MUSCULOSKELETAL MATTERS

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Leonie Schön, MD
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A BRIGHT FUTURE FOR WOMEN IN ORTHOPEDICS

CARLY DETER, M2

In celebration of September being women in medicine month, it is important to bring into the spotlight the voices of females who are breaking down historical boundaries and creating their own opportunities in their field. According to the American Medical Association, orthopedic surgery was reported to harbor the greatest gender discrepancy of any medical specialty, with women making up just 15.4% of orthopedic surgery residents in 2019. Dr. Sarah Hine, Dr. Nichole Shaw, and Dr. Belle Perez are among this minority, and are sharing their experiences to inspire women to create a more diverse workforce where patients can find providers and girls can find mentors who they can identify with.

DR. SARAH HINE

Dr. Sarah Hine is a graduate of The Ohio State University College of Medicine and is now a first year orthopedic surgery resident at Geisinger Medical Center. Dr. Hine chose orthopedic surgery because of a culmination of experiences throughout her education. She worked as an aide for kids with special needs prior to medical school, and saw the impact that orthopedic surgery can have on the quality of life for kids with musculoskeletal deformities. Procedural workshops in medical school increased her enthusiasm for a hands-on specialty, and observing how orthopaedics can change lives during her third year rotations was enough to seal the deal. There was a strong presence of women in orthopedics at Ohio State which further brought her vision into focus. She encourages women who are considering orthopedics to go for it, and not to be discouraged by lingering stereotypes or negative comments. “Anyone who really knows orthopedic surgery will tell you that it’s about technique, skill and knowledge of anatomical relationships rather than strength like some people used to think. Even the smallest of women should be comfortable pursuing orthopedic surgery.” She notes that the future is bright for women in orthopedics, and that increasing the diversity in the pool of providers can only lead to better patient care.

DR. NICHOLE SHAW

Dr. Nichole Shaw is a fourth year orthopedic surgery resident at The University of Maryland, and received her medical degree from University of Colorado School of Medicine. She was a competitive gymnast growing up, and frequented orthopedic offices for sport-related injuries including an elbow fracture when she was just six years old. She had a special appreciation for the orthopedic physicians who treated her because they helped her get back to doing what she wanted to do. Dr. Shaw emphasizes the importance of being strong-minded as a woman in orthopedics. “Do not take no for an answer,” she says, “there will always be someone who tells you you are not big enough, strong enough or smart enough. Take the ‘no’ as a challenge and show everyone that you are capable.” There is a discrepancy in height between herself and some of her colleagues which creates a challenge for her, but she makes the necessary adaptations by standing on two to three steps while performing surgery, and that alone is challenging. Despite the obstacles, she points out that women have many strengths that help them form long-term relationships with their patients and prioritize empathetic, longitudinal care. She recommends finding a female mentor early: someone who has been there and knows how to navigate tricky conversations and obstacles.

DR. BELLE PEREZ

Dr. Belle Perez graduated from The Ohio State University College of Medicine and is now in her first year of her orthopedic surgery residency at the University of Cincinnati. She fell in love with the field of orthopedics through her time volunteering for Special Olympics and experiencing the life altering orthopedic operations many of her cerebral palsy patients had. When asked what advice she has for women who are considering orthopedics, Dr. Perez says “DO IT! We need you, and we want you.” She emphasizes the importance of finding a mentor and advocating for yourself. She has experienced challenging interactions primarily with non-orthopedic staff and patients who confuse her role, even after she has introduced herself and established her role on their care team. Despite all of this, her current attendings and co-residents have been incredibly supportive, and do not treat her differently than her male colleagues. She broadens our conversation by stating that “orthopedics is difficult for women, but as SpeakUpOrtho has taught us, harrassment and discrimination isn’t exclusive to gender. There are accounts of anti-LGBTQ, racism, and bullying based on trainee status.” The pressure to change and to create a more inclusive environment can be initiated by sparking these conversations.

Despite their small numbers, the impact that women trainees are having on the field of orthopedics is unquestionable. They are finding creative solutions to the obstacles they face, encouraging inclusivity and inspiring a generation. To summarize some advice all three doctors seem to agree on, women who are considering orthopedic surgery should go for it. Do not take no for an answer. DO IT!

PHYSICIAN HIGHLIGHT: DR. MEAGAN FERNANDEZ

MIRA PATEL, M2

We had to opportunity to sit down with Dr. Meagan Fernandez, the Division Chief of Pediatric Orthopaedics and Medical Director for Pediatric Ambulatory Surgery at Geisinger. With innumerable accomplishments and honors, Dr. Fernandez inspires both medical students and residents, especially females interested in the field of orthopaedics, to do whatever they put their minds to and to be fearless of the obstacles along the way. Do not let anyone tell you your dreams are unobtainable because you are a woman.

Early on, Dr. Fernandez faced adversity simply because she was a female who wanted to play on her high school's golf team. Since there was no women's team, Meagan had to qualify to earn her third spot on the men's team. In addition to playing for the men's golf team, Meagan also had a successful, record breaking basketball career. At the time, Meagan just accepted the fact she had to work harder to achieve her goals. One of those goals lead her to the University of Pittsburgh where she played as a Division I athlete for the women's basketball team.

As a high school athlete, Dr. Fernandez's curiosity with orthopaedic surgery sparked after enduring an injury. Immediately, she became fascinated with orthopaedics. Throughout the healing process of her injury, she started to shadow her orthopaedic surgeon to see the daily life of a surgeon. To be able to gain an understanding of the study of orthopaedics and what it entails, and how as a surgeon, I can make a difference "that was kind of it for me."

"I was oblivious to the lack of female orthopedic surgeons until I entered medical school." This did not hinder Dr. Fernandez, it only motivated her more to accomplish her goals. When people in medical school told her, she could never do orthopaedics and be a wife and mother, Dr. Fernandez was determined to prove the naysayers wrong.

"My path to orthopaedic surgery was not without challenges. I saw myself as an orthopaedic surgeon and I never saw my gender as an impediment."

"Others however saw a woman that would maybe not find a good husband because she worked too hard, or a woman that wasn't strong enough because she didn't look like your typical jock, or a woman that would not be able to either have children or do a good job raising them. All of these things were said to me in earnest — and it simply made me want to prove them wrong. Rather than get discouraged, this fueled me. This is where my stubbornness served me well — I knew what I wanted, and who were they to tell me I couldn't because I'm a girl."

During medical school, she had the opportunity to shadow three female orthopaedic surgeons. Seeing these women, who became orthopaedic surgeons, working in large academic centers, raising children, and excelling in their fields, Dr. Fernandez knew with hard work, perseverance, and a growth mindset, her dream of becoming an orthopaedic surgeon, a wife, and a mother would come to fruition. "Orthopaedics chose me," she describes the excitement of beginning her rotation, "even though you're waking up at four or five am, working all day, with little time to eat, I just loved it, I thrived." With the support of her family and a drive to achieve her goals, Dr. Fernandez was accepted into an orthopaedic residency program.

> ***"You can be whatever it is that you want to be, you just have to commit, you have to put in the time, and it's not going to be easy."***

Since then, Dr. Fernandez became the first female hired at Geisinger in orthopaedics, rising to become the Division Chief of Pediatric Orthopaedic Surgery. With these successes, Dr. Fernandez manages to create a "work-life integration," successfully raising her children and being a part of her families lives all the while maintaining a successful practice. She strives daily to give her best to both her patients and her family.

While at Geisinger, Dr. Fernandez observes the growth and change facilities undergo, so she's continuously looking for ways to improve her practice and encourage female medical students to pursue careers orthopaedic surgery.

Dr. Fernandez leaves these words with our female readers: "Don't ever let anyone tell you that you can't do it! Be the role model you always wanted but never had!

It's all about balancing your career goals and your personal goals, a skill that most women employ within their careers, whether they're a physician, an accountant, a lawyer or a journalist.

Thankfully, there are many brave, intelligent women who are bucking the gender stereotypes and misinformation and choosing to become orthopaedic surgeons. When men and women, who bring different perspectives to the specialty, work side by side in fields like orthopaedics, they learn from each other and everyone wins, especially the patients."

BACK TO WHERE IT STARTED: AN INTERVIEW WITH DR. AMANDA HOLLERAN

CARLY DETER, M2

As one of the only three women to graduate from Geisinger Commonwealth School of Medicine (GCSOM) and match into an orthopedic surgery residency, Dr. Amanda Holleran is paving the way for many young women to follow in her footsteps. Dr. Holleran completed her orthopedic surgery residency at the University of Vermont Medical Center and then completed a fellowship in foot and ankle surgery at the University of Rochester Strong Memorial Hospital. Growing up, she spent the summers working with her dad's construction company, developing an enjoyment for working with her hands and growing accustomed to the male-dominated work environment. Reflecting back on that experience, she says that orthopedics is like carpentry of people in a way and the work she does now mirrors that of her childhood.

According to Dr. Holleran, a good orthopedic surgeon is somebody who is hard-working, a team player, a leader, a good communicator and someone who perseveres. Orthopedics is unique in that many patients are healthy but struggling with quality of life due to musculoskeletal pain and injury. It is very rewarding for her to be able to help patients improve their quality of life and return to a healthy and active lifestyle. Not only is she changing lives, but she is doing it in her home community. "I am so grateful to be back in the area and to be able to serve the community that I grew up in," she reflects. She is a member of one of the first classes at GCSOM and helped to shape the trajectory of the medical school in its early days.

Dr. Holleran has navigated her presence in the male-dominated field gracefully, but it does come with its challenges. The historical stereotype that orthopedic surgeons need to be exceptionally strong has made itself known to her along her path, but she emphasized that this is a misconception, and that it is important to work smarter rather than harder when it comes to tasks that require force, such as reductions. In navigating these waters, it helped her to have a strong female role model in the field to look up to. Through her fellowship at Strong Memorial Hospital, she met Dr. Judith Baumhauer, who was a past president of the American Orthopedic Foot and Ankle Society and director of her fellowship. "Dr. Baumhauer is a woman who, no questions asked, just gets stuff done and does so in a way that is just so impressive," Dr. Holleran says. When asked what she would tell young women interested in pursuing a career in orthopedic surgery, she advises to strive for work-life integration rather than work-life balance. The word integration emphasizes the need to coexist in the various roles we maintain. It is about making it all work simultaneously instead of viewing life as a scale that has to tip one way or the other. This integration has allowed her to be successful as a mother, a surgeon and a mentor for women following her lead.

RADIOLOGY INTEREST GROUP:
ACL TEARS IN FEMALE ATHLETES

PELKOWSKI ET AL.

ACL tears in females are reported at higher incidences when compared to males [1]. Factors such as hormonal and anatomic differences between males and females have been implicated in the differences, but evidence supporting other factors, such as core stability and neuromuscular activation, have also been reported [1]. For these reasons, it is important to understand the pathophysiology of this injury and prevention strategies for these injuries. Additionally, research to understand genetic predisposition is ongoing and important to understand regarding counseling patients about risk and implementation of individual protocols to decrease the likelihood of ACL rupture [2]. Below is a case study highlighting both the sex and genetic aspects of ACL injuries, describing two adolescent females that are identical twins, who sustained ACL injuries days apart [3].

Presentation

17-year-old female (Patient A) presents to the outpatient sports medicine clinic for chief concern of acute left knee pain and swelling, after landing from a jump on her left knee at basketball practice. During the landing, she noticed a "pop" sensation, followed by the knee giving out and subsequent fall. There was pain in the medial aspect of the knee and a feeling of tightness in the posterior knee. Physical exam revealed left knee effusion, positive Lachman's test and active range of motion from 0-90 degrees. Magnetic resonance imaging (MRI) demonstrated a complete ACL rupture of the left knee, as well as MCL sprain. Pre-operative rehabilitation to improve range of motion and edema was initiated five days after the injury.

Patient B, Patient A's identical twin sister, sustained a similar injury two days later. During a basketball game, Patient B suffered a non-contact twisting injury to the left knee, followed by acute pain, swelling and a feeling of instability. She presented to the sports medicine clinic with minimal pain and minimal disruption to her baseline ambulation. Physical exam revealed left knee effusion, positive Lachman's test and full active range of motion. MRI showed a complete ACL rupture without other structural damage to either meniscus or surrounding ligament structures. Pre-operative physical therapy was started one week after the injury. It was noted that both patients suffered their ACL injuries during ovulation, with neither being on oral contraceptives at time of injury.

ACL reconstruction with hamstring autograft was the preferred treatment modality, given the patients' age and physical activity levels. Despite similar tear patterns, patient A's pre-operative range of motion and edema complicated surgical timing, causing a delay in surgical intervention. Post-operative rehabilitation protocols were introduced one week after surgery, with both patients progressing as expected until approximately seven week post-operatively. Patient B's course was complicated by swelling and increased pain, and goals of rehabilitation were adjusted to pain management and swelling control. At 12 weeks post-operatively, both patients began supervised run ning progression protocols and have since been cleared to resume full competitive activity.

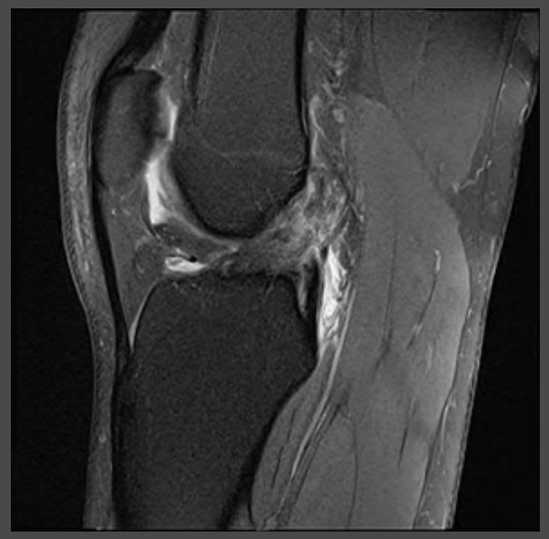

Figure 1: Patient A- MRI showing a complete anterior cruciate ligament (ACL) tear.

Figure 2: Patient B- MRI showing a complete anterior cruciate ligament (ACL) tear.

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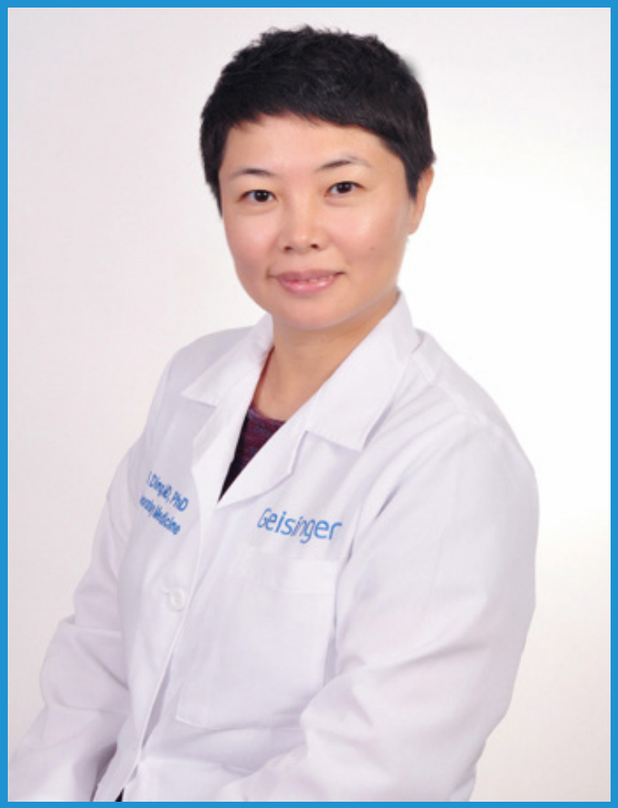
PATHOLOGY INTEREST GROUP:
MOLECULAR PATHOLOGY WITH DR. YI DING

NIRAJ VYAS, M2

At the forefront of precision medicine, Dr. Yi Ding works closely with many other clinicians, including orthopaedic surgeons, to bring better molecular tests to Geisinger. Dr. Ding earned her MD from Beijing Medical University and her PhD in immunology and oncology at New York University. She completed her pathology residency training at New York University Langone Medical Center and fellowships in molecular genetic pathology at New York Presbyterian Hospital and hematopathology at New York University Langone Medical Center. She currently serves as the System and Core Lab Director of Molecular Diagnostics at Geisinger Department of Laboratory Medicine. Dr. Ding found her passion for basic science research at a young age, but pursued medicine because solving real human problems involves moving past animal models. "Although molecular pathologist was a title that didn't exist when I was little, in retrospect, it would have been the career that I would've wished to spend my life in," she reflects.

People stereotypically think of microscopes or autopsies when they hear pathology, however, molecular pathology, despite its short 20-year history, is quickly shaping the future of the field. As the bridge between anatomic and clinical pathology, molecular pathology consists of many components, including genetics, oncology, infectious disease, pharmacogenomics, and human identification. Molecular pathology provides very important context for patient care discussions. For example, "no two cancers are the same", explains Dr. Ding, regarding musculoskeletal oncology, "bone tumors can look similar on radiographic imaging and even under the microscope, but each carries its unique genetic variants on the molecular level that cannot be fully anticipated from imaging or morphological examination". Dr. Ding notes there are more than sixty different subtypes of bone and soft tissue tumors, she adds, "a tumor's mutational profile is like its fingerprint, once identified, it can serve as a marker for monitoring disease progression. One of my roles is to identify those fingerprints to aid disease diagnosis and provide information for prognosis and management." No single gene is disease specific. Dr. Ding mentions that Geisinger will be performing our own Next Generation Sequencing (NGS) based multigene panel which includes over 500 different genes for solid tumor profiling in-house this winter. The molecular genetic information can now reveal if a patient could be beneficial between chemotherapy and fast-expanding targeted therapy and immunotherapy options, especially for patients with advanced staged cancers.



> ***Find your passion and lifelong pursuit . . . don't let others stop you from achieving it.***

To those interested in MSK fields, Dr. Ding advises us not to consider laboratory medicine as a black box. Providing a full and complete history helps tailor diagnostic approaches. "Pathologists should be your best friend," she states, "because we are just a phone call or a Tiger Text away and patient care is our shared first priority." When asked what she would tell young women interested in pursuing careers in orthopaedic surgery or pathology, Dr. Ding said "find the field that fits you, the one that you really enjoy. Find your passion and lifelong pursuit. If that passion is orthopaedic surgery or pathology, so be it; don't let others stop you from achieving it."

GIRLS IN SPORTS:
CONTINUING TO PUSH BEYOND TITLE IX

KARLIE BRASCH, M2

In 1972, one of the most influential laws regarding female sport was passed- Title IX. Title IX is a federal law that requires educational institutions that receive federal funding to provide equal opportunities to their female students, including equal opportunities in sports. From the time the law was passed in 1972 to 1978, there was a 600% increase in girls' sports participation [1]. While girls' participation has continued to increase throughout the years, this law can only go so far. In 1997, male high school students (70%) were still more likely than female high school students (53%) to participate in sports [2]. Even more recently, in 2018-2019, these numbers are still not quite equal—with only 43% of high school athletes being female [3]. Seeing successful female athlete role models have helped raise participation levels, but if we want to see true equality for girls in sports, we need to continue pushing forward with changes in sports medicine and continue to support individuals until that number reaches at least 50% of participation.

It is important to continue encouraging sport participation because there are identified benefits for all genders. However, there are several studies that report specific benefits for girls who play sport. The health benefits include building lean muscle [4,5], reducing fat [4-6], preventing osteoporosis [4,5,7,8], controlling weight [4,5], and reducing the risk of developing heart disease [4,6,9]. Personal and social benefits for girls participating in sports are a higher self-esteem and better body image [4,6,10,11], lower levels of depression [6,11], lower likelihood of having an unplanned pregnancy [4,12] or be involved with drugs or alcohol [4,6], and are more likely to graduate from high school [4,6]. Additionally, as little as two hours of exercise a week for a teenage girl can reduce her lifelong risk of breast cancer [6].

Despite the countless benefits, there is still a marked drop out of girls from sport as they progress into middle school and beyond [11,13,14]. By the age of 14, girls drop out of sport at a rate that is two times greater than boys [15]. Some reasons for discontinuing participation are inappropriate level of challenge, poor self-esteem, lack of opportunity, and time conflicts with other activities [6,14]. Other reasons include loss of interest, lack of competence, and the feeling that they were crossing traditional gender boundaries when playing sport, particularly for sports traditionally classified as masculine [13] like soccer or basketball. These reasons could play into why despite nearly 50 years of progress since Title IX was enacted, female participation in sport at the high school age is still not quite at the male level.

Staying motivated to remain physically active in sport is a barrier for female sport participation. However, girls reported that seeing famous athlete role models succeeding is a big contributor to continued participation in sport [6]. Over the years, there has been an explosion in the media presence of female athletes. US viewership of the 2019 Women's World Cup final was 22% higher than the 2018 men's final [16], with members of the US Women's National Soccer team becoming household names. At the Tokyo Olympics in 2021, the USA Olympic team had a record-breaking 60% of their medalists being women [17]. While it is still to be seen if these icons will encourage greater longevity of girls in sport, there is still more that can be done within their more immediate circle.

A female athlete's support system when participating in sport should include their physician. However, in one study, only 10% of girls reported that their doctors were one of their motivators for staying active in sport [14]. This could be due in part to the historically male-focused field of sports medicine. Looking to change this, assistant professor of Orthopaedic Surgery and Sports Medicine at Michigan Medicine Dr. Eileen Crawford states, "One size fits all sports medicine isn't good enough...Female athletes face different medical conditions and are more susceptible to certain injuries than their male counterparts" [18]. In order for girls and women to feel supported in sport, there must be a shift in the field of sports medicine to address their different needs. The goal for this shift is to give girls more confidence that their health needs will be met should they want to participate in sport and will likely positively impact the amount of girls' participation that we see.

I fondly remember my youth sport days, where there was not a practice my parents did not take me to, and rarely a meet or game they did not attend to cheer me on. I am positive this factored into my decision to continue sport through the collegiate level. My personal experience is universal, with most girls reporting their parents as being one of the main motivators for staying active in sport [6,14]. Unfortunately, not every girl has this privilege or this level of support behind her. While there are countless after-school programs and organizations to address these factors, our communities, schools, physicians, etc. need to remain focused on the immense benefits of a girl's participation in sport and continue to support participation. We have come so far since 1972, and this progress must continue. For while Title IX has empowered girls to participate, we need to continue empowering children closer to home.

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A HELPING HAND AT ST. JOSEPH'S CENTER

Originally created to serve as a shelter for deserted orphans, St Joe's has grown to include an adoption program, outpatient therapy, comprehensive childcare, adult day programs, a pregnancy shelter, and a variety of other services for the Scranton area. At the start of the pandemic, the staff and volunteers at St Joe's worked hard to provide the same level of support that they had become known for to those who depended on them. They enacted virtual programming and events with admirable resiliency, and by summer 2021 it seemed the light at the end of the tunnel was near. Now, as the conditions grow perilous once more, St Joe's needs our help. Efforts to secure funds and helping hands have redoubled, with volunteer opportunities for landscaping, gardening, and car washing.

Upcoming events include:

- A morning garden clean-up and Halloween decorations on October 22nd, 2021 from 9:30 am – 12:30 pm.
- An outdoor concert for St Joe's Residents on October 9th, 2021 from 1:30 – 2:30 pm

Furthermore, ideas are always welcome when it comes to activities for the residents. Many of those who reside at St Joe's are unable to explore and interact with the community for safety and health reasons, so the center has focused on bringing the community to them. Musical performances, theatre, art galleries, parades, and the like are all safe ways to bring joy to those who need it most. If you or someone you know has a talent or hobby you wish to incorporate, St Joe's would love to hear about it.

For more information, please reach out to the Director of Volunteers, Rich Brazill, at 570-342-8379

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DR. WHEATLEY'S MECHANICS AND MODELING OF ORTHOPEDIC TISSUES LABORATORY AT BUCKNELL UNIVERSITY

MIRA PATEL, M2

Dr. Benjamin Wheatley is an assistant professor of Mechanical Engineering and the leader of the Mechanics and Modeling of Orthopedic Tissues Laboratory at Bucknell University. Dr. Wheatley and his lab work in close collaboration with Geisinger's Musculoskeletal Institute on musculoskeletal tissue biomechanics research, creating models that can help to guide clinical decision making. We had the opportunity to speak with Dr. Wheatley regarding his career in biomechanics, the collaboration between Bucknell and Geisinger's MSKI, and the exciting implications of these joint efforts.

Dr. Wheatley is a teacher and collaborator inside and outside of the classroom. Bucknell is a primarily undergraduate institution, but strongly values time and effort towards research. In addition to running the lab and overseeing student projects, Dr. Wheatley also spends time working on the computational biomechanics simulations, serving not only as the lab leader, but also as an active member of the research group.

Another important role that Dr. Wheatley prides himself in is a collaborator. He works with Geisinger's Musculoskeletal Institute on a couple of different projects largely focused on human level biomechanics. "These projects and relationships," he says, "I try to foster because I see value, not only in doing the work and in developing important research studies, but also in providing opportunities for students – Bucknell students, Geisinger medical students – to engage in different types of research."

Dr. Wheatley also aims to foster inclusivity, working to promote diversity in engineering, and particularly in orthopedic biomechanics, which is traditionally a white male-dominated field. "The work benefits from a more diverse pool of involvement," admitting that the field is certainly not there yet, but he continues to recruit more students from different disciplines at Bucknell with different backgrounds, and he aims to have a diverse thinking pool in the lab. "That has already started to show really important dividends for the progression of the group in the environment that I want to have in the lab."

With a bachelor's degree in Engineering and a PhD in Mechanical Engineering, Dr. Wheatley has always enjoyed collaborations in the clinical setting. During his PhD work, he collaborated with Mayo Clinic in the development of a computational model. What he really enjoyed were "the interactions that I had with individuals, in the clinic, whether they were practicing physicians or researchers."

Still very passionate about developing computational biomechanics models, he "felt this need to want to more directly impact the clinic," knowing that he could help people by designing things that help humanity and help our environment. This need to be able to positively impact individuals directly served as the internal driving force to develop this relationship with Geisinger.

Dr. Wheatley met Dr. Seeley at a Bucknell Geisinger Research Initiative meeting, and they clicked right away. As an engineer and a problem solver, Dr. Wheatley felt there could be problems in the clinic that an engineer might be able to help solve, and they began to bounce ideas off each other. "I could tell that he was really passionate about solving problems to positively benefit the patients that he has in the clinic. And that was exactly what I was looking for, this opportunity to get to understand what goes into clinical treatment a little more, and how to how to contribute to improvements in clinical treatment."

Together, the team is looking at how individuals who have severe lower limb torsion – twisting of the femur, twisting of the tibia – contribute to joint pain. The musculoskeletal system is a complex contribution system. Looking at the morphology of the parts, soft tissues that also have neural control, and muscle activity patterns give an insight in gait and joint loads, and the interactions between them.

An example he provides is that a subject might come into the clinic with extreme lower limb torsion and may have significant pain. Another individual might have the same or very similar morphological profile without as much pain. It's not quite clear why Person A versus Person B presents with significant pain or what might be the optimal treatment strategy for Person A. Would they benefit from physical therapy? Would they benefit from surgical intervention? "What we are hoping to do is to better understand an individual: the way that an individual walks, the way their muscles activate their kinematic profile, that might characterize them better for a particular type of treatment, whether it's a PT, or surgical intervention."

They bring subjects into the motion analysis lab at Bucknell and in addition to visual inspection during walking, they collect motion analysis and gait analysis data, and feed that into the musculoskeletal modeling simulations to better understand what might help to reduce their pain by increasing or decreasing muscle forces and thus joint loads.

In the coming years, the team hopes to demonstrate that the computational models that they are developing can help in decision making for surgical interventions. They hope the predictions are going to provide a positive benefit when it comes time for physicians to choose specific surgical interventions and give guidance in terms of which option is best. The models would highlight which interventions lead to more favorable outcomes for an individual.

Additionally, Dr. Wheatley hopes to have a mobile analysis lab in the clinic, "I think it would be hugely beneficial for subjects if we could take what we do in the motion analysis lab, and break out of those four walls."

Dr. Wheatley shares that being able to be in the lab with Dr. Seeley and have conversations one on one has been extremely rewarding. Being about to "make progress intellectually with each other is such a rewarding experience where we start to actually make that connection between the clinical side and the engineering side. It opens up the door for more opportunities and more projects and more progress."

He encourages medical students who have an interest to get involved, emphasizing that collaboration in an occupation is critical. "You could be a brilliant, absolutely brilliant scientist or an absolutely brilliant doctor, but if you can't work with people, that is absolutely going to hinder your progress and the progress of the community." His research group at Bucknell is not only for engineers; there are students in the group from neuroscience or cell biology that bring their own set of skills and creating a collaborative, teamwork environment.

NEW ORTHOPEDIC RESIDENCY PROGRAM COMING TO GEISINGER WYOMING VALLEY

The upcoming events section of this issue would like to highlight the much anticipated orthopedic residency program at Geisinger Wyoming Valley Medical Center. The program will begin training its first group of four residents in July 2022. Dr. Kenneth Koury, a board-certified orthopedic surgeon and fellowship-trained trauma specialist will serve as the program director. Dr. Koury is excited to give students an opportunity to pursue their dream specialty in a highly-competitive field.

According to Dr. Koury, residents can expect to work with a knowledgeable and diverse team of healthcare professionals who will train residents in the latest techniques and help them build a strong foundation in "bread and butter" orthopedics. Dr. Michael Suk, chair of Geisinger's Musculoskeletal Institute and chair of the Department of Orthopedic Surgery, envisions this program as a sister program to the well-established orthopedic residency at Geisinger Medical Center in Danville. He describes it as eight residents and two sites, but under one umbrella. Dr. Suk is also hopeful that this program will serve as a pipeline to increase the number of orthopedic surgeons in the Scranton and Wilkes-Barre areas.

Dr. Koury describes a competitive candidate as one who performed well on rotations, has a strong work-ethic, is eager to learn, and is teachable. According to Dr. Suk, competitive candidates also display a true commitment to the patient and a strong sense of teamwork. He states that, while board scores are important, so is personality, character, and leadership potential. The program will begin accepting applications during the upcoming match cycle. We look forward to this monumental event that Dr. Koury and Dr. Suk are helping to pioneer.

Special thanks to Dr. Koury and Dr. Suk for their contributions to this section.

PLAY BALL

LISA FRIEDMAN, MD

I spent several years volunteering with the Minnesota Girl's Baseball Association, a non-profit organization that provides opportunities for girls to learn about and play baseball. We worked with several organizations in the Twin Cities, such as the Minnesota Twins and the St. Paul Saints, to put on skills clinics for girls who wanted to play baseball. Not infrequently, a coach from one of these organizations would invariably make the comment to our players along the lines of, "sweetie, keep your eye on the softball." Even with an organization specifically concerned with opportunities surrounding baseball, and with only baseballs on hand, it seemed inconceivable to some coaches that girls could or would continue to play baseball and not softball.

I started to play baseball when I was four when my older brother's team needed an additional player. Like so many experiences that defined being the younger child, I tagged along as the part-time mascot, and the part-time middle-right infielder, and fell in love with the game. I grew up with the game. I was the only girl on my high school's men's varsity team. After college, I've played on men's recreational leagues in several states. I am often asked why I stuck with baseball, a sport at which I am at best a mediocre player, when I could have excelled in softball competing with other women. But why would I switch? My favorite thing to do in baseball is to pitch. I love the cat-and-mouse game of leading off base. As a diehard Yankee fan growing up, I wanted the same opportunity to dig a ground ball out of the hole at shortstop like Derek Jeter and emulate my childhood heroes.

It is unlikely that any of the girls I coach in baseball will make baseball their professional career, but that's not the point. Girls, like boys, should get the chance to do what they love to do. When I got to medical school, I was unfazed by the low representation of women in orthopaedic surgery. My pursuit of orthopaedic surgery, like the hours spent mastering the curve ball is simple—I just really enjoy both of them.

Increasing representation for women in orthopaedics involves changing the narrative and expectation for girls early on. Some girls may prefer to play softball, some girls may prefer to play baseball, and still others may loathe sports, and all are fine. When we give opportunities to girls to try new things and we support their interests, we send the message that there is range of careers open for their exploration.

RESEARCH OPPORTUNITIES:

Summer Research Immersion Program

Geisinger Commonwealth School of Medicine's (GCSOM) Summer Research Immersion Program (SRIP) is an eight-week program open to current first-year medical students at GCSOM who are in good academic standing. The program provides students the opportunity to gain hands-on research experience in basic science, clinical science, public/community health, behavioral health or medical education under the guidance of a research mentor. Participants are also offered supplemental seminars on study design, institutional review board (IRB) protocol development, scientific writing and other topics within research. The experience includes an educational stipend contingent upon fulfillment of program requirements. The link to the SRIP application will be available to eligible GCSOM students through Canvas.

Geisinger MSKI Upper Extremity Research Fellowship

This is a one-year, paid Clinical Research Fellowship in Orthopaedic Surgery within the Geisinger Musculoskeletal Institute for qualified GCSOM students, beginning in July 2022. This research fellowship is designed for qualified GCSOM students interested in both gaining additional research experience and pursuing a career in orthopaedic surgery. The primary goal for this one-year clinical research fellowship is to provide GCSOM students with an opportunity to engage in meaningful clinical research. We aim to provide an opportunity for participating students to strengthen their research skills and knowledge base. We will engage students in a comprehensive musculoskeletal didactic program throughout the year, with the goal of improving their musculoskeletal and orthopaedic knowledge base. Interested candidates should send their CV and cover letter to Jennifer Harding, MSKI Research Director, at jlharding1@geisinger.edu.

Geisinger MSKI Orthopedic Research Application

This application is for outstanding and committed medical students who want to get involved with Orthopaedic research at Geisinger's MSKI. If accepted, students will have the opportunity to work closely with physicians and other research staff on Orthopaedic research projects. The aim of this program is to allow students to engage meaningfully with clinical Orthopaedic research. Applications are reviewed twice a year, in February and August. Student applicants are expected to engage with a Geisinger orthopaedics physician and complete a clinical shadowing experience before submitting their application. Students will also need to obtain a letter of recommendation from the physician with whom they shadowed. tinyurl.com/2c3fxbae

HSS Medical Student Summer Research Fellowship

The Medical Student Summer Research Fellowship is an 8-week program of mentored research designed to introduce students who have completed their first year of medical school to research opportunities in orthopaedic basic science, translational science, and clinical research in orthopaedics.

Eligibility: Students who have completed their first year at an LCME-accredited US medical school are eligible to apply.

Duration: June 2022 to August 2022

Stipend: $4,000

Number of fellowships offered: 16

Application Deadline: TBD

Completed applications must be submitted to the Academic Training Department though the online application. A selection committee will review the applications and determine the final candidates. Applicants will be notified of the status of their applications by the month of March 2021. Selected students will be given the contact information of all prospective mentors, along with descriptions of the projects offered. Securing a fellowship position will be contingent on the student being accepted by a mentor.
aagapps.com/hss/

NYU Orthopedic Research Opportunities for Medical Students & Trainees

Division of Adult Reconstructive Surgery, Shoulder and Elbow Surgery, Spine Surgery, Sports Medicine, and Trauma and Fracture Surgery offer one-year research opportunities for current medical school students interested in pursuing orthopedic clinical research. You have the opportunity to work closely with faculty, residents, fellows, statisticians, and other research staff.
tinyurl.com/v2ck5htw

RESEARCH OPPORTUNITIES (CONT.):

HSS Leon Root Pediatric Orthopaedic Research Award & Medical Student Program

The Leon Root Pediatric Orthopaedic Research Award & Medical Student Program is designed to facilitate high-level clinical research in the Pediatric Orthopaedic Surgery Service of HSS.

The ideal applicant is:

- Interested in pursuing a career in academic orthopaedic surgery
- Able to take a year off from their medical school education to gain experience and accomplishments in orthopaedic clinical research
- Enrolled and in good standing from a medical school in the United States
- Approved by their medical school to commit to a one-year clinical research program

Research Award Medical Student will be responsible for:

- All aspects of clinic research in our Pediatric Orthopaedic Division including:
- Identifying patients eligible for studies
- Working with doctors and the Pediatric Orthopaedic research team to consent patients
- Presenting project proposals to attendings
- Data Collection/Analysis/Radiographic Analysis
- Collaborating with the HSS Biostatistics Core to complete statistical analyses
- Writing abstracts, posters, and manuscripts that result from their project
- Participate in weekly meetings with division faculty and encouraged to attend clinical teaching programs and clinical rounds

To apply, please send the following to Emily Dodwell, MD (DodwellE@hss.edu) and John Denneen (DenneenJ@hss.edu): cover letter explaining interest, curriculum vitae, transcript, letter of recommendation (sent directly from the author). Applications are accepted September 1st, 2021 to December 15th, 2021. Decisions are made by February 1st, 2022.

Johns Hopkins Poggi Pediatric Orthopaedic Fellow

The Johns Hopkins Poggi Research Fellowship is a year-long fellowship program for extraordinary medical students. Fellows will have the opportunity to participate in cutting-edge clinical research, and learn the skills necessary to produce sound, high-quality papers. tinyurl.com/3jdkcp96

CHOP Orthopaedics Medical Student Clinical Research Award

The Benjamin Fox Orthopaedic Research Scholar Award promotes clinical research by giving extraordinary U.S. medical students the opportunity to investigate pertinent topics in clinical orthopaedic research at Children's Hospital of Philadelphia (CHOP). This funded "year-out" scholar program is unique because it was specifically designed for students who are interested in pursuing a career in orthopaedic surgery. The successful candidate will dedicate a year to clinical research with CHOP orthopaedic surgeons before either the third or fourth year of medical school. tinyurl.com/hjztkzfr

UCHealth Steadman Hawkins Orthopedic Surgery Research Assistant

This research assistant position will work primarily with Drs Stephanie Mayer and James Genuario at the CU Sports Medicine/ Steadman Hawkins Clinic Denver clinical facility at Inverness. This is a full-time position which will assist and coordinate clinical and biomechanical research in orthopedics. Specifically, Drs Mayer and Genuario specialize in sports medicine and arthroscopy, with further focus on hip preservation, knee injuries, shoulder injuries, and adolescent sports medicine. The research assistant will be involved in all phases of research including IRB and grant writing, data collection, patient interaction for consenting and outcomes collection, manuscript writing, and manuscript submission. The RA will be in charge of keeping track of all patients who are eligible for consent into databases and ongoing studies as well as managing their follow up. The RA will be involved in several multi center studies and will participate in coordinator calls and will be in charge of keeping our center cleared to participate. tinyurl.com/3hkhk4yu

Interested in writing about a topic in musculoskeletal medicine?

We are now accepting editorial submissions! We will be featuring one editorial in each issue of Musculoskeletal Matters and posting the rest of the submissions on the website! Submissions and questions can be sent to Jessica Koshinski (JKoshinski01@som.geisinger.edu).

CONTRIBUTORS

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