SAN LUIS OBISPO COUNTY
Messenger
Public Health Laboratory

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NDM-1 E. coli – a new central coast intruder and "superbug"

In January our laboratory staff received a phone call from a local hospital microbiology laboratory reporting an unusual isolate: a strain of ***Escherichia coli*** resistant to virtually all classes of antibiotics including carbapenems. Suspicions were confirmed when the culture isolate was determined by testing in the San Luis Obispo Public Health Laboratory, the state Microbial Diseases laboratory and the Centers for Disease Control and Prevention laboratories as NDM-1, or New Delhi Metallo-beta-lactamase carrying E coli. The gene for NDM-1, called bla_{NDM-1} codes for a type of beta lactamase enzyme called carbapenemase, and can be found in ***Klebsiella pneumoniae*** or ***E. coli.*** Isolates are typically resistant to multiple classes of antibiotics, including beta-lactams, tetracylclines, fluoroquinolones and aminoglycosides, while most are susceptible to the polymyxin-class antibiotic colistin. The gene resides on a highly transmissible plasmid accounting for the spread of the gene among several species of Enterobacteriaceae.

Originally discovered in a Swedish patient who came from India in 2008, the NDM-1 gene was then detected in bacteria in India, Pakistan, the UK, Canada, Japan, Brazil and the USA. An epidemiologist at the CDC described this isolate as the 29th occurrence of NDM-1 detection in the United States. An association of infection with bacteria carrying the NDM-1 gene with travel to India for medical procedures was reported for US patient in 2010. Other reports have provided additional evidence for the association of "medical tourism" as well as family visitation with the acquisition of NDM-1 bacteria. This new patient reported travel to India.

NDM-1 resistance provides a singular challenge for treatment as infecting bacteria are resistant to most commonly used classes of antibiotics. Treatment with a polymyxin, eg, Colistin, is unencumbered with significant drug side effects. Tigecycline (class: glycylcyclines) can be used as well. Testing all members of the carbapenem family (such as imipenem, ertapenem, doripenem, meropenem, etc.) is a fruitless exercise as resistance extends to all members of the class. However, testing for aztreonam, a monobactam, is useful as NDM-1 isolates may be susceptible to this drug.

At present staff of the San Luis Obispo Public Health Laboratory are providing technical assistance to the hospital staff to verify that the NDM-1 E. coli strain has not colonized other patients in this hospital. The spread of the NDM-1 strain within a Canadian hospital was recently reported, so laboratory surveillance of patients may be required when one of these strains appears. Worldwide, dissemination of this genetic element is on the march as there is clear evidence of most NDM-1 producing E. coli isolates belong to a successful clone called ST131 that seems to combine both virulence and resistance factors, a hitherto unseen combination.

SLO Public Health Laboratory website http://www.slopublichealth.org/lab.