AWARD NUMBER: W81XWH-14-2-0136
OR130096

TITLE: Vitamin D Supplementation for Prevention of Post-Traumatic Osteoarthritis: Evaluation in Animal and Clinical Models

PRINCIPAL INVESTIGATOR: Jennifer Moriatis Wolf, MD

CONTRACTING ORGANIZATION: University of Chicago Medicine
Farmington, CT 06030

REPORT DATE: October 2017

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
October 2017	Annual	22Sep2016 - 21Sep2017

4. TITLE AND SUBTITLE:

Vitamin D Supplementation for Prevention of Post-Traumatic Osteoarthritis: Evaluation in Animal and Clinical Models

5a. CONTRACT NUMBER

5b. GRANT NUMBER
W81XWH-14-2-0136

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Jennifer Moriatis Wolf, MD

E-Mail: jwolf@bsd.uchicago.edu

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

University of Chicago
Medicine
5841 S. Maryland Avenue
Chicago, IL 60637

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The purpose of this study is to evaluate the impact of Vitamin D in prevention and progression of post-traumatic osteoarthritis (PTOA). The animal portion of this study involves surgical induction of osteoarthritis in mice, with supplementation of varying levels of Vitamin D, and evaluation using histology, immunohistochemistry, and micro-CT. The clinical portion is an add-on study at the United States Military Academy, evaluating a clinical cohort of USMA cadets treated for anterior cruciate ligament (ACL) tear, with pre- and post-injury serum 25-hydroxy-Vitamin D levels and correlation with joint space narrowing and biomarkers of cartilage injury. Findings from the animal model show preliminary evidence that Vitamin D supplementation may decrease OA in female animals, with histologic changes in animals given one of two supraphysiologic doses of oral Vitamin D. Micro-CT demonstrates greater osteophyte volume in females but no consistent correlation with supplementation level. In the clinical portion, we have enrolled 70/100 (70%) of the required military cadets for the clinical study, but will evaluate serum 25-hydroxy-Vitamin D once the entire cohort is enrolled. Our findings provide preliminary support for the concept that Vitamin D supplementation could prevent the onset of often rapid joint destruction that occurs with PTOA, with important implications for high-risk military occupations.

15. SUBJECT TERMS Murine, post-traumatic osteoarthritis, military, ACL, knee, medial meniscus, 25-hydroxy-Vitamin D, supplementation					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON USAMRMC
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified	Unclassified	48	19b. TELEPHONE NUMBER *(include area code)*

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

Table of Contents

INTRODUCTION

The purpose of this study is to create an animal model of joint injury and evaluate the impact of Vitamin D supplementation in prevention and progression of post-traumatic osteoarthritis (PTOA). Concurrently, this funding supports an add-on study at the United States Military Academy, to evaluate a clinical cohort of USMA cadets treated for anterior cruciate ligament (ACL) tear, with pre- and post-injury serum 25-hydroxy-Vitamin D levels and correlation with joint space narrowing and biomarkers of cartilage injury. If Vitamin D supplementation can prevent the onset of often rapid joint destruction that occurs with PTOA, this simple and safe intervention could potentially translate to pre-emptive treatment in high-risk military occupations. In addition, Vitamin D could be used at the time of injury to possibly mitigate ongoing articular cartilage damage.

KEYWORDS

Murine, post-traumatic osteoarthritis, military, ACL, knee, medial meniscus, femoral, tibial, 25-hydroxy-Vitamin D, supplementation

ACCOMPLISHMENTS

This report represents the third annual summary of work for the 2016-17 year of funding for this project. It should be noted that we have requested and received a no-cost extension due to the transfer of funding from the University of Connecticut to the University of Chicago, with a 6 month lag pending administrative transfer. Reporting will be organized by task as noted in the Statement of Work.

<u>Specific Aim 1: to evaluate the impact of systemic Vitamin D supplementation on the initiation and development of surgically induced OA in a murine model</u>

Major Goals

1. **Vitamin D Supplementation and Rodent Surgery**
2. **Imaging/Tissue Analysis of Surgical Model**

Accomplishments

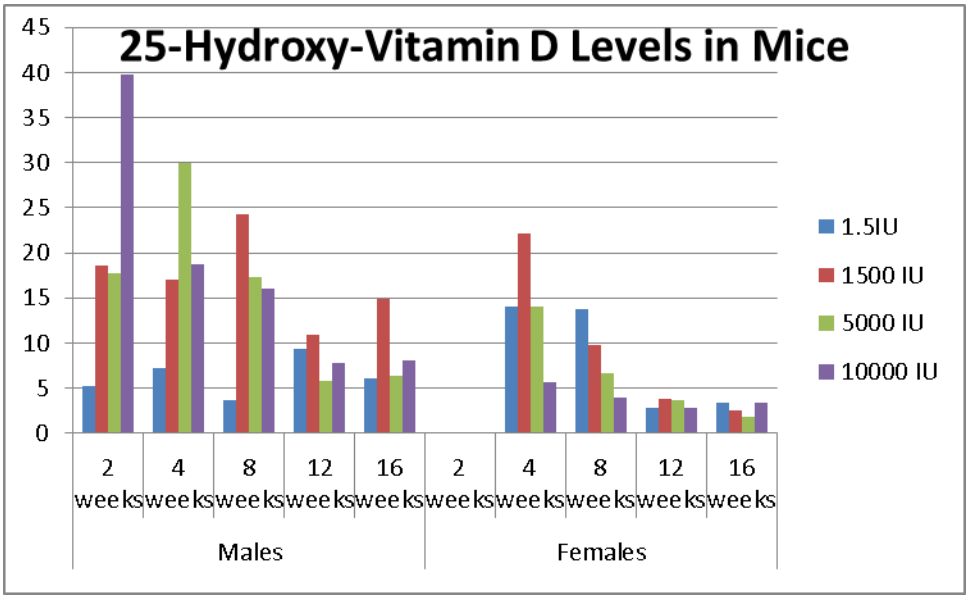
Major Activities

- We have completed the all three rounds of animal experimentation with C57-BL6 mice fed to supplement with four levels of Vitamin D:
    - control (1.5 IU/kg - minimal Vitamin D)
    - 1500 IU/kg (normal dietary level of Vitamin D)
    - 5000 IU/kg
    - 10,000 IU/kg

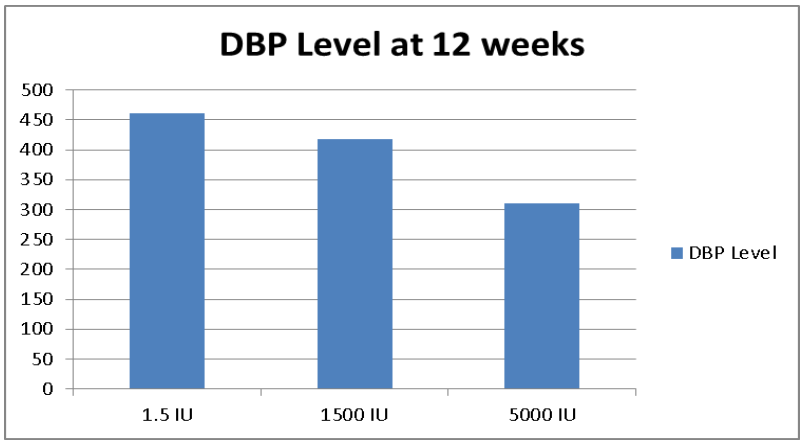
- A total of 300 mice underwent surgical initiation of osteoarthritis using destabilization of the medial meniscus and MCL sectioning.[1] A small subgroup was treated with anterior cruciate ligament (ACL) sectioning to evaluate the degree of osteoarthritis induction.
- We changed the timepoints to evaluate mice at 8,12,16, and 20 weeks as we noted minimal induction of osteoarthritis at 4 and 8 weeks.
- Initial testing using mouse Vitamin D ELISA confirmed graduated levels of Vitamin D in the sera of treated mice groups.
- We then performed histology, faxitron Xray imaging, and selected micro-CT analysis of the murine knees.
- A group of experienced animal histology investigators performed a blinded rating of the degree of osteoarthritis of the murine knee histology using the Glasson scale, for rounds 1 and 2 of murine experimentation. We have repeated this rating at the University of Chicago, using data from rounds 2 and 3. These groups of surgically treated mice are thought to represent more consistent induction of osteoarthritis due to increased familiarity with the DMM technique.

Results

- Using ELISA, we evaluated differential levels of circulating 25-hydroxy-Vitamin D in each of the 4 groups of mice fed different levels of Vitamin D over time, and noted initial increase in circulating 25-hydroxy-Vitamin D levels that differed by feeding dose, with metabolic equilibration over time. While high doses of Vitamin D have been previously shown to be well-tolerated in mice,[1] the findings of metabolic equilibration over time have not been previously reported. In males, the dose-response from minimal to high levels was shown best at 2 and 4 weeks; we did not have data on females in this group at 2 weeks.

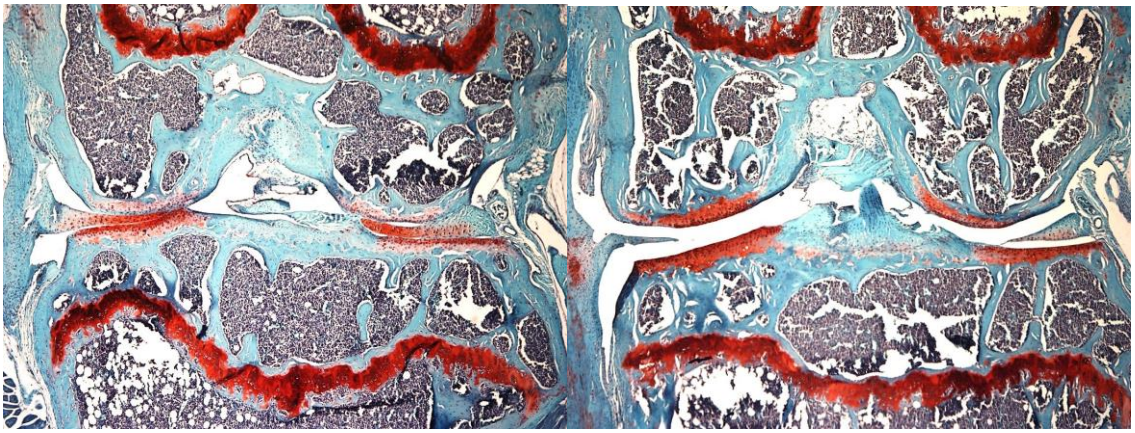


- We also tested Vitamin-D binding protein (DBP), which binds Vitamin D metabolites in plasma up to a certain species-specific level. It has been shown that free Vitamin D metabolites are active, and thus once DBP binding is maximized, the free metabolite levels will increase.[2] Our results showed the highest levels of DBP in the mice given minimal Vitamin D, with DBP decreasing as supplementation increased.

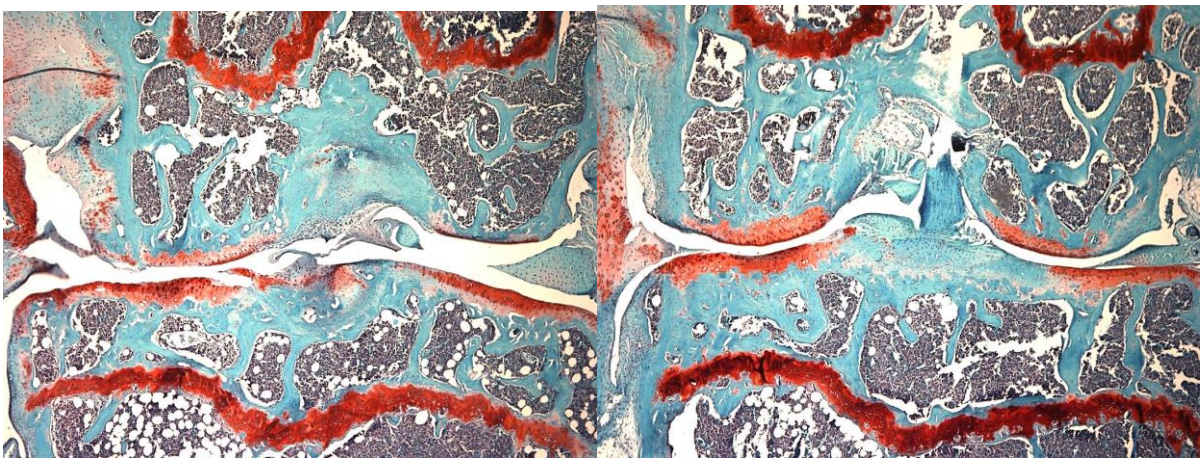


Histology Analysis

In analysis of the histology from round 2, performed by the same three blinded examiners for consistency, we noted improved consistency of arthritic change at the 8, 12,16, and 20 week timepoints. Histological analysis again showed some evidence in female mice of mitigation of post-traumatic osteoarthritis in the ACL group, as well as in females at 12 weeks, but no trends in male mice.



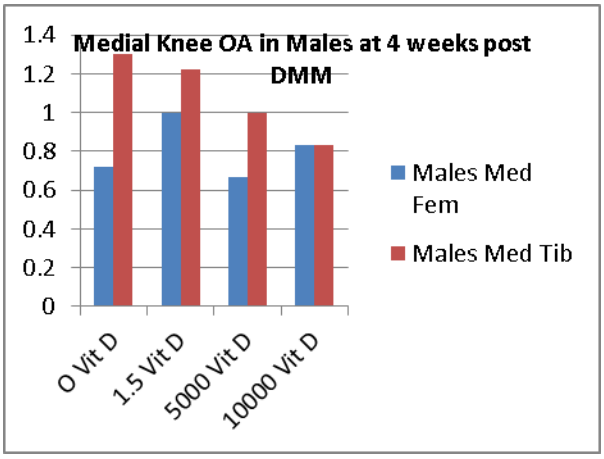
On the left, 20-week female with 0 Vitamin D supplementation with thinned cartilage and joint narrowing. On the right, female with 5000IU/kg supplementation, showing normal staining of the cartilage with less articular change. Note that in both, tibial squaring and osteophyte formation are visualized.

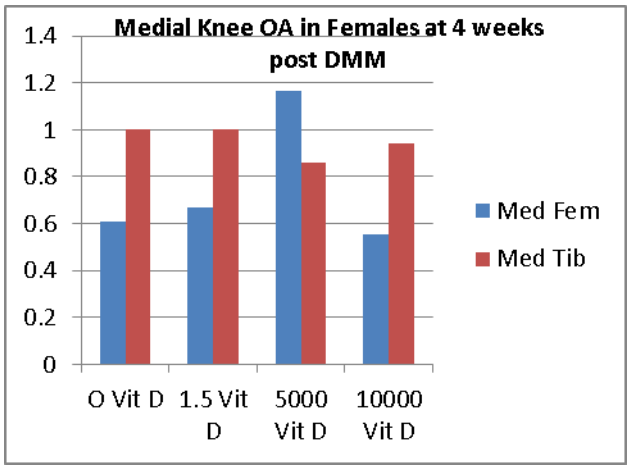


20 week histology samples from male mice with 5000 IU/kg Vitamin D. Note osteoarthritic changes on the left, with lesser changes on the right. Supplementation again seems to be more effective in female sex of mice.

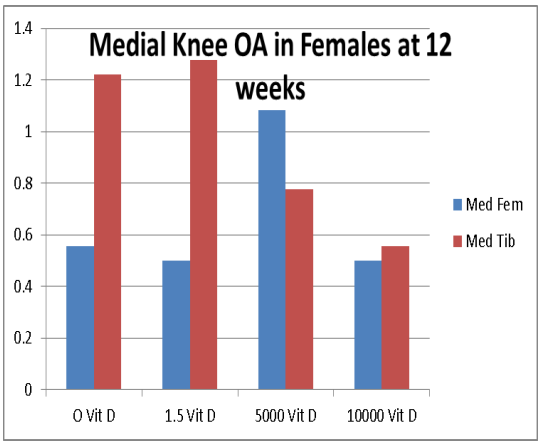
Histology analysis is ongoing, with the first two rounds showing promising data. A group of three experienced investigators rated histology slides in a blinded fashion using the Mankin scoring system for severity of murine joint osteoarthritis, with the findings of:

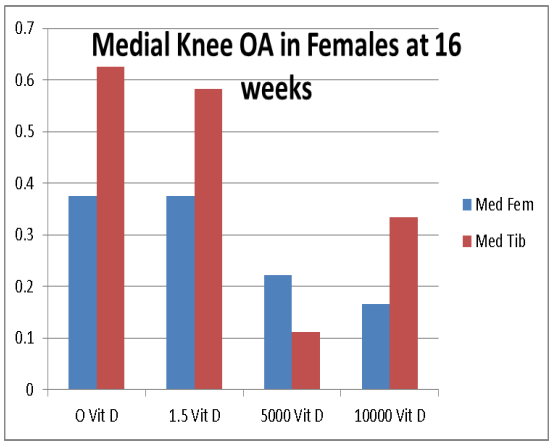
- Overall minimal induction of osteoarthritis in the earlier timepoints
- No correlation between Vitamin D supplementation and osteoarthritis in male or female mice at 4 or 8 weeks.



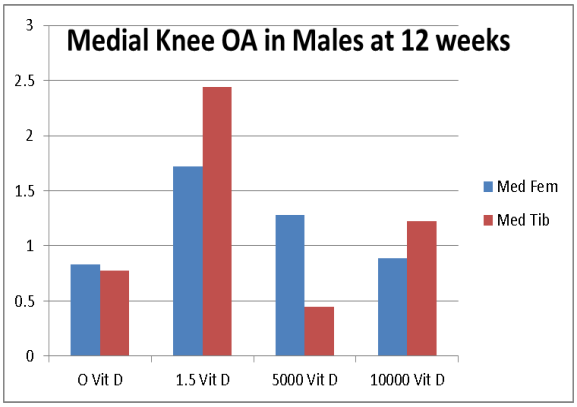


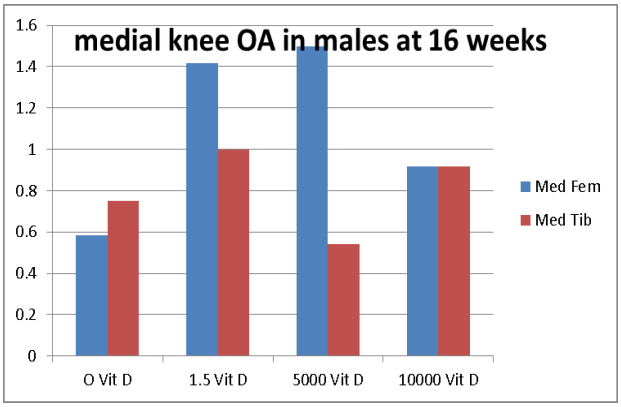
- In female mice at 12 and 16 weeks, ratings showed decreased OA histologically on the tibial side at 12 weeks and on both the tibial and femoral sides at 16 weeks.



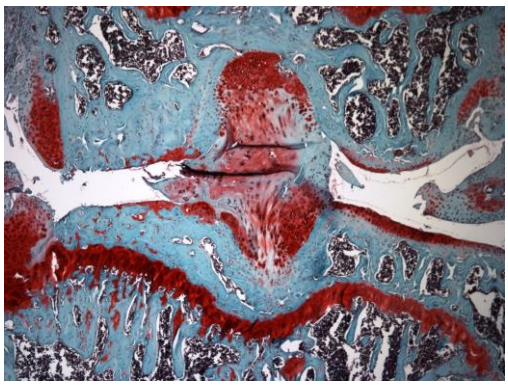


- We did not observe this effect in male mice, as shown below:

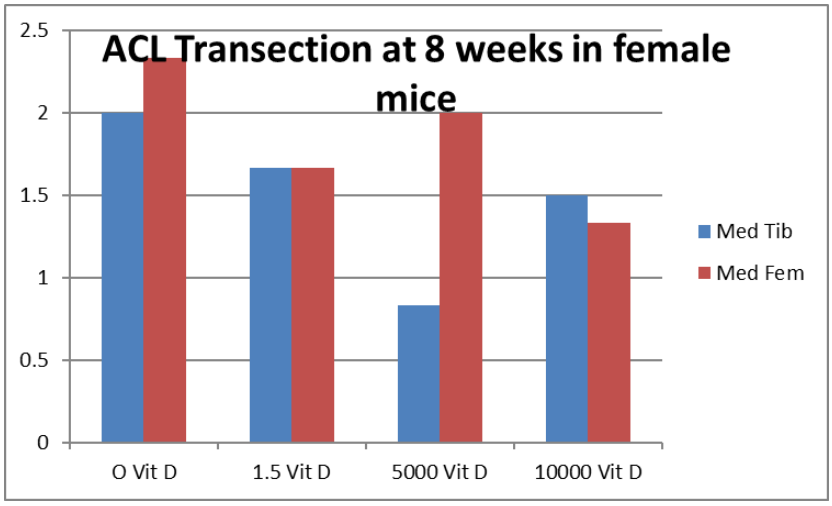




In a subset of mice treated with ACL transection in combination with destabilization of the medial meniscus, we observed faster onset and more severe osteoarthritic changes. Note the near complete loss of cartilage on the left side of the knee, with fibrillation and displacement of the meniscus.



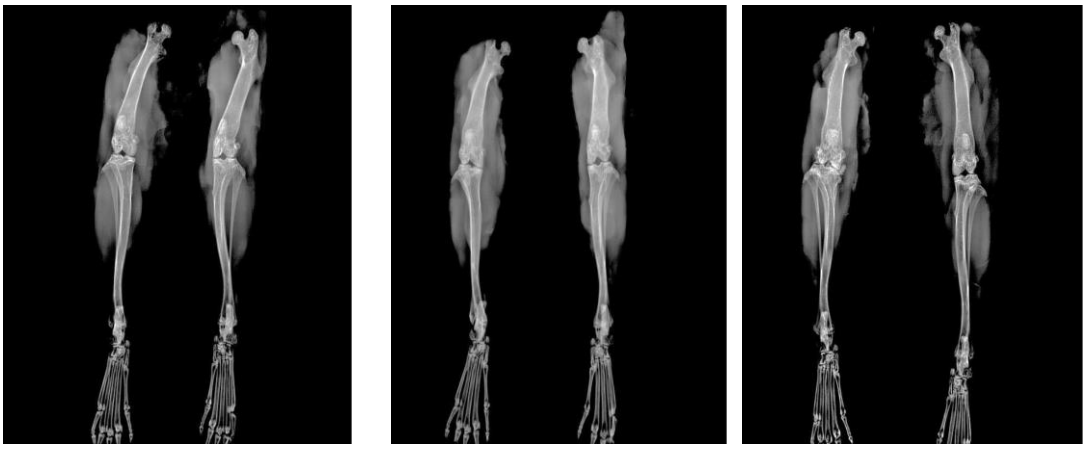
Evaluation of these mice showed a protective effect of Vitamin D supplementation, although all of these mice developed osteoarthritis at 8 weeks. However, there was a trend toward less severe involvement in the supraphysiologically dosed female mice, as shown below.



We are repeating this histologic evaluation at the University of Chicago using slides from rounds 2 and 3 of DMM surgery in mice, based on the assumption that the surgical technique was better and the induction of osteoarthritis more consistent in these rounds.

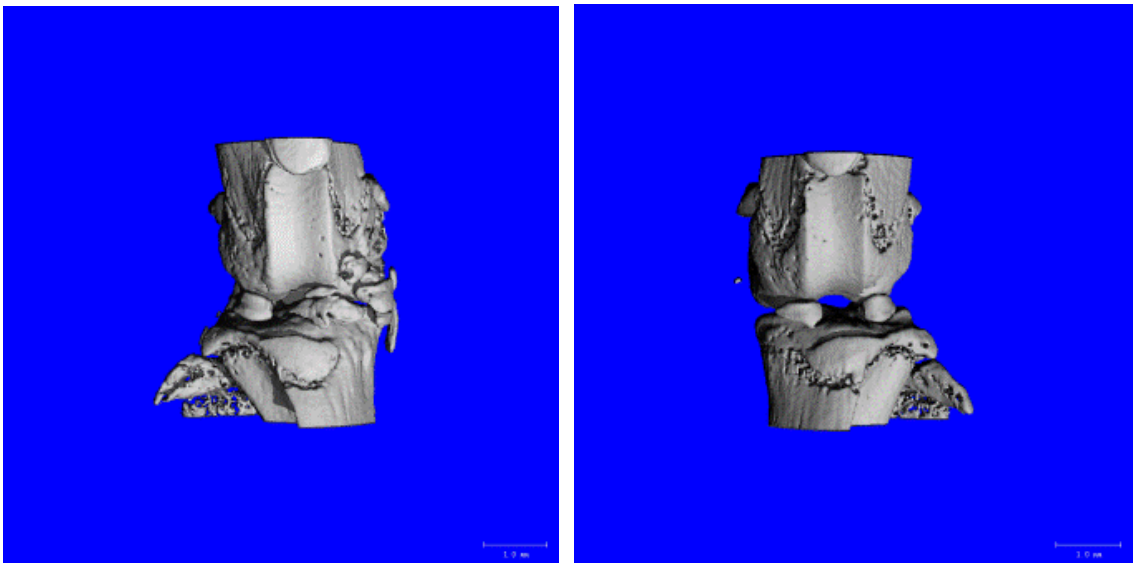
Bone Imaging

Faxitron imaging showed progressive signs of osteoarthritis over time.

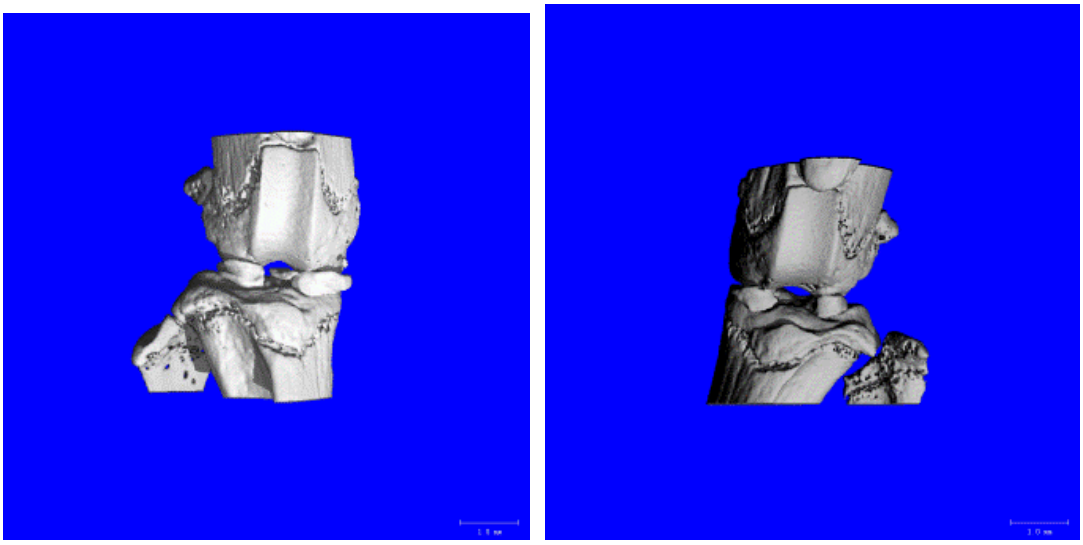


8, 12, and 16 week views with DMM (surgical) limb on left, sham surgery on right; all are of male mice with 1500 IU (normal) feed levels.

Micro-CT analysis has similarly shown signs of progressive osteoarthritis with aging in the murine model. We completed the analysis of rounds 2 and 3 through a subaward with the University of Connecticut.



Examples of micro-CT imaging with segmented views.



MicroCT Image Analysis of Femoral and Tibial Epiphyses

Changes in epiphyseal bone density often accompany joint instability, which are often observed and reported as subchondral thickening. Although a subchondral cortical "shell" is sometimes discernible in human studies by limiting inspection to a mid-sagittal cutting plane, trabeculation patterns in rodents greatly limit the selection of a region that defines and partitions a subchondral region (Figure X). Our approach for quantifying epiphyseal bone was to measure the bone volume of the entire epiphysis, thus objectively capturing all bone without subjective, manual interpretation of subchondral boundaries in a single plane of section. Moreover, because the spatial resolution and discretization of microCT imaging is very high, this objective definition provides for tremendously robust quantitation of bone volume and/or mass. In this study, spatial resolution and discretization to 16 micrometer cubic volume elements (i.e., voxels) is equivalent to 244,140 discrete voxels per cubic millimeter.

Figure X: Sagittal "slice" of volumetric rendering of a mouse knee joint, showing segmentation of the femoral epiphysis as a whole. Bone volume was quantified within the entire epiphysis as an objective measure of bony changes accompanying joint instability created by destabilization of the medial meniscus (DMM).

Isolation of the trabecular compartment within each epiphysis also was performed via manual selection (Figure Y), as is applied routinely in rodent studies. This approach quantifies the "volume fraction" of bone within the selected region, dividing bone volume (BV, obtained via Gauss filter and thresholding) by the total volume (TV) of the selected region (i.e., BV/TV).

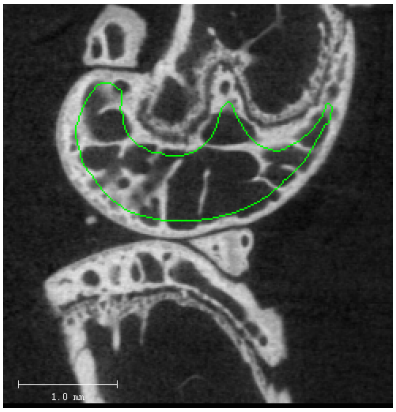
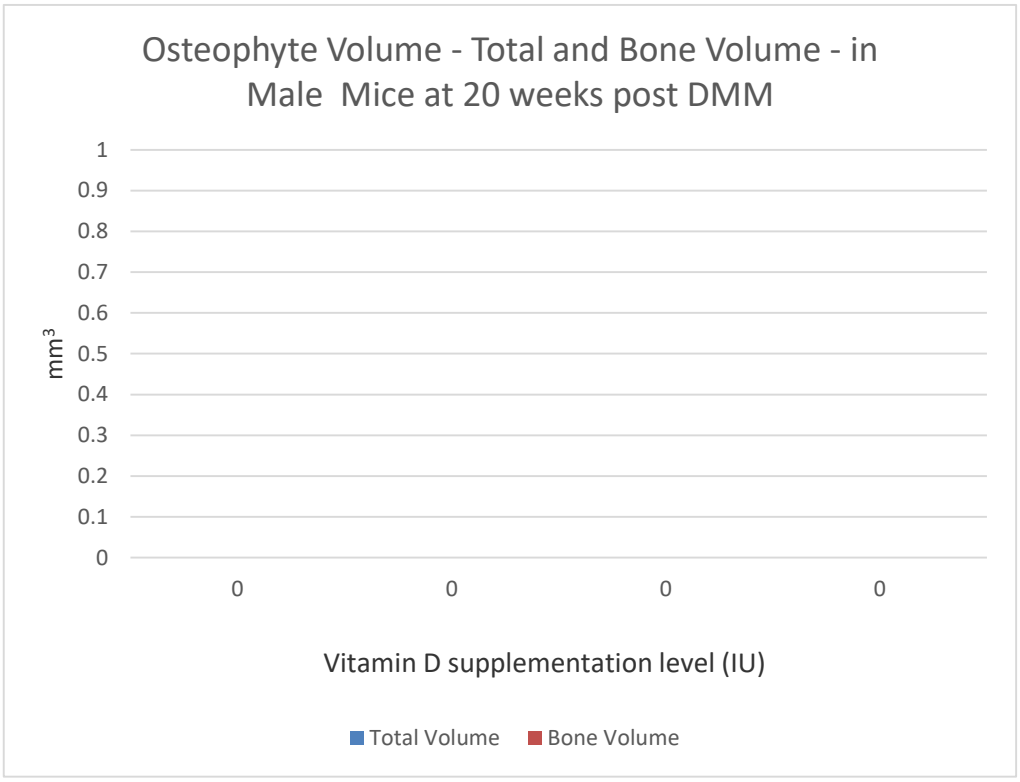


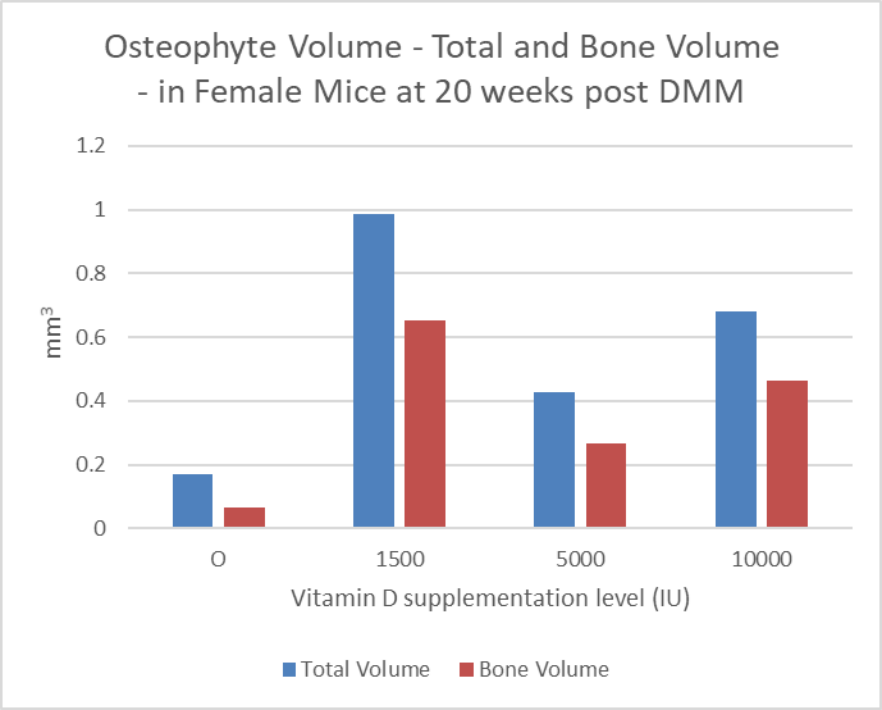
Figure Y: Sagittal "slice" of volumetric rendering of a mouse knee joint, showing segmentation of the trabecular compartment within the femoral epiphysis. Bone volume fraction (BV/TV) was quantified within the entire volumetric trabecular compartment of each epiphysis by dividing bone volume (BV) obtained via Gaussian threshold filter by the total volume (TV) of the selected region.

When we evaluated total bone volumes looking at epiphyseal volume increases, we expected to see consistent increase in the volume based on increased bone formation with osteoarthritis, and evaluated to see if there was an effect with varying Vitamin D supplementation. We did not see definite change in epiphyseal bone volumes when comparing the surgical induction of OA side to the sham surgical left, but did note differences in osteophyte formation between sides. Thus, we focused our in-depth analysis on osteophyte volume using micro-CT.

In the evaluation of osteophyte volume with micro-CT at 16 and 20 weeks post surgery, total and bone volumes in osteophytes showed similar trends in male and female mice – specifically, that in the absence of Vitamin D very little osteophyte formation was seen. In the mice given supplementation of greater than physiologic levels (5000 IU compared to 1500 IU), there was a decrease in osteophyte volume. However, with 10,000 IU supplementation, osteophyte volume increased similar to the physiologic levels. These findings were consistent across time points and across mice sex. We interpreted this as an absence of specific correlation between Vitamin D supplementation and decreased osteophyte volume or total bone volume, but have noted a difference in osteophyte volume overall between male and female mice. Female mice have nearly 3 times higher volume of osteophyte formation than males at all timepoints. This is an interesting sex difference and may be reflective of previously noted trends in osteoarthritis in humans.[3]

Alternatively, a difference in Vitamin D dosage might explain these findings – specifically, that 5000 IU of Vitamin D might have a mitigating effect, but 10000 IU of Vitamin D was too high and activated further bone formation and other pathways in the osteoarthritic cascade. This will be investigated further with the validation through histology to see if the there is a large difference between doses.





References

1. Fleet JC, Gliniak C, Zhang Z, et al. Serum metabolite profiles and target tissue gene expression define the effect of cholecalciferol intake on calcium metabolism in rats and mice. *J Nutr.* 2008;138(6):1114-1120.
2. Vieth R. The mechanisms of vitamin D toxicity. *Bone Miner.* 1990;11(3):267-272.
3. Srikanth VK, Fryer JL, Zhai G, Winzenberg TM, Hosmer D, Jones G. A meta-analysis of sex differences prevalence, incidence and severity of osteoarthritis. *Osteoarthritis Cartilage.* 2005;13(9):769-781.
4. van Grootheest G, Milaneschi Y, Lips PT, Heijboer AC, Smit JH, Penninx BW. Determinants of plasma 25-hydroxyvitamin D levels in healthy adults in the Netherlands. *Neth J Med.* 2014;72(10):533-540.
5. Rabenberg M, Scheidt-Nave C, Busch MA, Rieckmann N, Hintzpeter B, Mensink GB. Vitamin D status among adults in Germany--results from the German Health Interview and Examination Survey for Adults (DEGS1). *BMC Public Health.* 2015;15:641.

Summary of Aim 1 Accomplishments

- Completed animal surgeries at UConn before PI change of location.
- Established reliable histology ratings techniques using Mankin scoring rubric.
- Completed histology testing and in process of validating histology analysis.
- Completed micro-CT analysis. The findings of no specific correlation of osteophyte volume or bone volume with Vitamin D supplementation level using micro-CT are noted,

although there was a consistent effect of lower osteophyte volume with 5000 IU supplementation. The lack of further volume change with more Vitamin D supplementation, however, may indicate that this observation is just due to chance. Again, the sex difference with female mice showing higher volumes of osteophyte formation is notable and we plan to continue analyzing this finding. Further sub-analysis is needed to definitively translate these results.

- We have some exciting potential evidence of Vitamin D mitigation of OA in female animals.
- The main accomplishment is the preliminary finding of a correlation between increased Vitamin D supplementation and decreased OA histologically in the murine model. It is interesting to note that this was only seen in females, implying a possible sex-differential effect. Van Grootheest et al showed in a recent epidemiological study in the Netherlands that circulating Vitamin D levels were higher in women than men, particularly in the group under 35 years.[4] In contrast, Rabenberg et al showed no sex differences in 25-hydroxy-Vitamin D levels in an adult census study.[5] In our second round of the animal study, this appeared to be a consistent effect. We need to complete the pooled analysis of rounds 2 and 3 to validate this effect.

Specific Aim 2: To evaluate the serum 25-hydroxy-Vitamin D status of military cadets before and after ACL injury and reconstruction and correlate these findings with biomarkers of articular cartilage injury as well as radiographic joint space narrowing

Major Goals

1. ***1.*** **Initiation of Add-on to Existing Study**
2. ***2.*** **Subject Enrollment/Specimen and Data Collection**

Major Activities:

- We obtained Keller Army Hospital and UConn Institutional Review Board (IRB) approval in October 2014 to add-on to the existing study of ACL tears in United States Military Academy (USMA) cadets and biomarkers for initiation of PTOA. Our IRB approval allows us to also measure 25-hydroxy-Vitamin D levels in pre-injury, at-injury, at-surgery, and post-surgical serum samples from USMA subjects.
- To date, study participation is as follows per Dr. Cameron (USMA PI):
    - 119 ACL injured cadets screened
    - 70 ACL injured cadets enrolled in study; this is on target for 90-100 cadets to be enrolled over three year period.
    - Matched control subjects are also enrolled for each ACL injured case.
- We will not perform Vitamin D testing until we have reached target enrollment, both for reliability of testing (batched testing is much more comparable) and budget costs.

Results/Accomplishments reporting is deferred pending further enrollment for this segment of the study.

Opportunities for Training and Professional Development – Nothing to report

Results Dissemination – Nothing to report

Plans for Next Reporting Period

- We are about to begin immunohistochemistry to look at markers within articular cartilage and molecules upregulated with osteoarthritic degeneration. Specifically, the expression of extracellular matrix proteins (type 1, II, IX, collagens, aggrecan), chondrocyte hypertrophy markers (Runx2, type X collagen, MMP13), enzymatic degradation products for aggrecan and collagens (aggrecan NITEGE, collagen C1 and C2 neoepitopes) and differentiation markers (Runx1, Sox9) will be examined by immunohistochemistry (IHC).
- Completion of pooled analysis of histology
- Preparation of manuscript regarding Vitamin D supplementation in murine model
- Preparation of manuscript(s) regarding impact of Vitamin D supplementation on murine osteoarthritis
- Completion of USMA cadet enrollment and batched Vitamin D analysis
- Initiation of imaging study analysis in USMA cadets

IMPACT

Impact on Development of Principal Disciplines
The fact that we are studying the effect of a common molecule on a devastating musculoskeletal injury in young people has stimulated interest in this topic. The military studies of Vitamin D supplementation in recruits are related in scope.

Impact on Other Disciplines – Nothing to Report

Impact on Technology Transfer – Nothing to Report

Impact on Society Beyond Science and Techonology – Nothing to Report - yet. The results of this study could potentially impact public health and knowledge about the importance of Vitamin D for bone and joint health as well as routine surveillance for circulating blood levels.

CHANGES/PROBLEMS

Changes in Approach – Nothing to report

Actual Problems or Delays and Actions to Resolve

- The delay in funding transfer after PI change of institution slowed progress on the grant for 6 months.
    - work on the grant and set up of subaward at the University of Connecticut to complete micro-CT did not occur for 6 months.
    - With the change in institution and delay in funding transfer, cadet enrollment continued but payment for research assistant was threatened; fortunately, USMA was able to support his salary while awaiting grant transfer.
- We have received a no-cost extension to allow work on both specific aims 1 and 2 to be completed within the year.

Changes with Significant Impact on Expenditures – Nothing to report

Significant Changes in Use or Care of Human Subjects/Animals – Nothing to Report

USMA/Keller Army Hospital IRB is current – originally approved in October 2013, reviewed October 2017.

PRODUCTS

Publications, Conference Papers, and Presentations

1. **Wolf JM.** Progress Report: Impact of Vitamin D supplementation on murine osteoarthritis. Presented at CDMRP-PRORP Conference, May 7, 2017.

Website/Internet – Nothing to report

Inventions, Patents, and Licenses – **Nothing to report**

Other Products – related research work:

1 Rozental TD, Herder LM, Walley KC, Zurakowski D, Coyle K, Bouxsein ML, **Wolf JM**. 25-Hydroxyvitamin-D and Bone Turnover Marker Levels in Patients with Distal Radial Fracture. J Bone Joint Surg Am. 2015 Oct 21;97(20):1685-93. PMID: 26491133

2. Nchinda N, **Wolf JM,** Oliveira L. Identifying Risk Factors, including Vitamin D level, for Tendinopathy in a Large National Database. Manuscript in preparation, 2017.

Dr. Oliveira (above) and I have also begun a prospective project to look at Vitamin D levels in patients with specific tendinopathies – including Achilles tendinitis, lateral epicondylitis, and rotator cuff bursitis.

PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

Name	Project Role	Researcher Identifier	Person Month Worked	Contribution to Project	Funding Support
Jennifer Moriatis Wolf, MD	PI	0003-3514-8876	NO CHANGE		
Kenneth Cameron, PhD, ATC	USMA site PI	0002-6276-4482	NO CHANGE		
Tong-Che He, PhD	Co-Investigator	0001-7721-3934	6	Assistance with histology review, immunohistochemistry, project planning	University of Chicago cooperative funding with Chinese government
Wei Jiang	Postdoctoral student		6	Histology grading, slide preparation	University of Chicago postdoctoral support fund
Douglas Adams, PhD	UConn site PI		5	Micro-CT analysis of murine knees	Connecticut Institute for Clinical and Translational Science
Matthew Posner, MD	USMA Co-Investigator		NO CHANGE		
Steven Svoboda, MD	USMA Co-Investigator (until USMA retirement)		6	Enrollment of patients, consent process	

Change in Active Other Support of PD/PI or Key Personnel – Nothing to report

Organizational Partners – Nothing to report

SPECIAL REPORTING – Quad Chart for October 2017 attached

APPENDICES

- Quad chart
- PI CV

CURRICULUM VITAE
Jennifer Moriatis Wolf, MD

The University of Chicago
Department of Orthopaedic Surgery and Rehabilitation
Section of Hand and Upper Extremity Surgery
5841 S. Maryland Avenue, MC 4079
Chicago, Illinois 60637
Phone: 773-702-5384
Fax: 773-702-4384
Email: jwolf@bsd.uchicago.edu

EDUCATION

1987-1991	University of Maryland College Park, MD B.A., *magna cum laude* with General Honors
1991-1996	University of Pennsylvania School of Medicine Philadelphia, PA M.D., May 21, 1996

POST-DOCTORAL EDUCATION

1996-1997	Brown University Department of Surgery - **Internship** Providence, RI Director: Kirby I. Bland, MD
1997-2001	Brown University Department of Orthopaedic Surgery-**Residency** Providence, RI Director: Michael G. Ehrlich, MD
2001-2002	Brown University Division of Orthopaedic Trauma, Department of Orthopaedics – **Orthopaedic Trauma Fellowship** Providence, RI Director: Peter G. Trafton, MD
2002-2003	Mayo Clinic Division of Hand Surgery, Department of Orthopaedics – **Hand Surgery Fellowship** Rochester, MN Director: Robert D. Beckenbaugh, MD/Richard A. Berger, MD, PhD
2016-present	Lund University Faculty of Medicine – **PhD in Hand Surgery** Lund, Sweden Supervisors: Isam Atroshi, MD, PhD; Martin Englund, PhD

CERTIFICATION

2005/2013	Board Certified (Diplomate) - American Board of Orthopaedic Surgery (Chicago, Illinois)

2006/2013 Certificate of Added Qualification (Hand Surgery) - American Board of Orthopaedic Surgery (Chicago, Illinois)

LICENSURE

Licenses active in Connecticut, Colorado, Minnesota, Illinois, Georgia, and Indiana

ACADEMIC APPOINTMENTS

2003 – 2009 Assistant Professor, Department of Orthopaedic Surgery
University of Colorado Health Sciences Center
2009-2010 Associate Professor, Department of Orthopaedic Surgery
University of Colorado-Denver
2010-2015 Associate Professor, Department of Orthopaedic Surgery
University of Connecticut
2015-2016 Professor, Department of Orthopaedic Surgery
University of Connecticut
2016-present Professor, Department of Orthopaedic Surgery
The University of Chicago

TEACHING/EDUCATIONAL APPOINTMENTS

University of Colorado School of Medicine
Co-Director, Musculoskeletal Block (required 3rd-year course) (2007-2010)
Director, Orthopaedic Medical Student Courses/Sub-Internships (2007-2010)
University of Connecticut School of Medicine
Curriculum Reform Clinical Education Committee (2015-2016)
Medical School Admissions Committee (2014-2016)
Instructor, Musculoskeletal Block (2010-present)
The University of Chicago
Program Director, Hand Surgery Fellowship (2016-present)

HOSPITAL APPOINTMENTS

2003-2010 University of Colorado Hospital
2004-2010 Denver Veterans Administration Medical Center
2004-2010 Denver Health Medical Center
2004-2010 The Children's Hospital of Denver
2005-2010 Rose Hospital (Denver)
2010-2016 John Dempsey Hospital
2014-2016 Connecticut Children's Medical Center
2016-present The University of Chicago Hospitals

AWARDS & HONORS

2016 Office of Faculty Initiatives Grant Award – The University of Chicago
2014 Connecticut Technology Council Women of Innovation Award
2013 American British Canadian Traveling Fellowship – American Orthopaedic Association
2010 Sterling Bunnell Traveling Fellowship –American Society for Surgery of the Hand

2008 Clinician Scientist Award – Orthopaedic Research and Education Foundation
2008 Leadership Fellows Program – American Academy of Orthopaedic Surgeons
2007 John J. Fahey North American Traveling Fellowship –American Orthopaedic Association
2006 American Society for Surgery of the Hand – Young Member Leadership Program
2006 Alexandra Kirkley Traveling Fellowship - Ruth Jackson Orthopaedic Society
2005 United States Bone and Joint Decade Young Investigator
2001 Haffenreffer Award for Resident Research
1996 William G. Munn Memorial Prize for Promise in Orthopaedics
1995 Alpha Omega Alpha Medical Honor Society
1990 Phi Beta Kappa
1987 Chancellor's Scholar (full four-year college merit scholarship)

PROFESSIONAL SOCIETY MEMBERSHIP

American Society for Surgery of the Hand (Active Member, 2007 - present)
American Academy of Orthopaedic Surgeons (Fellow, 2007 – present)
American Orthopaedic Association (Member, 2012-present)
American Association of Hand Surgeons (Member, 2003-present)
Orthopaedic Leadership Institute (2010-present)
Ruth Jackson Orthopaedic Society (2002-present)
Rocky Mountain Hand Surgery Society (2003-present)
Colorado Orthopaedic Society (2004-2010)
Connecticut Orthopaedic Society (2010-present)
New England Orthopaedic Society (2015-present)
Chicago Society for Surgery of the Hand (2017)

JOURNAL REVIEW

Deputy Editor-in-Chief, *Journal of Hand Surgery* (2016-present)
Deputy Editor, *Journal of Hand Surgery* (2011-2015)
Associate Editor, Scientific – *Journal of Hand Surgery* (2009-present)

Associate Editor, Hand and Microsurgery, *Journal of Bone and Joint Surgery Reviews* (2013-present)

Editorial Board, *Orthopedics* (2003-2016)

Web Updates Editor, *Skeletal Trauma* (2008-2016)

Expert Contributor, *British Medical Journal Best Practice* website (2014-present)

Consultant Reviewer
Journal of Bone and Joint Surgery (2007-present)
Journal of Hand Surgery (2008-2009)
Journal of Bone and Joint Surgery – British (2009-present)
Clinical Orthopaedics and Related Research (2007-present)
Orthopedics (2003-present)

*Hand (*2010-present)
British Journal of Sports Medicine (2013-present)
International Journal of Sports Medicine (2012-present)
BMC Musculoskel Disorders (2014-present)
Osteoarthritis Cartilage (2015-present)
Arthritis Care and Research (2015-present)

Editor, Hand Module, *Orthopaedic Hyperguide* (2008-2011)

COMMITTEES/SERVICE

American Society for Surgery of the Hand
Council Member-at-Large (2014-2017)
Treasurer (2017-2020)
Lead, Innovation Task Force (2017-2018)
Program Co-Chair, Annual Meeting (2014)
Liaison, AOA Own the Bone (2016)
Annual Meeting Committee (Co-Chair, 2016)
Publications and Products Committee (2015-2016)
Membership Application Task Force (2015)
CME Guidelines Task Force (2015)
Commercial Support Committee (2012-2017)
Touching Hands Project (2012-2015)
Bunnell Traveling Fellowship Committee (2010-2013; Chair, 2013-2014)
Products and Publications Committee (2005-2011)
Annual Meeting Scientific Displays Committee (Member, 2006-2015; Chair, 2009-2012)
Mentoring Task Force (2006)
Resident Education Committee (2007-2010)
Crucial Elements of Hand Surgery Committee (2007-2008)
Courses and Meetings Advisory Committee (2007-2010)
Young Members Steering Committee (Member, 2008-2010; Chair 2010-2011)
Diversity Committee (2008-2011)
Membership Task Force (2009)

American Foundation for Surgery of the Hand
Board Member-at-Large (2012-2014)
Complus Manus Committtee (2012-2014)
Nominating Committee (2012-2013)
Touching Hands Project (2012-2013)

American Academy of Orthopaedic Surgeons
Chair, Residents, Fellows, and Candidate Members Subcommittee (2008-2011)
Member (2006-2009)
Co-Editor, Residents' Monthly E-Newsletter (2007-2009)
Co-Chair, Leadership Development Endowment Fund Meeting Committee (2010-2012)

American Board of Orthopaedic Surgeons/National Board of Medical Examiners
Oral Boards Examiner (2015-2017)
Joint Committee for CAQ Question-Writing Task Force (2011-2015)

American Orthopaedic Association
Nominating Committee – alternate (2017-18)

Orthopaedic Research and Education Foundation
Grant Reviewer (2010-present)

Ruth Jackson Orthopaedic Society Governing Board
President (2014-2015)
Vice- President (2013-2014)
Secretary (2011-2013)
Chair, Nominating Committee (2015)

Orthopaedic Leadership Institute
Inaugural Meeting Program Coordinator (2011)

American Association of Hand Surgery
Research Committee (2008-2011)

Board of Directors, Rocky Mountain Hand Surgery Society (2008-2011)
Secretary/Treasurer (2008-2009)
Vice President (2009-2010)

New England Hand Society (2011-present)

Department of Orthopaedic Surgery, University of Connecticut
Research Committee (2011-present, Chair 2012-present)
Admissions Committee member (2010-present)
OR Lean Committee (2014-15)

Colorado Multiple Institutions Review Board (IRB) reviewer, 2004-2008

Faculty Advisor, Orthopaedic Student Interest Group, University of Colorado School of Medicine, 2008-2010

Department of Orthopaedics, University of Colorado
Finance Committee member, 2006-2010
Academic Council member, 2007-2010
Curriculum Committee member, 2006-2010

University of Colorado Hospital Trauma Committee member, 2004-2010

Active Women's Health Initiative, University of Colorado Hospital, 2004-2010

PEER-REVIEWED PUBLICATIONS

1. **Moriatis JM**, Gannon FH, Shore EM, Bilker W, Zasloff MA, Kaplan FS: Limb swelling in patients who have fibrodysplasia ossificans progressiva. *Clin Orthop Rel Res* 336: 247-253, 1997.

2. **Wolf JM**, Weiss APC: Portable mini-fluoroscopy improves operative efficiency in hand surgery. *J Hand Surg* 24A: 182-184, 1999.

3. Greisberg JK, **Wolf JM**,Wyman J, Zou L,Terek RM: Gadolinium inhibits thymidine incorporation and induces apoptosis in chondrocytes. *J Orthop Res* 19: 797-801, 2001.

4. **Wolf JM,** Weiss APC: Bone-retinaculum-bone reconstruction of scapholunate ligament injuries. *Orthop Clinics North Am* 30: 241-246, 2001.

5. Lin C, Mak S, Meitner PM, **Wolf JM**, Bluman E, Block JA, Terek RM: Cancer/testis antigen CSAGE is concurrently expressed with MAGE in chondrosarcoma. *Gene*. 285(1-2):269-278, 2002.

6. **Wolf JM**, Green A: Influence of co-morbidity on self-assessment instrument scores of patients with idiopathic adhesive capsulitis. *J Bone Joint Surg Am* 84: 1167-1173, 2002.

7. **Wolf JM**, DiGiovanni CW: A survey of orthopedic surgeons regarding DVT prophylaxis in foot and ankle trauma surgery. *Orthopedics* 27:504-508, 2004.

8. **Wolf JM**, Ritter M, Weiss APC, Akelman E: Access and use of the Internet in a hand surgery population. *Hand Surg* 9: 29-33, 2004.

9. Cooney WP III, **Wolf JM,** Holtkamp K, Dobyns JH: Congenital duplication of the thumb. *Handchir Mikrochir Plast Chir* 36: 126-136, 2004.

10. Tashjian RZ, **Wolf JM**, Ritter M, Weiss APC, Green A: Functional outcomes and general health status after ulnohumeral arthroplasty for primary degenerative arthritis of the elbow. *J Shoulder Elbow Surg* 15:357-366, 2006.

11. Ryzewicz MA, **Wolf JM**: Trigger digits: review, management, and complications. *J Hand Surg Am,* 31A: 135-146, 2006.

12. DiMatteo LD, **Wolf JM**: Flexor carpi radialis tendon rupture as a complication of a closed distal radius fracture: a case report. *J Hand Surg Am*. 32(6):818-20, 2007.

13. Faro F, **Wolf JM**: Lateral epicondylitis: review and current concepts*., J Hand Surg Am* 32: 1271-1279*,* 2007.

14. Sobky K, Baldini T, Thomas K, Bach J, Williams A, **Wolf JM:** Biomechanical comparison of different volar fracture fixation plates for distal radius fractures. *Hand* 3(2):96-101, 2008.

15. **Wolf JM**: Treatment of Scaphotrapezio-Trapezoid Arthritis. *Hand Clin* 24(3): 301-306. 2008.

16. **Wolf JM,** Ritchie P, McCarty EC. Triceps reconstruction using hamstring graft for triceps insufficiency or recurrent rupture. *Tech Hand Upper Extremity Surg* 12(3): 174-179, 2008.

17. **Wolf JM,** Sturdivant RX, Owens BD. Incidence of de Quervain's tenosynovitis in a young active population. *J Hand Surg* 34(1):112-115*,* 2009.

18. **Wolf JM.** The influence of ligamentous laxity and gender – implications for hand surgeons. *J Hand Surg* 34(1): 161-163, 2009.

19. **Wolf JM**, Mountcastle SB, Owens BD. The epidemiology of carpal tunnel syndrome in a military population. *Hand 4*(3): 289-291, 2009.

20. Scher D, **Wolf JM**, Owens BD. Current concepts review: lateral epicondylitis. *Orthopedics* 32(4), 2009.

21. **Wolf JM**, Athwal GS, Shin AY, Dennison DG. Instructional course lecture: Acute trauma to the upper extremity: what to do and when to do it. *J Bone Joint Surg Am* 91(5):1240-1252, 2009.

22. **Wolf JM**, Athwal GS, Hoang BH, Mehta S, Williams A, Owens BD. Knowledge of levels of evidence criteria in orthopaedic residents. *Orthopedics* 32(7):494, 2009.

23. **Wolf JM**, Dawson L, Mountcastle SB, Owens BD. The incidence of scaphoid fracture in a young, active population. *Injury*, (epub) Jun 2009.

24. **Wolf JM,** Oren TW, Ferguson B, Williams AE, Petersen B. The carpometacarpal stress view radiograph in the evaluation of basilar thumb joint laxity. *J Hand Surg* 34(8):1402-1406, 2009.

25. Scher DL, Owens BD, Sturdivant RX, **Wolf JM.** Incidence of joint hypermobility syndrome in a military population: impact of gender and race. *Clin Orthop Rel Res* (epub), Dec 2009.

26. Oren TW, **Wolf JM.** Soft tissue complications of distal radius fractures. *Operative Tech Orthop* 19(2): 100-106, 2009.

27. **Wolf JM,** Mountcastle SB, Burks R, Sturdivant RX, Owens BD. Epidemiology of lateral and medial epicondylitis in a military population. *Mil Med* 175(5): 336-339*,* 2010.

28. **Wolf JM.** Evidence based medicine: Injections for trapeziometacarpal arthrosis. *J Hand Surg* 35(6): 1007-1009, 2010.

29. Van Tassel DC, Owens BD, **Wolf JM.** Incidence estimates and demographics of scaphoid fracture in the United States population. *J Hand Surg* 35(8):1242-1245, 2010.

30. **Wolf JM,** Bucknell A. Arthroscopic removal of improvised explosive device (IED) debris from the wrist: a case report. *Mil Med* 175(10): 742-744, 2010.

31. Chung KC, Song JW, WRIST Study Group (**Wolf JM, member)**. A guide to organizing a multicenter clinical trial. *Plast Recon Surg* 126(2):515-23, 2010.

32. Rose J, Harms S, **Wolf JM.** Rapidly-growing squamous cell carcinoma of the hand in a renal transplant recipient: a case report. *J Bone Joint Surg Am* 93(2): 199-202*,* 2011.

33. **Wolf JM,** Schreier S, Tomsick S, Williams AE, Petersen B. Radiographic laxity of the trapeziometacarpal joint is correlated with generalized joint hypermobility. *J Hand Surg* 36(7): 1165-1169, 2011.

34. Owens BD, Hurwitz S, Thompson T, Harrast JJ, **Wolf JM.** Surgical trends in Bankart repair: an analysis of data from American Board of Orthopaedic Surgery (ABOS) certification examinations. *Am J Sports Med,* epub May 31, 2011.

35. Posner M, **Wolf JM**, Belmont P, Cameron K, Owens BD. Epidemiology of major league baseball injuries. *Am J Sports Med* 39(8): 1676-1680, 2011.

36. **Wolf JM,** Ozer K, Gordon MJV, Scott F, Williams AE. Autologous blood injection vs. corticosteroid injection in the treatment of lateral epicondylitis: a prospective, randomized, controlled multi-center study. *J Hand Surg* 36(8): 1269-1272, 2011.

37. Scher DL, Boyer MI, Hammert W, **Wolf JM.** Evaluation of knowledge of common hand surgery problems in emergency medicine and internal medicine residents. *Orthopedics* 34 (7): 279-281, 2011.

38. **Wolf JM,** Cameron KL, Owens BD. Impact of joint laxity and hypermobility on the musculoskeletal system: Implications for orthopaedic surgeons. *J Amer Acad Orthop Surg* 19(8): 463-471, 2011.

39. Mir HR, Cannada LK, Murray JN, Black KP, **Wolf JM.** Orthopaedic resident and program director opinions of resident duty hours. *J Bone Joint Surg Am* 93(23): 2239, 2011.

40. **Wolf JM,** Delaronde S. Current trends in treatment of trapeziometacarpal osteoarthritis: a survey of US hand surgeons. *J Hand Surg* 37(1): 77-82, 2012.

41. Stoneback JW, Owens BD, Sykes J, Athwal GS, **Wolf JM.** Incidence of elbow dislocations in the United States. *J Bone Joint Surg Am* 94(3): 240-245, 2012.

42. Ozer K, **Wolf JM,** Watkins B, Hak D. Comparison of four fluoroscopic views for dorsal cortex screw penetration after volar plating of the distal radius. *J Hand Surg*, 37(5): 963-967, 2012.

43. Ritting AW, **Wolf JM.** How to measure outcomes of distal radius fracture treatment. *Hand Clin* 28(2):165-175*,* 2012.

44. Nakashian M, Pointer L, Owens BD, **Wolf JM.** Incidence of metacarpal fractures: analysis of a national database. *HAND* 7(4): 426-430, 2012.

45. **Wolf JM,** Dukas A, Pensak M. Advances in wrist arthroscopy. *Journal of the American Academy of Orthopaedic Surgeons* 20(11):725-734, 2012.

46. **Wolf JM,** Cameron KL, Clifton K, Owens BD. Serum relaxin values in young athletic males are similar to females. *Orthopedics* 36(2):128-31, 2013.

47. Ladd A, Weiss APC, Crisco JJ, Hagert E, **Wolf JM,** Glickel S, Yao J. The thumb CMC joint: anatomy, hormones, and biomechanics. *Instructional Course Lectures* 62:165-79, 2013.

48. Bernstein J, **Wolf JM.** Autologous blood and platelet-rich plasma injections for enthesopathy of the extensor origin. *J Hand Surg*, epub March 6, 2013.

49. **Wolf JM,** Williams AE, Delaronde S, Clifton KB, Leger R, King KB. Relationship of serum relaxin to generalized and trapeziometacarpal joint laxity. *J Hand Surg* 38(4):721-728, 2013.

50. **Wolf JM,** Scher DL, Scott F, Williams AE, Delaronde S, Etchill E, King KB. Relationship of relaxin hormone and thumb carpometacarpal joint arthritis. Epub April 7, 2103, *Clin Orthop Rel Res*.

51. Van Tassel D, Owens BD, Pointer L, **Wolf JM.** Incidence of clavicle fractures in sports: analysis of the NEISS database. Epub June 8, *Int J Sports Med,* 2013.

52. Owens BD, **Wolf JM,** Seelig AD, Jacobson IG, Boyko EJ, Smith B, Ryan MAK et al. Risk factors for lower extremity tendinopathies in military personnel. Epub June 10, *Orthop J Sports Med,* 2013.

53. Hageman MG, Becker SJ, Bot AG, Guitton T, Ring D; Science of Variation Group (**Wolf JM, SVG group member).** Variation in recommendation for surgical treatment for compressive neuropathy. *J Hand Surg Am*. 38(5):856-62, 2013.

54. WRIST Study Group (**Wolf JM, member).** Reflections one year into the 21-center NIH-funded WRIST study: a primer on conducting a multicenter clinical trial. *J Hand Surg* 38: 1196-1201, 2013.

55. Blonna D, **Wolf JM,** O'Driscoll SW. Prevention of nerve injury during arthroscopic capsulectomy using a safety-driven technique. *J Bone Joint Surg Am* 95(15); 1373-1381*,* 2013.

56. Pensak MJ, Bayron J, **Wolf JM.** Evidence-based medicine: current treatment of de Quervain syndrome. *J Hand Surg* 38: 2247-2249*,* 2013.

57. Judson C, **Wolf JM.** Lateral epicondylitis: injection therapies. *Orthop Clin North Am,* 44: 615-23, 2013.

58. Baldwin P, **Wolf JM.** Outcomes measurement in phalangeal fractures. *Hand Clin* 29: 621-630, 2013*.*

59. Clifton K, Paglia DN, Soung DY, **Wolf JM**, Moss I, Drissi H. Effects of Wnt5a haploinsufficiency on bone repair. E-pub, *J Orthop Trauma,* 2013.

60. **Wolf JM,** Turkiewicz A, Atroshi I, Englund M. Prevalence of doctor-diagnosed thumb carpometacarpal joint osteoarthritis: Analysis of Swedish health care. *Arthritis Care Res,* 66(6): 961-965, 2014.

61. Webber T, **Wolf JM.** Squamous cell carcinoma of the hand in solid organ transplant patients. *J Hand Surg* 39(3):567-570, 2014.

62. Clifton KG, Rodner CM, **Wolf JM.** Detection of relaxin receptor in the dorsoradial ligament, synovium and articular cartilage of the trapeziometacarpal joint. *J Orthop Res* 32(8): 1061-1067, 2014.

63. O'Malley M, Ritting A, Rodner CM, **Wolf JM**. Radiographic interpretation of distal radius fractures: visual estimations versus digital measuring techniques.. *HAND* 9(4):488-493, 2014.

64. Scordino L, Bernstein J, Nakashian M, Cote M, McIntosh M, **Wolf JM.** Prevalence of scapho-trapezio-trapezoid osteoarthritis. *J Hand Surg* 39(9):1677-82, 2014.

65. Scher DL, Ferreira JV, Cote M, Abdelgawad A, **Wolf JM**.The need for musculoskeletal education in primary care residencies. *Orthopedics* 37(8):511-3, 2014.

66. Webber T, Patel SP, Pensak MJ, Fajolu O, Rozental TD, **Wolf JM.** Correlation between radial cortical thickness and bone mineral density. *J Hand Surg* 40(3):493-499, 2015.

67. **Wolf JM**, Cannada LK, Lane JM, Sawyer AJ, Ladd AL. A comprehensive overview of osteoporotic fracture treatment. *Instr Course Lect* 64:25-36, 2015.

68. Dukas AG, **Wolf JM.** Management of complications of periarticular fractures of the distal interphalangeal, proximal interphalangeal, metacarpophalangeal, and carpometacarpal joints. *Hand Clin* 31(2):179-192, 2015.

69. **Wolf JM,** Cannada L, Van Heest AE, O'Connor MI, Ladd AL. Male and female differences in musculoskeletal disease. *JAAOS* 23(6): 339-347, 2015.

70. Owens BD, Williams AE, **Wolf JM.** Risk factors for surgical complications in rotator cuff repair in a veteran population. *J Shoulder Elbow Surg* 24(11):1707-12, 2015.

71. Rozental TD, Zurakowski D, Herder L, Whalley KC, Coyle K, Bouxsein M, **Wolf JM.** 25-Hydroxy-Vitamin D and bone turnover marker levels in patients with distal radius fractures. *J Bone Joint Surg Am* 97(20): 1685-1693, 2015.

72. Owens BD, **Wolf JM,** Clifton K, Svoboda SJ, Cameron KL. Association between serum relaxin and subsequent shoulder instability. *Orthopedics* 39(4): 724-728, 2016.

73. Rohde R,**Wolf JM,** Adam JE**.** Where are the women in orthopaedic surgery? *Clin Orthop Rel Res,* 474(9): 1950-6*,* 2016.

74. O'Sullivan MB, Singh H, **Wolf JM.** Tendon transfers in the rheumatoid hand for reconstruction. *Hand Clin* 32(3): 4017-416, 2016.

75. Wolf MR, Avery D, **Wolf JM.** Upper extremity injuries in gymnasts. *Hand Clin* 33(1): 187-197, 2017.

76. Owens BD, Cameron KL, Bokshan S, Clifton K, Svoboda SJ, **Wolf JM**. Serum biomarkers of cartilage turnover and shoulder instability. *Orthopedics* 40(1):34-36, 2017.

77. Wei Q, Fan J, Liao J, Zou Y, Song D, Liu J, Lu M, Liu F, Ma C, Hu X, Li L, Yu Y,Qu Y, Chen L, Yu X, Zhang Z, Zhao C, Zeng Z, Reid RR, Lee MJ, **Wolf JM**, He TC. Engineering a rapid adenovirus packaging and amplification (RAPA) cell line to expedite the generation of recombinant adenoviruses. *Cell Physiol Biochem* 41(6): 2383-2398, 2017.

78. Song D, Zhang F, Reid RR, Ye J, Wei Q, Liao J, Zou Y, Fan J, Ma C, Hu X, Qu X, Chen L, Li L, Yu Y, Yu X, Zhang Z, Zhao C, Zeng Z, Zhang R, Yan S, Wu T, Wu X, Shu Y, Lei J, Li Y, Zhang W, Wang J, Lee MJ, **Wolf JM**, Huang D, He TC. BMP9 induces osteogenesis and adipogenesis in the immortalized human cranial suture progenitors from the patent sutures of craniosynostosis patients. *J Cell Mol Med* May 4, 2017 (epub ahead of print)

79. Andrews R, Chamberlin KW, Ingrassia J, Kuo C-L, Pizzi A, **Wolf JM.** Five-step guide to conversations between trainees and patients in pain: educating trainees about discontinuing opioids using a staged approach. *J Fam Med & Community Health* 4(5): 1123-1127, 2017.

80. **Wolf JM**, Atroshi I, Karlsson J, Zhou C, Englund M. Sick leave after surgery for thumb carpometacarpal osteoarthritis: a population-based study. Submitted, *J Hand Surg*, 2017.

81. Zaino CJ, Boyajian H, Shi L, **Wolf JM.** Trends in the surgical treatment of trapeziometacarpal osteoarthritis. Submitted, *J Hand Surg,* 2017.

82. Twu J, Landy D, **Wolf JM.** Olecranon fracture through persistent olecranon apophysis in a 21-year-old male: Case report and review of the literature. Submitted, *Eur J Hand Surg,* 2017.

83. Marchese J, Cote M, Coyle K, **Wolf JM.** Prospective evaluation of a single corticosteroid injection in radial tunnel syndrome. Submitted, *J Hand Surg,* 2017.

NON-PEER REVIEWED PUBLICATIONS

1. Kaplan FS, Glaser DL, Shore EM, Emerson S, Mitchell D, **Wolf JM**, and the FOP Clinical Consortium: Medical management of fibrodysplasia ossificans progressiva: current treatment considerations. C*lin Proc Third Intl Symp FOP* 1: 1-52, 2001.

2. **Wolf JM**: *Editorial:* The genetic key to a rare disease and its impact on orthopaedics. *Orthopedics* 29:1, 2006.

3. **Wolf JM**, Athwal GS, Hoang B, Mehta S, Owens BD. Report from the 2007 AOA North American Traveling Fellowship. *J Bone Joint Surg Am* 90(5):1160-1164, 2008.

4. **Wolf JM.** Web commentary on: Pyrolytic carbon resurfacing arthroplasty for osteoarthritis of the proximal interphalangeal joint. *J Bone Joint Surg Am*, 2011.

5. **Wolf JM.** *Editorial:* New iPad App for the Journal of Hand Surgery, *J Hand Surg,* 37 (9): 1763-1764, 2012.

6. **Wolf JM.** *Editorial:* Do we need to treat tennis elbow? *Orthopedics* 35(11): 921-922, 2012.

7. Scher DL, Ferreira JD, Cote ML, Abdelgawad A, **Wolf JM.** *Editorial:* The need for musculoskeletal education in primary care residencies. *Orthopedics,* 37(8): 511-513, 2014.

8. **Wolf JM.** *Editorial:* Raising the bar: the use of standardized reporting outcomes. *J Hand Surg* 39(10):1905-1906, 2014.

ELECTRONIC MEDIA

1. **Wolf JM**, Lawson AB, Mallette P, Leppek N, Spitzer VM: Wrist and Carpal Anatomy section, *The Fractured Wrist*, Instructional DVD-video, American Academy for Orthopaedic Surgeons, 2008.

2. **Wolf JM**. Injection of the digital flexor. WebMD article, www.emedicine.com, 2008.

3. Owens BD, **Wolf JM**, Murphy T. Lateral epicondylitis. WebMD article, www.emedicine.com, 2008.

4. Scher DL, **Wolf JM**: Lateral elbow tendinopathy. American Academy of Orthopaedic Surgeons Web site: Orthopaedic Knowledge Online 2011;9(9): http://orthoportal.aaos.org/oko/abstract.aspx?article=OKO_HAN031.

TEXTBOOK CHAPTERS

1. **Moriatis JM,** Zackai E, Kaplan FS: Skeletal dysplasia and dwarfism: physiology and pathophysiology. *In* Fetal and Neonatal Physiology, Vol. II, 2nd edition. W. B. Saunders, 1995.

2. **Wolf JM,** Weiss APC: Arthroplasty of the hand. *In* Operative Orthopaedics, 3rd edition.Chapman MW, ed. J.B. Lippincott Company, 2000.

3. Hayes E, Carney K, **Wolf JM,** Smith J, Akelman E: Carpal tunnel syndrome. *In* Rehabilitation of the Hand and Upper Extremity, 5th edition. Mosby, Inc, 2002.

4. **Wolf JM.** Dupuytren's disease. *In* Hand Surgery, 1st edition. Berger RA, Weiss APC, eds. New York: Lippincott, Williams & Wilkins, 2004.

5. **Wolf JM,** Shin AY: Proximal row carpectomy. *In* Operative Techniques in Hand and Wrist Surgery. Chung KC, ed. Philadelphia: Elsevier, 2007.

6. **Wolf JM,** Shin AY: Carpal anatomy. *In* Distal Radius Fractures and Carpal Injury: The Cutting Edge. Slutsky D, ed. Philadelphia: Elsevier, 2008.

7. D'Ambrosia P, **Wolf JM:** Metacarpophalangeal and carpometacarpal fractures and dislocations. *In* Master Skills: Fractures. Budoff JE, ed. American Society for Surgery of the Hand, 2008.

8. **Wolf JM,** Shin AY: Radius/Carpus/DRUJ - Bones and ligaments. *In* Principles and Practice of Hand Surgery. Slutsky D, ed. Philadelphia: Elsevier, 2008.

9. **Wolf JM.** Cross-finger flaps. *In* Flap Reconstruction of the Upper Extremity: A Master Skills Publication. Rayan GH, Chung KC, eds. American Society for Surgery of the Hand, 2009.

10. **Wolf JM.** Lateral and medial epicondylitis.*In* Pocket Book of Hand Surgery. Boyer MI, ed. American Society for Surgery of the Hand, 2010.

11. **Wolf JM.** Options in failed tendon transfers. *In* Reoperative Hand Surgery. Duncan S, ed. New York: Springer, 2011.

12. Scher DL, **Wolf JM.** Ligament injuries in the hand and wrist. *In* Musculoskeletal Examination of the Elbow, Wrist and Hand. Culp RW, Katolik LI, eds. Philadelphia: SLACK Inc., *in press.*

13. Gerhardt D, **Wolf JM.** Lateral epicondylitis. *In* Evaluation and Management of Common Upper Extremity Disorders. Rohde RE, Millett P, eds. Philadelphia: SLACK Inc., 2011.

14. Young L, **Wolf JM.** Carpometacarpal arthrodesis. *In* Arthritis of the Hand and Upper Extremity. Glickel SZ, Bernstein RA, eds. Chicago: ASSH, 2011.

15. Scher DL, **Wolf JM.** Lateral elbow tendinopathy. *In* Orthopaedic Knowledge Update/Online. Rayan GH, Grana W, eds. Chicago: AAOS, 2011.

16. **Wolf JM.** The perionychium: anatomy and pathophysiology. *In* The Hand: Examination and Diagnosis, 4th edition. Rayan GH, Akelman E, eds. Chicago: ASSH, 2011.

17. **Wolf JM.** History taking and examination of the hand. *In* The Hand: Examination and Diagnosis, 4th edition. Rayan GH, Akelman E, eds. Chicago: ASSH, 2011.

18. **Wolf JM.** Hand and finger contracture. *In* The Hand and Upper Extremity Surgery Textbook. Weiss APC, Berger RA, Slutsky D, Goldfarb CA, eds. Chicago: ASSH, 2013.

19. Scher DL, **Wolf JM.** General medical conditions. *In* The Hand and Upper Extremity Surgery Textbook. Weiss APC, Berger RA, Slutsky D, Goldfarb CA, eds. Chicago: ASSH, 2013.

20. **Wolf JM.** Elbow Tendinopathies and Bursitis. *In* DeLee and Drez: Sports Medicine. Miller M, ed. Philadelphia: Elsevier Inc, 2014.

21. **Wolf JM.** Distal radius fractures: fixation of intraarticular fracture with volar plate. *In* Distal Radius Fractures. Lawton J, ed. Philadelphia: Springer Inc, 2015.

22. Marchese J, **Wolf JM.** Closed pinning of metacarpal neck/shaft fractures. *In* Case Competencies in Orthopaedic Surgery. Frank R, Provencher MT, Forsythe B, eds. Philadelphia: Elsevier Inc, 2015.

23. Dukas A, **Wolf JM.** Management of complications of periarticular fractures of the DIP, PIP, MCP, and CMC joints. *In* Complications of Hand Fractures. Chung KC, ed. Philadelphia: Springer Inc, 2016.

24. Yoshida R, **Wolf JM.** Thumb CMC arthroplasty. *In* Hand Surgery Update IV. Murray PM, Hammert WR, eds. Chicago: ASSH, 2016.

25. **Wolf JM.** Lateral and medial epicondylitis. *In* Advanced Reconstruction Series: Elbow. Ring D, ed. Chicago: AAOS, *in press,* 2016.

26. Pensak M, **Wolf JM.** Soft tissue problems. *In* Orthopaedic Revision, Della Rocca G, ed. Springer, *in press,* 2016.

27. Scher DL, **Wolf JM,** Nesti L. Hand, wrist, and elbow injuries. *In* Musculoskeletal Injuries in the Military. Owens BD and Cameron KL, eds. Springer, *in press,* 2016.

28. Yoshida R, **Wolf JM.** Benign tumors of the skin. *In* Tumors of the Hand and Upper Extremity. Kakar S, Murray P, eds. American Society for Surgery of the Hand. *In press,* 2016.

29. Kozlowski R, **Wolf JM.** Basilar thumb arthritis. *In* Chapman's Comprehensive Orthopaedics, 4th edition. Chapman MW, James M, eds. Philadelphia: JP Medical Publishers, *in press,* 2016.

30. Suh N, **Wolf JM.** Hand and wrist reconstruction. *In* Orthopaedic Knowledge Online 12. Ring DR, ed. Chicago: American Academy of Orthopaedic Surgeons, *submitted,* 2016.

31. **Wolf JM,** Barnum K. Thumb CMC osteoarthritis: LRTI procedure, simple trapeziectomy, CMC arthrodesis. *In* Postoperative Orthopaedic Rehabilitation, Green AG, Calfee R, eds. American Academy of Orthopaedic Surgeons, *submitted,* 2016.

32. **Wolf JM.** Elbow Tendinopathies and Bursitis. *In* DeLee and Drez: Sports Medicine. Miller M, ed. Philadelphia: Elsevier Inc, *submitted,* 2017.

TEXTBOOKS

1. Cannada L, **Wolf JM,** co-editors: *Guide for Women in Orthopaedic Surgery*. Ruth Jackson Orthopaedic Society, 2015.

2. Wolf JM, Editor, *Tennis Elbow: Clinical Management*. Springer: New York, 2015.

RESEARCH SUPPORT

PEER-REVIEWED

CURRENT

1. Wolf (PI) 9/1/14-4/1/17 3% effort
   American Foundation for Surgery of the Hand
   Conditional Deletion of Relaxin Receptor in Ligament: In Vivo Model
   We will create a transgenic mouse with inducible deletion of relaxin receptor at the level of tendon and ligament using a cross of relaxin null and scleraxis-Cre mice.

2. Wolf (PI) 10/7/14-10/6/17 10% effort
   Department of Defense/Congressionally Directed Medical Research Program
   Supplementation of Vitamin D in Prevention of Post-Traumatic Osteoarthritis: Animal and Clinical Models
   This project will study the impact of oral Vitamin D in prevention of surgically induced arthritis in a murine model, as well as evaluate Vitamin D levels in military cadets prior to and after ACL injury.

3. Wolf (PI) 7/1/14-6/30/15 5% effort **Orthopaedic Research and Education Foundation/Goldberg Arthritis Grant** Animal Model of Vitamin D Supplementation for Prevention of Osteoarthritis This project evaluates the potentially preventive impact of Vitamin D oral supplementation on the initiation and development of surgically induced osteoarthritis in mice.
   Awarded but declined due to overlap with DOD/CDMRP grant above.

COMPLETED

1. Chung (PI) 06/01/2011-05/30/2016 3% effort **NIH/NIAMS RO1. WRIST Study Group**
   A clinical trial for the surgical treatment of elderly distal radius fractures
   This multicenter randomized trial compares 3 different methods of fixation in surgically treated distal radius fractures in elderly patients.
   Role: Co-investigator, PI on subcontract

2. Wolf (PI) 9/14/13-09/13/15 3% effort **American Foundation for Surgery of the Hand**
   Impact of local and systemic relaxin in a murine osteoarthritis model
   This study uses a murine model to examine the impact of locally and systemically delivered relaxin on the development of surgically induced osteoarthritis.

3. Rozental (PI) 05/01/2012-04/30/2013 3% effort
   Orthopaedic Research and Education Foundation/RJOS/ DePuy

Markers of bone turnover and Vitamin D in patients with distal radius fractures
This study expands the smaller pilot study to evaluate biomarkers of bone turnover and 25-hydroxy-Vitamin D in patients with distal radius fractures, compared to controls.
Role: Co-Investigator

4. Wolf (co-PI) 09/01/11-08/31/12 3% effort **American Foundation for Surgery of the Hand**
25-Hydroxy-Vitamin D and bone turnover marker levels in patients with distal radius fractures
This study will evaluate Vitamin D and biomarkers of bone turnover in patients with wrist fractures and controls.
Role: co-PI

5. Wolf (PI) 08/20/10-06/01/11 3% effort **University of Connecticut GCRC/CICATS Pilots and Feasibility Funds-2010** Correlation of serum relaxin with joint mobility and ligament injury and analysis for gender differences
This study will correlate serum relaxin with a prospective injury database in military cadets.
Role: PI

6. Wolf (PI) 09/01/08-08/31/10 3% effort **American Foundation for Surgery of the Hand**
Effect of relaxin on gender differences in laxity and arthritis of the thumb base
This study will evaluate hormonal effects on gender differences in thumb laxity and osteoarthritis.
Role: PI

7. Wolf (PI) 07/01/08-06/30/11 15% effort **Orthopaedic Research and Education Foundation Clinician-Scientist Award**
Does relaxin mediate gender differences in joint laxity and osteoarthritis of the thumb carpo-metacarpal joint?
This study's goal is to correlate serum relaxin levels and joint laxity in normal subjects as well as to evaluate this relationship in patients with surgically treated thumb CMC osteoarthritis.
Role: PI

8. Wolf (PI) 10/01/06-09/30/08 3% effort **American Foundation for Surgery of the Hand**
A prospective, randomized, controlled trial of autologous blood injection vs. corticosteroid injection for the treatment of lateral epicondylitis.
This is a prospective, blinded, multicenter trial to evaluate the efficacy of autologous blood injection for lateral epicondylitis.
Role: PI

9. Dawson (PI) 2/01/08-1/31/09 2% effort **Southwest Orthopaedic Trauma Association**
Incidence of scaphoid fractures in a young, active population.
This study uses a military database of healthcare visits coded by ICD-9 to calculate the incidence of scaphoid fracture in a young, active population as well as analyze potential demographic risk factors for this injury.

Role: Co-investigator

10. Sobky (PI) 07/01/04-06/30/05
Department of Orthopaedics, University of Colorado Health Sciences Center
Comparison of bending strength and load to failure of multiple volar plates.
This was a biomechanical study of the strength and stiffness of multiple plates used for fixation in distal radius fractures.
Role: Co-investigator

11. Wolf (PI) 07/01/94-06/30/95
American Heart Association
Sequencing of bone morphogenetic proteins and effects on human osteoblast-like cells.
This was a project to evaluate the effect of BMP-2 and BMP-4 on osteoblasts in culture.
Role: PI

NON-PEER-REVIEWED

1. Wolf (PI) 01/01/04-04/01/06
Orthologic, Inc., Phoenix, Arizona
A double-blind, randomized, placebo-controlled Phase III study to evaluate the efficacy and safety of Chrysalin on the rate of healing in distal radius fractures.
This was a multicenter trial of an injectable substance with the goal to increase healing in distal radius fractures.
Role: PI

INVITED PRESENTATIONS and LECTURES (National/International)

1. Metacarpal and Phalangeal Fractures: *Operative Treatment of Phalangeal Fractures.* Instructional Course Lecture, AAOS Annual Meeting. February 2007, San Diego, CA.

2. Trapeziometacarpal Arthritis and Other Degenerative Arthropathies of the Hand: *Evidence-Based Treatment.* Instructional Course Lecture, ASSH Annual Meeting, September 2007, Seattle, WA.

3. Kienbock's Disease: *Cases and Discussion.* Interactive Case Review, ASSH Annual Meeting, September 2007, Seattle, WA.

4. Lateral Epicondylitis: Evidence-Based Treatment in 2007. *North American Traveling Fellowship Lecture*. University of Maryland, October 5, 2007. Dalhousie University, Halifax, October 10, 2007. University of Rochester, October 17, 2007. Boston University Medical Center, October 22, 2007. Brown University, October 24, 2007. Emory University, November 1, 2007.

5. Current Trends in the Fixation of Distal Radius Fractures. *North American Traveling Fellowship Lecture*. McGill University, Montreal, October 12, 2007. Dartmouth-Hitchcock Medical Center, October 17, 2007. Massachusetts General Hospital, October 17, 2007. University of Miami Medical Center, October 29, 2007.

6. The Visible Hand: Anatomy and Virtual Surgery. *North American Traveling Fellowship Lecture*. Carolinas Medical Center, October 1, 2007. Rothman Institute, October 8, 2007. Sacre-Coeur Hospital, University of Montreal, October 16, 2007. University of Rochester, October 18, 2007.

7. Dupuytren's Disease: Outcomes and Evidence. *North American Traveling Fellowship Lecture*. Maisonneuve-Rosemont Hospital, University of Montreal, October 18, 2007. University of Florida-Jacksonville, October 31, 2007.

8. Current Trends in the Fixation of Distal Radius Fractures. Howard Rosen Tri-State Trauma Symposium, Hospital for Joint Diseases, New York, New York, October 19, 2007.

9. Acute Trauma to the Upper Extremity: What to Do and When to Do It: *The Wrist.* Instructional Course Lecture, AAOS Annual Meeting, San Francisco, California, March 2008.

10. Metacarpal and Phalangeal Fractures: *Treatment of Metacarpal Shaft Injuries and Carpometacarpal Fracture-Dislocations.* Instructional Course Lecture, AAOS Annual Meeting, March 2008, San Francisco, California.

11. Trends and Outcomes in the Fixation of Distal Radius Fractures & Gender Differences in Thumb Carpometacarpal Arthritis. *Visiting Professor:* Grand Rounds, Texas Tech University/William Beaumont Army Medical Center, July 9, 2008, El Paso, Texas.

12. The Minimum Surgical Experience. Resident Educators' Workshop, American Society for Surgery of the Hand Annual Meeting, Chicago, Illinois, September 2008.

13. Tendinopathies of the Hand and Dupuytren's Contracture. Hand Review Course, American Association of Hand Surgeons Annual Meeting, January 9, 2008, Maui, Hawaii.

14. Elbow Dislocations: Back to the Basics: *Simple Elbow Dislocations.* Instructional Course Lecture, AAOS Annual Meeting, February 2009, Las Vegas, Nevada.

15. Acute Trauma to the Upper Extremity: What to Do and When to Do It: *The Wrist.* Instructional Course Lecture, AAOS Annual Meeting, February 2009, Las Vegas, Nevada.

16. Hormonal Influences inThumb Arthritis. Research Lecture, University of Virginia, April 18, 2009, Charlottesville, Virginia.

17. Tendon Biology. ASSH Master Skills Course: Tendon Repair and Reconstruction. Chicago, Illinois, October 16-17, 2009.

18. Current Treatment Strategies in Arthritis of the Basilar Thumb Joint: *Nonoperative Treatment* and *Pantrapezial Osteoarthritis.* Symposium, AAOS Annual Meeting, March 2010, New Orleans, Louisiana.

19. Elbow Dislocations: Back to the Basics: *Simple Elbow Dislocations.* Instructional Course Lecture, AAOS Annual Meeting, March 2010, New Orleans, Louisiana.

20. The Influence of Joint Laxity and Hormones on Gender Differences in Thumb Carpometacarpal Arthritis. Grand Rounds Speaker, Columbia University Dept. of Orthopaedic Surgery, May 27, 2010, New York, New York.

21. The Use of Steroid and Hyalgan Injections for Trapeziometacarpal Arthritis. ASSH Precourse, ASSH Annual Meeting, October 7, 2010, Boston, Massachusetts.

22. Lateral Epicondylitis Treatment in 2010, Grand Rounds Speaker, University of Michigan Dept. of Plastic Surgery, November 2, 2010, Ann Arbor, Michigan.

23. Hormonal Influences on Gender Differences in Basilar Thumb Arthritis. Grand Rounds Speaker, Stanford University Dept. of Orthopaedic Surgery, January 19, 2011, Palo Alto, California.

24. Gender and Hormones in Carpometacarpal Joint Arthritis of the Thumb. Grand Rounds Speaker, University of Massachusetts Dept. of Orthopaedic Surgery, January 26, 2011, Worcester, Massachusetts.

25. Acute and Chronic Management of Mallet Injuries. ASSH Specialty Day, AAOS Annual Meeting, February 19, 2011, San Diego, California.

26. Thumb CMC Arthritis: A Survey of US Hand Surgeons. Japanese Society of Hand Surgery Annual Meeting (held online), May 2011, Aomori, Japan.

27. Hormonal Influences on the Development of Trapeziometacarpal Arthritis. Department of Rheumatology Rounds, Landspitalinn Hospital/University of Iceland, June 7, 2011, Reykjavik, Iceland.

28. Acute and Chronic Scapholunate Ligament Injury. Invited Speaker, Department of Orthopaedic Surgery, Landspitalinn Hospital/University of Iceland, June 8, 2011, Reykjavik, Iceland.

29. Lateral Epicondylitis: Treatment of a Difficulty Problem. Invited Speaker, Orkuhusid Orthopaedic Clinic, June 8, 2011, Reykjavik, Iceland.

30. Limited Incisions – Volar and Radial for Distal Radius Fractures. Wrist Injuries: State-of-the-Art, Orthopaedic Learning Center, June 24, 2011, Rosemont, Illinois.

31. Decision-Making in Post-Traumatic Arthritis of the Wrist. Wrist Injuries: State-of-the-Art, Orthopaedic Learning Center, June 25, 2011, Rosemont, Illinois.

32. Upper Extremity Trauma. Hassleholm Hospital Orthopaedic Conference, August 22, 2011, Hassleholm, Sweden.

33. Hormonal Influences on Basilar Thumb Joint Laxity. Lund University Hand Conference, August 23, 2011, Lund, Sweden.

34. Hormones as Etiology for Thumb Arthritis. The Thumb CMC Joint: Anatomy, Hormones, Biomechanics - and a Surgery Wish List. Symposium, AAOS Annual Meeting, February 2012, San Francisco, California.

35. Hormonal Influences on the Basilar Thumb Joint. Sex, Bones, and Women. Symposium, AAOS Annual Meeting, February 2012, San Francisco, California.

36. Fragility Fractures of the Upper Extremity: What Every Hand Surgeon Should Know. Instructional Course Lecture, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.

37. Lateral Epicondylitis: Doing Something vs. Nothing. Symposium Moderator, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.

38. Evidence Based Medicine 2012 - The Use of Evidence in Daily Practice. Symposium, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.

39. Fast and Furious: Thumb CMC Arthritis in 5-Minute Bullets. Symposium, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.

40. Highlighting the Achievements of the American Foundation for Surgery of the Hand (AFSH). Symposium, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.

41. Hand Fractures: Techniques and Complications. Current Concepts in Upper Extremity Injury and Reconstruction Course, November 2012, Atlanta, Georgia.

42. CMC and MCP Instability. Current Concepts in Upper Extremity Injury and Reconstruction Course, November 2012, Atlanta, Georgia.

43. Hypermobility and Orthopaedic Surgery.*ABC Traveling Fellowhip Lecture*. Royal National Orthopaedic Hospital, Stanmore, UK, April 25, 2013. Nuffield Orthopaedic Centre, Oxford, UK, April 27, 2013. Lancashire and Wigan Infirmary, Wrightington, UK, May 1, 2013. Sheffield NHS Trust, Sheffield, UK, May 3, 2013. Jubilee National Hospital Centre, Glasgow, UK, May 7, 2013.

44. Lateral Epicondylitis: To Treat or not to Treat in 2013? *ABC Traveling Fellowship Lecture.* Royal Orthopaedic Hospital, Birmingham, UK, April 29, 2013. Edinburgh Royal Infirmary, May 5, 2013. Newcastle/Northumbria NHS Trust, May 6, 2013. University of Pretoria, Pretoria, South Africa, May 14, 2013. Kwazilu-Natal University Hospital, May 16, 2013. University of Cape Town/Stellenbosch University Combined Program, May 22, 2013.

45. Simple Elbow Dislocations: Epidemiology and Treatment. *ABC Traveling Fellowship Lecture.* Medunsa Orthopaedic Hospital, Limpopo, South Africa, May 15, 2013. Bloemfontein University Hospital, Bloemfontein, South Africa, May 21, 2013.

46. Failed Thumb CMC Arthroplasty. Israeli Society for Surgery of the Hand, November 27, 2013, Tel Aviv, Israel.

47. Current Trends in Thumb CMC Arthroplasty. Israeli Society for Surgery of the Hand, November 27, 2013, Tel Aviv, Israel.

48. Lateral Epicondylitis & Mallet Finger Deformity, Electives in Hand Surgery, New Orleans, Louisiana, February 7-8, 2014.

49. Thumb CMC Arthritis: Epidemiology, Hormones, Treatment. Grand Rounds Speaker, University of Rochester. Rochester, New York, August 24, 2014.

50. Owning Osteoporosis Care in Your Practice. Instructional Course Lecture, American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, LA, February 2015.

51. Hand and Wrist Injuries in Gymnasts. Italian Society for Surgery of the Hand. Viterbo, Italy. October 8-10, 2015.

52. Quality Is in the Eye of the Beholder: What's Measured, What Matters, and How Do We Reconcile This? Symposium, American Academy of Orthopaedic Surgeons Annual Meeting, March 10, 2016, Orlando, Florida.

53. Ulnar Collateral and Radial Collateral Ligament Repair and Reconstruction. AAOS Complex Wrist and Hand Trauma Course, April 15, 2016, Rosemont, Illinois.

54. Radial Tunnel Syndrome. AAOS Complex Wrist and Hand Trauma Course, April 15, 2016, Rosemont, Illinois.

55. Research in Thumb CMC Osteoarthritis. Brown University Grand Rounds, March 20, 2016, Providence, Rhode Island.

56. Thumb CMC Osteoarthritis: Epidemiology, Hormones, and Laxity. Boston University Grand Rounds, November 23, 2016, Boston, Massachusetts.

57. Orthopaedic Residency in the United States. Kristianstad Department of Orthopaedics Lecture, December 12, 2016, Kristianstad, Sweden.

58. Trapeziometacarpal Osteoarthritis: Research on Epidemiology, Laxity, and Treatment. University of California-San Francisco Grand Rounds, January 16, 2017, San Francisco, California.

59. Upper Extremity Injuries in Gymnastics. All Alaska Orthopaedic Conference, April 8, 2017, Anchorage, Alaska.

60. Tennis Elbow: Perspectives in the 21st Century on Etiology and Treatment. All Alaska Orthopaedic Conference, April 8, 2017, Anchorage, Alaska.

61. Basilar Thumb Joint Arthritis: Conservative and Operative Treatment Options. All Alaska Orthopaedic Conference, April 8, 2017, Anchorage, Alaska.

62. Wrist Arthroscopy: Anatomy, Imaging, and Technique. Denver Wrist Course, April 27, 2017, Denver, Colorado.

63. Lateral Elbow Pain: Mystery and Myth. 25th Dirstine Lecture, Seattle Hand Group. May 5, 2017, Seattle, Washington.

64. Thumb CMC Arthritis: A Research Journey. 25th Dirstine Lecture, Seattle Hand Group. May 4, 2017, Seattle, Washington.

65. Emerging Leaders Forum: Diversity in Orthopaedic Surgery – Research. American Orthopaedic Association Annual Meeting, June 20, 2017, Charlotte, North Carolina.

66. C. McCollister Evarts Resident Forum: What to Expect in Early Practice. American Orthopaedic Association Annual Meeting, June 20, 2017, Charlotte, North Carolina.

NATIONAL/INTERNATIONAL PRESENTATIONS

1. **Wolf JM**; Gannon FH; Shore EM; Bilker W; Zasloff MA; Kaplan FS: The prevalence, natural history, and pathogenesis of limb swelling in patients who have fibrodysplasia ossificans progressiva. Adult Bone and Mineral Working Group, American Society for Bone and Mineral Research Annual Meeting; September 10, 1995, Baltimore, Maryland. (podium)

2. **Wolf JM**; Gannon FH; Shore EM; Bilker W; Zasloff MA: Kaplan FS: Limb swelling in patients who have fibrodysplasia ossificans progressiva. Second International Symposium on Fibrodysplasia Ossificans Progressiva; October 30-31, 1995, Philadelphia, Pennsylvania. (podium)

3. **Wolf JM**; Weiss APC: Complications of wrist arthroscopy. American Academy of Orthopaedic Surgeons Annual Meeting; March 4, 1999, Anaheim, California. (podium)

4. **Wolf JM**; Weiss APC: A new technique of intercarpal arthrodesis. Adrian Flatt Residents and Fellows Conference, American Society for Surgery of the Hand; October 4, 2000, Seattle, Washington. (podium)

5. Wyman JJ; Greisberg J; **Wolf JM**; Zou L; Terek R: "The effects of gadodiamide on proteoglycan production, cell proliferation, and apoptosis in chondrocytes." Symposium of the International Cartilage Repair Society, June 16, 2000, Gotebörg, Sweden. (podium)

6. **Wolf JM**; Weiss APC; Akelman E: Mini-open carpal tunnel release using a new protective guide and blade system. American Association of Hand Surgery Annual Meeting, January 10-13, 2001, San Diego, California. (poster)

7. **Wolf, JM**; Green A: The effect of co-morbidity on pain, function, and general health status (GHS) associated with idiopathic adhesive capsulitis (IAC). American Academy of Orthopaedic Surgeons Annual Meeting, February 28-March 4, 2001, San Francisco, California. (poster)

8. Greisberg J; **Wolf JM**; Wyman JJ; Terek R: "The effects of gadolinium chelates on articular cartilage." Orthopaedic Research Society, February 25-28, 2001, San Francisco, California. (poster)

9. **Wolf JM;** Meitner PA; Terek RM: The effect of hydrogen peroxide on chondrosarcoma cells: an *in vitro* analysis. Musculoskeletal Tumor Society Annual Meeting, April 25-27, 2002, Toronto, Canada. (podium)

10. **Wolf JM;** DiGiovanni CW: Thromboembolic prophylaxis in patients with foot and ankle trauma. American Orthopaedic Foot and Ankle Society Annual Meeting, July 14-16, 2002, Traverse City, Michigan. (podium)

11. **Wolf JM,** Meitner PM, Terek RM: Hydrogen peroxide as a potential adjuvant therapy for chondrosarcoma. Orthopaedic Research Society Annual Meeting, February 2-5, 2003, New Orleans, Louisiana. (poster)

12. Tashjian RZ, Ritter M, **Wolf JM,** Weiss APC, Green A: Functional outcomes and general health status after ulnohumeral arthroplasty for primary degenerative elbow arthritis. American Shoulder and Elbow Surgeons Focus Meeting, November 14-16, 2003, Las Vegas, Nevada. (podium)

13. Tashjian RZ, Ritter M, **Wolf JM,** Weiss APC, Green A: Ulnohumeral arthroplasty affects functional outcomes and general health status. Ninth International Congress of Shoulder Surgeons, May 3, 2004, Washington, DC. (podium)

14. **Wolf JM,** Shin AY, Moran S, Beckenbaugh RD: Complications of silastic metacarpophalangeal joint arthroplasty. American Society for Surgery of the Hand Annual Meeting, September 9-11, 2004, New York, New York. (poster)

15. **Wolf JM**, Sobky K, Baldini T, Thomas K, Bach J**:** Biomechanical comparison of different volar plates for fixation of distal radius fractures. American Association for Hand Surgery Annual Meeting, January 11, 2007, San Juan, Puerto Rico. (podium)

16. **Wolf JM,** Scott F, Gordon M, Ozer K, Williams A: Preliminary results of a randomized prospective trial of autologous blood injection for lateral epicondylitis. American Society for Surgery of the Hand Annual Meeting, September 20, 2008, Chicago, Illinois. (podium)

17. **Wolf JM,** Boyer MI. Evaluation of knowledge of common hand surgery problems in internal medicine residents. American Society for Surgery of the Hand Annual Meeting, September 18, 2008, Chicago, Illinois. (poster)

18. **Wolf JM**, Dawson L, Mountcastle SB, Owens BD. Incidence of scaphoid fracture in a young, active population. Orthopaedic Trauma Association Annual Meeting, October 11, 2008, Denver, Colorado. (poster)

19. **Wolf JM,** Athwal GS, Hoang BH, Mehta S, Williams A, Owens BD. Resident knowledge of levels of evidence criteria. American Academy of Orthopaedic Surgeons Annual Meeting, Las Vegas, Nevada, February 25, 2009. (podium)

20. **Wolf JM,** Blonna D, O'Driscoll SW. Prevention of nerve injuries using a safety-driven step-wise technique for arthroscopic capsulectomy of the elbow. American Shoulder and Elbow Society Open Meeting, Las Vegas, Nevada, February 28, 2009. (podium)

21. **Wolf JM**, Williams A, Boyer MI. Prospective Outcomes Assessment in Dupuytren's Contracture Comparing Palmar and Palmo-Digital Fasciectomy. Joint Meeting of the American and British Societies for Surgery of the Hand, London, UK, April 30, 2009. (podium)

22. **Wolf JM**, Athwal GS, Hoang BH, Mehta S, Williams A, Owens BD. Knowledge of levels of evidence criteria in orthopaedic residents. Special Emphasis Poster. American Orthopaedic Association Annual Meeting, Bonita Springs, Florida, June 2009. (poster)

23. Sturdivant R, Burks R, Owens B, **Wolf J**, and Cameron K. Epidemiological studies in the military. Joint Statistical Meeting, Washington, DC, August 5, 2009. (podium)

24. Posner MA, **Wolf JM,** Belmont PJ, Owens BD. Epidemiology of Major League Baseball Injuries. American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, Louisiana, March 2010. (poster)

25. Van Tassel DC, Owens BD, Pointer L, **Wolf JM.** Incidence and Demographics of Scaphoid Fracture in the United States Population. American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, Louisiana, March 2010. (poster/alternate podium)

26. Posner MA, **Wolf JM**, Belmont PC, Owens BD. Epidemiology of Major League Baseball injuries. Society of Military Orthopaedic Surgeons Annual Meeting, Honolulu, Hawaii, December 2009. (poster)

27. Posner MA, **Wolf JM**, Belmont PC, Owens BD. Epidemiology of Major League Baseball injuries. Mid-America Orthopaedic Association Annual Meeting, Austin, Texas, April 22, 2010. (podium)

28. Posner MA, **Wolf JM,** Mountcastle S, Belmont PC, Owens BD. Epidemiology of Major Leage Baseball Injuries. American Orthopaedic Society for Sports Medicine Annual Meeting, Providence, Rhode Island, July 18, 2010. (podium)

29. Schreier S, Williams AE, **Wolf JM.** Relationship between Generalized Hypermobility and Carpometacarpal Radiographic Laxity. American Society for Surgery of the Hand Annual Meeting, Boston, Massachusetts, October 7, 2010. (poster)

30. Stoneback J, Owens BD, Athwal GS, Pointer L, **Wolf JM.** Incidence of Elbow Dislocations in the United States Population. American Academy of Orthopaedic Surgeons Annual Meeting, San Diego, California, February 18, 2011. (poster)

31. Stoneback JW, Owens BD, Sykes JB, Athwal GS, Pointer L, **Wolf JM**. Incidence of Elbow Dislocations in the United States Population. Canadian Orthopedic Association Annual Meeting. St John's, Newfoundland. July 7-9, 2011. (poster)

32. **Wolf JM,** Scott F, Delaronde S, Williams AE, King KB. Relaxin Upregulates Relaxin Receptor and MMP in the Anterior Oblique Ligament. American Society for Surgery of the Hand Annual Meeting, Las Vegas, Nevada, September 9, 2011. (podium)

33. Mir H, Cannada L, Black KP, Murray J, **Wolf JM.** Orthopaedic Resident and Program Director Opinions of Resident Duty Hours – A National Survey. American Orthopaedic Association Annual Meeting, Washington, DC, June 2012. (special emphasis poster)

34. **Wolf JM,** Scott F, Williams AE, Delaronde S, King KB. Serum Relaxin is Correlated with Relaxin Receptors and MMP-1 in the Anterior Oblique Ligament. 2012 World Congress on Osteoarthritis, Barcelona, Spain, April 26-29, 2012. (poster)

35. Clifton K**,** Rodner CM, Drissi H, **Wolf JM.** Relaxin Receptors in the Dorsoradial Ligament and Synovium of the Trapeziometacarpal Joint. American Society for Surgery of the Hand Annual Meeting, Chicago, Illinois, September 7,2012, (podium)

36. **Wolf JM**, Turkiewicz A, Atroshi I, Englund M. Prevalence of Symptomatic Basilar Thumb Joint Osteoarthritis in the General Population. American College of Rheumatology Annual Meeting, Washington, DC, November 12, 2012. (poster)

37. Judson CR, Cote M, Bernstein J, **Wolf JM.** Outcomes of Conservative Therapies for the Treatment of Lateral Epicondylitis with Minimum One Year Follow-up. American Society for Surgery of the Hand Annual Meeting, San Francisco, California, Oct 3-5, 2013. (e-poster)

38. **Wolf JM.** Measuring trapeziometacarpal mobility using stress radiography and its association with generalized hypermobility. International Thumb Osteoarthritis Workshop, Newport, Rhode Island, Oct 23-25, 2013 (podium)

39. Judson C, Cote M, Coyle KM, **Wolf JM.** Outcomes of conservative therapies for the treatment of lateral epicondylitis with minimum one year follow-up. American Society for Surgery of the Hand Annual Meeting, Seattle,Washington. September 8-12, 2014 (poster)

40. Webber T, Patel SP, Pensak M, Fajolu O, Rozental TD, **Wolf JM.** Correlation between distal radius cortical thickness and bone mineral density. Hand Wrist Biomechanics International Meeting, Milan, Italy, June 16, 2015. (podium)

41. Rohde RS, **Wolf JM,** Adams JE. Where are the Women in Orthopaedic Surgery? Special Interest Poster, American Orthopaedic Association Annual Meeting, Providence, Rhode Island, June 24-27, 2015. (poster)

42. Rozental TD, Walley K, Herder L, Coyle K, Bouxsein M, **Wolf JM.** 25-Hydroxy-Vitamin D and bone turnover marker levels in patients with distal radius fractures. American Society for Surgery of the Hand Annual Meeting, Seattle, Washington. September 8-12, 2015 (poster)

43. Rohde RS, **Wolf JM,** Adams JE. Where are the Women in Orthopaedic Surgery? American Academy of Orthopaedic Surgeons Annual Meeting, March 2-4, 2016. (poster)

44. Marchese J, Coyle K, Cote M, **Wolf JM.** Prospective evaluation of single corticosteroid injection on outcomes in patients with radial tunnel syndrome. Joint Australian and American Society for Surgery of the Hand Meeting, Sydney, Australia. March 31, 2016. (podium)

45. Webber T, Cote M, **Wolf JM.** Normative values for trapeziometacarpal subluxation on stress view radiographs. American Society for Surgery of the Hand Annual Meeting, Austin, Texas. Sept 27-October 1, 2016. (poster)

46. Marchese J, Coyle K, Cote M, **Wolf JM.** Prospective evaluation of corticosteroid injection on outcomes in patients with radial tunnel syndrome. American Society for Surgery of the Hand Meeting, San Francisco, California. Sept 8, 2017. (podium)

47. Khazai R, Boyajian H, Shi L, **Wolf JM.** Trends in incidence and treatment setting of fingertip injuries in the United States. American Society for Surgery of the Hand Meeting, San Francisco, California. Sept 6-8, 2017. (poster)

48. Zaino C, Boyajian H, Shi L, **Wolf JM.** Trends in the surgical treatment of thumb carpometacarpal arthritis. American Society for Surgery of the Hand Meeting, San Francisco, California. Sept 6-8, 2017. (poster)

COURSE FACULTY

1. Co-director: Hand Anatomy for Hand Therapists Course, May 23, 2004, Englewood, Colorado.

2. Co-director: Hand Anatomy for Hand Therapists Course, April 21, 2006. Englewood, Colorado.

3. Co-Director: Hand Anatomy for Hand Therapists Course, May 10, 2008, Englewood, Colorado.

4. Moderator, Instructional Course Lecture. Acute Trauma to the Upper Extremity: What to Do and When to Do It. American Academy of Orthopaedic Surgeons Annual Meeting, March 6, 2008, San Francisco, California.

5. Moderator, Instructional Course Lecture. Acute Trauma to the Upper Extremity: What to Do and When to Do It. American Academy of Orthopaedic Surgeons Annual Meeting, February 27, 2009, Las Vegas, Nevada.

6. Instructor, ASSH Master Skills Course: Flexor Tendon Repair and Reconstruction. SERC Institute, October 16-17, 2009, Burr Ridge, Illinois.

7. Co-Chair, ASSH Annual Meeting Precourse: Controversies in Hand Surgery: What Works, What Doesn't. ASSH Annual Meeting, October 7, 2010, Boston, Massachusetts.

8. Moderator, ASSH Specialty Day: Finger Fractures Section. AAOS Annual Meeting, February 19, 2011, San Diego, California.

9. Instructor, Orthopaedic Learning Center: Wrist Injuries: State-of-the-Art. AAOS Course Faculty, June 24-25, 2011, Rosemont, Illinois.

10. Moderator, New England Hand Society Annual Meeting: Radial Fracture and Thumb Arthritis Section. December 3, 2011, Sturbridge, Massachusetts.

11. Instructor, Hand Surgery Comprehensive Review Course: Osteoarthritis and Atypical Arthridities. July 15, 2012, Chicago, Illinois.

12. Moderator, ASSH Annual Meeting Symposium: Tennis Elbow: Doing Something vs. Nothing. September 2012, Chicago, Illinois.

13. Instructor, 4th Annual Current Concepts in Upper Extremity Restoration Conference. November 2-3, 2012, Atlanta, Georgia.

14. Co-Moderator, AFSH Grants Symposium. American Society for Surgery of the Hand. October 2013, San Francisco, California.

15. Co-Chair, Interactive Case Reviews, American Society for Surgery of the Hand, October 2013, San Francisco, California.

16. Moderator and Instructor, International Thumb Osteoarthritis Workshop. Clinical vs Research Questions in Thumb Arthritis. October 2013, Newport, Rhode Island.

17. Program Co-Chair, Annual Meeting, American Society for Surgery of the Hand, September 2014, Boston, Massachusetts.

18. Instructor, Hand Surgery Comprehensive Review Course: Osteoarthritis and Atypical Arthridities. July 2015, Chicago, Illinois.

19. Faculty, Hand Section, New England Orthopaedic Society, May 2015, Rockland, Maine.

20. Co-Chair, Precourse on Controversies in Hand Surgery. American Society for Surgery of the Hand Annual Meeting, September 10, 2015; Seattle, Washington.

21. Faculty, Resident Review Course, American Society for Surgery of the Hand Annual Meeting, September 9, 2015, Seattle, Washington.

22. Faculty, 2nd Annual Course on Wrist Arthroscopy and Arthoplasty, October 10-12, 2015, Arezzo, Italy.

23. Faculty, Symposium on PIP Joint Injury**;** Joint Australian and American Society for Surgery of the Hand Meeting. March 31, 2016.Sydney, Australia.

24. Faculty, AAOS Complex Wrist and Hand Course, April 14-15, 2016. Rosemont, Illinois.

25. Moderator, ASSH Annual Meeting Instructional Course: Seeing the M4 Weakness. October 2016: Austin, Texas.

26. Faculty, ASSH Annual Meeting Symposium: Avoiding Complications of Thumb CMC Surgery. October 2016: Austin, Texas.

27. Co-Chair, Interactive Case Reviews, ASSH Annual Meeting: Thumb CMC Arthritis. October 2016, Austin, Texas.

28. Faculty, Resident Review Course, ASSH Annual Meeting. September 2016, Austin, Texas.

29. Chair, ASSH Annual Meeting Precourse: Navigating Complicated Problems in Hand Surgery. September 7, 2017: San Francisco, California.

30. Moderator, ASSH Annual Meeting Instructional Course: When Skeptics Become Believers: Atypical Nerve Compression. September 8, 2017. San Francisco, California.

31. Faculty, ASSH Annual Meeting Symposium: Managing Osteoporosis in the Hand Surgical Patient. September 7, 2017: San Francisco, California.

32. Faculty, ASSH Annual Meeting Symposium: Updates and Innovations in Thumb CMC Arthritis. September 9, 2017: San Francisco, California.

33. Faculty, Resident Review Course, ASSH Annual Meeting. September 2017: San Francisco, California.

REGIONAL/LOCAL PRESENTATIONS

1. A new technique of open carpal tunnel release. New England Hand Society Annual Meeting, December 1, 2000, Sturbridge, Massachusetts.

2. Access and use of the Internet in a hand surgery population. New England Hand Society, December 7, 2001, Sturbridge, Massachusetts.

3. Osteoporosis and Orthopaedics. Sargent School of Physical Therapy, Boston University, November 6, 2001, Boston, Massachusetts.

4. Foot and Ankle Injuries. Sargent School of Physical Therapy, Boston University, November 13, 2001, Boston, Massachusetts.

5. Triceps Rupture and Reconstruction: Case Report and Review of the Literature. Packard Lecture Presentation, May 19, 2004, Denver, Colorado.

6. Advances in Wrist Arthroscopy. Fall Orthopaedic Summit on Minimally Invasive Surgery, September 15, 2005, Keystone, Colorado.

7. Pyrocarbon in Small Finger Joints. Hand SIG Society, Denver Medical Library, October 19, 2005, Denver, Colorado.

8. Scapholunate Ligament Tears. Doctors Demystify the Wrist 2006, October 21, 2006, Denver, Colorado.

9. Common Problems in Hand Surgery. Physical Medicine and Rehabilitation Conference, February 8, 2007, Denver, Colorado.

10. Ulnar Collateral Ligament Injuries of the Thumb. Doctors Demystify the Thumb 2007, April 21, 2007, Denver, Colorado.

11. Top 10 Issues in Hand Surgery for Primary Care Physicians. Webcast, January 22, 2007, Denver, Colorado.

12. Common Hand Surgery Diagnoses. Physical Medicine and Rehabilitation Conference, January 16, 2008, Denver, Colorado.

13. Hand Surgery as Related to Rheumatology. Rheumatology Teaching Conference, March 23, 2008, Denver, Colorado.

14. Lateral and Medial Epicondylitis. Doctors Demystify the Elbow 2008, April 19, 2008, Denver, Colorado.

15. Issues in Hand Surgery for Primary Care. Physician Assistants Curriculum, April 24, 2008, Denver, Colorado.

16. New Treatments for Dupuytren's Contracture. Hand SIG Society, Denver Medical Library, April 15, 2009.

17. My Aching Hand: Discovery Series. University of Connecticut Health Center, November 9, 2010.

18. Lateral Epicondylitis: Current Treatment in 2012. Clinical Research Center Conference, University of Connecticut Health Center, March 14, 2012.

19. Texting Tendinitis: Discovery Series. University of Connecticut Health Center, December 4, 2012.

20. Common Issues in Hand Surgery: Grand Rounds. Department of Medicine Grand Rounds, University of Connecticut Health Center, April 16, 2015.

21. Lateral Epicondylitis in 2015. New England Orthopaedic Society, May 29, 2015, Rockport, Maine.

22. Unusual Compressive Neuropathies: Hartford Hand Surgery Fellowship Conference, Hartford Hospital. March 10, 2016, Hartford, Connecticut.

PERSONAL

Married to Douglas S. Wolf

2 children

Hobbies: rowing, hiking, running, travel, exploring restaurants

Volunteer physician at overnight camp (2006-present)

Medical Director, Ramah Rockies Summer Camp (2009-10)

Completed New York Marathon November 2011; Hartford Marathon November 2015; Chicago Marathon October 2017.

Vitamin D Supplementation for Prevention of Post-Traumatic Osteoarthritis: Evaluation in Animal and Clinical Models

OR130096/Peer Reviewed Orthopaedic Research Program/Translational Research Award

PI: Jennifer Moriatis Wolf, MD Org: University of Chicago Award Amount: $750,000

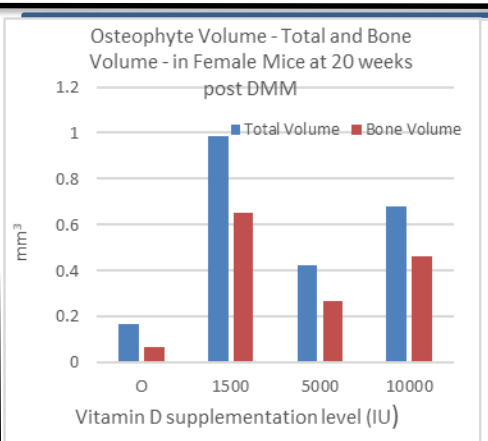
Study/Product Aim(s)

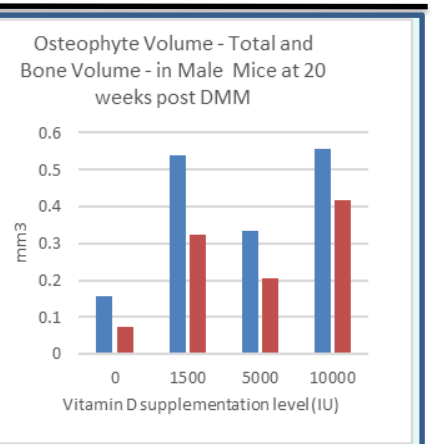
• to evaluate the impact of systemic Vitamin D supplementation on the initiation and development of surgically induced OA in a murine model

• to evaluate the serum 25-hydroxy-Vitamin D status of military cadets before and after ACL injury and reconstruction and correlate these findings with biomarkers of articular cartilage injury as well as radiographic joint space narrowing.

Approach

- Oral vitamin D supplementation of mice at 4 doses, followed by induction of surgical osteoarthritis using destabilization of medial meniscus. Evaluation using micro-CT, histology and immunohistochemistry
- Add-on to existing clinical trial at United States Military Academy with measurement of Vitamin D levels prior to and during and after ACL injury and treatment, with postoperative imaging evaluation.





Micro-CT analysis did not show a consistent pattern of osteophyte formation when measured by bone volume; however, females consistently showed osteophyte volumes twice as high as male mice at all time points measured (8, 12, 16, and 20 weeks). This sexual dimorphism bears further evaluation. In analysis of overall bone volumes, knees in mice treated with Vitamin D show a consistent trend of lower bone volumes.

Timeline and Cost

Activities CY	14	15	16	17
Initiation/Vitamin D Supplementation, Measurement and Rodent Surgery				
Tissue Analysis of Surgical Model				
Clinical Subject Enrollment and Specimen/Data/Imaging Acquisition				
Data Analysis/Organization				
Estimated Budget ($K)	$250,000	$250,000	$250,000	

Updated: 10/10/2017

Goals/Milestones

CY14 Goal –Establishment of animal model, initiation of add-on for ongoing clinical trial

- ✓ Initiation of animal study with Vitamin D murine supplementation – 100 mice underwent OA initiation surgery 1/9/15 after 2 weeks pre-feeding at 4 Vitamin D doses – experiment completed; histology and imaging analysis complete
- ✓ Initiate clinical study add-on with consent, obtaining pre-injury serum from DODSR – confirmed add-on to existing study

CY15 Goal –Validation of model, tissue analysis, clinical trial

- ✓ Repeat animal studies to validate animal findings, micro-CT analysis – complete 2nd and 3rd round of 100 mice with 12,16, 20 week timepoints as well as ACL transection addition with 8 week sacrifice ; histology and micro-CT evaluation to be set up
- ✓ Begin tissue analysis of murine knees with histology and immunohistochemistry
- ✓ Continue clinical study with specimen and data acquisition **(total 70 subjects enrolled)**

CY16 Goal – Experimental completion and data analysis

- ☐ Complete histology and micro-CT analysis of murine data
- ☐ Finalize clinical subject enrollment and determine followup needs
- ☐ Data analysisComments/Challenges/Issues/Concerns: No consistent pattern of osteophyte formation related to dose using micro-CT

Budget Expenditure to Date

Projected Expenditure: $1,062, 293.00 (including indirects) – Univ Chicago total $337,479.49

Actual UCMC expenditure to date: 180,149.40 (additional $184,619 committed to subcontracts with USMA (Geneva Foundation) and UConn