ANDERSON ORTHOPAEDIC RESEARCH INSTITUTE

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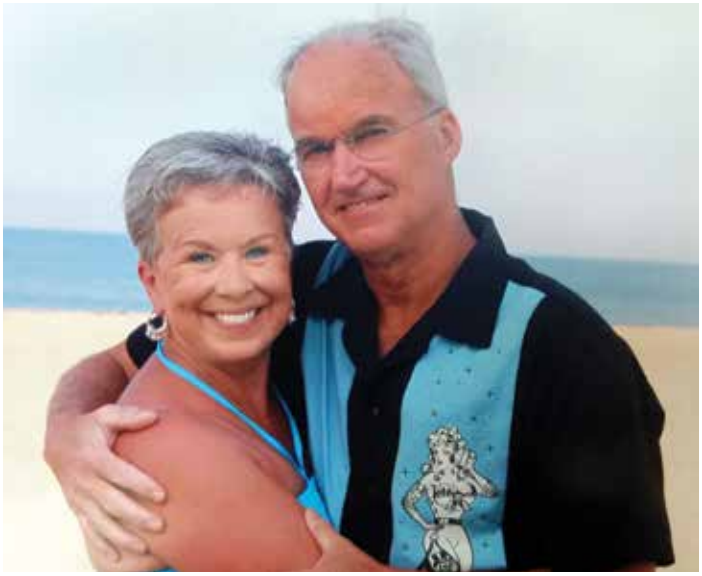
Celebrating the Career of Dr. Jerry Engh

Although the phrase "all good things must come to an end" has been applied to many things, it most certainly describes Dr. Gerard A. Engh's recent retirement from clinical practice. Affectionately known as "Dr. Jerry" around the office, Dr. Engh spent over four decades practicing orthopaedics. As a tribute to his accomplishments, we wanted to take the opportunity afforded by his retirement to reflect on his many achievements and celebrate his contributions to orthopaedics. As many readers of the Joint Journal already know, Dr. Jerry devoted his career to improving the quality of his patient's lives through joint arthroplasty. After graduating from Davidson College, he attended medical school at the University of Virginia. Following an internship and residency at Yale-New Haven Hospital, Dr. Jerry spent two years as a major in the Army Medical Corps. He then joined his brother at The Anderson Orthopaedic Institute, which had been founded by his father, Dr. Otto Anderson Engh.

Throughout his career, Dr. Jerry was a clinical pioneer whose research and development efforts helped improve the function and durability of knee replacements. To ensure that his efforts were based on clinical data, he developed and maintained an electronic database for tracking the outcomes of knee replacement surgery that AORI continues to use today. Analyzing this information and coupling it with his surgical experience, Dr. Jerry developed the Anderson Orthopaedic Research Institute (AORI) Bone Defect Classification System that many clinicians currently use to describe the extent of bone damage in a knee that requires revision surgery. By combining his clinical experience with his research data, Dr. Engh was instrumental in bringing issues of polyethylene sterilization and wear to the attention of other orthopaedic surgeons and implant manufacturers. His dedication to improving knee arthroplasty implants and surgical procedures resulted in many journal publications and book chapters that archive the operative techniques he developed and preserve the data he generated for future generations of orthopaedic surgeons.



Dr. Jerry Engh with his wife, Patty, who assisted with his clinics for many years.

With the goal of pursuing new implant design ideas for knee replacement surgery based on his clinical experience, Dr. Engh co-founded Alexandria

See Celebrating Dr. Jerry, page 11

AORI Researchers Receive Award for Study Addressing Contemporary Concerns

For over four decades, the goal of the studies undertaken by the Anderson Orthopaedic Research Institute (AORI) has been to answer the day-to-day questions that joint replacement patients and their orthopaedic surgeons confront. As implant technology and surgical techniques have changed, the nature of the questions that AORI has explored has also changed. One persistent concern that periodically resurfaces is whether the modular components that are used for most joint replacement implants create interfaces that might be susceptible to corrosion. Like most things, implant modularity has potential benefits and disadvantages. Creating a construct from several pieces allows a surgeon to customize an implant for a specific patient's anatomy without requiring an extremely large inventory of parts. However, at each junction or interface where modular parts are joined, the possibility for wear and corrosion exists. Although revisions that could be attributed to corrosion appeared to diminish in the 1990s as orthopaedic surgeons tended to use smaller diameter femoral heads to minimize polyethylene wear, the more recent popularity of metal-on-metal bearings coupled with larger-diameter femoral heads intended to reduce the possibility of dislocation has brought renewed concerns about implant corrosion over the last few years. As orthopaedic surgeons recently began to notice an increased incidence of corrosion at the junction between the femoral ball and stem during some revision surgeries, they naturally wondered what role the corrosion played in the need for additional surgery. Of particular interest was the question about whether the stem needed to be exchanged when corrosion was identified during revision. Since most femoral balls are modular, it's fairly easy to replace the ball during a revision surgery. However, many stems are securely fixed to the patient's femur when a revision is performed and removing a well-fixed stem can cause a significant amount of damage to a patient's bone. Yet when evidence of corrosion on a well-fixed stem is encountered, it might be useful to remove the existing stem and implant a new one.

To address this concern, AORI researchers including Dr. Nitin Goyal, Dr. Kevin Fricka, Dr. Andy Engh and Henry Ho used AORI's clinical database and implant retrieval collection to explore the relationship between corrosion on the femoral ball and the need for subsequent surgery when a new

See AORI Researchers Receive Award, page 15

To grade corrosion, AORI researchers assigned a score of 1 to 5 based on the appearance of the taper inside femoral balls retrieved at the time of revision surgery. Examples of balls with corrosion scores ranging from 1 (left) to 5 (right) are illustrated above. Scores of 1 and 2 were considered low-grade while scores of 3, 4 or 5 were considered high-grade.

A Fond Farewell to the 2013-14 Fellowship Class

Each year, the Anderson Orthopaedic Institute hosts a new group of joint replacement fellows who spend a year learning the finer points of adult joint replacement under the mentorship of Drs. Andy Engh, Bill Hamilton, Kevin Fricka and Nitin Goyal. The current class began their fellowship year in August of 2013 and recently completed their training in July of 2014. Like those who came before them, each of the past year's fellows is an exceptional orthopaedic surgeon who will take the skills they cultivated at the Anderson Orthopaedic Institute to different parts of the United States.

Jarrod A. Crum, MD, was born in Harbor City, California, and earned bachelor's degrees in physiology and biological psychology from the University of California, Los Angeles. He then earned a master's degree in epidemiology at the UCLA School of Public Health before going on to the University of Michigan Medical School in Ann Arbor. After completing medical school, Dr. Crum returned to the West Coast where he did his residency in orthopaedics at the University of California, San Diego.

Having been previously exposed to research while earning his master's degree, Dr. Crum sought a fellowship experience that would prepare him to tackle the most complex joint reconstructions. With its national reputation and high volume, Dr. Crum found the Anderson Institute to be a perfect match for his fellowship ambitions. Working with four different Anderson surgeons over the course of his fellowship year, Dr. Crum learned to manage patients when things went smoothly as well as when complications arose. With the benefit of many different perspectives, Dr. Crum will be using the strategies that work best for him as he moves back to the West Coast where he will be joining Kaiser Permanente in Los Angeles as a joint replacement specialist. When he is not practicing orthopaedics, Jarrod enjoys playing sports and listening to many different types of music.

Dr. Jarrod Crum with Dr. Andy Engh

Dr. Ryan Koonce with his wife, Megan, and their son, Gavin.

Ryan C. Koonce, MD, was born in Glenwood Springs, Colorado, and earned a bachelor's degree in civil engineering from the University of Colorado at Boulder before going on to medical school and an orthopaedic residency at the University of Colorado School of Medicine in Denver. Dr. Koonce subsequently completed a fellowship at San Diego Arthroscopy and Sports Medicine in California before going into practiced for two years as an orthopaedic surgeon at the Skagit Region Clinics in Mount Vernon, Washington. While in practice, Dr. Koonce did a variety of procedures including arthroscopy, trauma and hand surgery as well as joint replacement of the hip, knee and shoulder. Based on this experience, Dr. Koonce came to realize that he enjoyed the technical aspects of joint reconstruction more than the other procedures he performed.

Dr. John Scanelli receives his Fellowship certificate from the Anderson Clinic attending surgeons.

Not being content as a general orthopaedist who dabbled in joint replacement, he sought a fellowship at a nationally recognized joint replacement center where he could learn the latest surgical techniques. These ambitions ultimately led him to the Anderson Institute's fellowship in joint replacement.

Working closely with Anderson surgeons, Dr. Koonce was able to refine his skills and develop new expertise related to joint replacement during his fellowship year. While noting that each of the surgeons he worked with is recognized as an expert in particular hip and knee arthroplasty techniques, Dr. Koonce also found that the attending surgeons preferred to do things in slightly different ways. Reflecting on his fellowship experience, his fondest memories are of the surgical tips and techniques he gleaned from each of the Anderson surgeons. Drawing upon his diverse fellowship experiences, the most valuable things Dr. Koonce learned were how to handle stress and complications, how to run a successful practice and how to communicate with patients and staff.

Having completed his fellowship, Dr. Koonce will be returning to Colorado where he will be working for Kaiser Permanente in Denver. His long-term ambition is to build a practice focusing on hip and knee joint replacement. When he is not practicing orthopaedics, Ryan's greatest joy is spending time with his family. During his fellowship year at the Anderson Institute, Ryan and his wife, Megan, welcomed the birth of their first son, Gavin, in October of 2013. When he's not with family, Ryan enjoys traveling and endurance sports including running, biking and swimming.

John A. Scanelli, MD, was born in Norfolk, Virginia, and earned a bachelor's degree in biology from the College of William and Mary in Williamsburg, Virginia, before going on to complete medical school and a residency in orthopaedics at the University of Virginia in Charlottesville. Prior to starting his fellowship in joint replacement, Dr. Scanelli completed a year-long knee fellowship at the North Sydney Orthopedic and Sports Medicine Centre in Sydney, Australia, and the Dunedin Public Hospital in New Zealand. Dr. Scanelli chose the Anderson Institute for his joint reconstruction fellowship based on its long history of

Dr. Nirav Shah enjoys a round of golf.

excellence in patient care and its research contributions. During his fellowship, Dr. Scanelli learned how to manage all aspects of joint replacement, from routine office visits to complex reconstructions in the operating room. His most memorable experiences were the many patient interactions he had in the office and the hospital.

After completing his fellowship, Dr. Scanelli will remain in the area and join Washington Circle Orthopaedics where he plans to specialize in joint replacement and sports medicine of the hip and knee. When he is not practicing orthopaedics, John enjoys spending time with his wife, Elizabeth, and their 3-year-old son, Joseph. In his spare time, he relishes the opportunity to visit Mount Vernon and explore other regional attractions.

The 2013-14 Fellows with Anderson Clinic Director of Operations Susan Goss (center) and Fellowship Administrator Susan Sensi (right).

Nirav J. Shah, MD, was born in Elyria, Ohio, and earned a bachelor's degree in biomedical engineering from Columbia University in New York before going on to the Keck School of Medicine in Los Angeles. Following medical school, Dr. Shah returned to New York to complete his residency in orthopaedics at the Albany Medical Center. With three former Anderson fellows currently practicing in the Albany area, Dr. Shah became well-acquainted with the reputation of the Anderson Institute during his residency and chose to do his fellowship here based on Anderson's national reputation.

During his fellowship, Dr. Shah enjoyed the opportunity to learn the different surgical approaches used by each of the Anderson surgeons. He also became comfortable with complex joint replacements and the intra-operative decision-making process. At the conclusion of his fellowship, Dr. Shah and his wife, Anuja, will be moving back to the West Coast where he will be joining the Center for Orthopedic Specialists in West Hills, California. In the long-term, Dr. Shah plans to build a practice that will focus on joint replacement and trauma. When he is not busy working, Nirav enjoys playing golf in his free time.

As we bid a fond farewell to our 2013-14 fellows, we are grateful for the contributions that each of them made to the Anderson Orthopaedic Institute over the course of their fellowship year and wish them the best in all of their future endeavors.

Do you have a story that you would like to share with the readers of the Joint Journal? Please contact Susan Sensi at (703) 619-4411 or email research@aori.org

Johnamanjaro — An Adventure Benefitting Many

"The overall experience was wonderful, life-changing, and will continue to expand in our minds. We thank all of you for your support of this effort through your gifts to our targeted educational non-profits." – John & Liz Schanz

In the last edition of the Joint Journal, we began to chronicle John Schanz's plans to celebrate his 50th birthday by summiting Mount Kilimanjaro and his ambition to use the adventure to raise support for AORI and four other educational charities that he and his wife, Liz, support. In this edition, we wanted to update readers on the outcome of John and Liz's climb and their fundraising efforts.

After some preparatory hiking on Pike's Peak in Colorado and Camelback Mountain in Arizona during the fall of 2013, John and Liz arrived in Africa on Thursday evening, February 6, 2014. They met their climb guide, Noah, the following day and began their ascent of Mount Kilimanjaro in Tanzania on Saturday, February 8, 2014. After hiking for about six hours through dense rubber tree and giant fig forests on the first day, they made camp at about 10,000 feet, an altitude twice that of Denver, Colorado. Their first night in a tent was accompanied by torrential rains, underscoring the reality that nature, not humanity, reigns supreme on the mountain. Arising at 6 AM on Day 2, they hiked out of the forest and up into the subalpine Hagenia zone, making camp at an elevation of approximately 12,500 feet. On Day 3, they crossed the Shira Plateau and climbed to 15,000 feet, exceeding the 14,000 foot altitude of Pike's Peak, before descending towards camp at an elevation of about 13,000 feet. Days 4 and 5 were spent hiking four to five hours each day until they reached Barafu camp at an altitude of 15,200 feet. The shorter duration hikes on these

See Johnamanjaro, page 9

John and Liz Schanz celebrate summiting Mount Kilimanjaro with members of their climbing team on John's 50th birthday.

Traveling Fellows Visit the Anderson Orthopaedic Institute

Each year, the Hip Society Rothman-Ranawat Traveling Fellowship enables four young orthopaedic surgeons from around the world to visit major orthopaedic centers throughout North America. The goal of the fellowship is to provide emerging orthopaedic leaders with an opportunity to tour state-of-the-art facilities offering exceptional surgical care of the hip. During their visits over a four week period, the fellows have the opportunity to interact and develop personal relationships with some of the world's most prominent specialists in adult joint reconstruction. They also participate in scientific conferences hosted by the sites they visit.

The 2014 Traveling Fellows visited the Anderson Orthopaedic Institute in April.

This year, the Traveling Fellows came from Los Angeles, England, Greece and Ukraine. They began their journey in New Orleans, Louisiana, at the American Academy of Orthopaedic Surgeon's Specialty Day on Saturday, March 15, 2014. On April 3rd, they arrived at the Anderson Orthopaedic Institute where they toured the Joint Replacement Center at Inova Mount Vernon Hospital and observed the Anderson Clinic doctors in surgery. On April 4th and 5th, the Traveling Fellows participated in two days of scientific meetings where they presented their own research and listened to presentations by AORI's surgeon researchers and other doctors who had previously trained at the Anderson Orthopaedic Institute. As part of AORI's mission to share our research findings and help educate the worldwide orthopaedic community, we are honored that the Hip Society selected the Anderson Orthopaedic Institute as one of the sites for this year's Traveling Fellows.

In conjunction with their visit, the Traveling Fellows enjoyed a Segway tour of Washington, DC.

Remembering a Tireless Volunteer

Jerry Holiber celebrates his 75th birthday with his children and grandchildren.

If you visited the Inova Mount Vernon Hospital during the past 15 years, you may have crossed paths with Jerry Holiber. As a hip replacement patient himself, Jerry was always eager to share his experiences with others undergoing joint replacement and offer his reassurance that everything was going to be fine. His confidence was compelling because it was based on his own experience. As an active 52-year old, Jerry underwent his first hip replacement in February of 1983 after an automobile accident several years earlier. Jerry was one of the original group of 215 patients who received the first porous-coated cups and stems implanted by Dr. Charles Engh. Although component fixation with polymethymethacrylate (PMMA) bone cement was considered the "gold standard" when Jerry's first hip replacement was done, Dr. Charles was confident that bone ingrowth into the porous surfaces of the implants he was using would offer durable long-term fixation. After his surgery, Jerry faithfully returned for follow-up each year, allowing Dr. Charles to carefully document how his hip was doing. Although the clinical community was initially skeptical of these new implants that relied on a patient's own bone for fixation, Jerry's experience helped convince people that "cementless" fixation was a durable option for all hip replacement patients. Jerry was fond of sharing that his left hip replacement enabled him to continue playing tennis, usually at least twice a week, for over three decades. Although his original polyethylene liner demonstrated definite evidence of wear, his hip replacement never required revision.

When Jerry's right hip began to cause him persistent pain, he had that hip replaced in January of 2006. Although his right hip was done almost 23 years after his left hip, Dr. Charles used implants with the same type of porous-coating – a testament to the longevity of the fixation. However, Jerry did receive a new form of crosslinked polyethylene for this second hip that AORI's research had proven to have substantially a lower wear rate than the polyethylene liner used for his first hip. At his most recent follow-up visit in April of 2013, both of Jerry's hip replacements had perfect Harris Hip Scores of 100.

See Tireless Volunteer, page 15

Johnamanjaro continued from page 6

days were intended to help them acclimate to the higher altitudes and rest before John's 50th birthday on Thursday, February 13th when they would attempt to reach Kilimanjaro's summit on Day 6 of their expedition.

Following a few hours of restless sleep, John and Liz began their final ascent at 11 PM on Day 5 of their climb. After about six hours of hiking in darkness, they reached Stella Point at 18,630 feet on the rim of Mount Kilimanjaro's crater. Pausing to watch the sunrise, they continued for another hour around the rim to Uhuru Peak, which at 19,341 feet is the highest point in Africa. John and Liz recount that, "The views were stunning on that cloudless morning, and we were overwhelmed from both the effort and the sense of great accomplishment!" After savoring their achievement, they began their descent to 10,200 feet. On the day they reached the summit, their total trekking time was approximately 13 hours. Overall, the 7-day journey included 57 miles of hiking and climbing in some rather rough and rocky terrain.

When John and Liz first proposed "Johnamanjaro," they committed to personally donate $50,000 to their fundraising efforts and hoped that their generosity would inspire others to cumulatively match their contribution. Thanks to the overwhelming generosity of friends, colleagues and many others, John and Liz dramatically exceeded their initial goal of $100,000 and ultimately raised a total of $208,472. At a lovely dinner hosted on the scenic campus of Cabrini College in Radnor, Pennsylvania, on April 5th, 2014, John and Liz presented checks to five different educational charities including AORI, Cabrini College, Cristo Rey, FIRST and Readers are Leaders. Everyone at AORI would like to express their deep gratitude to John and Liz, as well as all those who supported their climb, for the $29,651 that AORI received. These funds will be used to support AORI's ongoing research efforts to inform and educate the joint replacement community.

If you would like to make an online donation to AORI using PayPal, please go to www.AORI.org and click on the "Donate to AORI" link at the bottom right of the page.

Helping to Ensure a Joint Legacy by Supporting AORI Research

Jeanette Blankenship's estate donation will support AORI's hip research.

Like many other people, Jeanette L. "Jane" Blankenship first came to the Anderson Orthopaedic Institute in June of 1990 based on the recommendations of numerous friends. About 18 months prior to her visit, Jane had begun to experience progressively increasing left hip pain. On July 13, 1990, at the age of 67, she had her left hip replaced by Dr. Charles Engh. For her hip replacement, Dr. Charles used porous-coated implants that he had helped develop. Although the surgery successfully relieved Jane's pain, her right hip subsequently began to deteriorate with progressively worsening pain that ultimately confined her to home and forced her to use a walker. In July of 1992, Jane had her right hip replaced with the same type of implants used for her left side. The only difference was that a slightly smaller femoral ball with a diameter of 28 mm was used for her right side instead of a 32 mm diameter ball like her left side. As with most things in life, the use of a smaller head was associated with pros and cons. The biggest potential advantage associated with using a smaller diameter ball was a reduction in the volume of polyethylene wear that would be generated over time. By reducing wear, it was hoped that the likelihood of bone loss around the hip replacement, called osteolysis, would also be reduced. The tradeoff associated with decreased wear was a potentially increased risk of dislocation because the smaller femoral head could pop out of the cup a bit easier.

Although dislocations were typically reported to occur in only 1 to 4% of hip replacement patients in the 1990s, Jane experienced two episodes of instability when her right hip popped out during the first year after her surgery. These dislocations were treated without surgery and things went well for the next two years. However, two additional dislocations of her right hip during the third year after surgery led Jane to opt for revision surgery in July of 1996, four years after her original right hip replacement. During her revision, Dr. Charles anticipated that he would retain her bone-ingrown cup and stem but change her polyethylene liner and ball to a 32 mm diameter head with a longer neck length to make her hip more stable. However, when he did the surgery and inserted trial components, he found that her hip was stable but her right leg was lengthened too much and would create an unacceptable difference compared to the length of her left leg if the final components to be implanted were the same size as the trial components. Instead of addressing Jane's instability with a different ball, Dr. Charles opted to use the same size ball that she originally received but implanted a special type of "constrained" liner that locks the ball inside the polyethylene liner with a metal ring. Although dislocations can still occur with a constrained liner if the metal ring breaks or the liner pulls out of the cup, Dr. Charles felt that this was the best option for Jane based on his experience. Because her cup and stem did not need to be revised, Jane's recovery after her revision surgery was easier and we are delighted to report that her left and right hip replacements served her well for 16 years after her revision operation until she passed away at age 89. Not long afterwards, AORI learned that Jane left a portion of her estate to support hip replacement research.

See Joint Legacy, page 14

Celebrating Dr. Jerry continued from page 1

Dr. Jerry and Patty with their grandchildren.

Research Technologies in 2001. This led to the concept of Tissue Guided Surgery – a surgical procedure that optimizes the placement of the knee implants based on a patient's own knee motion. Along with specialized instrumentation for surgery, Dr. Engh and his team also developed an implant specifically designed for Tissue Guided Surgery. Although now retired from clinical practice, Dr. Engh continues to maintain a keen interest in implant technology and innovative new options for joint replacement surgery. Everyone at AORI is also grateful that Dr. Jerry will continue to serve as AORI's Medical Director.

Dr. Jerry's career took him to the pinnacle of the joint replacement community and he is a past President of the Knee Society but any attempt to celebrate his life would be incomplete without acknowledging his many passions outside his professional work. Leveraging his vocational experience, Dr. Jerry founded Operation Walk – Virginia, a non-profit dedicated to providing free joint replacements to patients within the United States and abroad. Dr. Jerry is also passionate about farming and his cattle ranch. He has always loved the outdoors and has been known to "relax" in the fields on his tractor. Despite his many commitments, Dr. Jerry has always been dedicated to his family and looks forward to spending even more time with wife, Patty, his four children and 12 grandchildren now that he is retired.

If you have a fond memory of Dr. Jerry that you would like to share with him, we would invite you to send a letter to AORI at P.O. Box 7088, Alexandria, VA 22307 or drop us an email at research@aori.org. Please feel free to include photographs and other memorabilia. Using whatever we receive, we hope to compile a keepsake that will be presented to Dr. Jerry. With permission, we'd also like to share some of the letters we receive with our readers in future editions of the Joint Journal.

AORI's Surgeon Researchers Share Their Expertise and Research at Annual Meeting

The 2014 Annual Meeting of the American Academy of Orthopaedic Surgeons (AAOS) was a busy time for Dr. Andy Engh, Dr. Bill Hamilton, Dr. Kevin Fricka and Dr. Nitin Goyal. These surgeons, who serve as senior technical advisors for AORI, shared their expertise and research findings with other doctors from around the world in a variety of venues at this year's event. With attendance that can exceed 30,000, the annual AAOS meeting is the world's largest gathering of orthopaedic surgeons, researchers and allied health professionals. This year's meeting was held in New Orleans, Louisiana. It began on March 11th and concluded on March 15th. In the overview that follows, each doctor's contributions to the meeting are summarized in the context of some of the important contemporary issues in hip and knee joint replacement.

When a porous-coated cup is used for a hip replacement, the pelvic bone is usually prepared by reaming to a diameter slightly less than the cup that will be implanted so a good "pressfit" can be obtained. Making sure the cup is initially well-fixed and maximizing the amount of the porous surface in contact with bone is essential to achieve durable, long-term fixation. In some cases however, the initial pressfit is not ideal. To help surgeons understand how to improve initial fixation, Dr. Andy Engh presented a talk titled, "The Cup Pressfit Is No Good" as part of a symposium held on Wednesday, March 12, 2014. In his talk, Dr. Andy addressed the type of patient at risk for a poor pressfit of their cup, the reasons for poor fit and options for improving the pressfit. While improving exposure, removing soft tissue caught between the implant and bone, additional reaming and using screws to augment fixation were all acknowledged as viable options, Dr. Andy noted that simply hitting the cup harder was not likely to be useful.

Dr. Andy Engh

Dr. Andy and three other nationally renowned surgeons also served as moderators for an Instructional Course Lecture titled "Revision in Total Hip Arthroplasty: Understanding and Management of Osteolysis" that was held on Wednesday, March 12, 2014. As a moderator, he facilitated discussion about the causes, evaluation and surgical treatment of osteolysis, a type of bone loss that occurs around some hip replacements, typically in conjunction with implant wear. With his personal knowledge acquired by treating some of the most challenging cases of osteolysis over more than 20 years coupled with AORI's research work, Dr. Andy is uniquely qualified to offer insights based on scientific data and his own surgical experience.

On Thursday, March 13, 2014, Dr. Andy along with nine other experienced surgeons served as moderators for an Instructional Course Lecture devoted to managing complex primary hip replacements. Using a format based on actual clinical cases, he helped present tips and techniques for patients whose initial hip replacement is

Dr. Bill Hamilton

challenging. These patients can include the young, those who previously had traumatic hip fractures and individuals with bone deformities or deficiencies.

Dr. Bill Hamilton was a co-author on two presentations and one poster that were presented during the annual meeting. The first presentation on March 12, 2014, titled "Thirty-Day Postoperative Complications and Mortality Following Total Hip Arthroplasty: A Study of 17,640 Patients" found a 2.6% incidence of major complications or death for patients undergoing their first hip replacement and confirmed the need for diligent medical management during the immediate post-operative period.

The second presentation on Thursday, March 13, 2014, was titled "Thrombosis Prevention Using a Portable Compression Device in Total Hip Arthroplasty." By combining data for 1,509 patients from several different centers including AORI, the use of a portable compression device with or without aspirin as the only means to prevent blood clots after joint replacement was found to be associated with a low (0.53%) incidence of adverse events. No deaths occurred and only eight adverse events were identified including four symptomatic deep vein clots below the knee, one clot above the knee and three pulmonary embolisms. The results indicate that portable compression devices can be used as an alternative to pharmaceutical medications for the prevention of blood clots after joint replacement. Together with Dr. Nitin Goyal and AORI researcher Nancy Parks, Dr. Hamilton also presented his personal experience using the Direct Anterior Approach in a poster format. He examined the success rates of different stem designs when implanted via different surgical approaches in total hip arthroplasty. Given the increased interest in

Dr. Nitin Goyal

the anterior approach nationwide, AORI has been at the forefront of research efforts to present early outcome data associated with this new surgical technique.

Dr. Hamilton also served as a moderator for two Instructional Course Lectures. In the first, held on Wednesday, March 12, 2014, he and four other experienced surgeons discussed techniques to make sure that unicompartmental and total knee replacements are appropriately positioned. Given the complex geometry of a knee joint, it is important to balance the bone cuts and soft tissue throughout the patient's range of motion. This can be accomplished by us-

ing "measured resection" and "gap balancing" techniques that were taught in the course. The second course, also held on March 12, 2014, was titled "Update on Unicondylar Knee Replacement." Together with three other surgeons, Dr. Hamilton reviewed the most current information on partial knee replacement and evaluated its current role in the treatment of arthritis. Since the knee joint consists of three compartments, it's possible to only replace the patellofemoral surface between the femur and knee cap, the medial compartment between the femur and tibia or the lateral compartment between the femur and tibia. Although usage varies and controversy persists, many surgeons believe that replacing only one or two of the three compartments in the knee is a valuable option when advanced joint degeneration is not present in all compartments. Several of AORI's current research studies are focused on evaluating the outcome of partial knee replacements using different types of implants to determine what works best for particular patients.

Drawing on their own expertise acquired by treating patients, Dr. Kevin Fricka and one other nationally-recognized surgeon served as the moderators for a series of presentations on Friday, March 14, 2014, devoted to "metal-on-metal" hip replacements. These implants use metal components for both the liner and femoral head that comprise the bearing surfaces. Although metal-on-metal hips gained widespread popularity during the early years of the 21st century, reports of complications among some patients led to a steep decline in the use of these devices over the past few years. However, the hundreds of thousands of patients who received metal-on-metal implants worldwide will require continued care for decades to come. Topics that were discussed during the session included factors contributing to metal-on-metal wear and metal levels in the blood, methods to screen for adverse local tissue reactions and how to care for patients with metal-on-metal hips.

Dr. Kevin Fricka

AORI is grateful that the surgeons who guide our work are also willing to take time to share our research results with the broader joint replacement community at major orthopaedic meetings so that our findings can benefit patients worldwide.

Helping to Ensure a Joint Legacy continued from page 10

Although Dr. Charles and Dr. Jerry Engh who founded AORI are now retired, we are deeply grateful for people like Jane Blankenship whose generosity will help sustain the patient-centered research efforts that the Engh family began in 1972. Although AORI's aspiration is that every joint replacement would last a lifetime, we particularly appreciate that people who have experienced complications understand that as good as contemporary hip and knee joint replacements can be, there are still important unanswered questions and room for improvements. As several of AORI's traditional sources for research funding have decreased or disappeared over the past decade, everyone at AORI is deeply grateful for the continued support of donors like Jane. When we reflect on the new implant technology and surgical techniques that AORI's research has facilitated, we are inspired to continue pressing forward in pursuit of even better options to restore mobility and relieve joint pain.

AORI Researchers Receive Award continued from page 2

metal ball is placed on a corroded stem. AORI is uniquely equipped to do these types of studies because it maintains retrieved implants as well as the clinical data about the joint replacement before and after revision. To perform the study, metal balls from 86 hip replacements that had undergone ball and polyethylene liner exchanges with retention of the original stem were inspected for corrosion. All of the revised heads had been implanted for at least 10 years, allowing a considerable amount of time for corrosion to develop. Each of the revised balls was graded and the cases were divided into high-grade and low-grade corrosion groups. Using the clinical outcome data after the head exchanges were performed, the researchers determined how many additional revision surgeries were performed in each group. They found a total of seven re-revisions (8%) but none of the reasons for re-revision were related to corrosion and there was no difference in the re-revision rates between the 32 hips with high-grade corrosion and the 54 hips with low-grade corrosion. Based on the findings, routinely removing a well-fixed stem with corrosion was not recommended.

This study was presented at the most recent Annual Meeting of the American Association of Hip and Knee Surgeons in November of 2013 where it was selected from among hundreds of submissions for the Lawrence Dorr Award for the most outstanding paper in surgical techniques and technologies. The paper titled "Do You Have to Remove a Corroded Femoral Stem?" that described the study was electronically published in May of 2014 in the *Journal of Arthroplasty* and should be available in print soon. AORI is grateful for the opportunity to share our findings with the orthopaedic community and honored to have our research recognized for its clinical relevance. We are also deeply indebted to all of the individuals who make our research possible.

Remembering a Tireless Volunteer continued from page 8

As a tireless ambassador for joint replacement, Jerry served as an AORI trustee for many years and traveled to Capitol Hill on several occasions to encourage his elected representatives to support orthopaedic research. As he had many times before, Jerry attended AORI's Board of Trustees Meeting on October 24, 2013. In good spirits and apparently good health at the time, we were surprised to learn that Jerry passed away quite suddenly on November 5, 2013. Although deeply saddened by his passing, Jerry would want everyone to know that he had a life-long passion for Cadillacs and his last moments were spent in a Cadillac dealership. Although we will miss Jerry's regular visits, everyone at AORI remains forever grateful for his tireless support of our research efforts and we offer our sincerest condolences to his family.

Jerry Holiber with his grandsons and his brother, Charles. Because his brother, Charles, had a knee replacement done by Dr. Jerry, Jerry Holiber was fond of saying, "Dr. Charles fixed Jerry's hip and Dr. Jerry fixed Charles' knee."

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