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# Editor's Spotlight/Take 5

# Editor's Spotlight/Take 5: Addition of Vancomycin to Cefazolin Prophylaxis Is Associated With Acute Kidney Injury After Primary Joint Arthroplasty

**M. Daniel Wongworawat MD**

When the cure is difficult or dangerous, prevention becomes especially important. This is particularly relevant in the care of patients with prosthetic joint infections, where a cure might entail several operations and loss of a weight-bearing implant. When antibiotic resistant organisms are thrown into the mix, finding effective prevention measures is not that simple.

From the moment we began making antibiotics, bacteria have been working on resisting them. Among the most worrisome resistant organisms we see is methicillin-resistant Staphylococcus aureus (MRSA), and the incidence of MRSA infection is increasing [2, 5, 7].

In response, some institutions began using antibiotic regimens with wider coverage and coverage specifically to address the prevalence of MRSA, in places where it is prevalent; specifically, the use of vancomycin as presurgical prophylaxis to combat MRSA has been reported, with some apparent benefits [6]. Also added to the armamentarium were decolonization protocols with varying levels of success [3, 4]. Interestingly, a recent report found that 20% of patients undergoing elective total joint arthroplasty may be colonized with MRSA despite undergoing a screening and decolonization protocol; perhaps not surprisingly in that setting, the protocol was ineffective in decreasing infection rate [1].

Because of the challenges surgeons see with respect to decolonization, and because strains of resistant Gram-positive bacteria are endemic in some tertiary-care hospital settings, dual-antibiotic prophylaxis—often using vancomycin in addition to a first-generation cephalosporin—sometimes is used. Dr. Gwo-Chin Lee and his team at University of Pennsylvania evaluated the benefits and drawbacks of this approach. In short summary, dual coverage including vancomycin did not reduce the rate of infection when compared to cefazolin alone [8]; rather, doing so resulted in an increased risk of developing kidney injury.

Our intentions are good; the impulse to look for new and better ways to prevent infection—which causes so

*Note from the Editor-In-Chief: In* "Editor's Spotlight," *one of our editors provides brief commentary on a paper we believe is especially important and worthy of general interest. Following the explanation of our choice, we present* "Take Five," *in which the editor goes behind the discovery with a one-on-one interview with an author of the article featured in* "Editor's Spotlight."

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much harm in this setting—is the right impulse. But Dr. Lee's team provides us with an important reminder that we must always consider a calculus of risks and rewards as we make these decisions. Complications arise from prevention efforts too, and so we need to follow the evidence, in whichever direction it takes us. Dr. Lee's work is an important inquiry on the topic of unintended consequences. In the "Take 5" interview that follows, Dr. Lee, lead author on this important subsequent study, joins me to explore how we weigh risks that come with prevention.

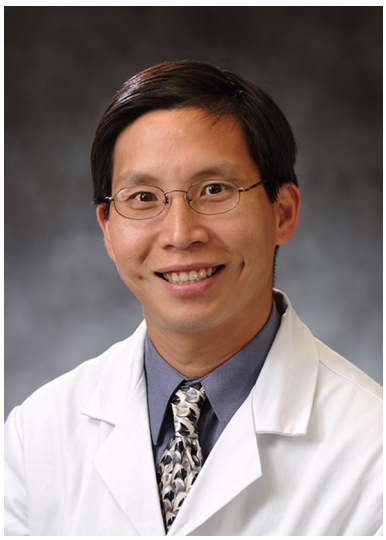
## Take Five Interview with Gwo-Chin Lee MD lead author of "Addition of Vancomycin to Cefazolin Prophylaxis Is Associated With Acute Kidney Injury After Primary Joint Arthroplasty"

**M. Daniel Wongworawat MD:** *Congratulations on some excellent work, and thank you for publishing it in CORR®. What prompted your interest looking at kidney injury associated with dual antibiotic coverage?*

**Gwo-Chin Lee MD:** Initially, it made sense that universal dual antibiotic prophylaxis (vancomycin and cefazolin) would decrease infection rates in hip and knee replacement patients. This measure was adopted without any data on the specific antibiogram of our specific patient population. The result was our initial study comparing the rates of surgical site infection (SSI) in patients receiving dual antibiotic prophylaxis compared to those receiving cefazolin alone [8]. These results showed that dual antibiotic prophylaxis did not alter the frequency of infections in hip and knee patients, but it did affect the kinds of infecting organisms we saw, in that patients treated with dual antibiotic prophylaxis were less likely to have MRSA infections compared to those treated with cefazolin alone. However, the data also showed that universal dual antibiotic prophylaxis was relatively inefficient at preventing MRSA infections. More patients undergoing THA and TKA have medical comorbidities and the process of surgery can have unintended effects on the various systems of the body. One of the known complications of vancomycin is renal toxicity. Our previous study did not look at complications associated with dual antibiotic prophylaxis [8]; therefore, we felt the need to look at renal complications associated with the use of dual antibiotics in patients undergoing hip and knee replacements.

**Dr. Wongworawat:** *With MRSA screening becoming the norm in many areas, many surgeons prescribe vancomycin more often than we used to. Any suggestions for surgeons regarding how to weigh the risks and when to include vancomycin?*

**Dr. Lee:** Surgeons have to take their part in practicing good antibiotic stewardship. Issues such as renal and ototoxicity are rare and affect the individual; on the other hand, resistant organisms place entire populations at risk. Instead of routine dual coverage for all patients, I do support MRSA screening in patients undergoing joint replacements and also support decolonization programs for these patients. I think we need to be more efficient at identifying the "at risk" patient for MRSA infections rather



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than universally giving unnecessary doses of potentially harmful antibiotics such as vancomycin to often-elderly patients who may have compromised renal function to begin with.

**Dr. Wongworawat:** *Besides MRSA screening, some hospitals have developed local antibiograms that suggest cefazolin may be ineffective against some of the most common pathogens. Do you have any suggestions on antibiotic choice?*

**Dr. Lee:** Each hospital should develop detailed antibiograms looking at the types of prevalent organisms in its patient population. This may even be different between specialties within a given hospital based on the area of service or subtypes of procedures. The optimal antibiotic regimen should then be guided objectively based on the data. If the prevalence of MRSA in a particular institution and for a particular procedure is high (> 30%), then addition of vancomycin for prophylaxis for that specific procedure is perhaps reasonable. Additionally, institutions selecting to universally adopt clinical practices such as the universal administration of additional antibiotics need to study the effects of these changes such as developing programs to track the development of complications and resistant organisms associated with these changes.

**Dr. Wongworawat:** *Are there instances where dual coverage is appropriate, and how would you mitigate the risk of kidney injury?*

**Dr. Lee:** I believe there are instances when dual antibiotics (vancomycin and another agent) can be appropriate. High-risk patients who have had prior history of infection with MRSA and those who screened positive are those who I would consider adding vancomycin to their prophylaxis. As to mitigation of kidney injury, adequate fluid resuscitation, avoidance of hypotension and maintaining adequate blood volumes are some of the strategies to reduce renal side effects. Of course, actively engaging anesthesia and medical colleagues to comanage patients undergoing joint replacement is critical to optimizing safety in these patients.

**Dr. Wongworawat:** *From your work, what related questions that could influence other orthopaedic specialties might you highlight, and how might we go about answering them?*

**Dr. Lee:** We all need to critically look at our clinical practices to ensure that they are evidence based. In the field of antibiotic utilization, we need to study the effects of widespread utilization and the effects on medical complications and antimicrobial resistance. We simply present a snapshot of our institutional data from a particular period. The microbiology of infections is highly variable and dynamic. Just like flu vaccinations programs, yearly vaccines are changed based on the prevalence of a particular strain for that particular year. Thus, if we could coordinate our efforts to develop accurate and up-to-date antibiograms, it would allow us to be more discriminative in antibiotic selection to best protect our patients. Additionally, results from hip and knee arthroplasty cannot be generalized to other orthopaedic surgical procedures in other regions of the body. Each orthopaedic subspecialty should evaluate the infection risk profile of each particular procedure and prophylaxis patients accordingly. Finally, future studies on infections and their prevention may need to drill down to the molecular and genetic levels to individualize patient protection while minimizing unnecessary exposures.

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