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## Spinal Surgeon Among Most-Cited Researchers Worldwide

Yongjung Kim, MD, has been named among the top most-cited researchers on spinal deformity surgery according to an article published in the July 2014 issue of *Spine Deformity*, the journal of the Scoliosis Research Society. The article's authors analyzed nearly 40,000 scholarly works published between 1900 and 2013 and identified individuals who have contributed the most to the advancement of spinal deformity surgery and the body of knowledge used to guide evidence-based clinical decision making in spinal deformity surgery today. Dr. Kim, who specializes in the treatment of spinal disorders in both adults and children at NewYork-Presbyterian/Columbia, is one of only five surgeons in the world to have



Dr. Yongjung Kim

authored three or more articles that rank among the top 100 most-cited articles in spinal deformity surgery.

Dr. Kim's article, "Free hand pedicle screw placement in the thoracic spine: is it safe?" published in 2004 in *Spine*, ranks number eight in the top 100 list with 272 citations. Explains Dr. Kim, "This research started with Dr. Se-Il Suk at the Seoul Spine Institute at Inje University Medical School in Korea, who pioneered and introduced pedicle screws in the treatment of scoliosis in 1989.

Dr. Suk's article in 2001 in *Spine* did not show the logical reason why thoracic pedicle screw fixation is safe. In my article published three years later, however, I showed the safety of the pedicle screw in a logical and persuasive way."

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## Getting a Fix on Foot and Ankle Fusion

A new technique that may improve fusion of foot and ankle joints is being studied in the Center for Orthopedic Research in the Department of Orthopedic Surgery at NewYork-Presbyterian/Columbia University Medical Center. "We are evaluating whether a new fixation device is viable and superior to the conventional fixation technique," says **Justin K. Greisberg, MD**, a foot and ankle specialist. "Currently, because of the nature of the anatomy of the foot and ankle, we secure the bones with a screw and compress them so that they will heal together. However, this screw and compression technique is always applied eccentrically – off the center – which is less than ideal mechanically."

Dr. Greisberg refers to the new orthopedic fixation device under investigation as a "post and screw" construct. "With this technique, the compression screw threads through a post that has already been loaded into the bone in order to provide compression more central to the bone rather than off-axis," explains Dr. Greisberg.

With the availability of the on-site Center for Orthopedic Research, which conducts cutting-edge molecular biomedical engineering and biomechanical research, Dr. Greisberg, with lead researcher **Thomas R. Gardner, MCE**, Associate Director, Biomechanics Laboratory and Center Manager, has been able to test the novel fusion device in different ways to demonstrate its validity. The first objective of the research team was to determine whether the "post and screw" device brings the compression closer to the center of the joint.

"We used CT imaging of a normal hindfoot to create an anatomically correct synthetic bone model as opposed to commercially available models, which do not portray a realistic reproduction of foot structure," says Dr. Greisberg. "We compared the 'post and screw' construct to regular compression screws in a hindfoot fusion of the talonavicular joint. Looking at compression with pressure sensitive film across the models that we created, we found that the new device

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## Spinal Surgeon Among Most-Cited Researchers Worldwide (continued from page 1)

According to Dr. Kim, previously surgeons considered the pedicle screw technique too dangerous. “Prior to the pedicle screw, you needed to do the anterior and posterior in the case of a 70 or 80 degree curve,” says Dr. Kim. “However, after the introduction of the pedicle screw it was not necessary. You can perform everything from the posterior and achieve the same amount of correction. Since the publication of our article, the technique is now used by more than 90 percent of spine surgeons.”

Dr. Kim’s second paper in the top 100 – “Comparative analysis of pedicle screw versus hook instrumentation in posterior spinal fusion of adolescent idiopathic scoliosis” – ranks number 32 with 177 citations. In a retrospective matched cohort study, the results of which were also published in *Spine* in 2004, Dr. Kim and his colleagues comprehensively compared the two-year postoperative results of posterior correction and fusion with segmental pedicle screw instrumentation versus those with hook constructs in adolescent idiopathic scoliosis (AIS).

“In this article, I demonstrated a more versatile comparative analysis, including junctional problems above the fusion levels and lung function which had not been demonstrated in previous research,” says Dr. Kim. “We concluded that pedicle screw instrumentation offers a significantly better major and minor curve correction without neurologic problems and improved pulmonary function values in the operative treatment of AIS and enables a slightly shorter fusion length than segmental hook instrumentation.”

A third paper – “Comparative analysis of pedicle screw versus

hybrid instrumentation in posterior spinal fusion of adolescent idiopathic scoliosis,” published in *Spine* in 2006 – ranks 44 with 146 citations. “In this study, we compared the two-year post-operative results of posterior correction and fusion with segmental pedicle screw instrumentation versus hybrid – proximal hooks and distal pedicle screws – constructs in AIS,” says Dr. Kim. “I’ve used this technique on more than 200 patients, some of them presenting with scoliosis greater than 100 degrees, and now use the pedicle screw technique with all of my patients with scoliosis.”

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### For More Information

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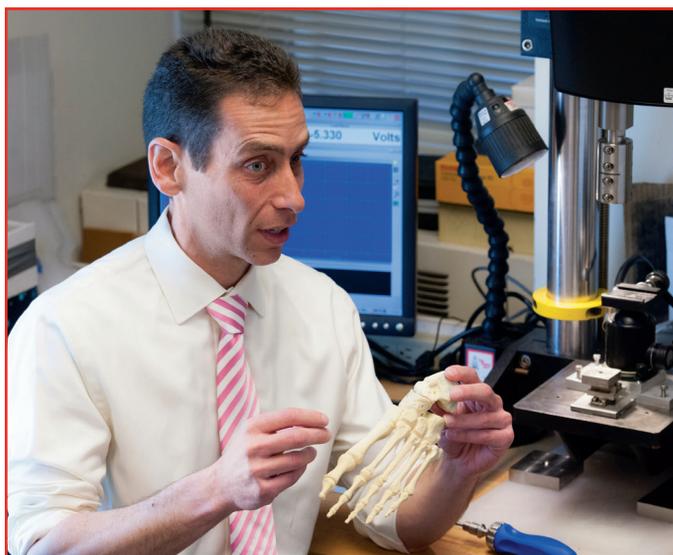
## Getting a Fix on Foot and Ankle Fusion (continued from page 1)

actually did increase the compression across the joint. It transferred that compression more toward the center of the joint and away from the edge. In fact, the compression was evenly distributed both toward the center and throughout the entire joint.”

In the next research phase of the study, the researchers looked at performance of the device in a controlled environment. The team used cadaver feet to conduct simulated fusions to determine how well each fixation approach held up to weight-bearing forces. Relying on a linear extensometer, a device that measures displacement, the researchers compared the conventional fusion approach to the “post and screw” approach using a simulated weight-bearing frame to represent a person walking. They loaded the linear extensometer approximately 2,500 times and closely observed how the bones gapped or shifted during the loading, and then compared the loading of each device. “We’re still analyzing this data,” says Dr. Greisberg. “It’s not clear yet if the results in this research are going to be straight forward in determining which fixation is superior.”

The third phase of the research looked at clinical outcomes. Dr. Greisberg applied the newer fixation device in approximately 20 patients and then compared them to 20 patients who had fusion with the conventional screws. By comparing the outcomes, he discovered that the new device had a significantly reduced chance of failure and the healing rate was higher.

Further research will also determine if the new technique will allow weight-bearing sooner after fusion surgery rather than the six to eight weeks of non-weight-bearing activities following standard fusion.



Dr. Justin K. Greisberg

“We have the resources at Columbia to scrutinize new methods of fixation that can improve foot and ankle fusion,” says Dr. Greisberg. “Our study of the ‘post and screw’ construct was a clear example of the type of translational research that we can pursue from concept to clinical practice.”

### For More Information

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## New Intraoperative Device Makes Knee Replacement More Precise

With an inevitable increase of knee arthritis among the large population of aging baby boomers, it is predicted that the number of knee replacement surgeries will soar to about 3.5 million annually by 2030.

“Today, a fair number of cases in my practice is redoing surgeries for those patients whose knee replacements were done poorly the first time,” says **Jeffrey A. Geller, MD**, Co-Chief, Division of Hip and Knee Reconstruction and Director of Research, Center for Hip and Knee Replacement at NewYork-Presbyterian/Columbia University Medical Center. “For many of these patients, improperly balanced ligaments are the reason for the revision procedures. If the ligaments are not balanced correctly during the surgery, the knee replacement is at risk for failing. Patients will experience pain and stiffness if the ligaments are too tight and instability if they are too loose. So the key is to avoid these ligament-based complications that often, unfortunately, require a second surgery on the same knee.”

Until recently, surgeons relied on their experience, training, and finesse along with visual and tactile examination to achieve the appropriate tension for the ligaments. Dr. Geller has been participating in early studies to validate a new state-of-the-art digital technology designed to make the whole surgical knee replacement process, as he says, “a bit smarter.”

One such device – OrthoSensor™ – is transforming knee replacement surgery from a mechanical procedure into an evidence-driven science. “This device is showing early promise with regard to improving the outcomes of knee surgeries and perfecting the fit of the knee implant to each patient’s specific anatomy,” says Dr. Geller. The system accomplishes this by delivering computerized, objective intraoperative feedback that guides the surgical team in making precise, accurate decisions regarding ligament tension and alignment positioning.

“Traditionally, we would test a few different sizes of the plastic inserts until we felt that we had the right one for properly balancing the tension of the ligaments around the knee joint,” says Dr. Geller. “It often happened that one side would feel too loose, while the other side may have felt too tight.”



Dr. Jeffrey A. Geller

With OrthoSensor, the surgical team tries various inserts until they have found the one most suitable, at which point they insert the OrthoSensor device. “Its pressure-sensitive surface transmits real-time information to and from a computer via bluetooth or radio frequency, providing feedback that lets us know the actual pounds of pressure across the knee joint,” explains Dr. Geller. “It tells us if the pressure is too tight or too loose and lets us know what we need to do to create the optimal pressure. We may find that certain ligaments have to be balanced a bit better.”

Although OrthoSensor is limited to knee replacement surgery at this time, Dr. Geller predicts its potential for future applications in other joint replacement surgeries.

“Joint replacement is not just about the joint,” he says. “It’s about the soft tissues, the muscles, and the various structures of the hip, knee and shoulder. This technology may help ensure the success of these surgeries. Further studies will be needed to validate this new technology.”

### For More Information

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### OrthoSensor

**Kinetic Tracking™:**  
Displays femoral component motion paths in the medial and lateral compartments for full kinetic assessment of knee function

**VeraSense Sensors:**  
For wireless communication without interference

**Dynamic femoral contact points**

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Source: VeraSense™ Knee System – OrthoSensor Inc.

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## Dr. Christopher Ahmad Named Lead Team Physician of Rockland Boulders

The Rockland Boulders, an American independent professional baseball team based in Rockland County, New York, has entered into a partnership for the 2014 season with Columbia Orthopedics at NewYork-Presbyterian/Columbia. The Columbia orthopedic surgeons will serve as the Rockland Boulders' new team physicians, under the direction of **Christopher S. Ahmad, MD**, sports medicine specialist, who will serve as Lead Team Physician. The Rockland Boulders is a member of the Canadian American Association of Professional Baseball.

Dr. Ahmad is Head Team Physician for the New York Yankees and a member of the Major League Baseball Team Physicians Association. He is also the head team physician for local area high schools, serves as consultant to local metropolitan gymnastics and



On September 14, the Boulders capture their first Can-Am League Championship.

swim teams, and the official medical provider to the FC Westchester Soccer Academy.

Dr. Ahmad has received many awards for outstanding research in the field of sports medicine, and is the author of the textbook *Pediatric and Adolescent Sports Injuries* and co-editor of *Minimally Invasive Shoulder and Elbow Surgery*. He continues to conduct ongoing research in the areas of ACL injury prevention and screening, surgical techniques for rotator cuff repair and shoulder instability, and biomechanics of the elbow.

"The health and well-being of our players is paramount," says **Ken Lehner**, President of the Rockland Boulders. "It is a distinct honor to partner with Columbia Orthopedics, Dr. Ahmad, and his staff. We know our players will be treated by the best team physicians in the business."

"We are proud to become part of a terrific local baseball team and look forward to keeping the Boulders healthy and safe," adds Dr. Ahmad. "It's so important for athletes of all sorts to get the right care, from the pros to Little League players and weekend warriors, too."



Dr. Christopher S. Ahmad