watershed-based segmentation of the cartilage surface from sequential CT arthrography scans.** *Quantitative imaging in medicine and surgery*
  Hall, M. E., Black, M. S., Gold, G. E., Levenston, M. E.
  2022; 12 (1): 1-14

- **Weight-Bearing C-Arm Cone-Beam CT Using a Dynamic Range Reducer (DyRaR): Initial Prototype and Phantom Studies**
  Bennett, N., Zhang, H., Mueller, K., Fahrig, R., Maier, A., Levenston, M., Gold, G., Wang, A.
  WILEY.2021

- **Characterizing the transient response of knee cartilage to running: Decreases in cartilage T2 of female recreational runners.** *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*
  Crowder, H. A., Mazzoli, V. n., Black, M. S., Watkins, L. E., Kogan, F. n., Hargreaves, B. A., Levenston, M. E., Gold, G. E.
  2021

- **On the impact of vessel wall stiffness on quantitative flow dynamics in a synthetic model of the thoracic aorta.** *Scientific reports*
  Zimmermann, J. n., Loecher, M. n., Kolawole, F. O., Bäumler, K. n., Gifford, K. n., Dual, S. A., Levenston, M. n., Marsden, A. L., Ennis, D. B.
  2021; 11 (1): 6703
- **Rapid volumetric gagCEST imaging of knee articular cartilage at 3 T: evaluation of improved dynamic range and an osteoarthritic population.** *NMR in biomedicine*
  Watkins, L. E., Rubin, E. B., Mazzoli, V. n., Uhlrich, S. D., Desai, A. D., Black, M. n., Ho, G. K., Delp, S. L., Levenston, M. E., Beaupré, G. S., Gold, G. E., Kogan, F. n.
  2020: e4310
- **Non-ionic CT Contrast Solutions Rapidly Alter Bovine Cartilage and Meniscus Mechanics.** *Osteoarthritis and cartilage*
  Baylon, E. G., Crowder, H. A., Gold, G. E., Levenston, M. E.
  2020
- **Osmotic Swelling Responses are Conserved Across Cartilaginous Tissues with Varied Sulfated-Glycosaminoglycan Contents.** *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*
  Baylon, E. G., Levenston, M. E.
  2019
- **EVALUATING THE RELATIONSHIP BETWEEN GAGCEST MRI AND CARTILAGE BIOCHEMICAL COMPOSITION IN JUVENILE BOVINE ARTICULAR CARTILAGE**
  Watkins, L., Kogan, F., Rubin, E., Black, M., Levenston, M., Gold, G.
  ELSEVIER SCI LTD.2019: S369–S370
- **Rapid and durable photochemical bonding of cartilage using the porphyrin photosensitizer verteporfin.** *Osteoarthritis and cartilage*
  Arvayo, A. L., Imbrie-Moore, A. n., Levenston, M. E.
  2019
- **Mechanical Properties of the Airway Tree: Heterogeneous and Anisotropic Pseudoelastic and Viscoelastic Tissue Responses.** *Journal of applied physiology (Bethesda, Md. : 1985)*
  Eskandari, M., Arvayo, A. L., Levenston, M. E.
  2018
- **Enhancing integration of articular cartilage grafts via photochemical bonding.** *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*
  Arvayo, A. L., Wong, I. J., Dragoo, J. L., Levenston, M. E.
  2018
- **Detecting Anatomical Landmarks for Motion Estimation in Weight-Bearing Imaging of Knees**
  Bier, B., Aschoff, K., Syben, C., Unberath, M., Levenston, M., Gold, G., Fahrig, R., Maier, A.
  edited by Knoll, F., Maier, A., Rueckert, D.
  SPRINGER INTERNATIONAL PUBLISHING AG.2018: 83–90
- **Feasibility of Motion Compensation using Inertial Measurement in C-arm CT**
  Maier, J., Aichert, A., Mehringer, W., Bier, B., Eskofier, B., Levenston, M., Gold, G., Fahrig, R., Bonaretti, S., Maier, A., IEEE
  IEEE.2018
- **Adipokines Induce Catabolism of Newly Synthesized Matrix in Cartilage and Meniscus Tissues.** *Connective tissue research*
  Nishimuta, J. F., Levenston, M. E.
  2017
- **Mechanical confinement regulates cartilage matrix formation by chondrocytes.** *Nature materials*
  Lee, H. P., Gu, L. n., Mooney, D. J., Levenston, M. E., Chaudhuri, O. n.
  2017; 16 (12): 1243–51
- **JOINT CALIBRATION AND MOTION ESTIMATION IN WEIGHT-BEARING CONE-BEAM CT OF THE KNEE JOINT USING FIDUCIAL MARKERS**
  Syben, C., Bier, B., Berger, M., Aichert, A., Fahrig, R., Gold, G., Levenston, M., Maier, A., IEEE
  IEEE.2017: 494–97
- **Comparison of Different Approaches for Measuring Tibial Cartilage Thickness** *JOURNAL OF INTEGRATIVE BIOINFORMATICS*
  Maier, J., Black, M., Bonaretti, S., Bier, B., Eskofier, B., Choi, J., Levenston, M., Gold, G., Fahrig, R., Maier, A.

2017; 14 (2)

- **Co-Culture with Infrapatellar Fat Pad Differentially Stimulates Proteoglycan Synthesis and Accumulation in Cartilage and Meniscus Tissues.** *Connective tissue research*
  Nishimuta, J. F., Bendernagel, M. F., Levenston, M. E.
  2016: -?
- **Bovine meniscal tissue exhibits age- and interleukin-1 dose-dependent degradation patterns and composition-function relationships** *JOURNAL OF ORTHOPAEDIC RESEARCH*
  Ling, C. H., Lai, J. H., Wong, I. J., Levenston, M. E.
  2016; 34 (5): 801-811
- **TIBIAL CARTILAGE CREEP DURING WEIGHT BEARING: IN VIVO 3D CT ASSESSMENT**
  Choi, J., McWalter, E. J., Datta, S., Mueller, K., Maier, A., Fahrig, R., Levenston, M. E., Gold, G. E.
  ELSEVIER SCI LTD.2016: S104
- **Object Removal in Gradient Domain of Cone-Beam CT Projections**
  Bier, B., Berger, M., Maier, J., Unberath, M., Hsieh, S., Bonaretti, S., Fahrig, R., Levenston, M. E., Gold, G. E., Maier, A., IEEE
  IEEE.2016
- **Meniscus is more susceptible than cartilage to catabolic and anti-anabolic effects of adipokines** *OSTEOARTHRITIS AND CARTILAGE*
  Nishimuta, J. F., Levenston, M. E.
  2015; 23 (9): 1551-1562
- **Quantitative tracking of passage and 3D culture effects on chondrocyte and fibrochondrocyte gene expression.** *Journal of tissue engineering and regenerative medicine*
  Son, M., Levenston, M. E.
  2015
- **FACT VERSUS ARTIFACT: AVOIDING ERRONEOUS ESTIMATES OF SULFATED GLYCOSAMINOGLYCAN CONTENT USING THE DIMETHYLMETHYLENE BLUE COLORIMETRIC ASSAY FOR TISSUE-ENGINEERED CONSTRUCTS** *EUROPEAN CELLS & MATERIALS*
  Zheng, C. H., Levenston, M. E.
  2015; 29: 224-236
- **Mechanisms of osteoarthritis in the knee: MR imaging appearance.** *Journal of magnetic resonance imaging*
  Shapiro, L. M., McWalter, E. J., Son, M., Levenston, M., Hargreaves, B. A., Gold, G. E.
  2014; 39 (6): 1346-1356
- **Regional variation in T1? and T2 times in osteoarthritic human menisci: correlation with mechanical properties and matrix composition.** *Osteoarthritis and cartilage*
  Son, M., Goodman, S. B., Chen, W., Hargreaves, B. A., Gold, G. E., Levenston, M. E.
  2013; 21 (6): 796-805
- **Application of advanced magnetic resonance imaging techniques in evaluation of the lower extremity.** *Radiologic clinics of North America*
  Braun, H. J., Dragoo, J. L., Hargreaves, B. A., Levenston, M. E., Gold, G. E.
  2013; 51 (3): 529-545
- **Application of advanced magnetic resonance imaging techniques in evaluation of the lower extremity.** *Radiologic clinics of North America*
  Braun, H. J., Dragoo, J. L., Hargreaves, B. A., Levenston, M. E., Gold, G. E.
  2013; 51 (3): 529-545
- **Modulation of Mesenchymal Stem Cell Shape in Enzyme-Sensitive Hydrogels Is Decoupled from Upregulation of Fibroblast Markers Under Cyclic Tension** *TISSUE ENGINEERING PART A*
  Yang, P. J., Levenston, M. E., Temenoff, J. S.
  2012; 18 (21-22): 2365-2375
- **Variations in chondrogenesis of human bone marrow-derived mesenchymal stem cells in fibrin/alginate blended hydrogels** *ACTA BIOMATERIALIA*
  Ma, K., Titan, A. L., Stafford, M., Zheng, C. H., Levenston, M. E.
  2012; 8 (10): 3754-3764

- **Self-assembling nanoparticles for intra-articular delivery of anti-inflammatory proteins** *BIOMATERIALS*
  Whitmire, R. E., Wilson, D. S., Singh, A., Levenston, M. E., Murthy, N., Garcia, A. J.
  2012; 33 (30): 7665-7675
- **Regional variations in the distribution and colocalization of extracellular matrix proteins in the juvenile bovine meniscus** *JOURNAL OF ANATOMY*
  Vanderploeg, E. J., Wilson, C. G., Imler, S. M., Ling, C. H., Levenston, M. E.
  2012; 221 (2): 174-186
- **Quantitative imaging of cartilage and bone morphology, reactive oxygen species, and vascularization in a rodent model of osteoarthritis** *ARTHRITIS AND RHEUMATISM*
  Xie, L., Lin, A. S., Kundu, K., Levenston, M. E., Murthy, N., Guldberg, R. E.
  2012; 64 (6): 1899-1908
- **Response of cartilage and meniscus tissue explants to in vitro compressive overload** *OSTEOARTHRITIS AND CARTILAGE*
  NISHIMUTA, J. F., Levenston, M. E.
  2012; 20 (5): 422-429
- **Depth-Dependent Transverse Shear Properties of the Human Corneal Stroma** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*
  Petsche, S. J., Chernyak, D., Martiz, J., Levenston, M. E., Pinsky, P. M.
  2012; 53 (2): 873-880
- **DISCRIMINATION OF MENISCAL CELL PHENOTYPES USING GENE EXPRESSION PROFILES** *EUROPEAN CELLS & MATERIALS*
  Son, M., Levenston, M. E.
  2012; 23: 195-208
- **Comparison of osmotic swelling influences on meniscal fibrocartilage and articular cartilage tissue mechanics in compression and shear** *JOURNAL OF ORTHOPAEDIC RESEARCH*
  Nguyen, A. M., Levenston, M. E.
  2012; 30 (1): 95-102
- **FIBRONECTIN- AND COLLAGEN-MIMETIC LIGANDS REGULATE BONE MARROW STROMAL CELL CHONDROGENESIS IN THREE-DIMENSIONAL HYDROGELS** *EUROPEAN CELLS & MATERIALS*
  Connelly, J. T., Petrie, T. A., Garcia, A. J., Levenston, M. E.
  2011; 22: 168-177
- **Cyclic Tensile Culture Promotes Fibroblastic Differentiation of Marrow Stromal Cells Encapsulated in Poly(Ethylene Glycol)-Based Hydrogels** *TISSUE ENGINEERING PART A*
  Doroski, D. M., Levenston, M. E., Temenoff, J. S.
  2010; 16 (11): 3457-3466
- **Meniscus and cartilage exhibit distinct intra-tissue strain distributions under unconfined compression** *OSTEOARTHRITIS AND CARTILAGE*
  Lai, J. H., Levenston, M. E.
  2010; 18 (10): 1291-1299
- **Tensile Loading Modulates Bone Marrow Stromal Cell Differentiation and the Development of Engineered Fibrocartilage Constructs** *TISSUE ENGINEERING PART A*
  Connelly, J. T., Vanderploeg, E. J., Mouw, J. K., Wilson, C. G., Levenston, M. E.
  2010; 16 (6): 1913-1923
- **Nondestructive assessment of sGAG content and distribution in normal and degraded rat articular cartilage via EPIC-mu CT** *OSTEOARTHRITIS AND CARTILAGE*
  Xie, L., Lin, A. S., Guldberg, R. E., Levenston, M. E.
  2010; 18 (1): 65-72
- **ARE PASSAGED CHONDROCYTES PHENOTYPICALLY SIMILAR TO MENISCAL FIBROCHONDROCYTES?** *12th ASME Summer Bioengineering Conference*
  Son, M., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2010: 943–944

- **DOSE-DEPENDENT EFFECTS OF INTERLEUKIN-1ALPHA ON FUNCTIONAL DEGRADATION OF LATERAL AND MEDIAL MENISCI** *12th ASME Summer Bioengineering Conference*
  Ling, C. H., Lai, J. H., Nishimuta, J. F., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2010: 45–46
- **ARE PASSAGED CHONDROCYTES PHENOTYPICALLY SIMILAR TO MENISCAL FIBROCHONDROCYTES?** *12th ASME Summer Bioengineering Conference*
  Son, M., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2010: 943–944
- **Photochemical approaches for bonding of cartilage tissues** *OSTEOARTHRITIS AND CARTILAGE*
  Sitterle, V. B., NISHIMUTA, J. F., Levenston, M. E.
  2009; 17 (12): 1649-1656
- **Central and peripheral region tibial plateau chondrocytes respond differently to in vitro dynamic compression** *OSTEOARTHRITIS AND CARTILAGE*
  Bevill, S. L., Briant, P. L., Levenston, M. E., Andriacchi, T. P.
  2009; 17 (8): 980-987
- **Composition-function relationships during IL-1-induced cartilage degradation and recovery** *OSTEOARTHRITIS AND CARTILAGE*
  Palmer, A. W., Wilson, C. G., BAUM, E. J., Levenston, M. E.
  2009; 17 (8): 1029-1039
- **Chondrocytes and Meniscal Fibrochondrocytes Differentially Process Aggrecan During De Novo Extracellular Matrix Assembly** *ASME Summer Bioengineering Conference 2007*
  Wilson, C. G., Nishimuta, J. F., Levenston, M. E.
  MARY ANN LIEBERT INC.2009: 1513–22
- **Quantitative assessment of articular cartilage morphology via EPIC-mu CT** *OSTEOARTHRITIS AND CARTILAGE*
  Xie, L., Lin, A. S., Levenston, M. E., Guldberg, R. E.
  2009; 17 (3): 313-320
- **Improved Estimation of Solute Diffusivity Through Numerical Analysis of FRAP Experiments** *CELLULAR AND MOLECULAR BIOENGINEERING*
  Irrechukwu, O. N., Levenston, M. E.
  2009; 2 (1): 104-117
- **Aggrecanolysis and in vitro matrix degradation in the immature bovine meniscus: mechanisms and functional implications** *ARTHRITIS RESEARCH & THERAPY*
  Wilson, C. G., Vanderploeg, E. J., Zuo, F., Sandy, J. D., Levenston, M. E.
  2009; 11 (6)
- **ARTICULAR CARTILAGE AND MENISCAL FIBROCARTILAGE MECHANICS: EVIDENCE FOR DIFFERENCES IN ULTRASTRUCTURE AND FUNCTION OF PROTEOGLYCANS** *ASME Summer Bioengineering Conference*
  Nguyen, A. M., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2009: 927–928
- **OSMOTIC EFFECTS ON THE DYNAMIC SHEAR PROPERTIES OF MENISCAL FIBROCARTILAGE** *ASME Summer Bioengineering Conference*
  Ho, P. H., Nguyen, A. M., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2009: 415–416
- **Development And Finite Element Implementation Of A Nearly Incompressible Structural Constitutive Model For Artery Substitute Design** *ASME Summer Bioengineering Conference*
  Sun, W., Chaikof, E. L., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2009: 681–682
- **Numerical Approximation of Tangent Moduli for Finite Element Implementations of Nonlinear Hyperelastic Material Models** *JOURNAL OF BIOMECHANICAL ENGINEERING-TRANSACTIONS OF THE ASME*
  Sun, W., Chaikof, E. L., Levenston, M. E.
  2008; 130 (6)

- **Evaluation Criteria for Musculoskeletal and Craniofacial Tissue Engineering Constructs: A Conference Report** *TISSUE ENGINEERING PART A*
  Butler, D. L., Lewis, J. L., Frank, C. B., Banes, A. J., Caplan, A. I., De Deyne, P. G., Dowling, M., Fleming, B. C., Glowacki, J., Guldberg, R. E., Johnstone, B., Kaplan, D. L., Levenston, et al
  2008; 14 (12): 2089-2104

- **A modified lap test to more accurately estimate interfacial shear strength for bonded tissues** *JOURNAL OF BIOMECHANICS*
  Sitterle, V. B., Sun, W., Levenston, M. E.
  2008; 41 (15): 3260-3264

- **3D imaging of tissue integration with porous biomaterials** *BIOMATERIALS*
  Guldberg, R. E., Duvall, C. L., Peister, A., Oest, M. E., Lin, A. S., Palmer, A. W., Levenston, M. E.
  2008; 29 (28): 3757-3761

- **Articular chondrocytes derived from distinct tissue zones differentially respond to in vitro oscillatory tensile loading** *OSTEOARTHRITIS AND CARTILAGE*
  Vanderploeg, E. J., Wilson, C. G., Levenston, M. E.
  2008; 16 (10): 1228-1236

- **Interactions between integrin ligand density and cytoskeletal integrity regulate BMSC chondrogenesis** *JOURNAL OF CELLULAR PHYSIOLOGY*
  Connelly, J. T., Garcia, A. J., Levenston, M. E.
  2008; 217 (1): 145-154

- **Characterization of proteoglycan production and processing by chondrocytes and BMSCs in tissue engineered constructs** *OSTEOARTHRITIS AND CARTILAGE*
  Connelly, J. T., Wilson, C. G., Levenston, M. E.
  2008; 16 (9): 1092-1100

- **Contrast enhanced micro-CT imaging of vascular and cartilaginous tissues** *Annual Tissue-Engineering-and-Regenerative-Medicine-International-Society-European-Chapter Meeting*
  Guldberg, R. E., Xie, L., Duvall, C. L., Palmer, A. W., Taylor, W. R., Levenston, M. E.
  MARY ANN LIEBERT INC.2008: 715–15

- **Selective and non-selective metalloproteinase inhibitors reduce IL-1-induced cartilage degradation and loss of mechanical properties** *MATRIX BIOLOGY*
  Wilson, C. G., Palmer, A. W., Zuo, F., Eugui, E., Wilson, S., Mackenzie, R., Sandy, J. D., Levenston, M. E.
  2007; 26 (4): 259-268

- **Dynamic compression regulates the expression and synthesis of chondrocyte-specific matrix molecules in bone marrow stromal cells** *STEM CELLS*
  Mouw, J. K., Connelly, J. T., Wilson, C. G., Michael, K. E., Levenston, M. E.
  2007; 25 (3): 655-663

- **Inhibition of in vitro chondrogenesis in RGD-modified three-dimensional alginate gels** *BIOMATERIALS*
  Connelly, J. T., Garcia, A. J., Levenston, M. E.
  2007; 28 (6): 1071-1083

- **Ion-channel regulation of chondrocyte matrix synthesis in 3D culture under static and dynamic compression** *BIOMECHANICS AND MODELING IN MECHANOBIOLOGY*
  Mouw, J. K., Imler, S. M., Levenston, M. E.
  2007; 6 (1-2): 33-41

- **Chondrocytes and fibrochondrocytes differentially process aggrecan during de novo extracellular matrix assembly** *ASME Summer Bioengineering Conference*
  Wilson, C. G., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2007: 1041–1042

- **Contrast-enhanced micro-CT imaging of soft tissues** *International Symposium on Advanced Biotechnologies for Assessing Quality of Bone and Scaffold Biomaterials*
  Lin, A. S., Palmer, A. W., Duvall, C. L., Robertson, G. C., Oest, M. E., Rai, B., Levenston, M. E., Guldberg, R. E.

SPRINGER-VERLAG BERLIN.2007: 239–256

- **Depth dependent diffusivity profile in bovine articular cartilage: Comparing transverse and axial diffusivities** *ASME Summer Bioengineering Conference*
  Irrechukwu, O. N., Levenston, M. E.
  AMER SOC MECHANICAL ENGINEERS.2007: 123–124
- **Analysis of cartilage matrix fixed charge density and three-dimensional morphology via contrast-enhanced microcomputed tomography** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Palmer, A. W., Guldberg, R. E., Levenston, M. E.
  2006; 103 (51): 19255-19260
- **A constitutive model for protein-based materials** *BIOMATERIALS*
  Wu, X., Levenston, M. E., Chaikof, E. L.
  2006; 27 (30): 5315-5325
- **Indentation testing of human articular cartilage: Effects of probe tip geometry and indentation depth on intra-tissue strain** *JOURNAL OF BIOMECHANICS*
  Bae, W. C., Lewis, C. W., Levenston, M. E., Sah, R. L.
  2006; 39 (6): 1039-1047
- **Biomechanical analysis of silicon microelectrode-induced strain in the brain.** *Journal of neural engineering*
  Lee, H., Bellamkonda, R. V., Sun, W., Levenston, M. E.
  2005; 2 (4): 81-89
- **Alterations in physical cross-linking modulate mechanical properties of two-phase protein polymer networks** *BIOMACROMOLECULES*
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