

## Plasmid mediated AmpC production (PAMP)

AmpC  $\beta$ -lactamases are clinically important cephalosporinases encoded on the chromosome of many *Enterobacteriaceae* and a few other organisms where they mediate resistance to cephalothin, cefazolin, ceftazidime, most penicillins, and  $\beta$ -lactamase inhibitor/ $\beta$ -lactam combinations.

In many bacteria, AmpC enzymes are inducible and can be expressed at high levels by mutation. Overexpression confers resistance to broad-spectrum cephalosporins including cefotaxime, ceftazidime, and ceftriaxone, and is a problem especially in infections due to *E. aerogenes* and *E. cloacae*, where an isolate initially susceptible to these agents may become resistant upon therapy.

Transmissible plasmids have acquired genes for AmpC enzymes, which consequently can now appear in bacteria lacking or poorly expressing a chromosomal AmpC gene, such as *E. coli*, *K. pneumoniae*, and *P. mirabilis*. Resistance due to plasmid mediated AmpC enzymes is less common than extended spectrum  $\beta$ -lactamase (ESBL) production in most parts of the world. AmpC enzymes encoded by both chromosomal and plasmid genes are also evolving to hydrolyze broad-spectrum cephalosporins more efficiently.

The phenotypic method used in this laboratory to identify AmpC  $\beta$ -lactamase -producing isolates in bacteria that generally lack or poorly express AmpC is the inhibition of  $\beta$ -lactams by boronic acid discs. Genotypic characterisation of the various AmpC enzymes (CMY, MIR, MOX, LAT, FOX, DHA, ACT, ACC, CFE etc.) is not routinely available.

Plasmids carrying genes for AmpC  $\beta$ -lactamases often carry multiple other antibiotic resistance genes. The enzyme is potentially transferrable between bacteria and can therefore pose an infection control risk. Potential agents that can be used to treat these infections include carbapenems and fourth generation cephalosporins such as cefepime. Infectious Diseases input is recommended. It should be noted that positive disc testing in *E.coli* species may represent either Plasmid mediated AmpC  $\beta$ -lactamase or hyperproduction of a normally repressed chromosomal AmpC enzyme.

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