

April 2009

KPC, A Newly Emerging Carbapenemase - *Enterobacteriaceae* screening and antibiotic susceptibility tests

To Health Care Providers:

Klebsiella pneumoniae carbapenemase (KPC) is an enzyme which confers resistance to all known penicillin-like drugs. The enzyme renders *Enterobacteriaceae* such as *Klebsiella pneumoniae* resistant to antibiotic choices for which good evidence exists, thus making treatment of these infections very difficult.

KPC is easily missed in the laboratory using standard methods and can spread amongst admitted patients in hospitals. KPC was previously documented in the United States, especially New York State, as well as parts of Europe and South America. In the spring and summer of 2008, KPC–producers were detected in two metropolitan centres in Ontario¹.

Screening Tests

The Clinical and Laboratory Standards Institute (CLSI) recently issued guidelines for screening and confirming KPC production in *Enterobacteriaceae* and those guidelines are summarized below.

According to the CLSI recommended screening guidelines for carbapenemase in *Enterobacteriaceae*, isolates that fulfil any of the conditions below are considered presumptive carbapenemase producers.

Antibiotic	10 µg disc zone diameter	MIC broth microdilution
Ertapenem	≤ 21 mm	≥ 2 µg/mL
Meropenem	≤ 21 mm	≥ 2 µg/mL
Imipenem	Not recommended	≥ 2 µg/mL

Important Note: These zone sizes and MICs indicate carbapenemase activity despite the lower values being within the susceptible category.

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Confirmatory Tests

The Modified Hodge Test (MHT) is a phenotypic test used to confirm the presence of carbapenemase activity. *Enterobacteriaceae* screening positive by disc or broth microdilution will be confirmed for carbapenemase activity by the MHT. The MHT is not appropriate and will not be performed for non-*Enterobacteriaceae* isolates.

In certain cases such as nosocomial outbreaks, the PHL may further confirm the type of serine carbapenemase using molecular methods such as PCR and also may perform pulse field gel electrophoresis (PFGE) on the isolates.

Antibiotic Susceptibility Testing

All isolates found to be carbapenemase producers, and resistant to all antibiotics tested, will have MIC testing for tigecycline and colistin performed using the E-test method. These antibiotics have not been approved for use in KPC-related infections and there are other factors such as toxicity to consider. Testing and reporting of MICs is being performed because there are extremely limited treatment options and there has been some reported success with these antibiotics.

Important Note: Consultation with an infectious disease physician or medical microbiologist is strongly recommended before initiating treatment in infections caused by KPC-producing organisms.

For Further Information:

- During working hours contact Dr. David Farrell, Clinical Microbiologist at **416-235-6505** or Dr. Dylan Pillai, Medical Microbiologist at **416-235-6548**
- Reference Identification and Susceptibility Laboratory at **416-235-5874**
- Public Health Laboratory Helpline **1-800-640-7221**
- For the Specimen Collection Guide and previous Lababstracts refer to the Ontario Agency for Health Protection and Promotion website: www.oahpp.ca
- <http://www.cdc.gov/eid/content/15/5/827.htm>

¹ Pillai DR, Melano R, Rawte P, Lo S, Tijet N, Fuksa M, Roda N, Farrell DJ, Krajden S. *Klebsiella pneumoniae* carbapenemase (KPC) in Canada. Emerging Infectious Diseases. April 22, 2009.