# Drug resistance gene has spread from East Coast to Midwest

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A resistance gene that allows bacteria to beat an important class of antibiotics has started to appear in microorganisms taken from Midwestern patients, according to researchers at Washington University School of Medicine in St. Louis.

Less than a decade ago, scientists first noticed the BlaKPC gene in bacteria taken from East Coast patients. They found bacteria with an active copy of the gene could defeat carbapenems, a relatively young family of antibiotics that works on a wide variety of bacteria. Physicians generally reserve carbapenems for use in the most critically ill patients.

The new study, presented this week in Chicago at the Interscience Conference on Antimicrobial Agents and Chemotherapy, is among the first to detect the resistance gene in samples taken from a Midwestern hospital.

Researchers found the gene in only four of 243 samples from 223 patients with bloodstream-based bacterial infections. But BlaKPC spreads easily among bacteria, and scientists found the method most hospitals use to check for resistance genes didn't detect all BlaKPC-positive strains.

"It's relatively easy for us to find this gene, but most hospitals don't have access to the same high-tech methods that we have at a major medical center," says senior author David Warren, M.D., assistant professor of medicine. "To help slow the spread of this gene, we need to look at

whether we can develop a more effective way to detect it using widely available equipment and procedures."

BlaKPC was originally identified during an East Coast outbreak of the bacterium Klebsiella pneumoniae. The gene is encoded on a DNA structure known as a plasmid that can be easily copied and passed around not just among bacteria of the same species but also from one bacterial species to another. Subsequent studies found mortality rates climbing as high as 50 percent when bacteria with the resistance gene infected patients.

"We can't say much about BlaKPC's effects on mortality here yet, because we only had four patients test positive for bacteria containing the resistance gene," notes lead author Jonas Marschall, M.D., a fellow in infectious diseases.
Infection with a bacterium carrying an active copy of the resistance gene doesn't mean all treatment options are gone. But detection of BlaKPC can be key both to successful treatment and to containing the spread of the resistance gene by isolating affected patients.

To search for the BlaKPC gene, scientists used a technique known as PCR (for polymerase chain reaction) to isolate and amplify bacterial DNA. But most hospitals test for antibiotic resistance using a more low-tech method that involves directly exposing bacteria to antibiotics in the lab. When researchers used this method to look for BlaKPC-positive bacteria in their samples, it failed to catch all four strains carrying the gene.

This may be a result of the resistance gene being inactive in the bacteria. The gene does not convey its carbapenem-fighting abilities until the bacteria make a copy of its protein, and the bacterium may need some stimulus from the environment to start making those copies.

Regardless of whether the gene is spreading in active or inactive form, though, Warren asserts that clinicians need a better, more widely accessible method to track it.

Source: Washington University School of Medicine