

AWARD NUMBER: W81XWH-14-2-0136
OR130096

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

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REPORT DATE: DECEMBER 2019

TYPE OF REPORT: Final

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

DISTRIBUTION STATEMENT: Approved for Public Release;
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REPORT DOCUMENTATION PAGE		<i>Form Approved OMB No. 0704-0188</i>
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1. REPORT DATE DECEMBER 2019	2. REPORT TYPE Final	3. DATES COVERED 22SEP2014-21SEP2019
4. TITLE AND SUBTITLE Vitamin D Supplementation for Prevention of Post-Traumatic Osteoarthritis: Evaluation in Animal and Clinical Models		5a. CONTRACT NUMBER W81XWH-14-2-0136
		5b. GRANT NUMBER OR130096
		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) 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					
<p>This study evaluated the impact of Vitamin D in prevention and progression of post-traumatic osteoarthritis (PTOA). In animals, we surgically induced osteoarthritis in mice, with supplementation of varying levels of Vitamin D, and evaluated using histology, immunohistochemistry, and micro-CT. We evaluated a clinical cohort of USMA cadets treated for anterior cruciate ligament (ACL) tear, with pre- and post-injury serum 25-hydroxy-Vitamin D levels. Findings from the animal model showed 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; immunohistochemistry showed decreased staining of key enzymes that break down cartilage with increased Vitamin D supplementation. In the clinical portion, we enrolled 89 cadets and evaluated Vitamin D in ACL injured and control cadet cohorts. We noted a significant difference in baseline Vitamin D by sex, but no differences over time or between injured vs. controls. Interestingly, approximately half the cadets tested had serum Vitamin D levels considered low or low-normal. Our findings provide preliminary support for the concept that Vitamin D supplementation could</p>					
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
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER <i>(include area code)</i>
Unclassified	Unclassified	Unclassified	Unclassified	48	

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

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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 the typically 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 final summary of the work and findings derived from the CDMRP grant. We received a no-cost extension in 2017 due to the transfer of funding from the University of Connecticut to the University of Chicago, with a 6 month lag pending administrative transfer. A second no-cost extension was approved in October 2018, primarily for support of Aim 2. Reporting will be organized by task as noted in the Statement of Work.

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

Major Goals

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

Accomplishments

Major Activities

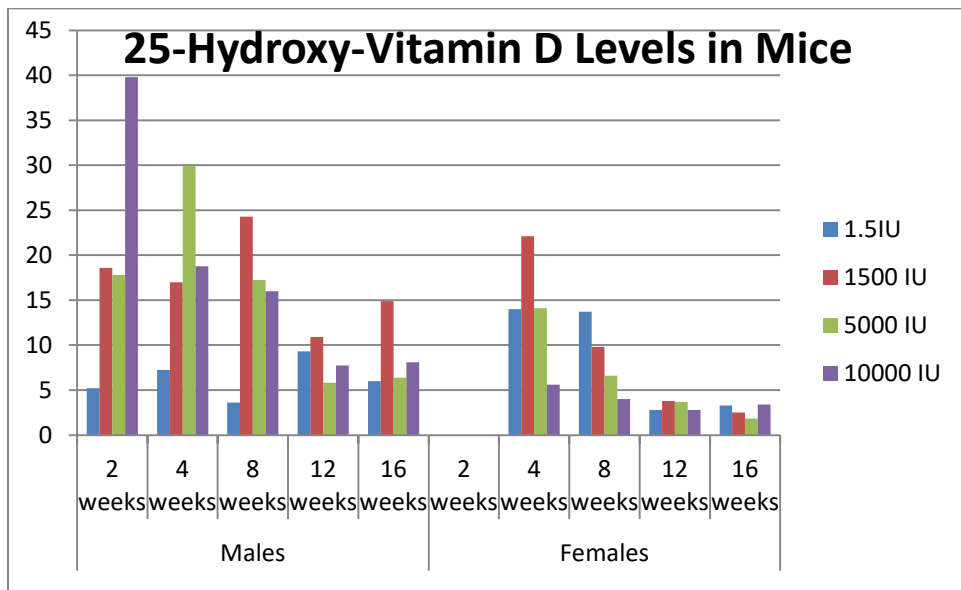
- We completed the all three rounds of animal experimentation with C57-BL6 mice fed to supplement with four levels of Vitamin D:
 - control (1.5 IU/kg - minimal Vitamin D)
 - 1500 IU/kg (normal dietary level of Vitamin D)
 - 5000 IU/kg
 - 10,000 IU/kg
- A total of 300 mice underwent surgical initiation of osteoarthritis using destabilization of the medial meniscus and MCL sectioning (DMM).¹ A small subgroup was treated with

anterior cruciate ligament (ACL) sectioning to evaluate the degree of osteoarthritis induction.

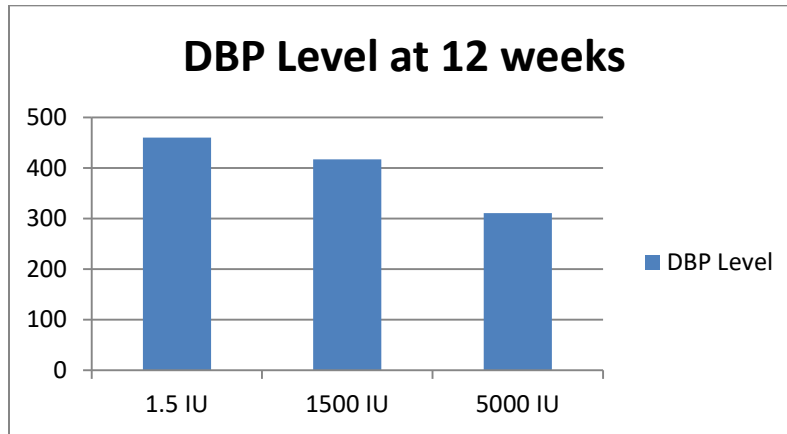
- We changed the timepoints to evaluate mice at 8, 12, 16, and 20 weeks as we noted minimal induction of osteoarthritis at 4 and 8 weeks.
- Initial testing using mouse Vitamin D ELISA confirmed graduated levels of Vitamin D in the sera of treated mice groups.
- We then performed histology, faxitron Xray 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, using the modified Mankin rating system for greater ease. 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.

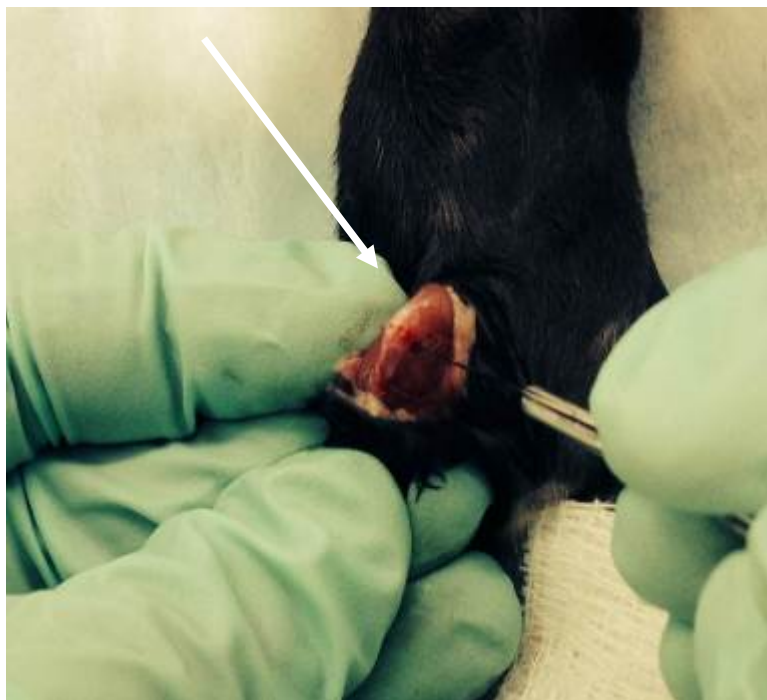


- We also tested Vitamin-D binding protein (DBP), which binds Vitamin D metabolites in plasma up to a certain species-specific level. It has been shown that free Vitamin D metabolites are active, and thus once DBP binding is maximized, the free metabolite levels will increase.² Our results showed the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



Histology Analysis

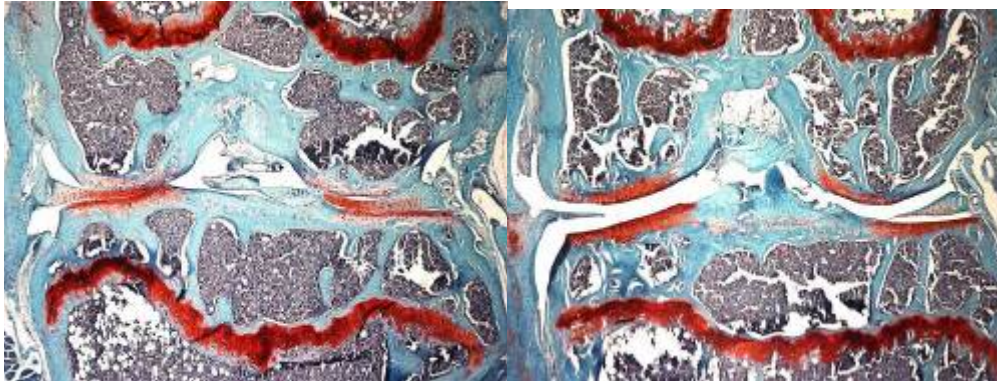
Our initial results in histology analysis from the first round of osteoarthritis (OA) induction indicated that arthritic change was minimal at 4 and 8 weeks after surgical induction of OA using the destabilization of the medial meniscus (DMM) model.



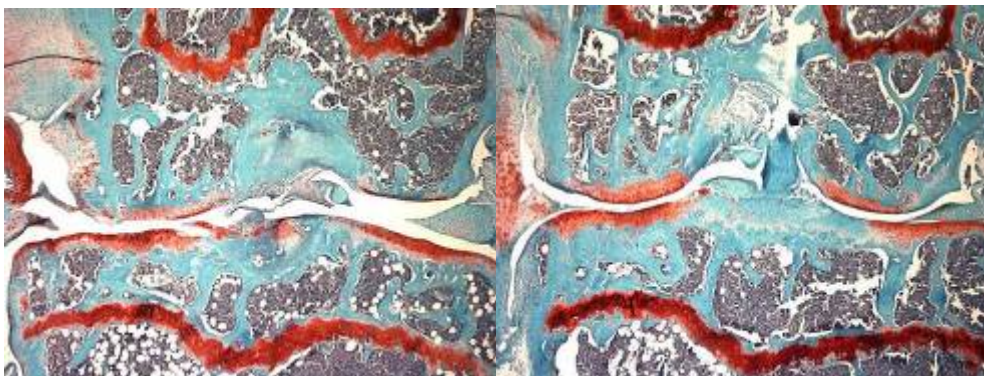
Here is an example of murine knee DMM surgery. The arrow points to the patellar tendon. This is a right knee; the medial meniscus is approached and destabilized by the scalpel blade seen on the right.

Preliminary histology showed minimal correlation between Vitamin D dosing and arthritic changes on histology in male mice, and possible trends in female mice.

These findings guided our decision to expand both surgical techniques and length of time from surgery to sacrifice for rounds 2 and 3, with IACUC approval at the University of Connecticut to allow use of the anterior cruciate ligament (ACL) transection model as well as use of 12, 16, and 20 week time intervals to sacrifice. The purpose of these two changes was to investigate if ACL transection was more efficient as a surgical model of OA induction, and to allow longer time for OA to occur for evaluating joint changes.



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 mice.

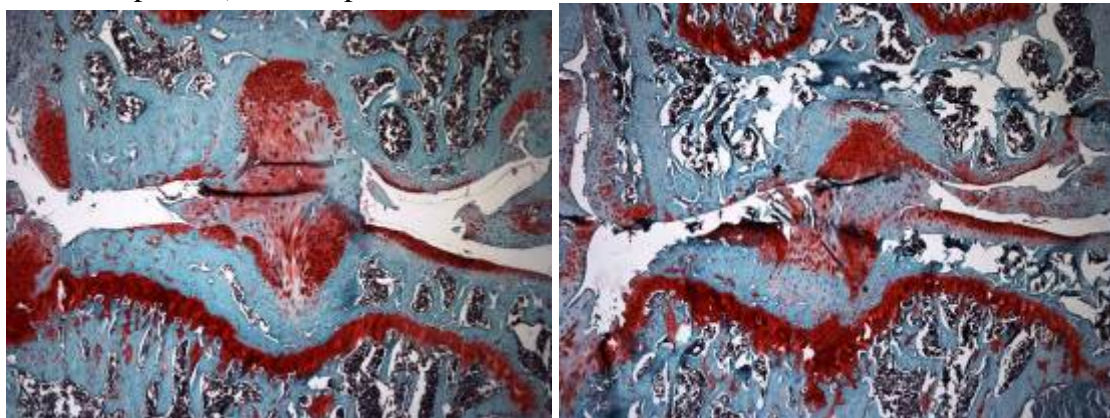
In late 2017, after the PI had moved to the University of Chicago, having completed all animal surgical studies, we undertook an analysis of pooled histology images from rounds 2 and 3, with the reasoning that surgical technique would have improved and findings be more reliable. Thus, 3 experienced investigators in Dr. He's laboratory performed blinded review of histology images using a modified Mankin scoring system.³ (Table 1)

Articular Surface Structural Integrity

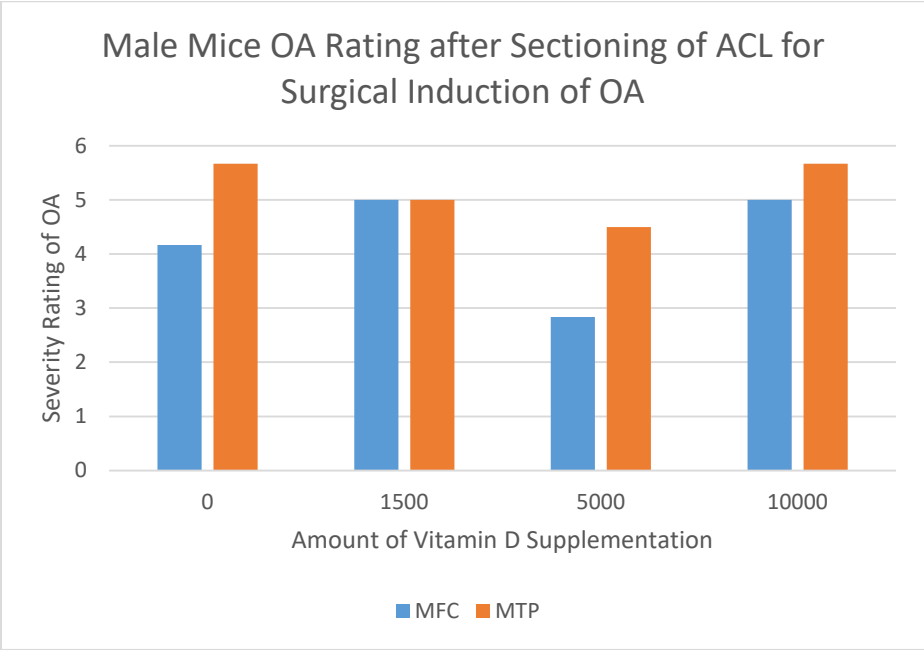
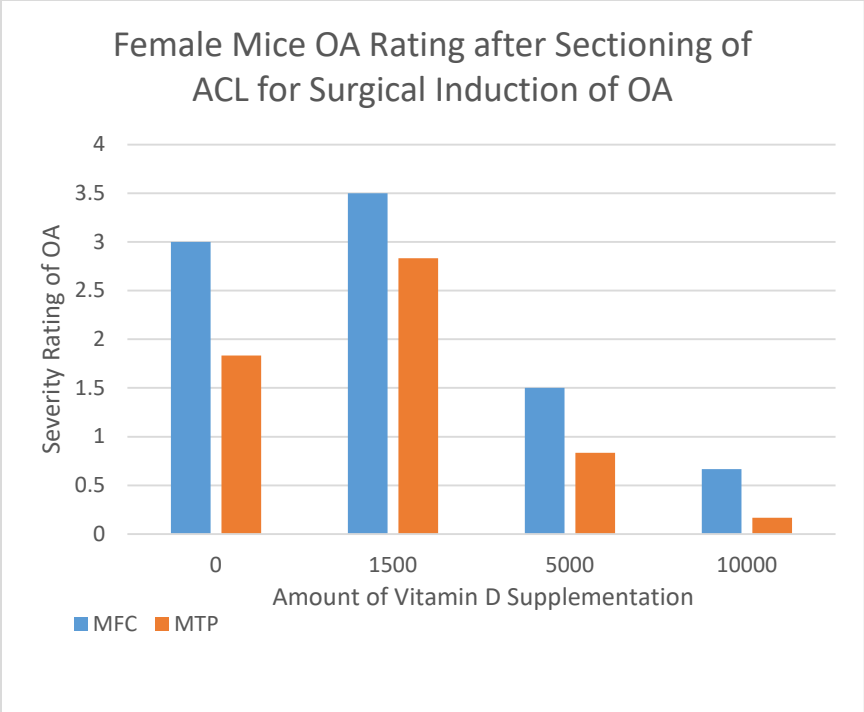
Normal	0
Surface irregularities - mild	1
Surface irregularities - moderate	2
Clefts to transitional zone	3
Clefts to radial zone	4
Clefts to calcified zone	5
Complete destruction & violation of tidemark	6

We evaluated and rated all 4 quadrants of the murine knee but focused on the medial femoral condyle and medial tibial plateau as this was the area of the joint impacted by destabilization of the medial meniscus or ACL transection.

We found that ACL transection induced fairly rapid and predictable onset of OA at 8 weeks, as shown in these histologic examples which demonstrate loss of chondrocytes with fragmentation of the femoral condylar bone, as shown on the left side (representing the medial femoral condyle and tibial plateau) of both pictures:

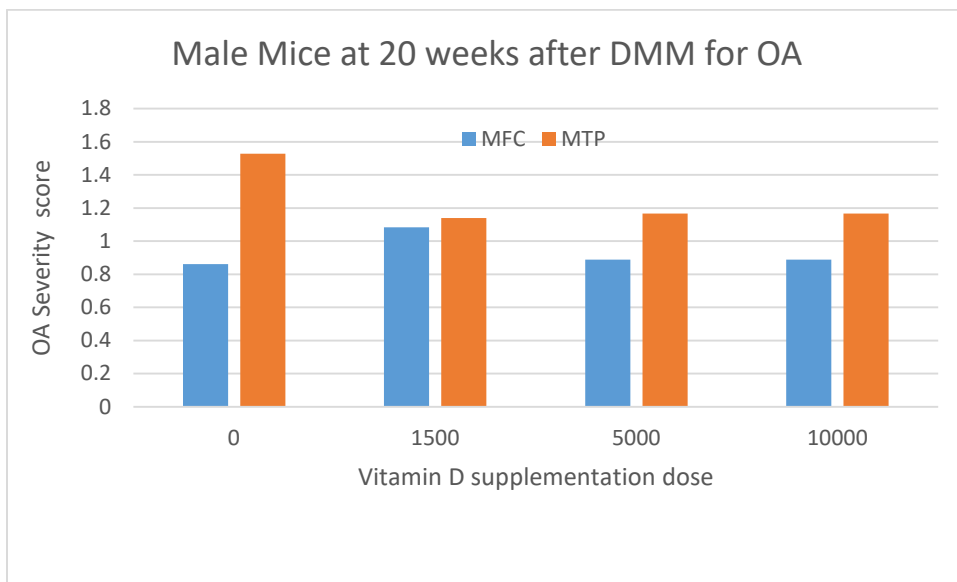
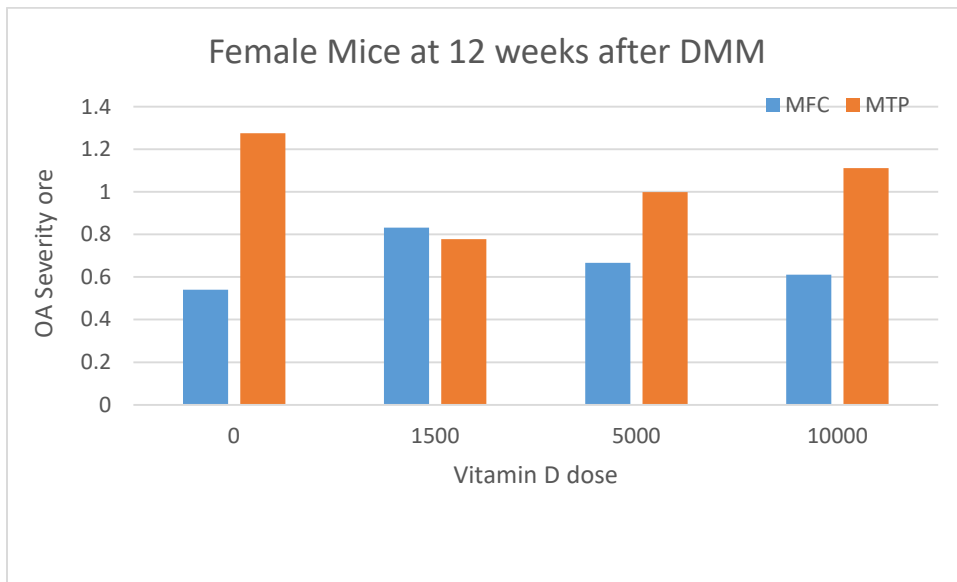


In this cohort of mice, the results of pooled histology analysis showed a strong correlation between increasing Vitamin D dose above physiologic levels and decreased osteoarthritis histologic rating by 3 blinded, experienced raters, but only in female mice undergoing ACL transection to form moderate to severe arthritis. Male mice did not show this effect, interestingly.



These findings suggest that Vitamin has a protective effect in females against the initiation of OA changes in cartilage in an animal model.

In the DMM cohort, we did not find a correlation between Vitamin D dosing and decreased histologic grading for OA. This was consistent across sexes and throughout all timepoints.



These findings suggest that the ACL transection model is a more effective way to induce OA, with faster onset and qualitatively greater changes. In this model, there is a significant relationship between supraphysiologic Vitamin D dosage and lower OA grading. This suggests the need for translational evaluation of this relationship to see if this correlation is shown in humans.

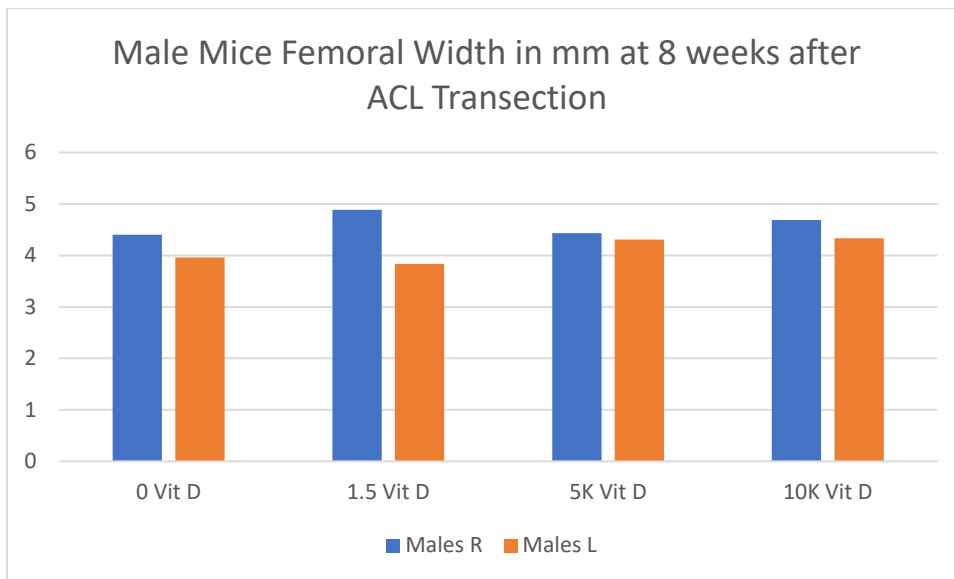
Bone Imaging

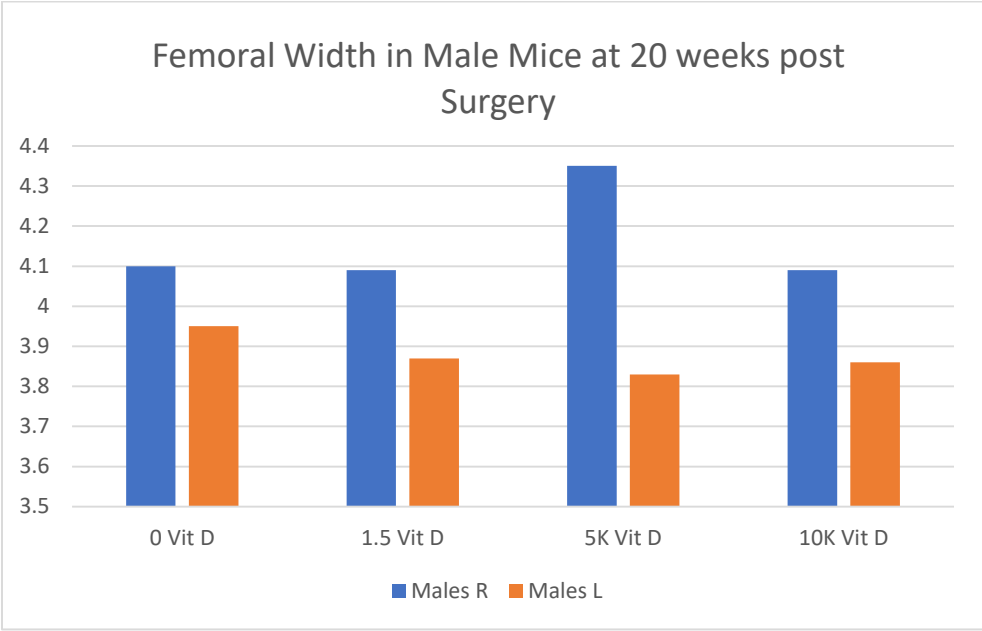
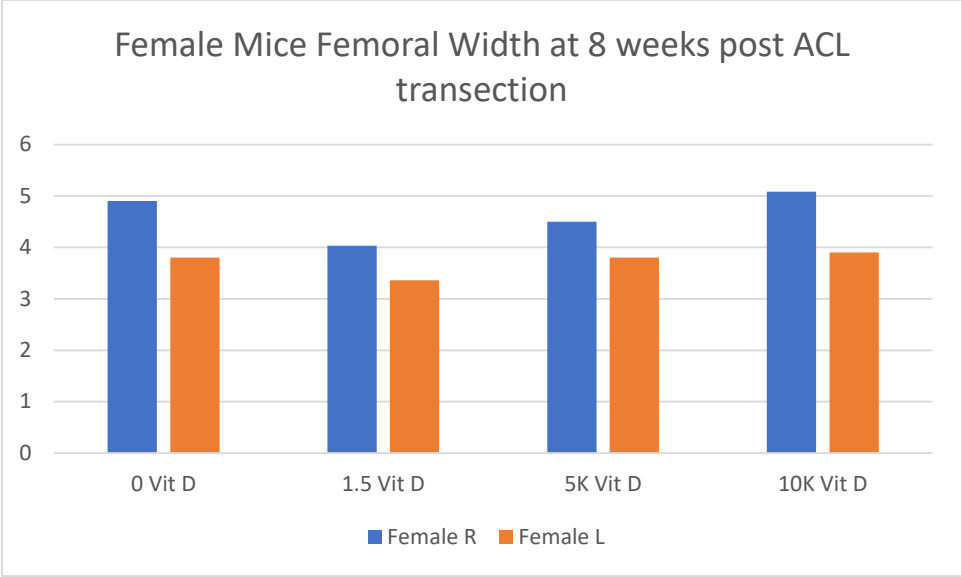
Faxitron imaging showed progressive signs of osteoarthritis over time.

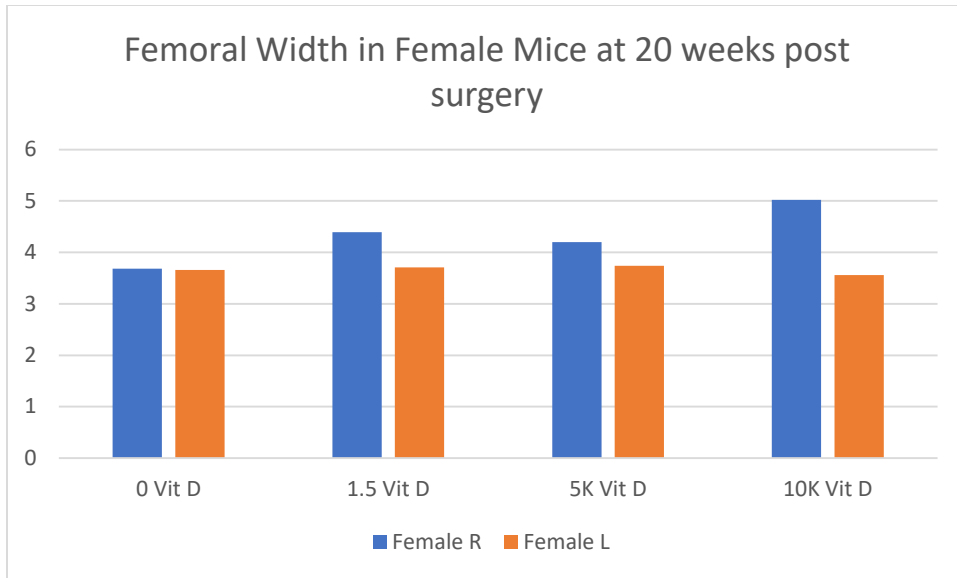


8, 12, and 16 week views with DMM (surgical) limb on left, sham surgery on right; all are of male mice with 1500 IU (normal) feed levels.

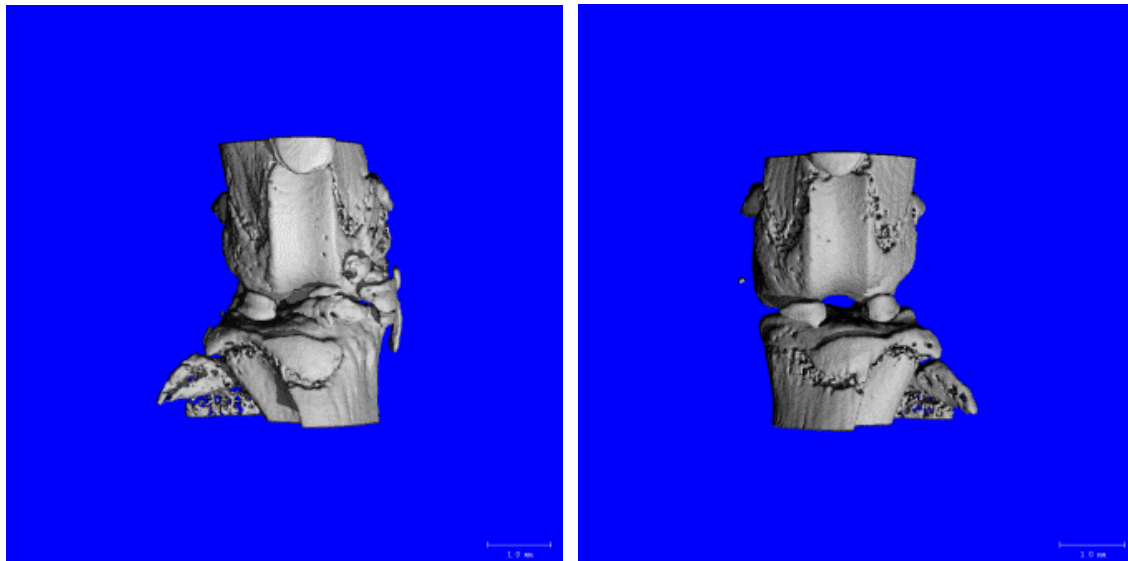
We performed quantitative analysis of femoral width as a measure of osteoarthritic change, based on data which shows widening of the knee joint and squaring of the femoral condyles.⁴ In comparing femoral width between operated (right) and sham (left) murine knees showed consistent differences between knees with greater arthritic change on the right (as expected as this was the side undergoing operative induction of OA). However, Vitamin D did not appear to impact the degree of arthritic change as measured by increased femoral width.



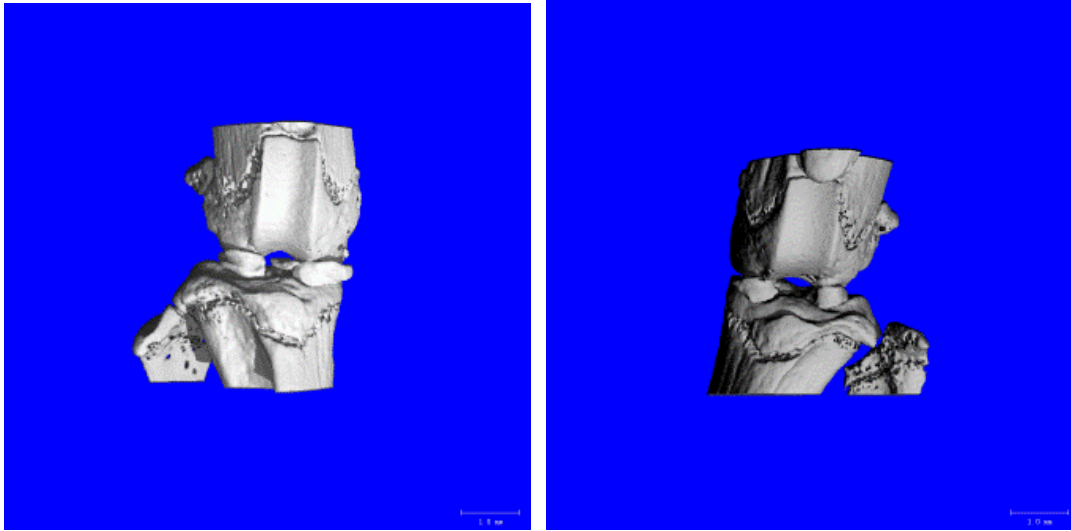




Micro-CT analysis has similarly shown signs of progressive osteoarthritis with aging in the murine model. We completed the analysis of rounds 2 and 3 through a subaward with the University of Connecticut.



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.

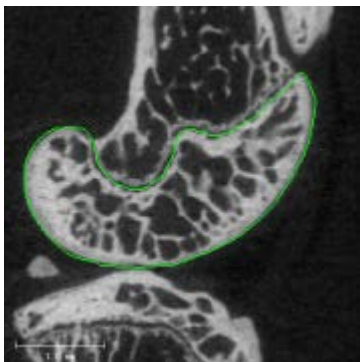


Figure X: Sagittal “slice” of volumetric rendering of a mouse knee joint, showing segmentation of the femoral epiphysis as a whole. Bone volume was quantified within the entire epiphysis as an objective measure of bony changes accompanying joint instability created by destabilization of the medial meniscus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



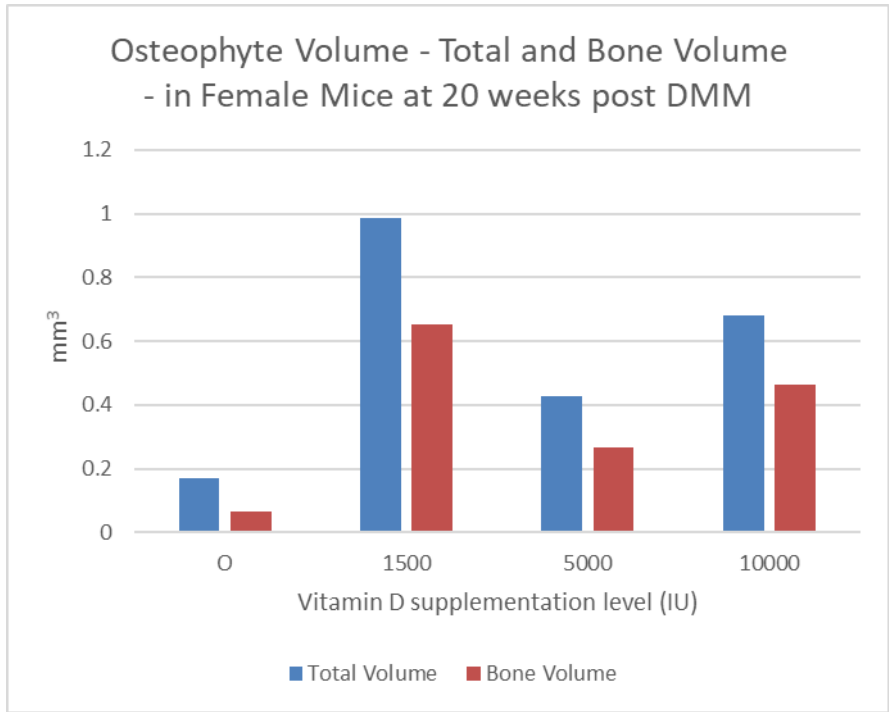
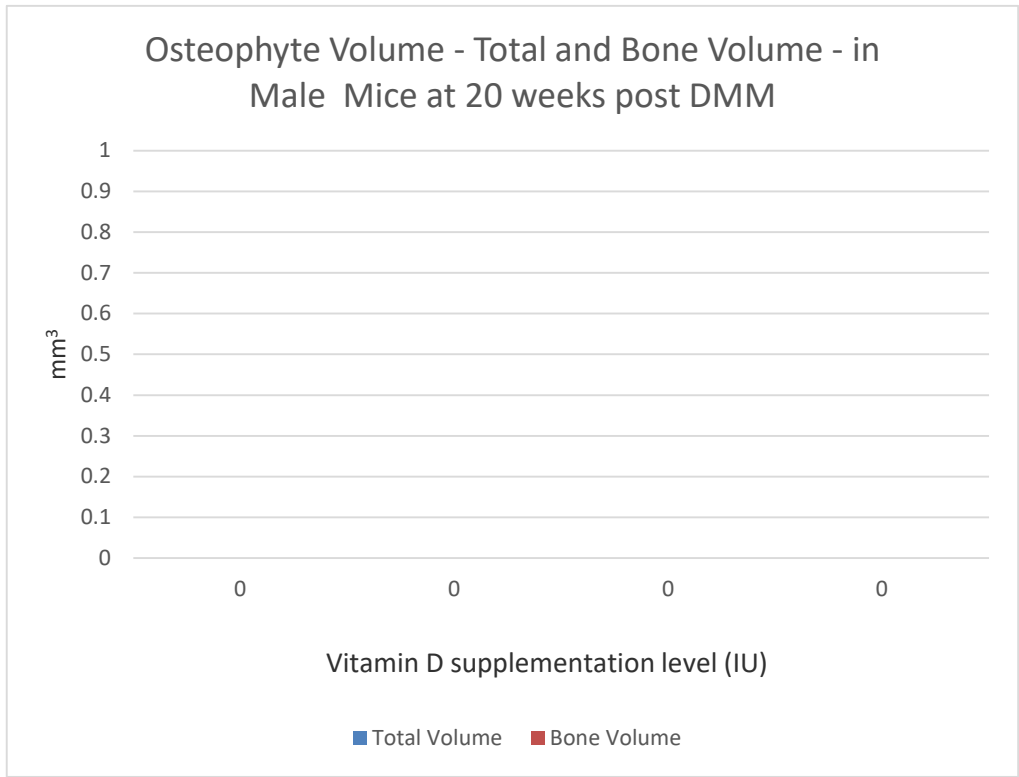
Figure Y: Sagittal “slice” of volumetric rendering of a mouse knee joint, showing segmentation of the trabecular compartment within the femoral epiphysis. Bone volume fraction (BV/TV) was quantified within the entire volumetric trabecular compartment of each epiphysis by dividing bone volume (BV) obtained 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.⁵

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

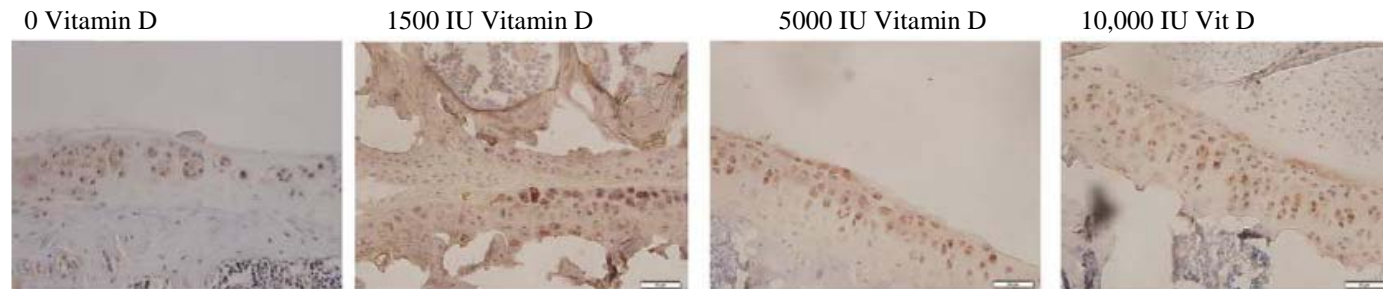
be investigated further with the validation through histology to see if there is a large difference between doses.



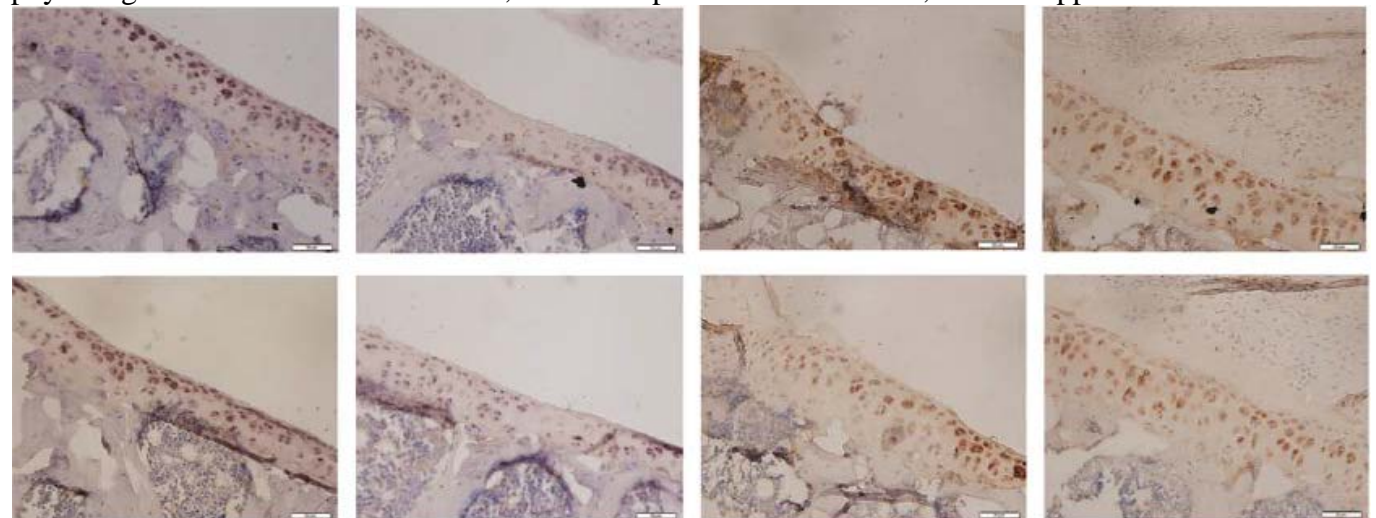
Immunohistochemistry Analysis

We initiated our immunohistochemistry analysis using the limited dataset of ACL-transection mice, who were sacrificed at week 8, because of the correlations between increased Vitamin D supplementation and decreased histologic grade of OA. We evaluated slide blocks for extracellular matrix proteins using type I collagen and aggrecan; for chondrocyte hypertrophy markers with Runx2, type X collagen, and MMP13; and differentiation markers using Runx1 and Sox9 (IHC kit and markers all from Sigma, St. Louis, MO). We also evaluated ADAMTS-5 because of its recent identification as a novel target in OA as a degradative enzyme.⁶ After optimization, slides were stained and imaging acquired using a Q-Imaging Retig 2000R camera connected to a Nikon Eclipse 50i microscope.

In the ACL-transection group, females showed fairly consistent staining across all Vitamin D dosages for several markers, including Type I collagen, aggrecan, and Runx2.

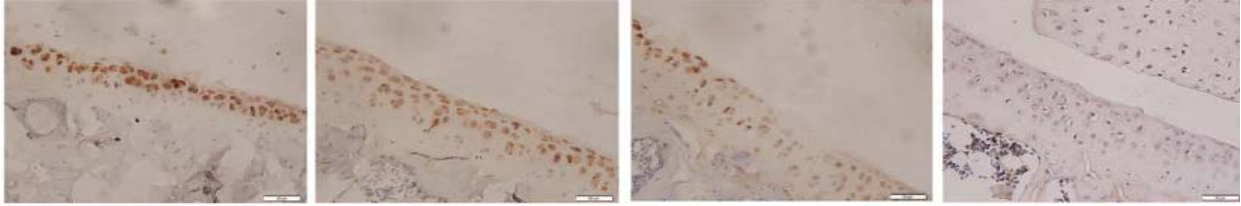


However, ADAMTS-5 and MMP-13 showed stronger staining at 0 Vitamin D, although not at physiologic levels of 1500 IU Vitamin, when compared to 5000 and 10,000 IU supplementation.

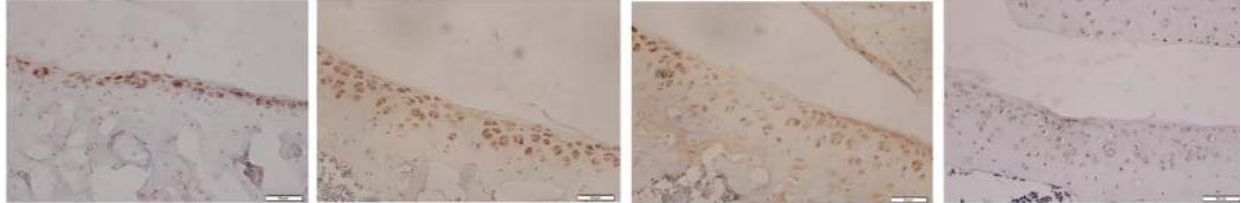


In males, the staining was somewhat different, with the same doses, same surgery, and sacrifice at the same timepoint. The majority of markers showed less staining at the 10,000 IU timepoint, with increased Vitamin D correlated with decreased staining seen in aggrecan, MMP 13, Sox9, and Runx1.

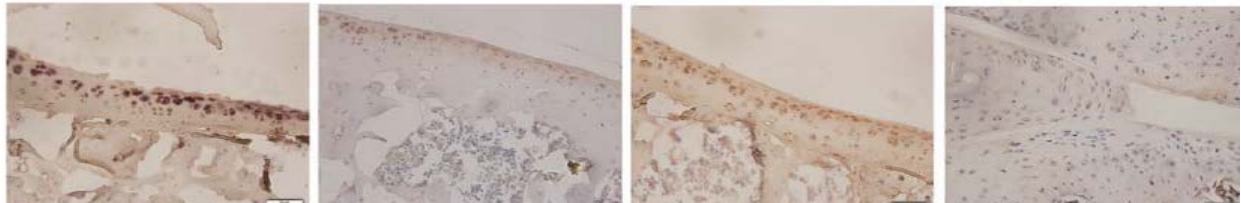
Sox9



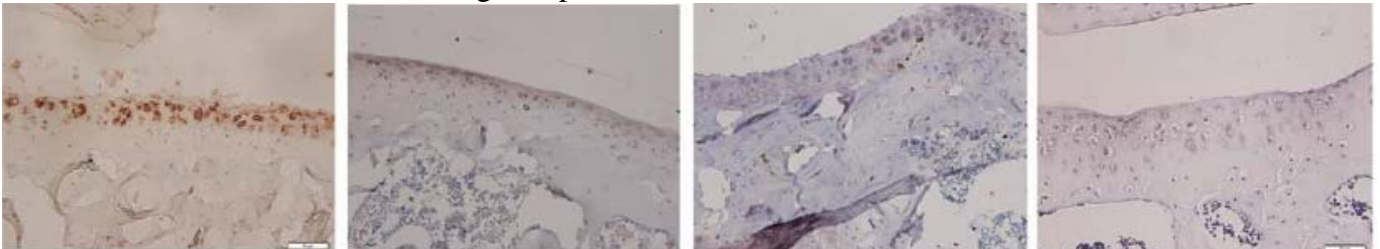
MMP-13



Runx1



ADAMTS-5 showed minimal staining except at the 0 Vitamin D level.



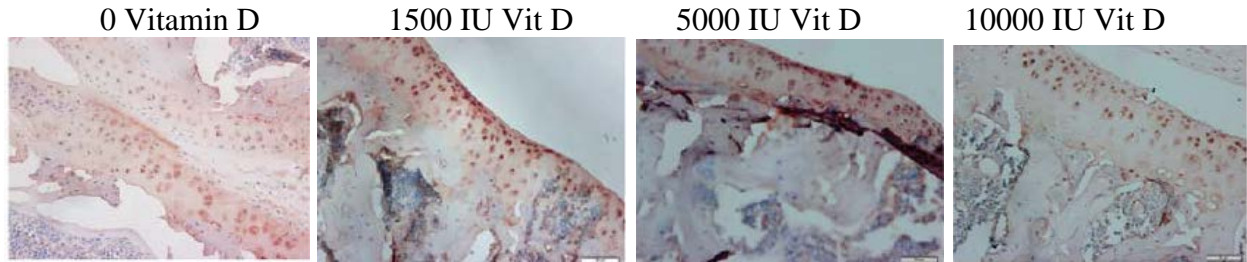
Taken together, these data indicate a sex difference at the molecular level after ACL-transection to induce OA in a murine model. In a moderate-severe osteoarthritic knee, males showed a dose-dependent effect of Vitamin D supplementation on several markers associated with chondrocyte hypertrophy and differentiation in response to arthritic change.⁷ In females, the osteoarthritic markers were more globally expressed, with the exception of MMP-13 and ADAMTS-5. This may indicate greater severity of OA in female mice after ACL transection. Studies on sex differences in function after ACL reconstruction have shown that women report statistically significantly worse outcomes at 1 and 2 years after surgery when compared to men.⁸ It is not known if this finding was due to a greater degree of knee OA.

It is notable that ADAMTS-5 (aggrecanase-2) showed a consistent correlation with lower (or no) Vitamin D dosing and IHC staining across sexes, as this has been shown as a marker for early

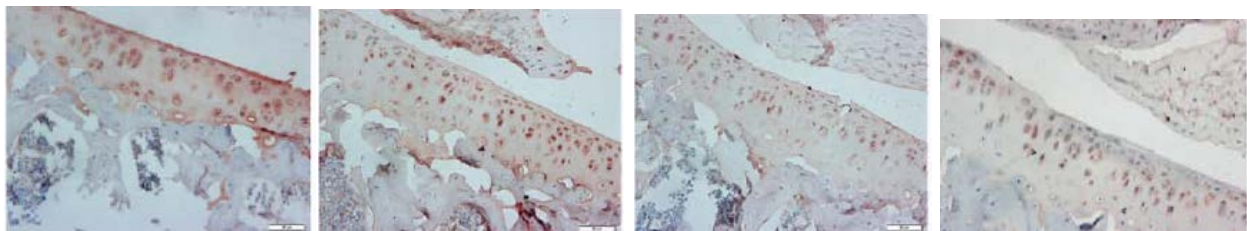
osteoarthritis. Tchetina et al evaluated human articular cartilage with early focal arthritic lesions and showed that only caspase-3 and ADAMTS-5 were expressed in cartilage tissue of early OA consistently.⁹

We also performed IHC on selected blocks of the DMM mice, using the same markers. Results in this group were somewhat more mixed. At 8 weeks, similar to ACL-transection mice, both males and females showed dose-dependent correlations in staining of ADAMTS-5.

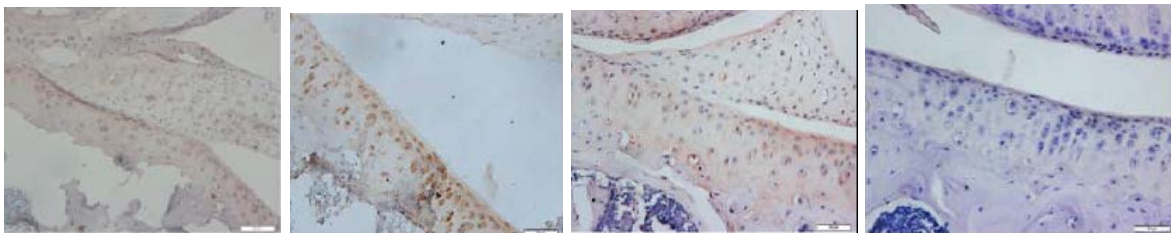
Females with ADAMTS-5 at 8 weeks:



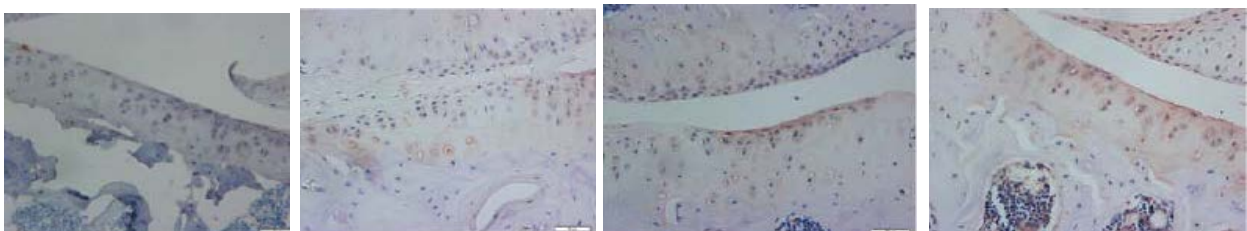
Males stained with ADAMTS-5 at 8 weeks:



At 12 and 16 weeks, ADAMTS-5 staining was fairly consistent with 8 weeks, but at 20 weeks, females showed differential staining with higher dose Vitamin showing lower or no staining, particularly at 10,000 IU.

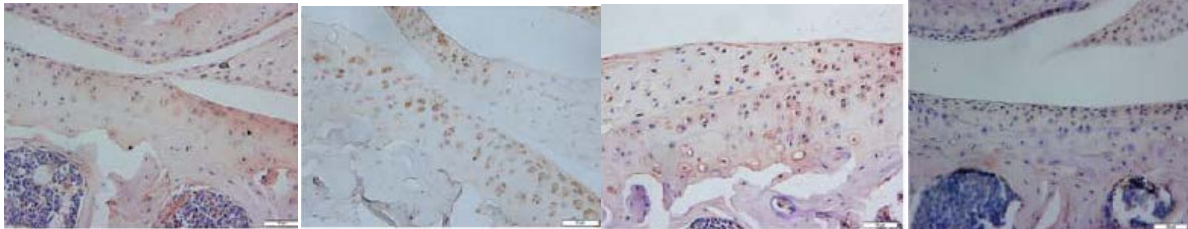


Male mice did not demonstrate this effect; in fact, showing minimal overall staining but slightly increased staining at 10,000 IU as below:

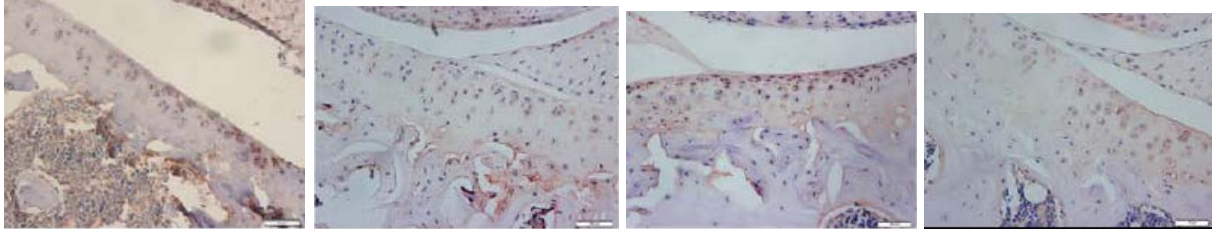


At 16 and 20 weeks, MMP-13 and Sox9, markers of cartilage differentiation, in response to OA stimulus, showed fairly consistent positive antibody staining without differences based on Vitamin D dose, in both sexes:

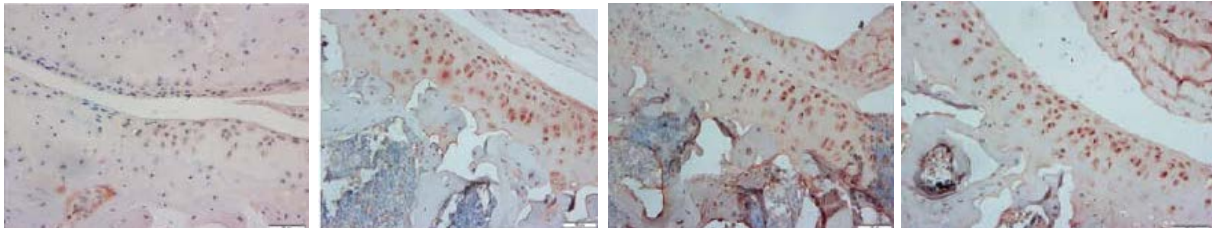
MMP-13 in females at 20 weeks



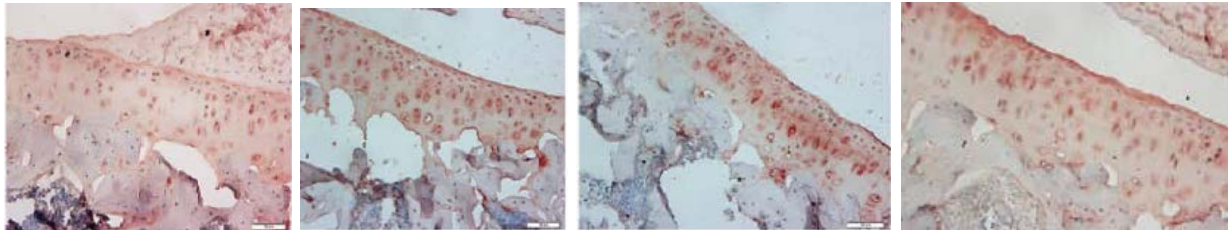
MMP-13 in males at 20 weeks



And Sox9 in females at 16 weeks:

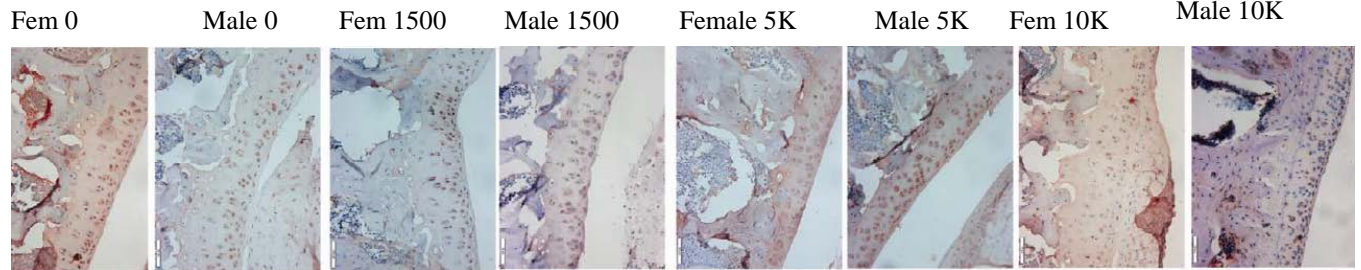


Sox9 in males at 16 weeks:



Markers of extracellular matrix proteins also showed fairly consistent staining across sexes and Vitamin D dosing. Aggrecan is shown as an example:

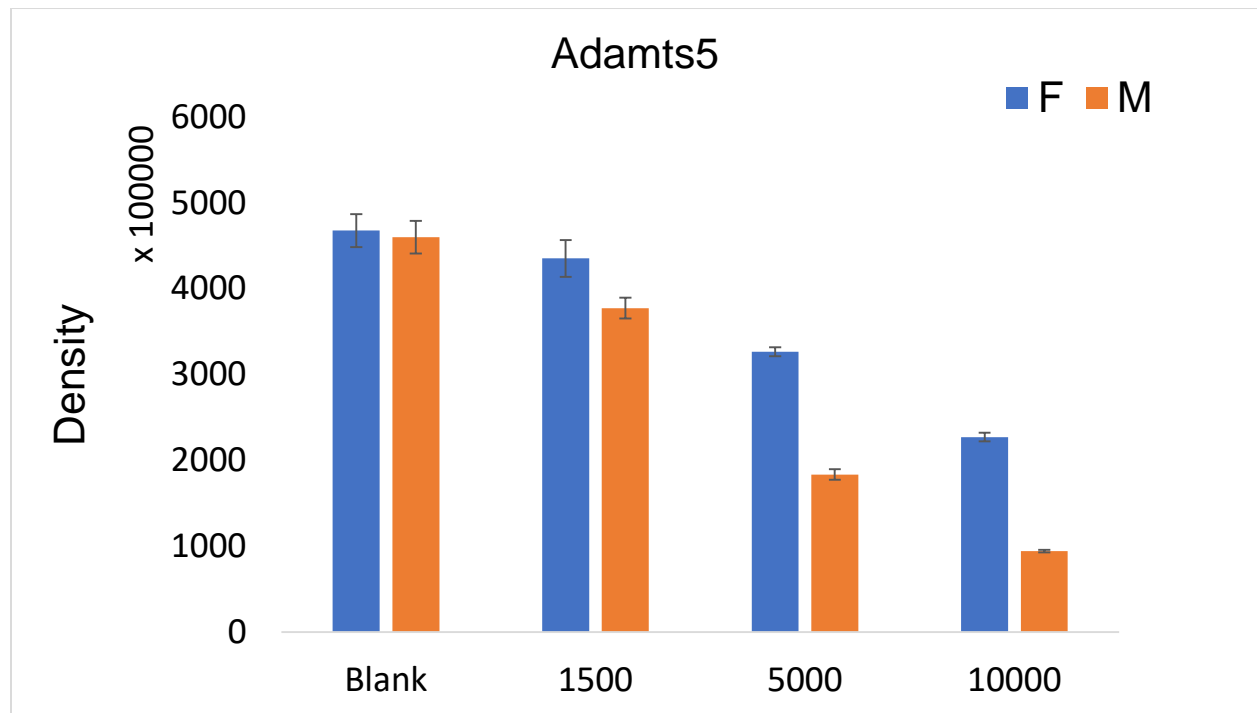
16 week IHC after DMM



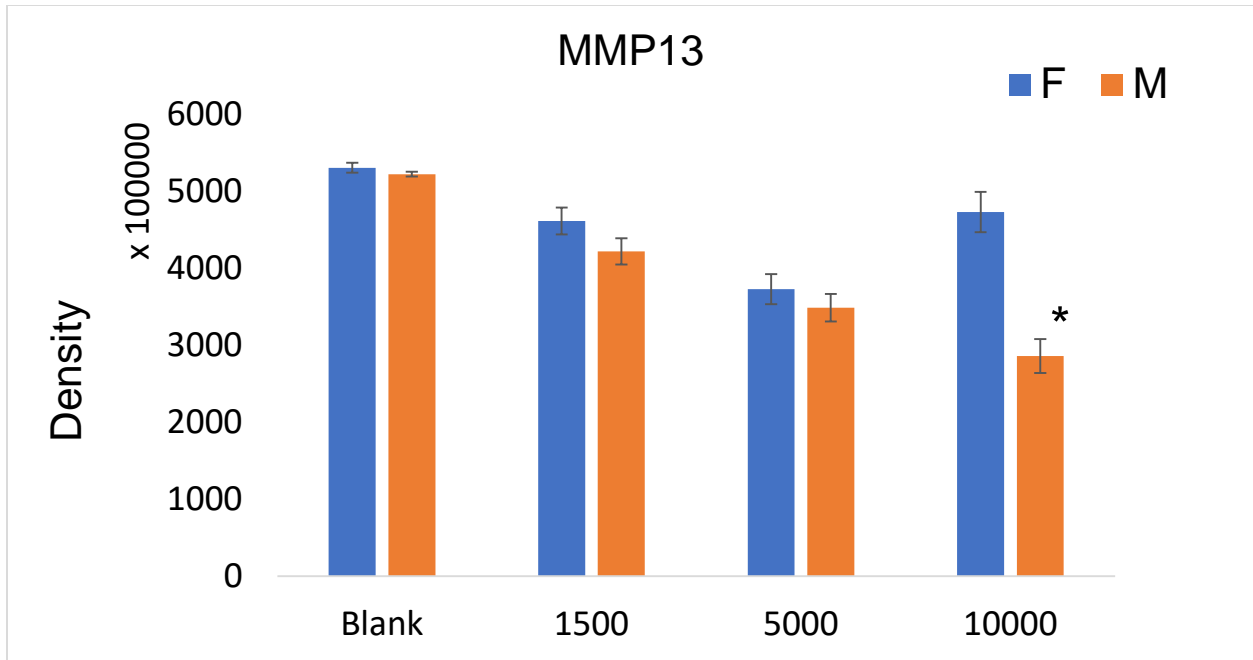
Quantitative Analysis of IHC

We then evaluated the immunohistochemistry by quantitative analysis of the staining density, using Image-J software. This was performed in both the ACL-transected group and the DMM groups.

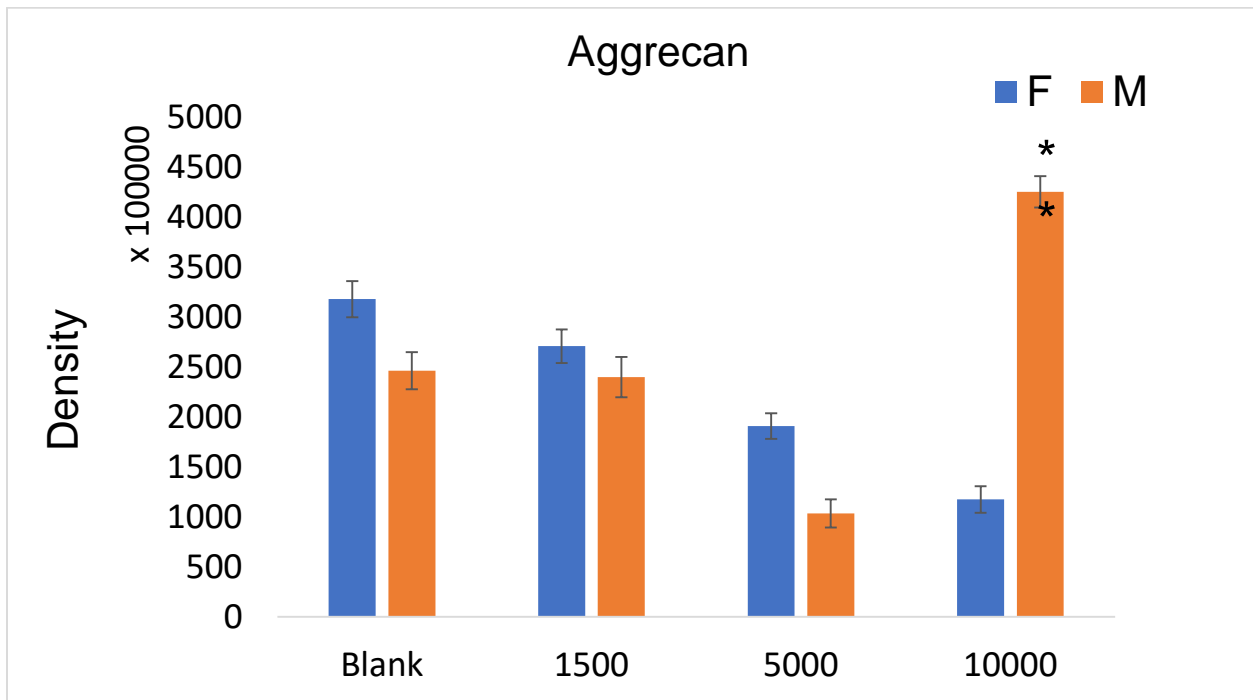
In the ACL cohort at 8 weeks, quantitative analysis showed mixed findings as above. ADAMTS-5 showed consistent decrease in staining as Vitamin D supplementation increased, as shown qualitatively, in both males and females.



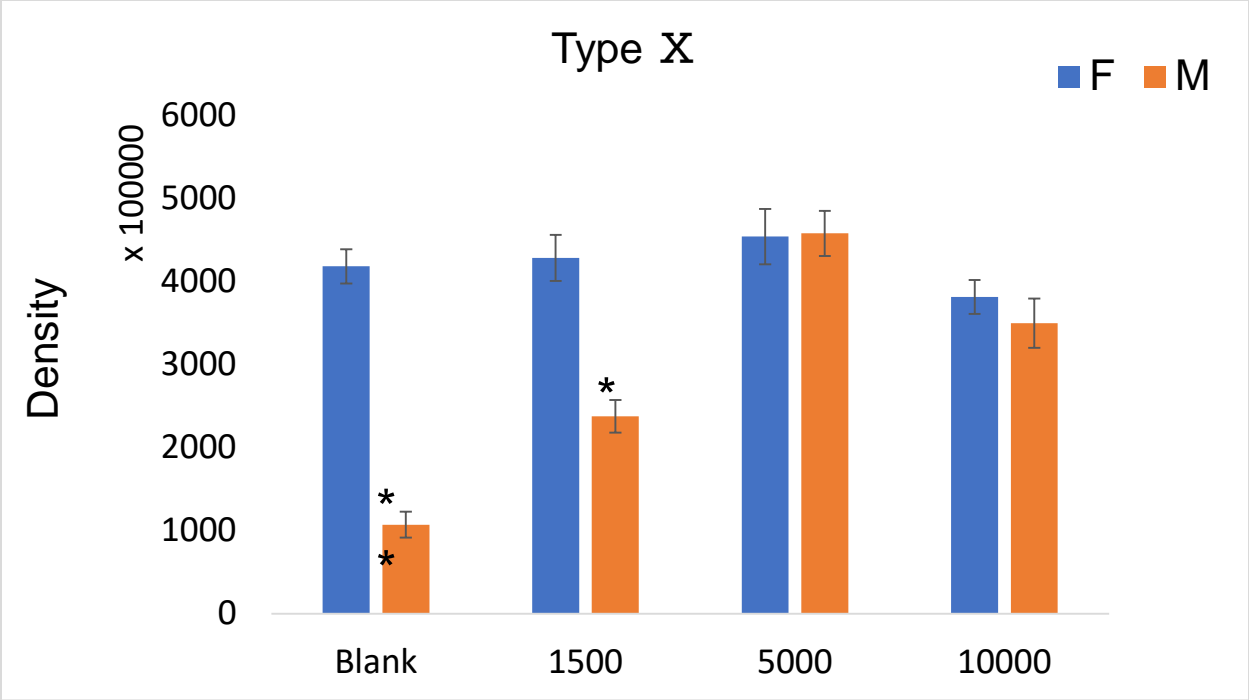
MMP-13 demonstrated decreased staining with increased Vitamin D in males, but not in females:



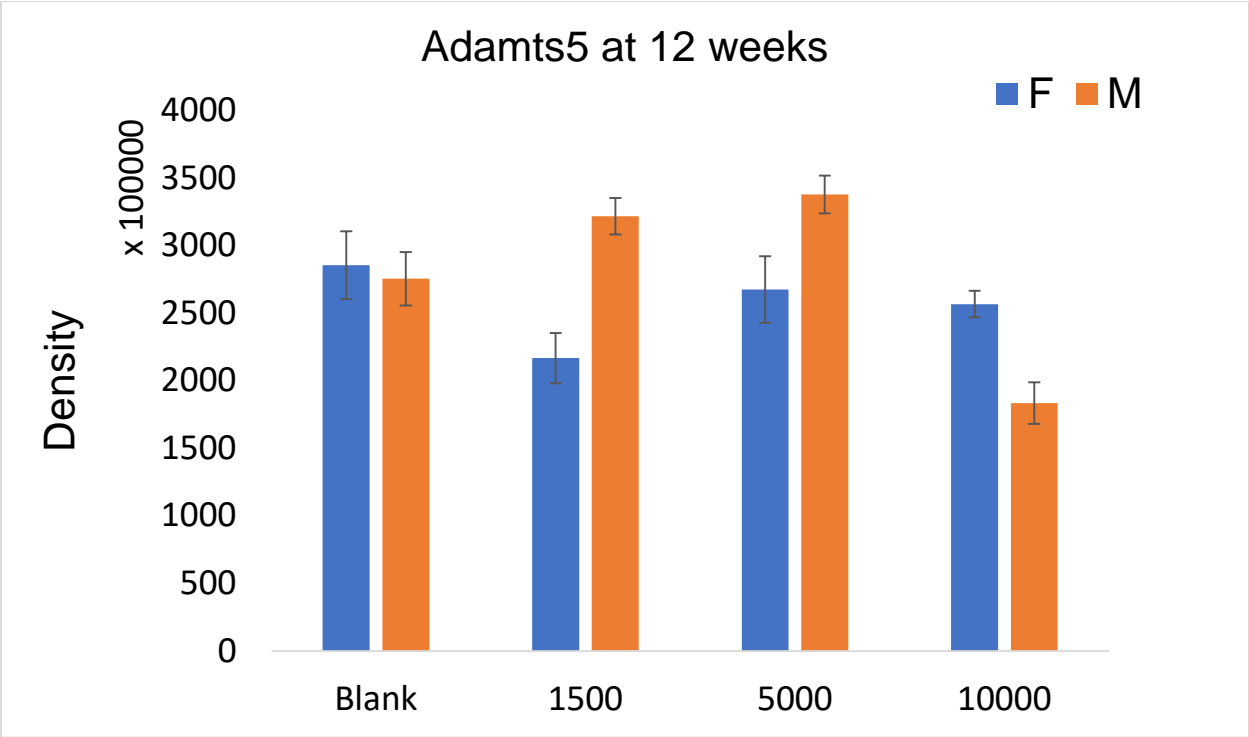
While aggrecan demonstrated a similar trend in females, but not males:

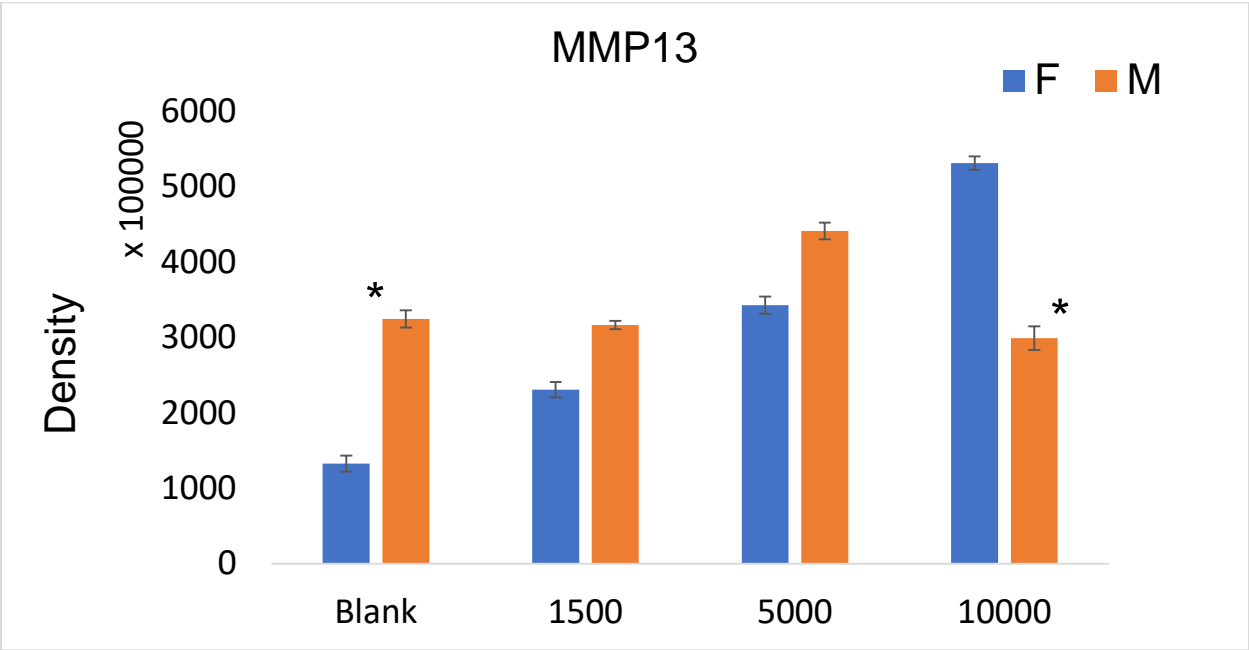
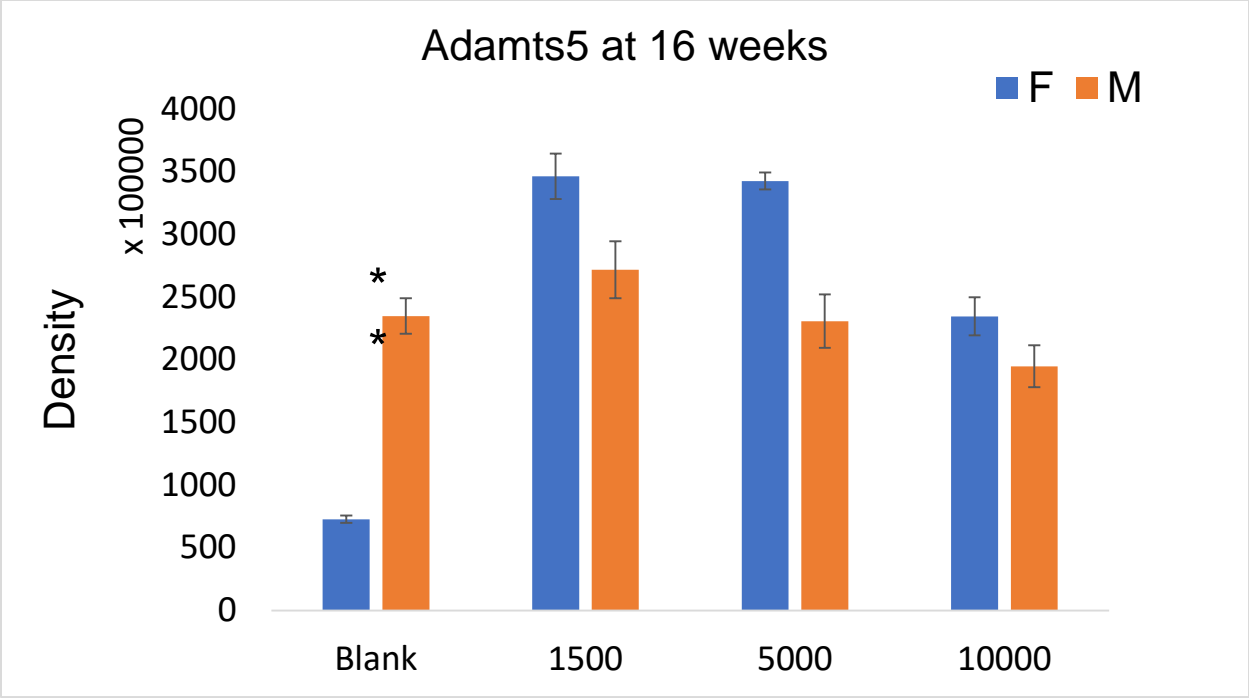


The remaining factors, including Sox9, type I collagen, type X collagen, Runx 1 and Runx 2 showed no measurable trends. An example is shown below for Type X collagen:



In the DMM groups, no correlation in quantitative density was shown for ADAMTS-5 or any other factor except MMP-13 in females at 16 weeks:





These findings suggest that DMM is effective in establishing OA, albeit in a slower time frame and less predictably. The findings of consistent staining for ECM markers as well as chondrocyte differentiation confirm this. There was not a clear correlation with Vitamin D dose and decreased staining for arthritic markers, except with ADAMTS-5, and this was seen most clearly in females at 8 weeks.

ADAMTS is an aggrecanase, or enzyme that breaks down aggrecan, a glycoprotein that is a key component of the cartilage extracellular matrix.¹⁰ Aggrecan breakdown is an early event in the cascade of osteoarthritic degeneration.¹¹ ADAMTS-4 and ADAMTS-5 are the most efficient enzymes which act to break down aggrecans in vitro and are thus thought to play critical roles in the pathogenesis of OA.¹² The specific findings of Vitamin D supplementation in decreasing the amount of ADAMTS-5 staining in murine cartilage after ACL transection and the development of osteoarthritis are novel. Thus, the qualitative and quantitative immunohistochemistry data supports a role for Vitamin D supplementation, specifically related to early dosage after injury. The findings of ADAMTS-5 with decreased IHC staining in response to 5,000 and 10,000 IU, particularly in females, suggest that early molecular changes of osteoarthritis in response to trauma (such as ACL tear) could be mitigated by supraphysiologic dosing of Vitamin D.

Summary of Aim 1 Accomplishments

- Completed animal surgeries at UConn before PI change of location.
- Established reliable histology ratings techniques using modified Mankin scoring rubric.
- Completed histology testing and analysis. There is consistent evidence of decreased osteoarthritic change at the cartilage levels in females after the induction of OA using the ACL transection model.
- 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 compared to male mice is notable, but is not related to Vitamin D supplementation.
- Completed immunohistochemistry analysis. Qualitative analysis is complete, and shows evidence for a role of increased Vitamin D and diminished staining for markers of early OA, including ADAMTS-5, Sox9, and MMP-13 in females. When quantitative analysis was performed using image analysis software, ADAMTS-5 demonstrated consistent decrease with increased Vitamin D supplementation in ACL transection modeled arthritis, with MMP-13 showing similar findings in females as in the qualitative analysis. Sox9 did not show a similar correlation in quantitative analysis.
- There is exciting potential evidence of supraphysiologic levels of Vitamin D correlated with mitigation of OA, particularly as measured by histology grading and immunohistochemistry, in female animals treated with ACL transection to induce OA.
- The main accomplishment is the finding of a correlation between increased Vitamin D supplementation and decreased OA, using histology and immunohistochemistry, in the murine model. It is interesting to note that this was primarily 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.¹³ In contrast, Rabenberg et al showed no sex differences in 25-hydroxy-Vitamin D levels in an adult census study.¹⁴

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

Major Activities:

1. Add-on Study Performance

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. Pre-injury samples were to be acquired from the Department of Defense Serum Repository (DODSR); however, because the main study is continuing to accrue samples and a single batched run of biomarkers is planned, we were not able to access DODSR serum for Vitamin D testing. Depending on volume during the main biomarker analysis, this may be possible in the future.

2. Subject Enrollment/Specimen Collection

- We ended enrollment for the add-on study at end June 2019, after extensive monthly conference calls between myself and Dr. Cameron (USMA PI). Final enrollment numbers were:
 - 159 ACL injured cadets screened
 - 89 ACL injured cadets enrolled in study; this was just below our target of 90-100. We closed the add-on Vitamin D study after cadet graduation and anticipated lower cadet numbers (and injuries) on campus over the summer.
- Age and sex-matched control subjects were enrolled for each ACL injured case.

3. Sample Analysis – Human Vitamin D

After confirming a contract for serum 25-hydroxy-Vitamin D testing with the Maine Medical Research Institute (MMRI), the research assistant at Keller Army Medical

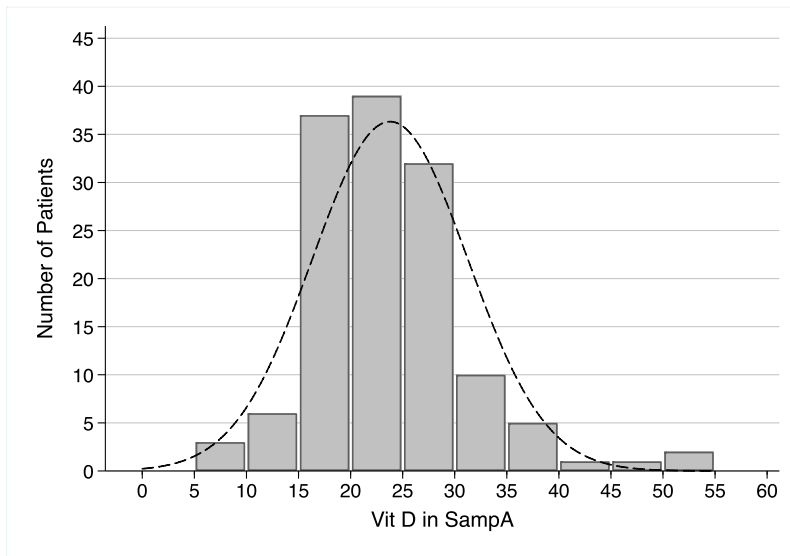
Center created and labeled 517 serum samples for the following time points for enrolled subjects and controls:

- Injury
- Surgery
- 6 months post ACL reconstruction
- 12 months post surgery

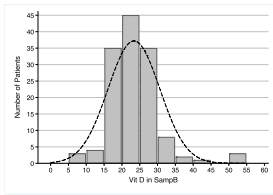
Results/Accomplishments

There were a total of 67 matched subjects and controls with data for all 4 time points, and they will form the basis of this results reporting. We used the standards promulgated by the Mayo Clinic, which defined Vitamin D as sufficient or normal when ≥ 20 ng/ml and low when below that threshold.¹⁵ This is the subject of some controversy, as some authorities believe a normal level is ≥ 30 ng/ml.¹⁶

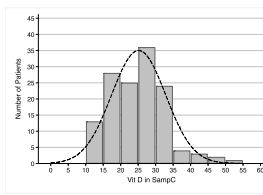
This group was composed of 36 male controls and subjects, and 31 female controls and subjects. The group had a mean age at injury of 20.3 years (range, 17.7-26.1 years). The mean serum Vitamin D at injury was 24.5 ng/ml (range, 7-53) in the injury group, and 23 ng/ml (range, 7-50) in the control group ($p=0.2$). When looking at both control and injured subjects' Vitamin D levels at injury, the mean Vitamin D level was 23.8 ng/ml.



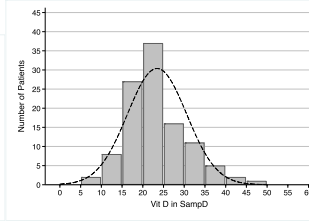
The distribution of Vitamin D samples was similar in samples taken at surgery and postoperatively, as seen below.



Surgery Sampling



6 months postop



12 months postop

However, when analyzing the means between men and women with control and injured specimens grouped together, the mean Vitamin D level in men was 22.3 ng/ml (± 0.7) compared to a mean Vitamin D of 25.4 ng/ml (± 1) in women. This difference was statistically significant ($p=0.01$).

Stratifying the Vitamin D samples across timepoints into low and normal showed similar proportions of low and normal serum levels in controls and injuries, without significant differences ($p>0.05$ for all using Fisher's exact testing):

	Injury		Surgery		6 months		12 months	
	Low	Normal	Low	Normal	Low	Normal	Low	Normal
ACL injured	19	49	20	48	20	48	17	37
Controls	27	41	22	46	21	47	20	35

When stratified by sex, there were no correlations with Vitamin D at injury or another other timepoint related to sex ($p=0.5$):

	Men		Women	
	Low	Normal	Low	Normal
ACL injured	10	27	9	22
Controls	17	19	10	22

We then categorized Vitamin into three groups: low (<20 ng/ml), low-normal (20-29 ng/ml), and normal (≥ 30 ng/ml) in order to analyze relationships between injury and Vitamin D level. These data are presented in table form below:

Vitamin D at Injury

	Low	Low-Normal	Normal
ACL injured	19	38	11
Controls	27	33	8

Vitamin D at Surgery

	Low	Low-Normal	Normal
ACL injured	20	39	9
Controls	22	41	5

Vitamin D at 6 Months Post Surgery

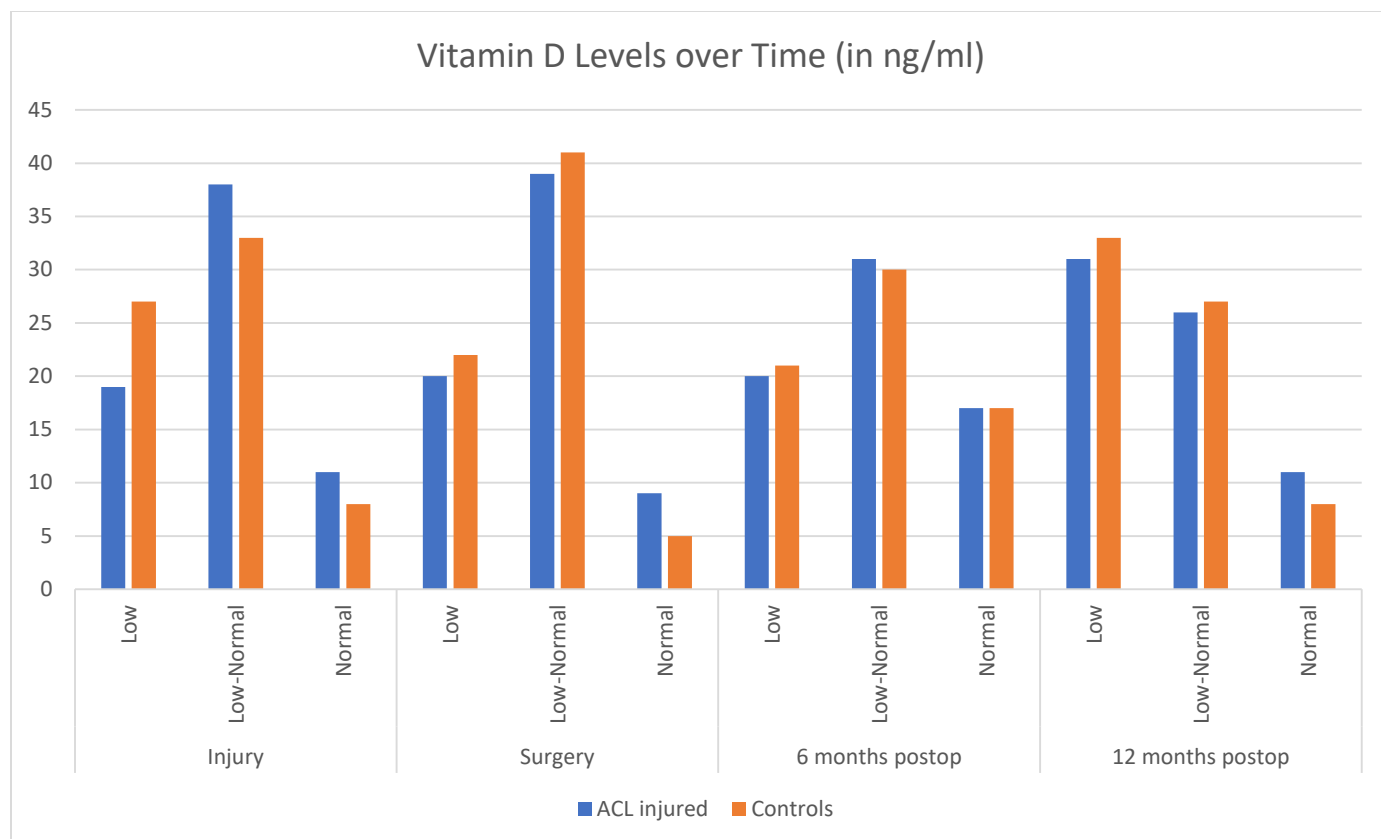
	Low	Low-Normal	Normal
ACL injured	20	31	17
Controls	21	30	17

Vitamin D at 12 Months Post Surgery

	Low	Low-Normal	Normal
ACL injured	31	26	11
Controls	33	27	8

Evaluation of Vitamin D levels with comparison between injured and control subjects showed no differences over time in all 4 timepoints. Using mixed-models analysis, between-group comparisons also showed no significant differences ($p>0.05$ for all).

The graph below demonstrates that the majority of both injured and control cohorts' serum Vitamin D levels fall within the low-normal range, between 20-29 ng/ml – between 38-60% of each group. At 12 months post-surgery, the cohort in the low range made up the highest percentage of both injured and controls, at 46 and 49% respectively. As enrollment occurred from 2014-2019 over all seasons, this difference, while not significant, cannot be explained by differences in sun exposure or seasonal variation.¹⁷



The findings from this clinical add-on study indicate that while a young active military population may have a significant cohort with low or low-normal Vitamin D levels, there does not appear to be a difference in those who sustain ACL rupture vs. those who do not. Over time, the Vitamin D levels per person and within groups did not change significantly, suggesting that Vitamin D levels are fairly constant, absent any specific supplementation or intervention. This is consistent with other population studies of Vitamin D levels.¹⁸

The study cohort is still ongoing and radiographic analysis of post-traumatic OA will be analyzed with respect to Vitamin D level. While we were not able to demonstrate a correlation between Vitamin D level and ACL tear, the next step based on the animal study would be to learn whether Vitamin D supplementation would prevent or mitigate symptomatic knee osteoarthritis after ACL tear.

Summary

This study's findings of a positive impact of Vitamin D to decrease the severity of surgically induced OA in an animal model are consistent with the few other animal studies in the literature. Castillo et al performed a rat study using partial meniscectomy to induce OA and noted that Vitamin D supplementation decreased OA severity after surgery, but did not change the severity of established OA.¹⁹ Another rat study used ACL transection to induce OA and injected 24R, 25(OH)Vitamin D intraarticularly, and noted decreased OA severity on histologic evaluation.²⁰

Other studies have evaluated the impact of Vitamin D on cartilage metabolism and noted negative impacts with regard to histologic evidence of OA²¹ as well as inhibition of matrix metalloproteases 9 and 13 by Vitamin D supplementation.²²

Our study provides support for decreased histologic OA severity with OA supplementation, as well as qualitative and quantitative findings of decreased ADAMTS-5 on immunohistochemistry. While this study did not demonstrate diminution of other OA markers on IHC, these are exciting additions to the literature on Vitamin D.

In the clinical study, which was essentially an observational measurement of serum Vitamin D at ACL injury with subsequent comparison to Vitamin D at surgery and at 6 and 12 months, we did not note a difference in Vitamin D level between injured and control cohorts. There are no studies of ACL tears associated with Vitamin D deficiency, with the exception of a tibial avulsion fracture with ACL attachment.²³ Since 57-80% of the cadet population (depending on timepoint), in total, had low or low-normal Vitamin D levels,¹⁵ the question is whether lower Vitamin D is correlated with faster onset or greater severity of osteoarthritis after ACL tear. This will require ongoing followup in this population, with prospective evaluation of the knee joint.

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Opportunities for Training and Professional Development

The PI applied for and was accepted to the University of Chicago Medicine's Senior Leadership Academy for 2019-2020. This is a longitudinal experience featuring training in financial modeling, budgets, crisis management, communication, leadership style, meeting resources, and includes an individual project.

Results Dissemination

There are two manuscripts in process focused on the animal model:

1. Wolf JM, Owens BD, Adams D, Lingenheld E, Drissi H. Impact of Supraphysiologic Oral Vitamin D Supplementation on Weight and Bone Formation in Mice
2. Wolf JM, Lingenheld E, Owens BD, Drissi H, He TC. Supraphysiologic Vitamin D Supplementation is Correlated with Decreased Osteoarthritis in a Murine Model.

We have begun work on a manuscript reporting the outcomes of the human Vitamin D data.

Plans for Next Reporting Period

N/A – final report

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. Interest in the role of Vitamin D in the musculoskeletal system

Impact on Other Disciplines – Nothing to Report

Impact on Technology Transfer – Nothing to Report

Impact on Society Beyond Science and Technology

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 – None

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 completed the data and analysis using a second no-cost extension.

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 and updated approval in June 2018.

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. Zanolli S, Yu J, Bridgewater D, **Wolf JM**, Canalis E. Mice harboring a Hajdu Cheney Syndrome mutation are sensitized to osteoarthritis. Bone. 2018 Sep;114:198-205. doi: 10.1016/j.bone.2018.06.020. Epub 2018 Jun 22. PMID: 29940267
3. Schultz K, **Wolf JM.** Emerging Technologies in Osteoporosis Diagnosis. J Hand Surg Am. 2018 Aug 31. pii: S0363-5023(18)30495-7. doi: 10.1016/j.jhsa.2018.07.006. [Epub ahead of print] Review. PMID: 30177358

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

OTHER ACCOMPLISHMENTS

- The PI was chosen as a member of the Bucksbaum Institute at the University of Chicago, and was awarded grant funding to study nerve injuries secondary to ballistic trauma.

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
Wen-Ping Lu, PhD	Postdoctoral student		7	Immunohistochemistry analysis	University of Chicago postdoctoral support fund
Matthew Posner, MD	USMA Co-Investigator		NO CHANGE		

Change in Active Other Support of PD/PI or Key Personnel –

Wolf, Jennifer Moriatis

Wolf (PI) 9/1/17- 8/31/19 \$5000 2% effort

University of Chicago CTSA Core Subsidies Grant

Role of BMP9 in osteogenesis and chondrogenesis

This project’s aim is to investigate the effect of BMP9 overexpression and silencing on endochondrogenic osteogenic differentiation of mesenchymal stem cells *in vitro* and *in vivo*.

He, Tong-Chuan

1R21CA226303-01 (He, PI) 04/01/18- 03/31/20 2.4 calendar months
NIH/NCI \$108,750

“A genomewide discovery of chemoresistance-associated noncoding RNAs in human cancers”

Goal: The objective of this project is to develop a genomewide functional screening system to identify noncoding RNAs that may predict the occurrence of resistance to targeted cancer therapies.

Cameron, Kenneth L

Title: **The NCAA-DoD Grand Alliance CARE Consortium Longitudinal Natural History Study**

Time Commitment: 10%

Role: Co-Investigator

Supporting Agency: USUHS

Name and Address of Funding Agency's Procuring Contracting/Grants Officer:

Rick Franetzki

Senior Grants & Contracts Professional

The Henry M. Jackson Foundation

6720-A Rockledge Drive, Bethesda, MD 20817

Performance Period: 09/01/2015 – 12/31/2018

Level of Funding: \$670,000

Brief Description of Project Goals: The overall objective of this study is to conduct a prospective, longitudinal design to gain insight into the natural course of concussion.

List of Specific Aims:

Specific Aim 1: Expand the NCAA-DoD Grand Alliance Clinical Study Core to enroll all U.S. Military Academy cadets as part of this national multi-site consortium for the study of sports related concussion.

Specific Aim 2: Validate balance testing results obtained from novel commercially-available testing systems to standard BESS testing in the USMA population.

Specific Aim 3: Collect body fluids (i.e. serum, urine, whole blood) at the time of initial baseline testing, time of injury, and standardized time points after concussion (e.g. 1wk, 6wks, 3mos, 6mos) to evaluate changes in emerging biomarkers for concussion (ELISA S-100B, etc.) and their relationship with other clinical and special tests. We will also determine longitudinal changes over time in a normal cohort as well as in the cohort sustaining sports related concussion injury.

Overlap: None

Title: Using a Telehealth Platform to Provide Segmented Content on Osteoarthritis Risk and Risk Reduction Strategies Following Acute Traumatic Knee Joint Injury in Military Service Members

Time Commitment: 10%

Role: Principal Investigator

Supporting Agency: ACC-APG NATICK

Name and Address of Funding Agency's Procuring Contracting Grants Officer:

Lee Hess

Contracting Officer

Army Contracting Command – Aberdeen Proving Grounds Natick Contracting Division

110 Thomas Johnson Drive Suite 240, Frederick, MD 21702

Period of Performance: 08/16/2017 – 01/15/2019

Level of Funding: \$161,300

Brief Description of Project Goals: The scope of this project is to evaluate the optimal timing of intervention delivery to facilitate behavior change to reduce the risk of PTOA following acute traumatic knee joint injury in military service members.

Overlap: None

Title: Lower Extremity Injury Predication Models and Evaluating Targeted Injury Prevention Intervention Strategies

Time Commitment: 10%

Role: Principal Investigator

Supporting Agency: ACC-APG NATICK

Name and Address of Funding Agency's Procuring Contracting Grants Officer:

Richard Totten

Contract Specialist

Army Contracting Command – Aberdeen Proving Grounds Natick Contracting Division

110 Thomas Johnson Drive Suite 240, Frederick, MD 21702

Performance Period: 04/04/2016 – 04/03/2019

Level of Funding: \$536,000

Brief Description of Project Goals: The overall objective of this study is to develop predictive models for lower extremity musculoskeletal injury risk and to determine if targeted neuromuscular training interventions can improve movement quality in high risk candidates.

List of Specific Aims:

Specific Aim 1: To determine the role of movement and other baseline risk factors in estimating the time to first lower extremity injury after matriculation at the United States Military Academy.

Specific Aim 2: To determine if a targeted neuromuscular movement training intervention, which focuses on specific high risk movement errors identified during baseline LESS assessments upon entry to USMA, can improve movement quality equally whether it is delivered by a clinical coordinator or via a web-based program.

Overlap: None

Title: **NIAMS Multidisciplinary Clinical Research Center**

Time Commitment: 5%

Role: Site Principal Investigator

Supporting Agency: NIH/NIAMSD

Name and Address of Funding Agency's Procuring Contracting Grants Officer:

Steve Austin

NIH, NIAMS, EP

6701 Democracy Blvd, Suite 800

Bethesda, MD 20892

Performance Period: 07/01/2016 – 06/30/2019

Level of Funding: \$214,900

Overlap: None

Title: **Novel Longitudinal Assessment of Post-Traumatic Osteoarthritis after Major Knee Joint Injury Using Biomarkers of Cartilage Turnover at Mid-Term Follow-up.**

Time Commitment: 10%

Role: Co-Investigator/Site PI

Supporting Agency: CDMRP PROPR, USAMRAA

Name and Address of Funding Agency's Procuring Contracting/Grants Officer:

Jennifer Shankle

Contracting Officer

Congressionally Directed Medical Research Programs U.S. Army Medical Research

Acquisition Activity

1120 Fort Detrick, Frederick, MD 21702

Performance Period: 09/30/2015 – 09/29/2019

Level of Funding: \$732,000

Brief Description of Project Goals: The overall objective of this study is to find a surrogate measure to diagnose early degenerative changes consistent with post-traumatic osteoarthritis (PTOA) that occurs after major knee joint injuries involving the anterior cruciate ligament in its earliest, pre-radiographic state.

Overlap: None

Title: Biomarkers of Cartilage Turnover and Joint Metabolism Greater than One Year After Traumatic Knee Joint Injury and Signs of Early Post-Traumatic Osteoarthritis

Time Commitment: 10%

Role: Co-Investigator/Site PI

Supporting Agency: CDMRP-PRORP

Name and Address of Funding Agency's Procuring Contracting Grants Officer:

Kenneth Grenier
Grants Specialist
U.S. Army Medical Research Acquisition Activity
820 Chandler Street,
Fort Detrick, MD, 21702

Performance Period: 09/30/2016 – 09/29/2019

Level of Funding: \$980,000

Brief Description of Project Goals: The overall objective of this study is to prospectively evaluate acute changes in biomarkers of cartilage turnover and joint metabolism following knee joint injury and surgical reconstruction in relation to imaging biomarkers at one and two years post injury, to better understand the impact of acute joint injury, as these may be important factors related to the initiation and progression of PTOA.

List of Specific Aims:

Specific Aim 1: We will utilize and expand data from an established prospective cohort study at the USMA of ACL injured cadets, and uninjured matched controls, with pre-injury serum banked in the DODSR to address this objective. Pre-injury serum concentrations for emerging OA-related biomarkers will be compared to those at the time of traumatic knee joint injury, the time of surgical reconstruction, and 6 months, 1 year, and 2 years after reconstruction

Specific Aim 2: We will also evaluate changes in these biomarkers in serum and urine at the same time points following traumatic knee joint injury relative to an uninjured control group, with similar physical activity requirements, that are matched for sex, age, height, and, weight.

Specific Aim 3: Finally, we will determine the association between structural changes on emerging imaging biomarkers for OA and changes in serum biomarker concentrations over time following injury at 1 year and 2 years after ACL reconstruction.

Overlap: None

Title: Surgical Timing and Rehabilitation (STaR) for Multiple Ligament Knee Injuries (MLKs): A Multicenter Clinical Trial

Time Commitment: 5%

Role: Co-Investigator

Supporting Agency: University of Pittsburgh

Name and Address of the Funding Agency's Procuring Contracting/Grants Officer:

Michelle Darabant
Fiscal and Grants Administrator, University of Pittsburgh

Department of Orthopaedic Surgery
E1640 Biomedical Science Tower
200 Lothrop St.
Pittsburgh, PA 15261

Period of Performance: 09/30/2017 – 09/29/2021

Level of Funding: \$75,631

Brief Description of Project Goals: The overall objective of this study is to investigate the effects of timing of surgery and post-operative rehabilitation to optimize return to duty/work and sports and patient-reported physical function for military personnel and civilians with a multiple ligament knee injury.

Overlap with Other Research Projects: foundation for the current grant proposal.

Organizational Partners – Nothing to report

APPENDICES

- PICV

CURRICULUM VITAE

Jennifer Moriatis Wolf, MD

The University of Chicago
Department of Orthopaedic Surgery and Rehabilitation
Section of Hand and Upper Extremity Surgery
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Chicago, Illinois 60637
Phone: 773-702-5384
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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

- 2005-2025 Board Certified (Diplomate) - American Board of Orthopaedic Surgery
Recertified in 2013
- 2006-2025 Certificate of Added Qualification (Hand Surgery) - American Board of
Orthopaedic Surgery - recertified in 2013

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
- 2017-present Professor, Division of Plastic Surgery, Department of Surgery
The University of Chicago
- 2018-present Vice Chair, Faculty Affairs and Diversity, Department of Orthopaedic Surgery
The University of Chicago
- 2018-present Chief, Division of Hand Surgery, 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

2019 Gerald S. Laros Faculty Teaching Award - The University of Chicago
2018 Bucksbaum Institute Senior Faculty Scholar – The University of Chicago
2017 Making a Difference Every Day Award – The University of Chicago
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)
Association of Bone and Joint Surgeons (Member, 2018-present)
American Association of Hand Surgeons (Member, 2003-2012)
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-present)

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* (2009-2011)

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

Editorial Board, *Orthopedics* (2003-2016)

Web Updates Editor, *Skeletal Trauma* (2008-2017)

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

Consultant Reviewer

American Journal of Sports Medicine (2012-present)

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)

NATIONAL/REGIONAL COMMITTEES/SERVICE

American Society for Surgery of the Hand

Treasurer (2017-2020)

Council Member-at-Large (2014-2017)

Lead, Innovation Task Force (2017-2018)

Program Co-Chair, Annual Meeting (2014)

Lead, 75th Anniversary Task Force (2019)

Lead, Fellowship Case Logs Task Force (2019)

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 Committee (2012-2014)
Nominating Committee (2012-2013)
Touching Hands Project (2012-2013)

American Academy of Orthopaedic Surgeons
Member, Nominating Committee (2019-2020)
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 (2015-2019)
Committee for Written Boards Question-Writing (2019)
Joint Committee for CAQ Question-Writing Task Force (2011-2016)

American Orthopaedic Association
American British Canadian Traveling Fellowship Selection Committee (Vice Chair, 2019)
Nominating Committee – alternate (2017-2018)
North American Traveling Fellowship Selection Committee (Member, 2016-2018; Chair, 2019)

The University of Chicago Medicine
BSD Senior Leadership Academy Participant (2019-2020)
Executive Committee Member, Department of Orthopaedic Surgery (2017-present)
Member, Plastic Surgery Faculty Search Committee (2019)
Member, Committee on Appointments and Promotions (2018-present)
Department Liaison, DCAM Orthopaedic Surgery Committee (2018)
Foundational Leadership Course (February 2017)
Alan Alda Center for Scientific Communication – participant (January 2018)

Orthopaedic Research and Education Foundation
Grant Reviewer (2010-2016)

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 (2011-2016)

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

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

INSTITUTIONAL/DEPARTMENT SERVICE

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

Department of Orthopaedic Surgery, University of Connecticut
Research Committee (2011-present, Chair 2012-2016)
Admissions Committee member (2010-2016)
OR Lean Committee (2014-2015)

Department of Orthopaedic Surgery, University of Chicago
Executive Committee (2017-present)
Education Committee (2019-present)

University of Chicago Medicine
Surgical Director, DCAM Ambulatory OR (2019-present)

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. *J Hand Surg* 43(5): 439-447, 2018.
81. Saitta BH, **Wolf JM**. Treating proximal interphalangeal joint dislocations. *Hand Clin* 34(2): 134-148, 2018.
82. Zanotti S, Yu J, Bridgewater D, **Wolf JM**, Canalis E. Mice harboring a Hadju Cheney mutation are sensitized to osteoarthritis. *Bone* 114: 198-205, 2018.
83. Marchese J, Cote M, Coyle K, **Wolf JM**. Prospective evaluation of a single corticosteroid injection in radial tunnel syndrome. *HAND*, e-pub ahead of print, 2018.
84. Twu J, Patel N, **Wolf JM**, Patel N, Conti Mica MA. Impact of variation of corticosteroid dose, injection site and multiple injections on blood glucose measurement in diabetic patients. *J Hand Surg* 43(8):738-744, 2018.
85. Schultz K, **Wolf JM**. Emerging technologies in osteoporosis diagnosis. *J Hand Surg* 44(3): 240-243, 2019.
86. 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. Accepted, *J Hand Surg Asian Pacific*, 2019.
87. **Wolf JM**, Sandell L, Leopold S, Dodson K. Orthopaedic Forum: The landscape in orthopaedic publishing. Accepted, *J Bone Joint Surg*, 2019.
88. Reid R, Alverdy A, Pakvasa M, Zhao C, Mostafa S, Liu W, Luo W, **Wolf JM**, Ameer GA, He TC. Imiquimod acts synergistically with BMP9 via the Notch pathway as an osteoinductive agent in vitro. Accepted, *Plast Recon Surg*, 2019.

89. Gronberg C, **Wolf JM**, Rodner CM. Ultrasound–guided cubital tunnel injection: a review and exploration of utility as a diagnostic aid in mild or non–classic cubital tunnel patients. Submitted, *Tech Hand Upper Extrem Surg*, 2019.
90. Aultman HF, Curran J, Angeles J, Mass DP, **Wolf JM**, Conti Mica M. Predictors of patient satisfaction with post-operative pain control after carpal tunnel release in an orthopaedic practice. Submitted, *J Hand Surg Am*, 2019.
91. **Wolf JM**, Turkiewicz A, Atroshi I, Englund M. Occupational load as a risk factor for clinically-relevant base of thumb osteoarthritis. Submitted, *Occup Envir Med*, 2019.

TEAM SCIENCE

92. Wrist and Radius Injury Surgical Trial (WRIST) Study Group, Principal Investigator, Chung KC. Reflections 1 year into the 21-center National Institutes of Health-funded WRIST Study: A primer on conducting a multicenter clinical trial. *Journal of Hand Surgery* 38:6:1194-1201, 2013.
93. Janssen SJ, Teunis T, Guitton TG, Ring D; Science of Variation Group. Do Surgeons Treat Their Patients Like They Would Treat Themselves? *Clin Orthop Relat Res*. 2015 Nov;473(11):3564-72.
94. Becker SJ, Bruinsma WE, Guitton TG, van der Horst CM, Strackee SD, Ring D; Science of Variation Group. Interobserver Agreement of the Eaton-Glickel Classification for Trapeziometacarpal and Scaphotrapezial Arthrosis. *J Hand Surg Am*. 2016 Apr;41(4):532-540.e1.
95. Chung KC, Malay S, Shauver MJ, Kim HM, for the WRIST group. Assessment of distal radius fracture complications among adults 60 years or older: A secondary analysis of the WRIST randomized clinical trial. *JAMA Network Open* 2(1): e187053, 2019.
96. Chung KC, Malay S, Shauver MJ, for the WRIST Group. The relationship between hand therapy and long-term outcomes after distal radius fracture in older adults: evidence from the WRIST randomized trial. In Press Aug 2019, *Plast Reconstr Surg*.
97. Chung KC, Malay S, Shauver MJ, for the WRIST Group. The Complexity of Conducting a Multi-Center Clinical Trial: Taking it to the Next Level Stipulated by the Federal Agencies. Accepted, *Plast Reconstr Surg*.
98. Chung KC, Kim HM, Malay S, Shauver MJ, for the WRIST Group. The Wrist and Radius Injury Surgical Trial (WRIST): 12-month outcomes from a multicenter international randomized clinical trial. Submitted to *JAMA*, *NEJM*, *Lancet*, *JBJS*, *JAMA Surgery*, *PRS* (under review)

99. Chung KC, Hooper RC, Zhou N, Wang L, Shauver MJ for the WRIST Group. Pre-injury activity predicts outcomes following distal radius fracture. Submitted to NEJM (under review)
100. ICON 2019: International Scientific Tendinopathy Symposium CONsensus on Core Outcome Domains for Tendinopathy (COR-T): A Delphi Study of Patients and Health Care Professionals. Accepted, *British J Sports Med*, 2019.
101. ICON 2019: There are 9 core health-related domains for Tendinopathy (CORE DOMAINS): A Delphi Study of Health Care Professionals and Patients. Accepted, *British J Sports Med*, 2019.

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. *Clin 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, 2016.
26. Pensak M, **Wolf JM**. Soft tissue problems. *In* Orthopaedic Revision, Della Rocca G, ed. Springer, 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, 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, 2016.
29. Suh N, **Wolf JM**. Hand and wrist reconstruction. *In Orthopaedic Knowledge Online 12*. Ring DR, ed. Chicago: American Academy of Orthopaedic Surgeons, 2016.
30. **Wolf JM**. Elbow Tendinopathies and Bursitis. *In DeLee and Drez: Sports Medicine*. Miller M, ed. Philadelphia: Elsevier Inc, 2018.
31. Kozlowski R, **Wolf JM**. Basilar thumb arthritis. *In Chapman's Comprehensive Orthopaedics, 4th edition*. Chapman MW, James M, eds. Philadelphia: JP Medical Publishers, 2018.
32. **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, 2017.
33. Scher DL, **Wolf JM**. General medical conditions. *In The Hand and Upper Extremity Surgery Textbook*. Weiss APC, Ladd A, Lattanza L, Wolf JM, Goldfarb CA, eds. Chicago: American Society for Surgery of the Hand, 2019.
34. Gutierrez Sherman V, **Wolf JM**. Open Carpal Tunnel Release. *In Hand Surgery: Tricks of the Trade*. Beredjikian P & Lutsky K, eds. Philadelphia: Thieme, *submitted*, 2018.

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.
3. **Wolf JM**, section editor, *The Hand and Upper Extremity Surgery Textbook*. Weiss APC, Ladd A, Lattanza L, Wolf JM, Goldfarb CA, eds. Chicago: American Society for Surgery of the Hand, 2018.
4. **Wolf JM** and Got C, section editors. *AAOS Comprehensive Review Book, 3rd edition*. Lieberman JR, ed. Chicago, American Academy of Orthopaedic Surgeons, 2018.

RESEARCH SUPPORT

PEER-REVIEWED

CURRENT

1. Wolf (PI) 6/30/19-6/30/20 \$5000 1% effort
Bucksbaum Institute Pilot Grant

Impact Of Civilian Ballistic Trauma: Post Traumatic Stress Disorder and Its Impact On Physical And Psychological Outcomes After Gun Violence.

This project will evaluate PTSD using standardized measures in patients with orthopaedic injuries secondary to gun violence.

2. Wolf (PI) 10/7/14-10/1/19 \$750,000 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 \$50,000 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 \$22,500 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
4. Wolf (PI) 9/1/14-4/1/17 \$20,000 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.
ee
2. Wolf (PI) 9/14/13-09/13/15 \$20,000 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 \$45,000 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 \$20,000 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 \$20,000 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 \$20,000 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 \$300,000 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 \$20,000 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 \$1000 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 \$5,000
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 \$20,000

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 \$20,000

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 in Thumb 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, Landspítalinn Hospital/University of Iceland, June 7, 2011, Reykjavik, Iceland.
28. Acute and Chronic Scapholunate Ligament Injury. Invited Speaker, Department of Orthopaedic Surgery, Landspítalinn 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 Fellowship 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. Kwazulu-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. Owing 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.
67. Mallet Fingers: Treatment and Outcomes. Combined Meeting of the American and Singapore Societies for Surgery of the Hand, January 26, 2018, Singapore.
68. Mini-Review of Sports Injuries of the Upper Extremity. American Academy of Orthopaedic Surgeons Annual Meeting. March 15, 2018, New Orleans, Louisiana.
69. Ralph T. Manktelow Visiting Professorship. Toronto Western Hand Surgery Program. University of Toronto. October 18, 2019, Toronto, Ontario, Canada.

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, Göteborg, 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 League 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)
49. Ladd AL, Crisco T, Hoang Kim A, Kenney D, Weiss APC, **Wolf JM**. Developing a core outcome set for the research and treatment of thumb carpometacarpal osteoarthritis: a Delphi study. American Association of Hand Surgeons Annual Meeting, Palm Springs, California, January 30-Feb 2, 2019. (poster)
50. **Wolf JM**, Turkiewicz A, Atroshi I, Englund M. The impact of occupation on physician-diagnosed thumb carpometacarpal osteoarthritis. International Thumb Osteoarthritis Workshop conference, Stanford, California. November 10, 2018. (podium)
51. Ladd AL, Crisco JJ, Kenney D, Marks M, Moore D, Weiss APC, **Wolf JM**, Hoang-Kim A. Towards defining minimal core measurement areas in clinical trials: a modified delphi approach for the international thumb cmc osteoarthritis working group. Orthopaedic Research Society Annual Meeting, Las Vegas, Nevada, March 13-16, 2018. (poster)
52. **Wolf JM**. How to Diagnose and Treat Radial Tunnel Syndrome. Canadian Society for Surgery of the Hand Annual Meeting, St. John's, Newfoundland, June 25, 2019. (podium)
53. Hassan K, Shi L, **Wolf JM**. Multiple injections in deQuervain's tenosynovitis: to give or not to give. American Society for Surgery of the Hand Annual Meeting, Las Vegas, Nevada. September 5, 2019 (podium)

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 Arthritides. 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 Arthritides. 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 Arthroplasty, 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.
34. Faculty, Joint Singapore and American Society for Surgery of the Hand Meeting. January 26, 2018. Singapore.

35. Faculty, AAOS Annual Meeting Symposium: New Directions in Thumb CMC Arthritis. March 7, 2018. New Orleans, Louisiana.
36. Faculty, AAOS Annual Meeting Instructional Course Lecture: Mini-Update on Sports Medicine in the Upper Extremity. March 7, 2018. New Orleans, Louisiana.
37. Faculty and Moderator, ASSH/AAHS Specialty Day: Potpourri of Hand Surgery. March 10, 2018. New Orleans, Louisiana
38. Moderator, AOA Symposium: The New Paradigm of Orthopaedic Publishing: Proliferation of Journals, Online Publication, Open Access and Social Media. AOA Annual Meeting. June 27, 2018: Boston, Massachusetts.
39. Faculty, ASSH Annual Meeting, Resident Review Course. September 11, 2018: Boston, Massachusetts.
40. Co-Moderator, ASSH Annual Meeting Precourse: Navigating Complicated Patient Problems. September 13, 2014, Boston, Massachusetts.
41. Moderator, ASSH Annual Meeting Instructional Course Lecture: Making Skeptics into Believers: Proximal Forearm Nerve Compression. September 13, 2018, Boston, Massachusetts.
42. Faculty, ASSH Annual Meeting Instructional Course Lecture: Fixing the Opposable Thumb. September 13, 2018, Boston, Massachusetts.
43. Faculty, ASSH Annual Meeting Instructional Course Lecture: What Therapists Wished Surgeons Knew. September 14, 2018, Boston, Massachusetts.
44. Moderator, ASSH Annual Meeting Symposium: Pitfalls and Pearls – Unexpected Outcomes after Common Hand Procedures. September 15, 2018, Boston, Massachusetts.
45. Moderator, ASSH Annual Meeting Symposium: Thumb CMC Arthritis: The Italian Job. September 15, 2018, Boston, Massachusetts.
46. Moderator, ASSH Annual Meeting Paper Session: Thumb CMC Research. September 15, 2018, Boston, Massachusetts.
47. Faculty, ASSH Annual Meeting: Interactive Case Reviews – Thumb CMC Arthritis. September 15, 2018, Boston, Massachusetts.
48. Faculty, Plastic Surgery The Meeting: Lateral Elbow Pain: Lateral Epicondylitis and Radial Tunnel. September 29, 2018, Chicago, Illinois.
49. Faculty, AAOS Annual Meeting Instructional Course Lecture: Mini-Update on Sports Medicine in the Upper Extremity. March 13, 2019. Las Vegas, Nevada.
50. Faculty, ASSH/AAHS Specialty Day. Current Update on Nerve. March 16, 2019. Las Vegas, Nevada.

51. Faculty, ASSH Annual Meeting Symposium: Women in Hand Surgery. September 6, 2019. Las Vegas, Nevada.
52. Faculty, ASSH Annual Meeting Instructional Course Lecture: Urban vs military gunshot wounds: all bullets are not created equal. September 7, 2019. Las Vegas, Nevada.
53. Faculty, ASSH Annual Meeting Instructional Course Lecture: Hand joint instability: what you didn't learn in fellowship. September 6, 2019. Las Vegas, Nevada.

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.
23. More than Tennis Elbow: Radial Tunnel Syndrome. Athletico Journal Club, October 20, 2018, Oak Brook, Illinois.
24. Identifying Compartment Syndrome. Emergency Dept Core Curriculum, May 15, 2019. Chicago, Illinois.

PERSONAL

Married to Douglas S. Wolf; 2 children

Hobbies: rowing, hiking, running, travel, fine food

Volunteer physician at overnight camp (2006-2018)

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

Completed 5 marathons: Bataan Memorial (2009); New York (2011); Hartford (2015); Chicago (2017); Chicago (2018).