



## Constance Chu, MD

Professor of Orthopaedic Surgery (Sports Medicine)

### CLINICAL OFFICES

- **Stanford Sports Medicine Clinic**

450 Broadway St

Pavilion A 2nd Fl MC 6120

Redwood City, CA 94063

**Tel** (650) 723-5643      **Fax** (650) 721-3429

### Bio

---

#### BIO

Dr. Constance R. Chu is Professor and Vice Chair Research, in the Department of Orthopedic Surgery at Stanford University. She is also Director of the Joint Preservation Center and Chief of Sports Medicine at the VA Palo Alto. Previously, she was the Albert Ferguson Endowed Chair and Professor of Orthopaedic Surgery at the University of Pittsburgh. She is a clinician-scientist who is both principal investigator of several projects funded by the National Institutes of Health and who has been recognized as a Castle-Connelly/US News and World Report "Top Doctor" in Orthopedic Surgery as well as on Becker's list of Top Knee Surgeons in the United States. Her clinical practice focuses on the knee: primarily restoration and reconstruction of the ACL, menisci and cartilage. She graduated from the U.S. Military Academy at West Point and earned her medical degree from Harvard Medical School.

As Director of the multi-disciplinary Joint Preservation Center structured to seamlessly integrate the latest advances in biologics, mechanics, and imaging with comprehensive patient centered musculoskeletal and orthopedic care, Dr. Chu aims to develop a new model for health care delivery, research and education with an emphasis on health promotion and prevention. Cornerstones of this program include teamwork and a focus on personalized medicine. A central goal is to transform the clinical approach to osteoarthritis from palliation to prevention. In addition to optimizing clinical operations, outstanding research is critical to developing more effective new treatments. Towards this end, Dr. Chu is leading innovative translational research from bench to bedside in three main areas: quantitative imaging and biomarker development for early diagnosis and staging of joint and cartilage injury and degeneration; cartilage tissue engineering and stem cell based cartilage repair; and molecular and biological therapies for joint restoration and joint rejuvenation. Her research efforts have led to more than 30 professional awards and honors to include a Kappa Delta Award, considered to be the highest research honor in Orthopedic Surgery.

Dr. Chu also regularly holds leadership and committee positions in major professional organizations such as the American Association of Orthopedic Surgeons (AAOS) and the American Orthopedic Association (AOA). In her subspecialty of Orthopedic Sports Medicine, she is a past President of the Forum Sports Focus Group, a member of the Herodius Society of leaders in Sports Medicine, and immediate past Chair of the American Orthopedic Society for Sports Medicine (AOSSM) Research Council. She is alumnus of the AOA American, British, Canadian (ABC) and the AOSSM Traveling Fellowships.

## CLINICAL FOCUS

- Orthopaedic Surgery
- Sports Medicine and Arthroscopy
- ACL, Cartilage and Meniscus Repair

## ACADEMIC APPOINTMENTS

- Professor - University Medical Line, Orthopaedic Surgery
- Member, Bio-X

## ADMINISTRATIVE APPOINTMENTS

- Director, Joint Preservation Center, VA Palo Alto, (2013- present)
- Chief, Sports Medicine, VA Palo Alto, (2013- present)
- Vice Chair Research, Stanford Orthopedic Surgery, (2013- present)

## PROFESSIONAL EDUCATION

- Fellowship: Brigham and Women's Hospital Orthopaedic Surgery Programs (1999) MA
- Residency: UCSD Orthopaedic Surgery (1998) CA
- Internship: UCSD Surgery Residency (1993) CA
- Board Certification: Orthopaedic Surgery, American Board of Orthopaedic Surgery (2002)
- Medical Education: Harvard Medical School (1992) MA
- Fellowship, Drexel University , Executive Leadership in Academic Medicine (2012)
- Certificate, University of Pittsburgh Katz Business School , Physician Leadership and Management (2011)
- Undergraduate, US Military Academy at West Point (1983)

## LINKS

- Get a Second Opinion: <https://stanfordhealthcare.org/second-opinion/overview.html>

## Research & Scholarship

---

### CLINICAL TRIALS

- Gait Retraining to Reduce Joint Loading, Inflammation, and PTOA Risk, Recruiting
- Precision Assessment of Platelet Rich Plasma for Joint Preservation, Recruiting
- The Effects of Tranexamic Acid on Joint Inflammation and Cartilage Health in Anterior Cruciate Ligament Injured Patients, Recruiting

## Teaching

---

### COURSES

#### 2020-21

- Orthopaedic Tissue Engineering: ORTHO 270 (Win)

#### 2019-20

- Orthopaedic Tissue Engineering: ORTHO 270 (Win)

#### 2018-19

- Orthopaedic Research Seminar Series: ORTHO 10SI (Spr)

- Orthopaedic Tissue Engineering: ORTHO 270 (Win)

2017-18

- Orthopaedic Tissue Engineering: ORTHO 270 (Win)

## STANFORD ADVISEES

### Postdoctoral Faculty Sponsor

Karyn Chappell

### Postdoctoral Research Mentor

Karyn Chappell

## GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- PM& R Sports Medicine (Fellowship Program)
- Sports Medicine (Fellowship Program)

## Publications

---

### PUBLICATIONS

- **Dance between biology, mechanics, and structure: A systems-based approach to developing osteoarthritis prevention strategies** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Chu, C. R., Andriacchi, T. P.  
2015; 33 (7): 939-947
- **The Challenge and the Promise of Bone Marrow Cells for Human Cartilage Repair** *CARTILAGE*  
Chu, C. R.  
2015; 6 (2): 36S-45S
- **Effects of high heel wear and increased weight on the knee during walking.** *Journal of orthopaedic research*  
Titchenal, M. R., Asay, J. L., Favre, J., Andriacchi, T. P., Chu, C. R.  
2015; 33 (3): 405-411
- **Quantitative Magnetic Resonance Imaging UTE-T2\* Mapping of Cartilage and Meniscus Healing After Anatomic Anterior Cruciate Ligament Reconstruction.** *American journal of sports medicine*  
Chu, C. R., Williams, A. A., West, R. V., Qian, Y., Fu, F. H., Do, B. H., Bruno, S.  
2014; 42 (8): 1847-1856
- **Quantitative Magnetic Resonance Imaging UTE-T2\* Mapping of Cartilage and Meniscus Healing After Anatomic Anterior Cruciate Ligament Reconstruction** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Chu, C. R., Williams, A. A., West, R. V., Qian, Y., Fu, F. H., Do, B. H., Bruno, S.  
2014; 42 (8): 1847-1856
- **Osteoarthritis: From Palliation to Prevention: AOA Critical Issues.** *The Journal of bone and joint surgery. American volume*  
Chu, C. R., Millis, M. B., Olson, S. A.  
2014; 96 (15): e130
- **Persistence, Localization, and External Control of Transgene Expression After Single Injection of Adeno-Associated Virus into Injured Joints** *HUMAN GENE THERAPY*  
Lee, H. H., O'Malley, M. J., Friel, N. A., Payne, K. A., Qiao, C., Xiao, X., Chu, C. R.  
2013; 24 (4): 457-466
- **Early diagnosis to enable early treatment of pre-osteoarthritis** *ARTHRITIS RESEARCH & THERAPY*  
Chu, C. R., Williams, A. A., Coyle, C. H., Bowers, M. E.  
2012; 14 (3)
- **Donor sex and age influence the chondrogenic potential of human femoral bone marrow stem cells** *OSTEOARTHRITIS AND CARTILAGE*

- Payne, K. A., Didiano, D. M., Chu, C. R.  
2010; 18 (5): 705-713
- **Single-cell mass cytometry reveals cross-talk between inflammation-dampening and inflammation-amplifying cells in osteoarthritic cartilage** *Science Advances*  
Grandi, F. ., Baskar, R., Smeriglio, P., Murkherjee, S., Indelli, P., F. Amanatullah, D., Goodman, S., Chu, C., Bendall, S., Bhutani, N.  
2020; 6 (11)
  - **The distillation curve and sooting propensity of a typical jet fuel** *Fuel*  
Saggese, C., Singh, A. V., Xue, X., Chu, C., Kholghy, M. R., Zhang, T., Camacho, J., Giaccai, J., Miller, H., Thomson, M. J., Sung, C., Wang, H.  
2019; 235
  - **Proceedings of the signature series symposium "cellular therapies for orthopaedics and musculoskeletal disease proven and unproven therapies-promise, facts and fantasy," international society for cellular therapies, montreal, canada, may 2, 2018.** *Cytotherapy*  
Piuzzi, N. S., Dominici, M., Long, M., Pascual-Garrido, C., Rodeo, S., Huard, J., Guicheux, J., McFarland, R., Goodrich, L. R., Maddens, S., Robey, P. G., Bauer, T. W., Barrett, et al  
2018
  - **MRI UTE-T2\* Shows High Incidence of Cartilage Subsurface Matrix Changes 2 Years After ACL Reconstruction.** *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*  
Williams, A. A., Titchenal, M. R., Do, B. H., Guha, A., Chu, C. R.  
2018
  - **Longitudinal changes in knee gait mechanics between 2 and 8 years after anterior cruciate ligament reconstruction.** *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*  
Erhart-Hledik, J. C., Chu, C. R., Asay, J. L., Andriacchi, T. P.  
2018; 36 (5): 1478-86
  - **MRI UTE-T2\*profile characteristics correlate to walking mechanics and patient reported outcomes 2 years after ACL reconstruction** *OSTEOARTHRITIS AND CARTILAGE*  
Williams, A. A., Titchenal, M. R., Andriacchi, T. P., Chu, C. R.  
2018; 26 (4): 569-79
  - **ACTIVE FEEDBACK GAIT RETRAINING ALTERS FOOT PRESSURE PATTERNS AND REDUCES KNEE ADDUCTION MOMENT IN AN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTED POPULATION**  
Erhart-Hledik, J. C., Mahtani, G. B., Asay, J. L., Chu, C. R., Andriacchi, T. P.  
ELSEVIER SCI LTD.2018: S364
  - **MECHANICALLY STIMULATED CS846 CORRELATES WITH ULTRASHORT ECHO TIME ENHANCED T2\*QUANTITATIVE MRI AND GAIT MECHANICS 2 YEARS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION**  
Titchenal, M. R., Williams, A. A., Asay, J. L., Migliore, E., Erhart-Hledik, J. C., Andriacchi, T. P., Chu, C. R.  
ELSEVIER SCI LTD.2018: S176-S177
  - **Cartilage Subsurface Changes to Magnetic Resonance Imaging UTE-T2\*2 Years After Anterior Cruciate Ligament Reconstruction Correlate With Walking Mechanics Associated With Knee Osteoarthritis** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Titchenal, M. R., Williams, A. A., Chehab, E. F., Asay, J. L., Dragoo, J. L., Gold, G. E., McAdams, T. R., Andriacchi, T. P., Chu, C. R.  
2018; 46 (3): 565-72
  - **Men and Women Differ in the Biochemical Composition of Platelet-Rich Plasma** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Xiong, G., Lingampalli, N., Koltsov, J. B., Leung, L. L., Bhutani, N., Robinson, W. H., Chu, C. R.  
2018; 46 (2): 409-19
  - **Minimally Manipulated Bone Marrow Concentrate Compared with Microfracture Treatment of Full-Thickness Chondral Defects A One-Year Study in an Equine Model** *JOURNAL OF BONE AND JOINT SURGERY-AMERICAN VOLUME*  
Chu, C. R., Fortier, L. A., Williams, A., Payne, K. A., McCarrel, T. M., Bowers, M. E., Jaramillo, D.  
2018; 100 (2): 138-46
  - **Human iPSC-derived chondrocytes mimic juvenile chondrocyte function for the dual advantage of increased proliferation and resistance to IL-1 beta** *STEM CELL RESEARCH & THERAPY*  
Lee, J., Smeriglio, P., Chu, C. R., Bhutani, N.  
2017; 8: 244

- **CCL2/CCR2, but not CCL5/CCR5, mediates monocyte recruitment, inflammation and cartilage destruction in osteoarthritis** *ANNALS OF THE RHEUMATIC DISEASES*  
Raghu, H., Lepus, C. M., Wang, Q., Wong, H. H., Lingampalli, N., Oliviero, F., Punzi, L., Giori, N. J., Goodman, S. B., Chu, C. R., Sokolove, J. B., Robinson, W. H.  
2017; 76 (5)
- **BILATERAL ASSESSMENT OF CARTILAGE WITH UTE-T2\*QUANTITATIVE MRI AND ASSOCIATIONS WITH KNEE CENTER OF ROTATION FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION**  
Titchenal, M. R., Williams, A. A., Asay, J. L., Andriacchi, T. P., Chu, C. R.  
ELSEVIER SCI LTD.2017: S120-S121
- **Gait mechanics 2 years after anterior cruciate ligament reconstruction are associated with longer-term changes in patient-reported outcomes** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Erhart-Hledik, J. C., Chu, C. R., Asay, J. L., Andriacchi, T. P.  
2017; 35 (3): 634-640
- **Early articular cartilage MRI T2 changes after anterior cruciate ligament reconstruction correlate with later changes in T2 and cartilage thickness** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Williams, A., Winalski, C. S., Chu, C. R.  
2017; 35 (3): 699-706
- **Early Changes in Knee Center of Rotation During Walking After Anterior Cruciate Ligament Reconstruction Correlate With Later Changes in Patient-Reported Outcomes** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Titchenal, M. R., Chu, C. R., Erhart-Hledik, J. C., Andriacchi, T. P.  
2017; 45 (4): 915-921
- **Environmental durability of protected silver mirrors prepared by plasma beam sputtering** *APPLIED OPTICS*  
Folgnier, K. A., Chu, C., Lingley, Z. R., Kim, H. I., Yang, J., Barrie, J. D.  
2017; 56 (4): C75-C86
- **Effects of active feedback gait retraining to produce a medial weight transfer at the foot in subjects with symptomatic medial knee osteoarthritis.** *Journal of orthopaedic research*  
Erhart-Hledik, J. C., Asay, J. L., Clancy, C., Chu, C. R., Andriacchi, T. P.  
2017
- **Mechanically stimulated biomarkers signal cartilage changes over 5 years consistent with disease progression in medial knee osteoarthritis patients.** *Journal of orthopaedic research : official publication of the Orthopaedic Research Society*  
Chu, C. R., Sheth, S. n., Erhart-Hledik, J. C., Do, B. n., Titchenal, M. R., Andriacchi, T. P.  
2017
- **CCL2/CCR2, but not CCL5/CCR5, mediates monocyte recruitment, inflammation and cartilage destruction in osteoarthritis.** *Annals of the rheumatic diseases*  
Raghu, H., Lepus, C. M., Wang, Q., Wong, H. H., Lingampalli, N., Oliviero, F., Punzi, L., Giori, N. J., Goodman, S. B., Chu, C. R., Sokolove, J. B., Robinson, W. H.  
2016
- **Early Changes in Knee Center of Rotation During Walking After Anterior Cruciate Ligament Reconstruction Correlate With Later Changes in Patient-Reported Outcomes.** *American journal of sports medicine*  
Titchenal, M. R., Chu, C. R., Erhart-Hledik, J. C., Andriacchi, T. P.  
2016
- **Early articular cartilage MRI T2 changes after anterior cruciate ligament reconstruction correlate with later changes in T2 and cartilage thickness.** *Journal of orthopaedic research*  
Williams, A., Winalski, C. S., Chu, C. R.  
2016
- **AAOS Research Symposium Updates and Consensus: Biologic Treatment of Orthopaedic Injuries** *JOURNAL OF THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS*  
LaPrade, R. F., Dragoo, J. L., Koh, J. L., Murray, I. R., Geeslin, A. G., Chu, C. R.  
2016; 24 (7): E62-E78

- **Gait mechanics 2 years after anterior cruciate ligament reconstruction are associated with longer-term changes in patient-reported outcomes.** *Journal of orthopaedic research*  
Erhart-Hledik, J. C., Chu, C. R., Asay, J. L., Andriacchi, T. P.  
2016
- **PROSPECTIVE CHANGES IN CARTILAGE THICKNESS CORRELATE WITH KNEE KINEMATICS AT PEAK LOADING DURING WALKING FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION**  
Titchenal, M. R., Chu, C. R., Andriacchi, T. P.  
ELSEVIER SCI LTD.2016: S98–S99
- **SIDE-TO-SIDE DIFFERENCES IN KINEMATICS AND KINETICS TWO YEARS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION ARE ASSOCIATED WITH LONGER-TERM CHANGES IN PATIENT-REPORTED OUTCOMES**  
Erhart-Hledik, J., Chu, C., Asay, J., Andriacchi, T.  
ELSEVIER SCI LTD.2016: S90–S91
- **Defining Pre-Osteoarthritis Is Key to Prevention** *CARTILAGE*  
Chu, C. R.  
2016; 7 (2): 204
- **Addition of Mesenchymal Stem Cells to Autologous Platelet-Enhanced Fibrin Scaffolds in Chondral Defects Does It Enhance Repair?** *JOURNAL OF BONE AND JOINT SURGERY-AMERICAN VOLUME*  
Goodrich, L. R., Chen, A. C., Werpy, N. M., Williams, A. A., Kisiday, J. D., Su, A. W., Cory, E., Morley, P. S., McIlwraith, C. W., Sah, R. L., Chu, C. R.  
2016; 98A (1): 23-34
- **Addition of Mesenchymal Stem Cells to Autologous Platelet-Enhanced Fibrin Scaffolds in Chondral Defects: Does It Enhance Repair?** *journal of bone and joint surgery. American volume*  
Goodrich, L. R., Chen, A. C., Werpy, N. M., Williams, A. A., Kisiday, J. D., Su, A. W., Cory, E., Morley, P. S., McIlwraith, C. W., Sah, R. L., Chu, C. R.  
2016; 98 (1): 23-34
- **Short-term Analysis vs Long-term Data on Total Hip Replacement Survivorship** *JAMA SURGERY*  
Chu, C. R.  
2015; 150 (10): 989
- **PROSPECTIVE CHANGES IN THE KNEE JOINT CENTER OF ROTATION RELATIVE TO THE CONTRALATERAL KNEE AND OVER TIME PROVIDE A COMPREHENSIVE VIEW OF KINEMATIC CHANGES FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION**  
Titchenal, M., Chu, C. R., Andriacchi, T. P.  
ELSEVIER SCI LTD.2015: A96–A97
- **A Systems View of Risk Factors for Knee Osteoarthritis Reveals Insights into the Pathogenesis of the Disease** *ANNALS OF BIOMEDICAL ENGINEERING*  
Andriacchi, T. P., Favre, J., Erhart-Hledik, J. C., Chu, C. R.  
2015; 43 (2): 376-387
- **Osteoarthritis: From Palliation to Prevention AOA Critical Issues** *JOURNAL OF BONE AND JOINT SURGERY-AMERICAN VOLUME*  
Chu, C. R., Millis, M. B., Olson, S. A.  
2014; 96A (15)
- **The Effect of Platelet-Rich Plasma Formulations and Blood Products on Human Synoviocytes Implications for Intra-articular Injury and Therapy** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Braun, H. J., Kim, H. J., Chu, C. R., Drago, J. L.  
2014; 42 (5): 1204-1210
- **Articular cartilage changes in maturing athletes: new targets for joint rejuvenation.** *Sports health*  
Luria, A., Chu, C. R.  
2014; 6 (1): 18-30
- **Brief report: carboxypeptidase B serves as a protective mediator in osteoarthritis.** *Arthritis & rheumatology (Hoboken, N.J.)*  
Lepus, C. M., Song, J. J., Wang, Q., Wagner, C. A., Lindstrom, T. M., Chu, C. R., Sokolove, J., Leung, L. L., Robinson, W. H.  
2014; 66 (1): 101-106
- **Carboxypeptidase B Serves as a Protective Mediator in Osteoarthritis** *ARTHRITIS & RHEUMATOLOGY*  
Lepus, C. M., Song, J. J., Wang, Q., Wagner, C. A., Lindstrom, T. M., Chu, C. R., Sokolove, J., Leung, L. L., Robinson, W. H.

2014; 66 (1): 101-106

- **T2 texture index of cartilage can predict early symptomatic OA progression: data from the osteoarthritis initiative** *OSTEOARTHRITIS AND CARTILAGE*  
Urish, K. L., Keffalas, M. G., Durkin, J. R., Miller, D. J., Chu, C. R., Mosher, T. J.  
2013; 21 (10): 1550-1557
- **Repeatability of ultrashort echo time-based two-component T2\*measurements on cartilages in human knee at 3 T** *MAGNETIC RESONANCE IN MEDICINE*  
Qian, Y., Williams, A. A., Chu, C. R., Boada, F. E.  
2013; 69 (6): 1564-1571
- **T2 TEXTURE INDEX OF CARTILAGE CAN PREDICT EARLY SYMPTOMATIC OA PROGRESSION: DATA FROM THE OSTEOARTHRITIS INITIATIVE**  
Urish, K. L., Keffalas, M. G., Durkin, J. R., Miller, D. J., Chu, C. R., Mosher, T. J.  
ELSEVIER SCI LTD.2013: S10-S11
- **Effects of doxycycline on mesenchymal stem cell chondrogenesis and cartilage repair** *OSTEOARTHRITIS AND CARTILAGE*  
Lee, H. H., O'Malley, M. J., Friel, N. A., Chu, C. R.  
2013; 21 (2): 385-393
- **Registration of Magnetic Resonance Image Series for Knee Articular Cartilage Analysis: Data from the Osteoarthritis Initiative** *CARTILAGE*  
Urish, K. L., Williams, A. A., Durkin, J. R., Chu, C. R.  
2013; 4 (1): 20-27
- **The Role of ACL Injury in the Development of Posttraumatic Knee Osteoarthritis** *CLINICS IN SPORTS MEDICINE*  
Friel, N. A., Chu, C. R.  
2013; 32 (1): 1-?
- **Serum CTXii Correlates With Articular Cartilage Degeneration After Anterior Cruciate Ligament Transection or Arthroscopy Followed by Standardized Exercise.** *Sports health*  
Coyle, C. H., Henry, S. E., Haleem, A. M., O'Malley, M. J., Chu, C. R.  
2012; 4 (6): 510-517
- **The feasibility of randomized controlled trials for early arthritis therapies (Earth) involving acute anterior cruciate ligament tear cohorts.** *American journal of sports medicine*  
Chu, C. R., Beynonn, B. D., Drago, J. L., Fleisig, G. S., Hart, J. M., Khazzam, M., Marberry, K. M., Nelson, B. J.  
2012; 40 (11): 2648-2652
- **UTE-T2\* mapping detects sub-clinical meniscus injury after anterior cruciate ligament tear** *OSTEOARTHRITIS AND CARTILAGE*  
Williams, A., Qian, Y., Golla, S., Chu, C. R.  
2012; 20 (6): 486-494
- **Novel quantitative imaging for early detection of joint tissue injury to support early treatment strategies.** *HSS journal : the musculoskeletal journal of Hospital for Special Surgery*  
Stepp, P. C., Williams, A. A., Chu, C.  
2012; 8 (1): 54-56
- **High-resolution ultrashort echo time (UTE) imaging on human knee with AWSOS sequence at 3.0 T** *JOURNAL OF MAGNETIC RESONANCE IMAGING*  
Qian, Y., Williams, A. A., Chu, C. R., Boada, F. E.  
2012; 35 (1): 204-210
- **Clinical and Basic Science of Cartilage Injury and Arthritis in the Football (Soccer) Athlete** *CARTILAGE*  
Lee, H. H., Chu, C. R.  
2012; 3 (1): 63S-68S
- **Novel MRI Ultrashort TE Enhanced T Mapping Shows Subsurface Cartilage and Meniscus Changes Clinically in Human Subjects After Anterior Cruciate Ligament Tear (ACLT)**  
Chu, C. R., Williams, A. A., Qian, Y.  
WILEY-BLACKWELL.2011: S635-S636
- **DOXYCYCLINE CONTROL OF LOCALIZED IN VIVO TRANSGENE EXPRESSION IN CARTILAGE INJURED JOINTS**

- Lee, H. H., O'Malley, M. J., Payne, K. A., Xiao, X., Chu, C. R.  
ELSEVIER SCI LTD.2011: S111
- **SIGNAL HOMOGENEITY ON CARTILAGE T2 MAPS AS A PREDICTIVE IMAGE BIOMARKER FOR RAPID SYMPTOMATIC PROGRESSION OF OA**  
Urish, K. L., Keffalas, M. G., Miller, D. J., Durkin, J., Chu, C. R., Mosher, T. J.  
ELSEVIER SCI LTD.2011: S190
  - **IN VIVO MRI UTE-T2\* IS ELEVATED IN BOTH TORN AND SURFACE INTACT HUMAN MENISCI OF ANTERIOR CRUCIATE LIGAMENT INJURED KNEES**  
Williams, A., Qian, Y., Chu, C. R., Bowers, M.  
ELSEVIER SCI LTD.2011: S11-S12
  - **TGF-beta TYPE II RECEPTOR AS A NOVEL INDICATOR OF CHONDROGENESIS IN EQUINE BONE MARROW-DERIVED MESENCHYMAL STEM CELLS**  
Suter, K. K., Payne, K. A., Yao, V., Fortier, L. A., Chu, C. R.  
ELSEVIER SCI LTD.2011: S115-S116
  - **Single intra-articular injection of adeno-associated virus results in stable and controllable in vivo transgene expression in normal rat knees** *OSTEOARTHRITIS AND CARTILAGE*  
Payne, K. A., Lee, H. H., Haleem, A. M., Martins, C., Yuan, Z., Qiao, C., Xiao, X., Chu, C. R.  
2011; 19 (8): 1058-1065
  - **Release of Bioactive Adeno-Associated Virus from Fibrin Scaffolds: Effects of Fibrin Glue Concentrations** *TISSUE ENGINEERING PART A*  
Lee, H. H., Haleem, A. M., Yao, V., Li, J., Xiao, X., Chu, C. R.  
2011; 17 (15-16): 1969-1978
  - **Closing the Gap Between Bench and Bedside Research for Early Arthritis Therapies (EARTH) Report From the AOSSM/NIH U-13 Post-Joint Injury Osteoarthritis Conference II** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Chu, C. R., Beynnon, B. D., Buckwalter, J. A., Garrett, W. E., Katz, J. N., Rodeo, S. A., Spindler, K. P., Stanton, R. A.  
2011; 39 (7): 1569-1578
  - **Arthroscopic optical coherence tomography in diagnosis of early arthritis.** *Minimally invasive surgery*  
O'Malley, M. J., Chu, C. R.  
2011; 2011: 671308-?
  - **UTE-T2\* mapping of human articular cartilage in vivo: a repeatability assessment** *OSTEOARTHRITIS AND CARTILAGE*  
Williams, A., Qian, Y., Chu, C. R.  
2011; 19 (1): 84-88
  - **Multicomponent T2\* mapping of knee cartilage: technical feasibility ex vivo.** *Magnetic resonance in medicine*  
Qian, Y., Williams, A. A., Chu, C. R., Boada, F. E.  
2010; 64 (5): 1426-1431
  - **Multicomponent T-2 (star) Mapping of Knee Cartilage: Technical Feasibility Ex Vivo** *MAGNETIC RESONANCE IN MEDICINE*  
Qian, Y., Williams, A. A., Chu, C. R., Boada, F. E.  
2010; 64 (5): 1427-1432
  - **The association of osteoarthritis risk factors with localized, regional and diffuse knee pain** *OSTEOARTHRITIS AND CARTILAGE*  
Thompson, L. R., Boudreau, R., Newman, A. B., Hannon, M. J., Chu, C. R., Nevitt, M. C., Kwoh, C. K.  
2010; 18 (10): 1244-1249
  - **SINGLE INTRA-ARTICULAR INJECTION RESULTS IN STABLE AND CONTROLLABLE IN VIVO TRANSGENE EXPRESSION**  
Payne, K. A., Lee, H. H., Haleem, A. M., Martin, C., Xiao, X., Chu, C. R.  
W B SAUNDERS CO LTD.2010: S22
  - **REPEATED SUB-THRESHOLD DOSING OF TGF-BETA1 IS INEFFECTIVE IN STIMULATING HUMAN BONE MARROW CELLS: IMPLICATIONS FOR CARTILAGE REPAIR STRATEGIES**  
Yao, V., Payne, K. A., Chu, C. R.  
W B SAUNDERS CO LTD.2010: S86



- **The Clinical Use of Human Culture-Expanded Autologous Bone Marrow Mesenchymal Stem Cells Transplanted on Platelet-Rich Fibrin Glue in the Treatment of Articular Cartilage Defects: A Pilot Study and Preliminary Results** *CARTILAGE*  
Haleem, A. M., El Singergy, A. A., Sabry, D., Atta, H. M., Rashed, L. A., Chu, C. R., El Shewy, M. T., Azzam, A., Aziz, M. T.  
2010; 1 (4): 253-261
- **Optical Coherence Tomography Detection of Subclinical Traumatic Cartilage Injury** *JOURNAL OF ORTHOPAEDIC TRAUMA*  
Bear, D. M., Szczodry, M., Kramer, S., Coyle, C. H., Smolinski, P., Chu, C. R.  
2010; 24 (9): 577-582
- **Advances in Tissue Engineering Techniques for Articular Cartilage Repair.** *Operative techniques in orthopaedics*  
Haleem, A. M., Chu, C. R.  
2010; 20 (2): 76-89
- **Clinical Optical Coherence Tomography of Early Articular Cartilage Degeneration in Patients With Degenerative Meniscal Tears** *ARTHRITIS AND RHEUMATISM*  
Chu, C. R., Williams, A., Tolliver, D., Kwoh, C. K., Bruno, S., Irrgang, J. J.  
2010; 62 (5): 1412-1420
- **Assessing degeneration of human articular cartilage with ultra-short echo time (UTE) T-2\* mapping** *OSTEOARTHRITIS AND CARTILAGE*  
Williams, A., Qian, Y., Bear, D., Chu, C. R.  
2010; 18 (4): 539-546
- **Optical Coherence Tomography Grading Correlates with MRI T2 Mapping and Extracellular Matrix Content** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Bear, D. M., Williams, A., Chu, C. T., Coyle, C. H., Chu, C. R.  
2010; 28 (4): 546-552
- **In vivo effects of single intra-articular injection of 0.5% bupivacaine on articular cartilage.** *journal of bone and joint surgery. American volume*  
Chu, C. R., Coyle, C. H., Chu, C. T., Szczodry, M., Seshadri, V., Karpie, J. C., Cieslak, K. M., Pringle, E. K.  
2010; 92 (3): 599-608
- **Novel multiarm PEG-based hydrogels for tissue engineering** *JOURNAL OF BIOMEDICAL MATERIALS RESEARCH PART A*  
Tan, H., DeFail, A. J., Rubin, J. P., Chu, C. R., Marra, K. G.  
2010; 92A (3): 979-987
- **In Vivo Effects of Single Intra-Articular Injection of 0.5% Bupivacaine on Articular Cartilage** *JOURNAL OF BONE AND JOINT SURGERY-AMERICAN VOLUME*  
Chu, C. R., Coyle, C. H., Chu, C. T., Szczodry, M., Seshadri, V., Karpie, J. C., Cieslak, K. M., Pringle, E. K.  
2010; 92A (3): 599-608
- **Novel multiarm PEG-based hydrogels for tissue engineering.** *Journal of biomedical materials research. Part A*  
Tan, H., DeFail, A. J., Rubin, J. P., Chu, C. R., Marra, K. G.  
2010; 92 (3): 979-987
- **Animal Models for Cartilage Regeneration and Repair** *TISSUE ENGINEERING PART B-REVIEWS*  
Chu, C. R., Szczodry, M., Bruno, S.  
2010; 16 (1): 105-115
- **Progressive Chondrocyte Death After Impact Injury Indicates a Need for Chondroprotective Therapy** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Szczodry, M., Coyle, C. H., Kramer, S. J., Smolinski, P., Chu, C. R.  
2009; 37 (12): 2318-2322
- **The Knee Pain Map: Reliability of a Method to Identify Knee Pain Location and Pattern** *ARTHRITIS & RHEUMATISM-ARTHRITIS CARE & RESEARCH*  
Thompson, L. R., Boudreau, R., Hannon, M. J., Newman, A. B., Chu, C. R., Jansen, M., Nevitt, M. C., Kwoh, C. K.  
2009; 61 (6): 725-731
- **Sustained Hypoxia Enhances Chondrocyte Matrix Synthesis** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Coyle, C. H., Izzo, N. J., Chu, C. R.  
2009; 27 (6): 793-799
- **Injectable in situ forming biodegradable chitosan-hyaluronic acid based hydrogels for cartilage tissue engineering** *BIOMATERIALS*

- Tan, H., Chu, C. R., Payne, K. A., Marra, K. G.  
2009; 30 (13): 2499-2506
- **Localization and Persistence of Transgene Expression Following Intra-Articular Injection of Adeno-Associated Virus into the Rat Knee**  
Payne, K. A., Martins, C., Lee, H. H., Xiao, X., Chu, C. R.  
NATURE PUBLISHING GROUP.2009: S79
  - **Lidocaine Potentiates the Chondrotoxicity of Methylprednisolone** *ARTHROSCOPY-THE JOURNAL OF ARTHROSCOPIC AND RELATED SURGERY*  
Seshadri, V., Coyle, C. H., Chu, C. R.  
2009; 25 (4): 337-347
  - **The Role of the Biochemical and Biophysical Environment in Chondrogenic Stem Cell Differentiation Assays and Cartilage Tissue Engineering** *CELL BIOCHEMISTRY AND BIOPHYSICS*  
Wescocoe, K. E., Schugar, R. C., Chu, C. R., Deasy, B. M.  
2008; 52 (2): 85-102
  - **The in vitro effects of bupivacaine on articular chondrocytes.** *journal of bone and joint surgery. British volume*  
Chu, C. R., Izzo, N. J., Coyle, C. H., Papas, N. E., Logar, A.  
2008; 90 (6): 814-820
  - **The in vitro effects of bupivacaine on articular chondrocytes** *JOURNAL OF BONE AND JOINT SURGERY-BRITISH VOLUME*  
Chu, C. R., Izzo, N. J., Coyle, C. H., Papas, N. E., Logar, A.  
2008; 90B (6): 814-820
  - **Optimizing CO2 normalizes pH and enhances chondrocyte viability during cold storage** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Dontchos, B. N., Coyle, C. H., Izzo, N. J., Didiano, D. M., Karpie, J. C., Logar, A., Chu, C. R.  
2008; 26 (5): 643-650
  - **The 2007 ABC Traveling Fellowship: building international orthopaedic bridges.** *journal of bone and joint surgery. American volume*  
Chu, C. R., Antoniou, J., Donley, B. G., Frick, S. L., Hilibrand, A. S., Ricci, W. M., Younger, A. S.  
2008; 90 (3): 672-674
  - **Lidocaine exhibits dose- and time-dependent cytotoxic effects on bovine articular chondrocytes in vitro** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Karpie, J. C., Chu, C. R.  
2007; 35 (10): 1621-1627
  - **Clinical diagnosis of potentially treatable early articular cartilage degeneration using optical coherence tomography** *Conference on Water Environment-Membrane Technology*  
Chu, C. R., Izzo, N. J., Irrgang, J. J., Ferretti, M., Studer, R. K.  
SPIE-SOC PHOTO-OPTICAL INSTRUMENTATION ENGINEERS.2007
  - **Adeno-associated viral gene transfer of transforming growth factor-beta 1 to human mesenchymal stem cells improves cartilage repair** *GENE THERAPY*  
Pagnotto, M. R., Wang, Z., Karpie, J. C., Ferretti, M., Xiao, X., Chu, C. R.  
2007; 14 (10): 804-813
  - **Controlled in vivo degradation of genipin crosslinked polyethylene glycol hydrogels within osteochondral defects** *TISSUE ENGINEERING*  
Ferretti, M., Marra, K. G., Kobayashi, K., DeFail, A. J., Chu, C. R.  
2006; 12 (9): 2657-2663
  - **In vitro exposure to 0.5% bupivacaine is cytotoxic to bovine articular chondrocytes** *ARTHROSCOPY-THE JOURNAL OF ARTHROSCOPIC AND RELATED SURGERY*  
Chu, C. R., Izzo, N. J., Papas, N. E., Fu, F. H.  
2006; 22 (7): 693-699
  - **Controlled release of bioactive TGF-beta(1) from microspheres embedded within biodegradable hydrogels** *BIOMATERIALS*  
DeFail, A. J., Chu, C. R., Izzo, N., Marra, K. G.  
2006; 27 (8): 1579-1585
  - **Adenoviral-mediated transfer of TGF-beta 1 but not IGF-1 induces chondrogenic differentiation of human mesenchymal stem cells in pellet cultures** *EXPERIMENTAL HEMATOLOGY*  
Kawamura, K., Chu, C. R., Sobajima, S., Robbins, P. D., Fu, F. H., Izzo, N. J., Niyibizi, C.

2005; 33 (8): 865-872

- **p38 MAPK and COX2 inhibition modulate human chondrocyte response to TGF-beta** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Studer, R. K., Chu, C. R.  
2005; 23 (2): 454-461
- **Mini-pig fresh osteochondral allografts deteriorate after 1 week of cold storage** *CLINICAL ORTHOPAEDICS AND RELATED RESEARCH*  
Rohde, R. S., Studer, R. K., Chu, C. R.  
2004: 226-233
- **Recovery of articular cartilage metabolism following thermal stress is facilitated by IGF-1 and JNK inhibitor** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Chu, C. R., Kaplan, L. D., Fu, F. H., Crossett, L. S., Studer, R. K.  
2004; 32 (1): 191-196
- **Hand-held arthroscopic optical coherence tomography for in vivo high-resolution imaging of articular cartilage** *JOURNAL OF BIOMEDICAL OPTICS*  
Pan, Y. T., Li, Z. G., Xie, T. Q., Chu, C. R.  
2003; 8 (4): 648-654
- **Recovery of chondrocyte metabolic activity after thermal exposure** *AMERICAN JOURNAL OF SPORTS MEDICINE*  
Kaplan, L. D., Chu, C. R., Bradley, J. P., Fu, F. H., Studer, R. K.  
2003; 31 (3): 392-398
- **Analysis of rabbit articular cartilage repair after chondrocyte implantation using optical coherence tomography** *OSTEOARTHRITIS AND CARTILAGE*  
Han, C. W., Chu, C. R., Adachi, N., Usas, A., Fu, F. H., Huard, J., Pan, Y.  
2003; 11 (2): 111-121
- **Articular cartilage transplantation - Clinical results in the knee** *CLINICAL ORTHOPAEDICS AND RELATED RESEARCH*  
Chu, C. R., Convery, F. R., Akeson, W. H., Meyers, M., Amiel, D.  
1999: 159-168
- **The Marshall R. Urist Young Investigator Award. Autogenous flexor tendon grafts. Biologic mechanisms for incorporation.** *Clinical orthopaedics and related research*  
Seiler, J. G., Chu, C. R., Amiel, D., Woo, S. L., Gelberman, R. H.  
1997: 239-247
- **Autogenous flexor tendon grafts - Biologic mechanisms for incorporation** *CLINICAL ORTHOPAEDICS AND RELATED RESEARCH*  
Seiler, J. G., Chu, C. R., Amiel, D., Woo, S. L., Gelberman, R. H.  
1997: 239-247
- **Osteochondral repair using perichondrial cells - A 1-year study in rabbits** *CLINICAL ORTHOPAEDICS AND RELATED RESEARCH*  
Chu, C. R., Douchis, J. S., Yoshioka, M., Sah, R. L., Coutts, R. D., Amiel, D.  
1997: 220-229
- **IN-SITU ASSESSMENT OF CELL VIABILITY WITHIN BIODEGRADABLE POLYLACTIC ACID POLYMER MATRICES** *BIOMATERIALS*  
Chu, C. R., Monosov, A. Z., Amiel, D.  
1995; 16 (18): 1381-1384
- **ARTICULAR-CARTILAGE REPAIR USING ALLOGENEIC PERICHONDROCYTE-SEEDED BIODEGRADABLE POROUS POLYLACTIC ACID (PLA) - A TISSUE-ENGINEERING STUDY** *JOURNAL OF BIOMEDICAL MATERIALS RESEARCH*  
Chu, C. R., Coutts, R. D., Yoshioka, M., Harwood, F. L., Monosov, A. Z., Amiel, D.  
1995; 29 (9): 1147-1154
- **AUTOGENOUS INTRASYNOVIAL AND EXTRASYNOVIAL TENDON GRAFTS - AN EXPERIMENTAL-STUDY OF PRO ALPHA-1(I) COLLAGEN MESSENGER-RNA EXPRESSION IN DOGS** *JOURNAL OF ORTHOPAEDIC RESEARCH*  
Amiel, D., Harwood, F. L., Gelberman, R. H., Chu, C. R., Seiler, J. G., Abrahamsson, S.  
1995; 13 (3): 459-463
- **AUTOGENOUS FLEXOR-TENDON GRAFTS - A BIOMECHANICAL AND MORPHOLOGICAL-STUDY IN DOGS** *JOURNAL OF BONE AND JOINT SURGERY-AMERICAN VOLUME*  
Seiler, J. G., Gelberman, R. H., Williams, C. S., Woo, S. L., Dickersin, G. R., SOFRANKO, R., Chu, C. R., Rosenberg, A. E.

1993; 75A (7): 1004-1014

- **The fate of autogenous tendon grafts.** *The Iowa orthopaedic journal*

Seiler, J. G., Chu, C., ABRAHAMSSON, S. O., Gelberman, R. H.

1993; 13: 56-62

- **ANGIOGENESIS IN HEALING AUTOGENOUS FLEXOR-TENDON GRAFTS** *JOURNAL OF BONE AND JOINT SURGERY-AMERICAN VOLUME*

Gelberman, R. H., Chu, C. R., Williams, C. S., Seiler, J. G., Amiel, D.

1992; 74A (8): 1207-1216