

Screening for Fluoroquinolone Resistance...

Preventing Septicemias Following Prostate Biopsy



By Michael A. Liss, MD



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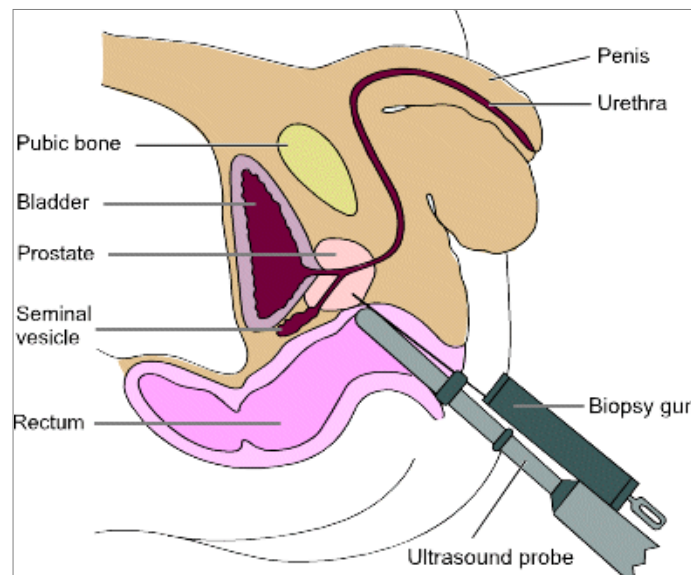
For the past three years, his research has focused on the incidence of infections caused by ciprofloxacin-resistant organisms following prostate biopsy.

Prostate cancer is one of the most common cancers in men, with an estimated 240,890 new cases in the United States in 2011. The majority of cases are diagnosed by transrectal ultrasound-guided prostate needle biopsy.¹ Over one million prostate biopsies are performed in the United States each year.² Urologists access the prostate through the rectum, as this is an accurate way to image and biopsy the prostate.

To prevent infection during the biopsy procedure, the patient undergoes a bowel preparation (enema or suppository) to clean the rectum prior to the biopsy. Additionally, they are given a dose of fluoroquinolone antibiotics such as ciprofloxacin or levofloxacin.

Most urologists will give one form of bowel

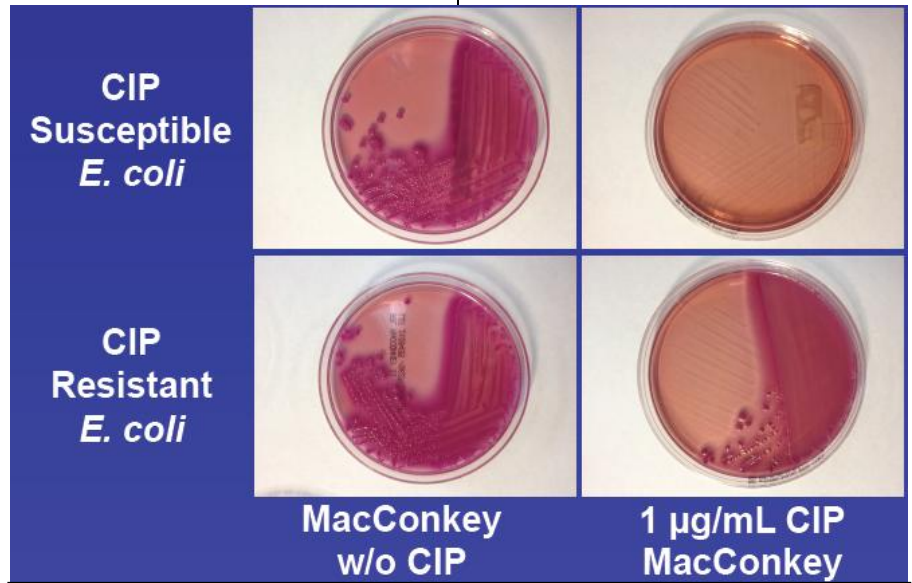
preparation and either 24 hours or three days of antibiotics to prevent biopsy related infections. The combination of these measures have largely prevented infectious complications. The most common infectious complications that do occur following prostate biopsy are urinary tract infections, prostatitis, infection of the testicle, and sepsis. Of these, sepsis leading to multiple organ failure causing men to be admitted to the intensive care unit is the most concerning complication from the prostate biopsy procedure.



Initial investigations focused on why men would get infected from the biopsy despite getting antibiotics. Initial studies looking at men in southern California that were admitted to the hospital with sepsis found that all of them had *Escherichia coli* that was resistant to the fluoroquinolone antibiotics.³ Based preliminary information, at that time we recommended that different antibiotics be administered to those patients when they present to the hospital. Further studies were needed to find a means to screen for these organisms and to prevent this from happening in the first place.

The mechanism thought to lead to infection is the presence of fluoroquinolone resistant bacteria in the rectal vault at the time of biopsy.⁴ These bacteria can be introduced into the prostate and bloodstream by the biopsy needle traversing the contaminated rectal wall. This prompted investigation into the prevalence of fluoroquinolone resistant organisms in the rectal flora at the time of biopsy.

Due to the fact that the stool/rectum harbors many bacterial species, initial studies used a broth enrichment with BHI broth containing 10µg/ml



Ciprofloxacin infused MacConkey agar compared with control showing ciprofloxacin resistant E. coli.

ciprofloxacin ([Hardy Diagnostics catalog number K258](#)) to select those bacteria that were resistant to fluoroquinolones. The enrichment broth was then subcultured onto MacConkey agar that also contained

fluoroquinolone resistant bacteria in the rectum at the time of prostate biopsy was about 22%, which was much higher than anticipated.⁵

Based on the surprising results of these studies,

“Widespread use of this procedure can hopefully decrease the incidence of infectious complications following prostate biopsy.”

ciprofloxacin at a concentration of 10µg/ml ([Hardy Diagnostics catalog number G258](#)). All bacteria growing on MacConkey with Cipro agar was presumed to be resistant to ciprofloxacin and would then undergo susceptibility testing. Using this screening method, it was demonstrated that the prevalence of

additional studies were carried out to investigate the routine use of rectal cultures using ciprofloxacin-containing media to provide a targeted, individualized approach to choosing antibiotic prophylaxis prior to prostate biopsy. This individualized approach would be based on the patient’s current rectal flora.

By providing culture results to the physician prior to a prostate biopsy, the urologist could determine what antibiotic to use for that patient, in contrast to continuing to give all patients fluoroquinolones not knowing if it would protect them from infection or not.

In seeking to identify the optimal approach to screening, studies were carried out to determine whether the use of an enrichment broth was necessary and to determine whether 10µg/ml of ciprofloxacin was the optimal concentration of antibiotic to use.

The data generated from these studies show that eliminating the broth enrichment and using a direct plating of the rectal culture onto a MacConkey plate containing 1 µg/mL ([Hardy Diagnostics catalog number G358](#)) provided the best sensitivity with the fewest false positive rates (publication pending, presented at ASM meeting in San Francisco).

Multicenter clinical trials looking at the effectiveness of this new screening protocol are now underway, the results of which may change how urologists provide antibiotic

prophylaxis for a common procedure.

Essentially, a healthcare provider will obtain a rectal swab and send this to the lab. The swab can be obtained using a culturette and placed in Cary-Blair media or Amies Solution and transported to the lab. There, the culturette can be vortexed into saline and plated on MacConkey plates containing 1µg/ml ciprofloxacin and incubated overnight. If there is no growth, the physician can proceed under the assumption that there are no fluoroquinolone resistant bacteria and can prescribe the usual antibiotic prophylaxis. If, however, there is growth on the plate, then identification and susceptibility testing will be performed. The physician can then use that identification and susceptibility profile to determine the most effective prophylaxis regimen for that patient.

The hope is that by using this information to guide prophylaxis prior to prostate biopsy, it will be possible to decrease the rates of infectious complications, including sepsis, from the procedure. Initial results have been encouraging. Two recent studies used this technique and have showed excellent results.^{6,7} Both studies showed a zero

infection rate when using rectal culture prior to biopsy in order to guide antibiotic therapy. One study showed a substantial cost benefit.



In summary, fluoroquinolone resistance has become a substantial problem causing significant infections in men undergoing a relatively routine procedure. The use of selective media to perform rectal cultures prior to transrectal ultrasound guided prostate biopsy allows for an alternative, individualized, and targeted approach to providing prophylactic antibiotics prior to prostate biopsy. Widespread use of this procedure can, hopefully, decrease the incidence of infectious complications following prostate biopsy.

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