

ESBLs

(Ambler class A, Bush group 2)

Inhibited by CA

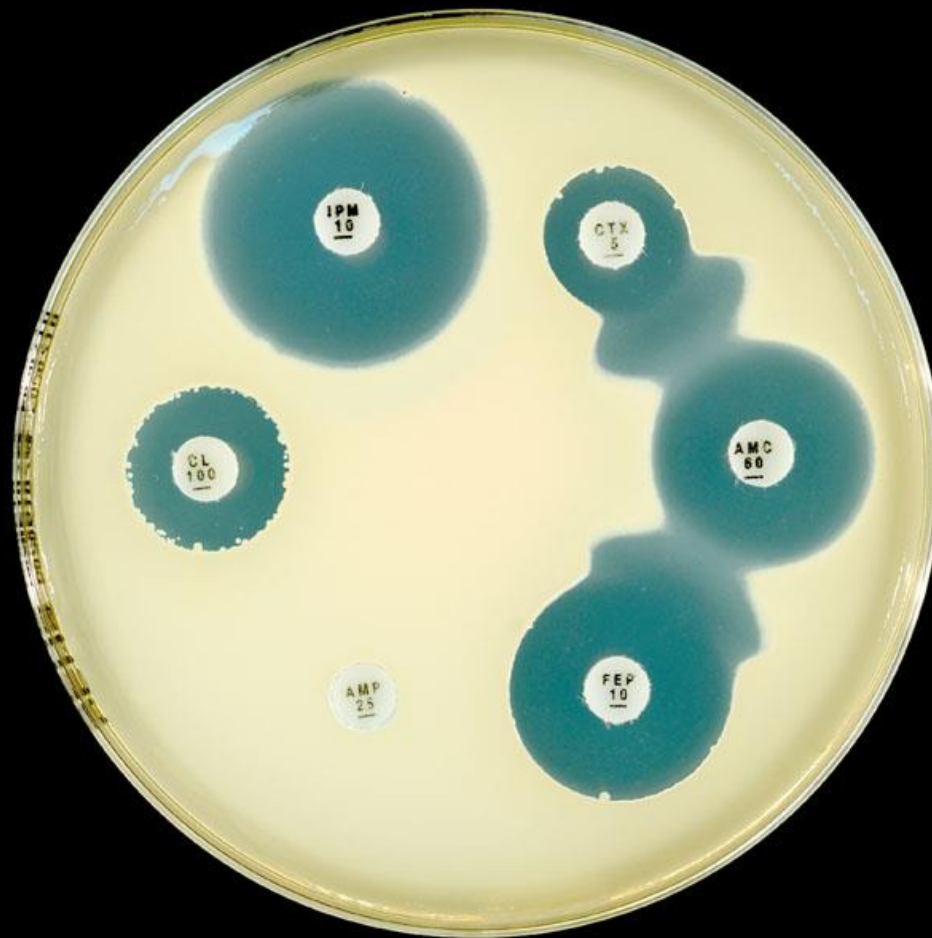
**R/ Cephalosporins (including cefepime) and
aztreonam**

S/ Augmentin (AMC 60)

S/ Cephamycin (cefoxitin, cefotetan)

**CDS routine testing → Synergy with AMC 60
(no need for confirmation)**

S/ Imipenem (T)



Disc positions recommended for urine isolates

***K. pneumoniae* producing an ESBL in routine CDS test**

S/ Augmentin (AMC 60), typical synergy between Augmentin and cefotaxime (CTX 5) / cefepime (FEP 10)

Report: S/ AMC (uncomplicated UTI), imipenem (IMP 10)



Disc positions recommended for urine isolates

Another *Klebsiella pneumoniae* producing an ESBL:

No synergy between Augmentin (ACM 60) and cefotaxime (CTX 5)

Synergy between Augmentin (ACM 60) and cefepime (FEP 10) only

PM-AmpC in *E. coli*

R/ AMC 60 (not inhibited by CA)

R/ CL 100

S/ FEP 10

Standard interpretation

> 6 mm (no resistant col.) => **S/ CTX 5**

< 6 mm => **R/ CTX 5**

Confirmation (optional): inhibition by boronic acid (BA)
(1-Benzothiophene-2-boronic acid)



**Routine CDS test showing an *E. coli* with a TEM-1 and a plasmid mediated AmpC
R/ ampicillin (AMP) Augmentin (AMC), cephalexin (CL), cefotaxime (CTX)
S/ cefepime (FEP 10) and imipenem (IPM 10).**



The same *E. coli*

Synergy between boronic acid discs (blank) and adjacent discs: cefotaxime (CTX 5), Augmentin (AMC 60), cephalixin (CL 100), ceftazidime (CAZ 10).

Blank disc = 250 µg boronic acid disc

Report: S / FEP, IMP

Acquired Metallo-Beta-Lactamases (MBLs)

Ambler class B or Bush group 3

* **Inhibited by EDTA (Zinc molecule)**

IMP-4 (most common)

NDM (new)

* **Hydrolyses all beta-lactams (except aztreonam)**

IMP 10 zone > 6mm with colonies



***E. coli*: R/AMP 25, AMC 60, CTX 5, CL100 and FEP 10, colonies at the edge of imipenem zone (> 6 mm).**

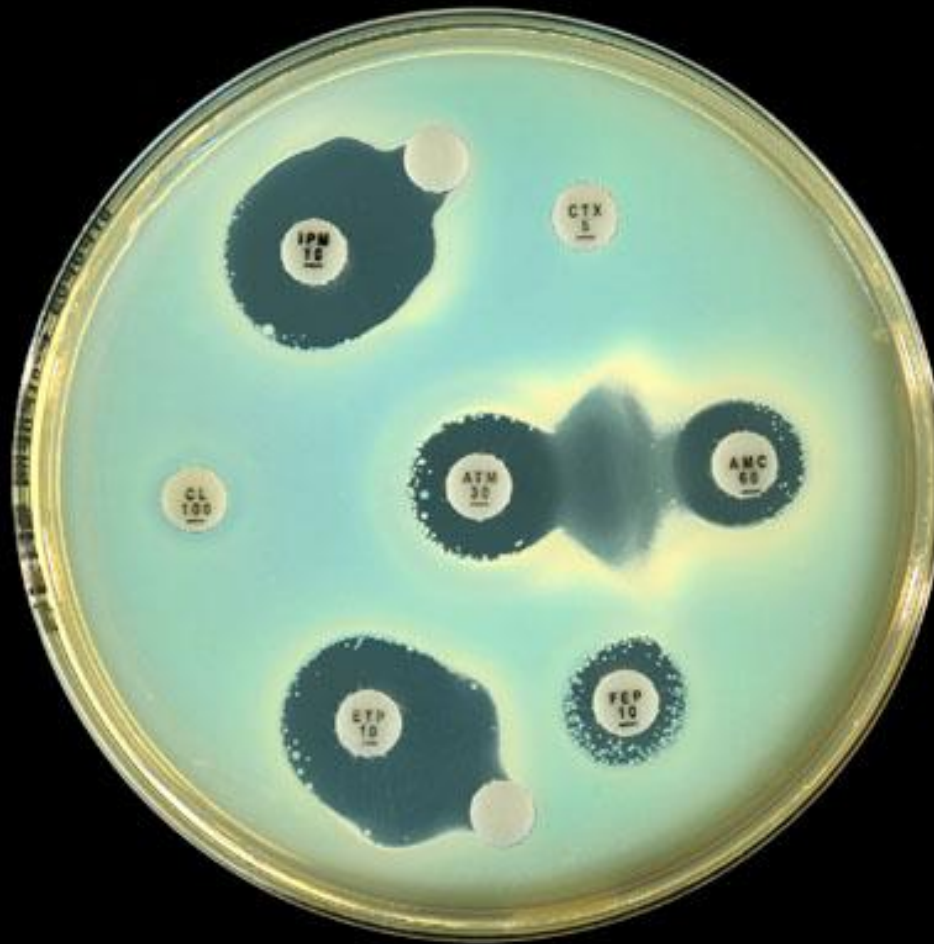
No synergy between FEP/AMC → not ESBL ⇒ ? MBL
Resistant colonies at the edge of IPM 10 zone ⇒ ? MBL



Simple phenotypic detection of MBL:

Same isolate showing synergy between an EDTA (blank) discs placed next to cefotaxime (CTX)/ imipenem (IPM)/ cefepime (FEP)/ ertapenem (ETP) discs.

S/ ATM



Klebsiella pneumoniae:

Synergy between **EDTA** (blank discs) and **IPM 10 / ETP 10** only
R/ ATM and **synergy** with **AMC 60**

=> MBL (IMP or NDM) and ESBL



K. pneumoniae:

R/ Augmentin (AMC 60), cephalexin (CL100), cefotaxime (CTX 5), cefepime (FEP 10), imipenem (IPM 10) zone (> 6 mm+ numerous colonies).

Confirmation: no synergy between EDTA and IPM 10 => Not MBL

???



The same *K. pneumoniae*:

Synergy between AMC 60 and IPM 10 => inhibited by clavulanate

??? A β -lactamase of Ambler class A or Bush group 2 hydrolysing carbapenem

KPC-2 producing *K. pneumoniae* from Greece

KPC in *Klebsiella pneumoniae*

Plasmid mediated *K. pneumoniae* carbapenemase (KPC)

Ambler class A or Bush group 2f

- Reported in Europe, US (Brooklyn 24%)
- Not yet reported in Australia
- Inhibited by clavulanic acid => ESBL affecting carbapenems
KPC-1 , KPC-2,...KPC-4
High level resistance to FEP, CTX, CRO, CAZ, ATM,
- Imipenem MIC ≥ 4 mg/L (border line)
- Ertapenem MIC > 8 mg/L (resistant)
- Inoculum dependent => broth MIC unreliable

Summary: R/ ALL (IPM zone may be > 6 mm with numerous colonies at edge)
=> Test ertapenem and send for confirmation

New Table 10.4

A guide to the testing and reporting of β -lactam antibiotics for Gram-negative organisms.

- 1. EEC to replace ESCHAPPM (Table 10.4)**
- 2. *Serratia marcescens* (Table 10.4)**
- 3. *Aeromonas* sp. (Table 10.4)**
- 4. HPPM: standard interpretation (except ampicillin)**
- 5. *K. oxytoca*: standard interpretation**
- 6. PM AmpC: standard interpretation**