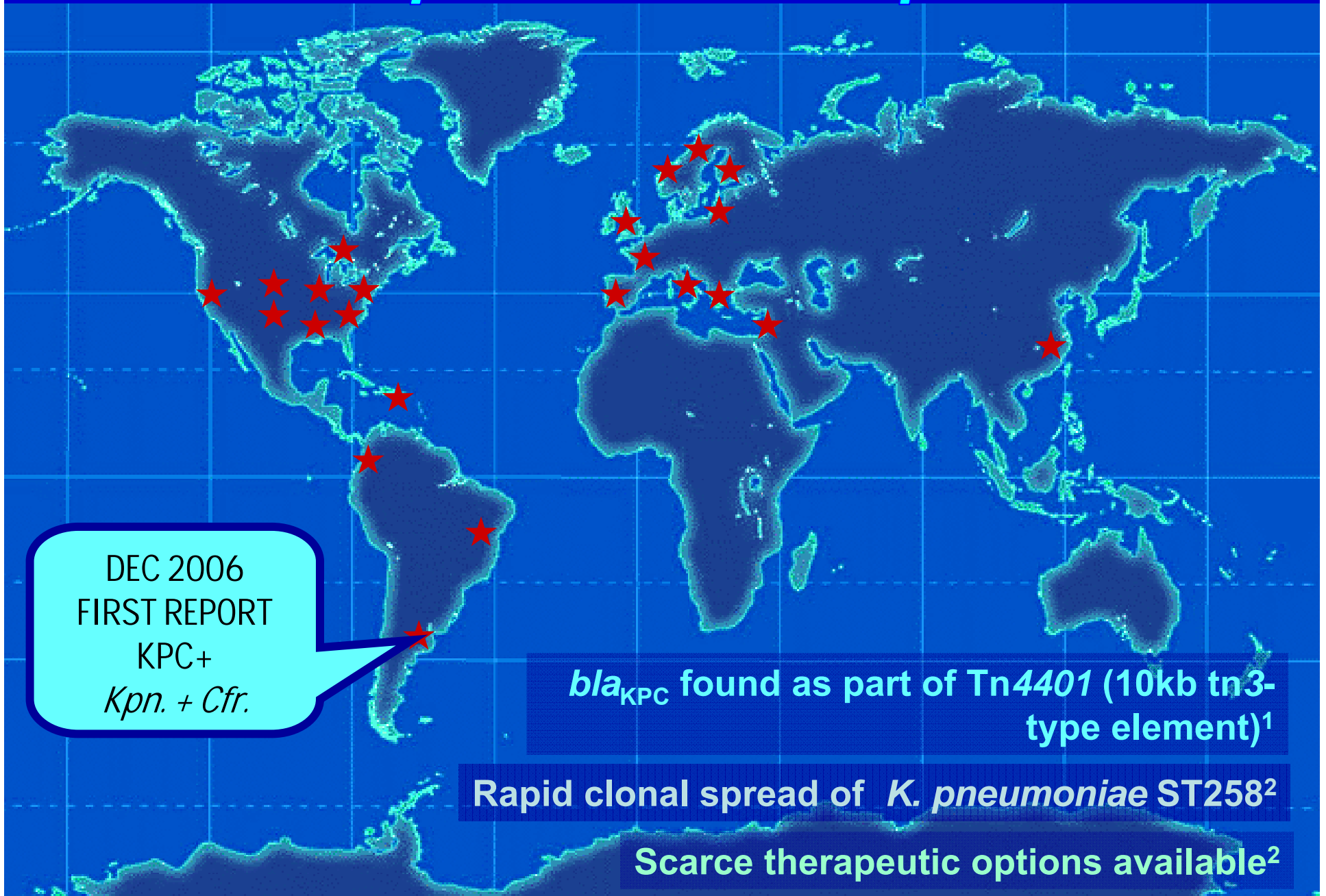


# **Diverse Genetic Background and Clones of KPC Producing *Enterobacteriaceae*. First Detection of ST258 in South America**

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# ★ *Klebsiella pneumoniae* carbapenemases ★



1. Naas et. Al. AAC 2008, 52(4):1257-1263. 2. Lancet Infect Dis 2009; 9: 228-36. 3. Pasteran et. al. EID 14 (7):1178

CLASS A AND MBL  
CARBAPENEMASES  
SEARCH IN  
ENTEROBACTERIA

**IMI PENEM**

SINCE 2007

**≤21 mm**

Exceptions:  
*Salmonella and Proteae*

**≥22mm**

Exceptions:  
*Salmonella and Proteae*

**3GC**

**CTX, CAZ**

**No  
carbapenemases**

**S**

Any of them

**R, I**

Report carbapenems  
according to phenotype

**Neg.**

**Pos.**

**Pos.**

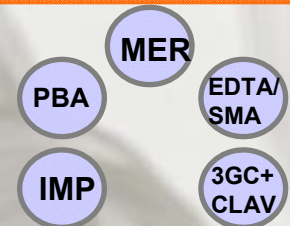
**Neg.**

**Neg. synergy PBA**

Unusual profile  
Report to  
National  
Reference Lab

*Sma and  
Enterobacter*

Precaution:  
false positives  
in *Enterobacter* &  
*C. freundii*



**Neg.**

**Neg.**

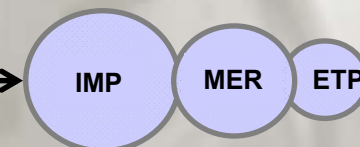
**Pos.**

**Neg. synergy EDTA\ SMA**

**Sme, Nmc-a**

**KPC**

**MBL**



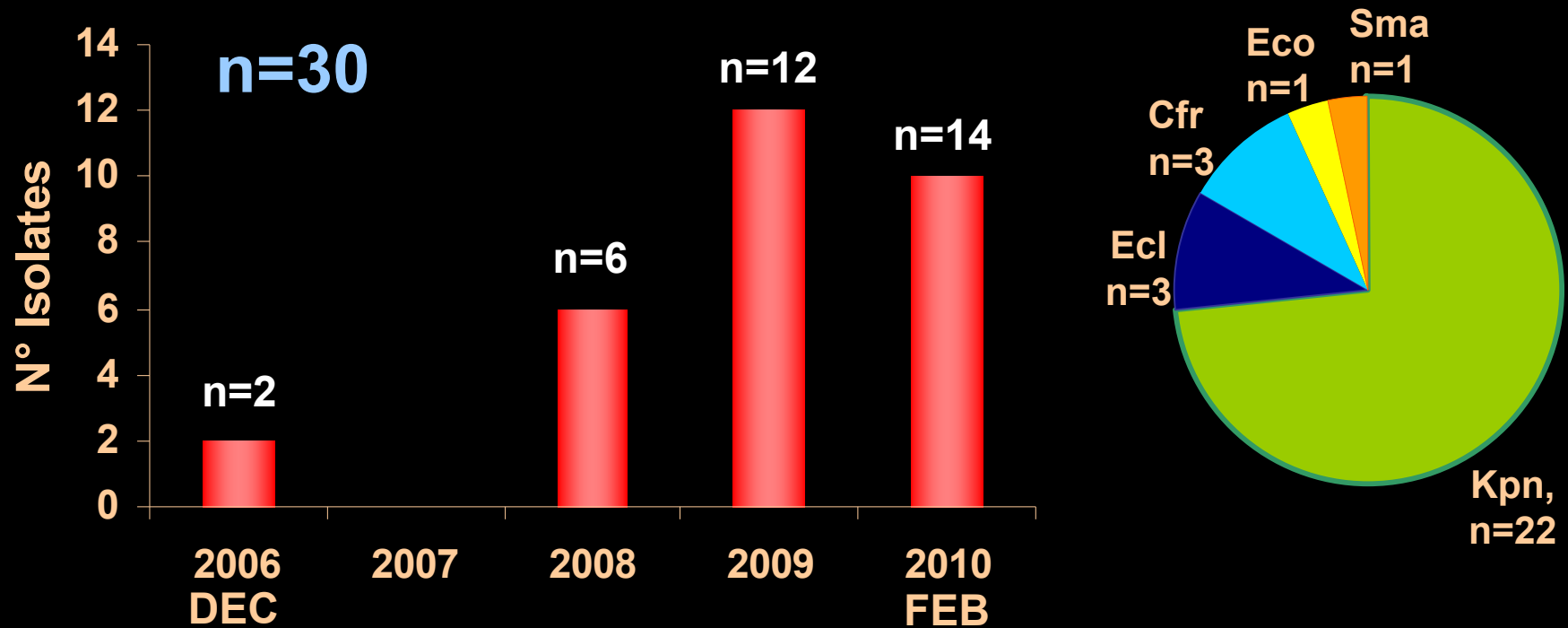
**REPORT R INDEPENDENT FROM HALOS/MIC  
MOLECULAR CONFIRMATION NECESSARY (Ntl. Ref. Lab.)**

High predictive value of ESBL +  
impermeability.  
Any other resistance profile,  
communicate with Ntl. Ref. Lab.

# OBJECTIVE

To characterize KPC-producing  
*Enterobacteriaceae* from Argentina.

# KPC+ ISOLATES RECEIVED (DEC 2006-FEB 2010)



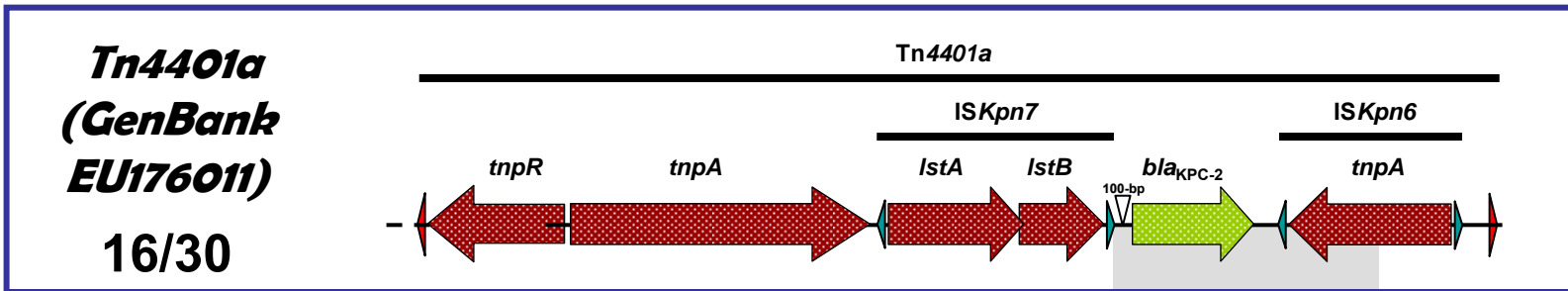
<b>Kpn</b>	50%	33.3	83.3%	90%	→ Htals. n=10
<b>Cities</b>	1	3	3	3	

All 30 strains derived complied with the criteria set forth by the NRL of IMP inhibition halos  $\leq 21$  mm and PBA synergy.

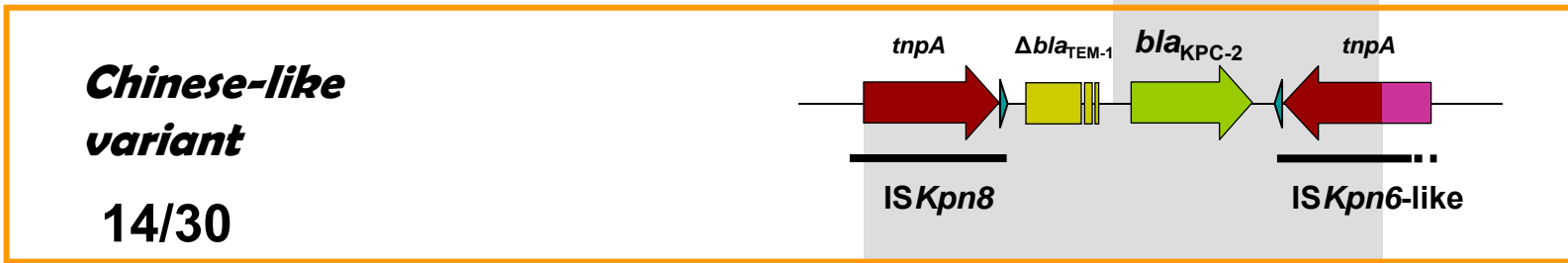
All sequenced strains harbored KPC-2 variant (n=30)

Co-production of ESBL: PER-2 (*Cfr* n=1, *Kpn* n=1), CTX-M2 (*Ecl* n=1)

# GENETIC PLATFORMS

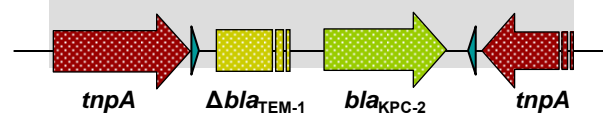


99.9%



99.9%

**E. coli**  
**Plasmid PH51075**  
**GenBank FJ609231**



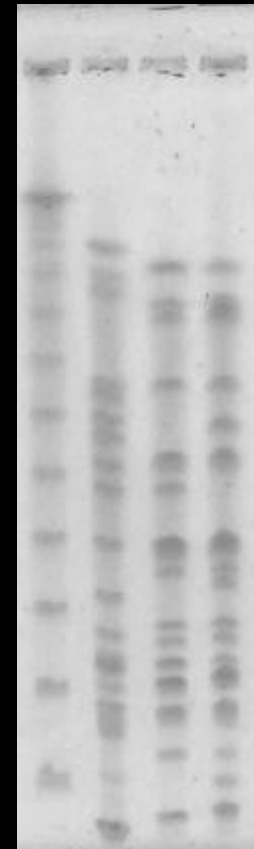
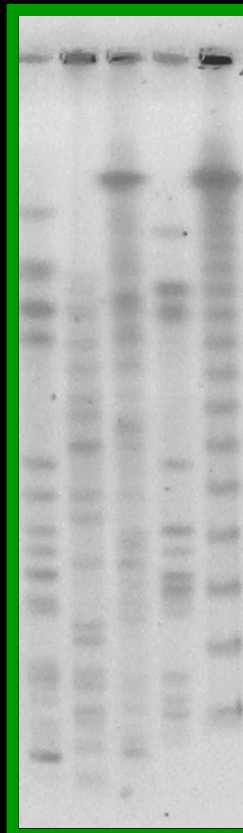
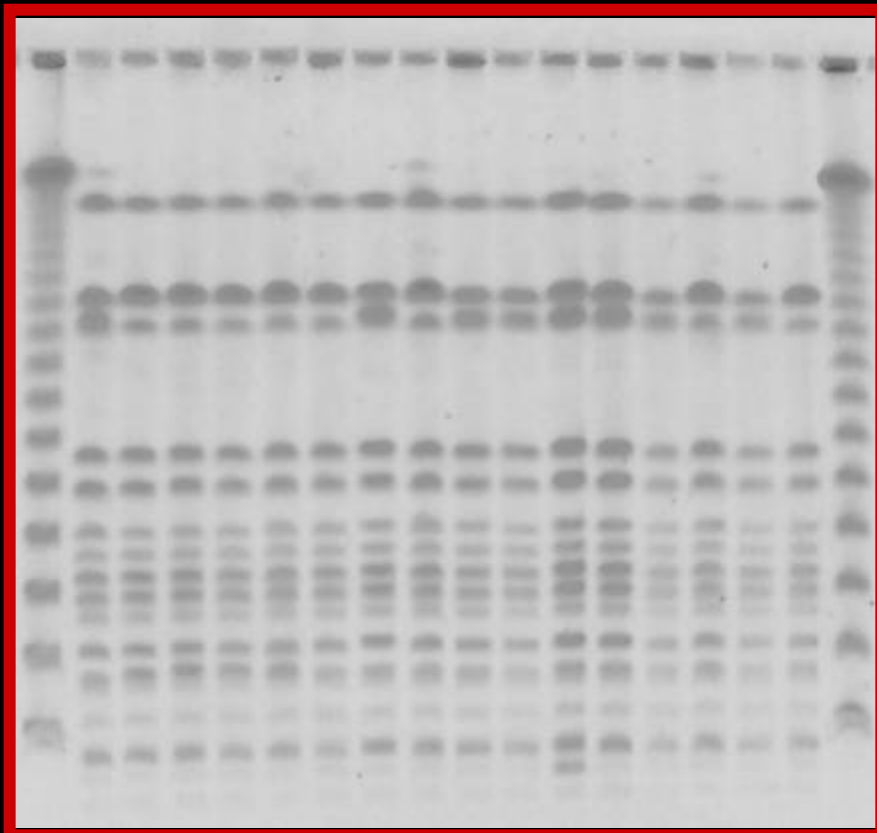


# Enterobacteriaceae KPC+: Xba-I PFGE analysis

*Kpn*, n=22

*Ecl*, n=3

*Cfr*, n=3



Pulsotype A



ST258

No clonal relatedness

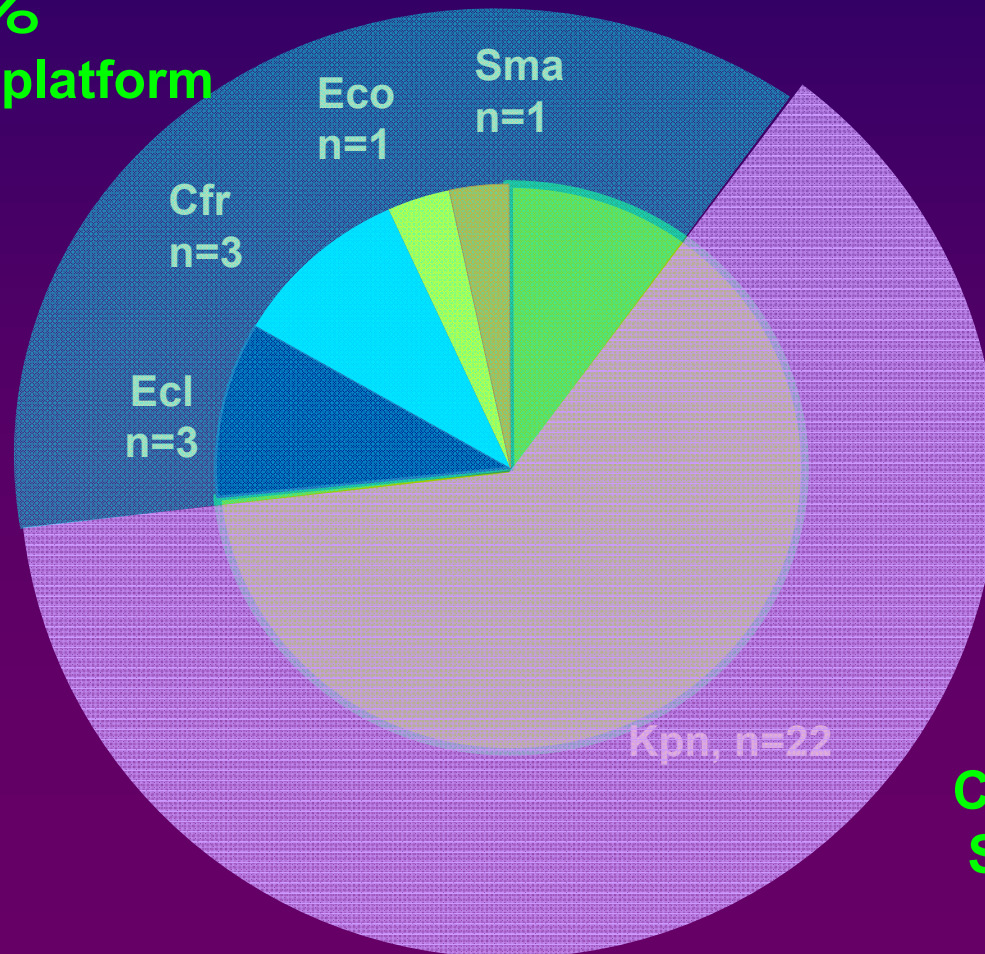
No clonal relatedness

Tn4401a

CH-like

# TOTAL NUMBER OF ISOLATES RECEIVED (DEC 2006-FEB 2010) Genetic environment/ST

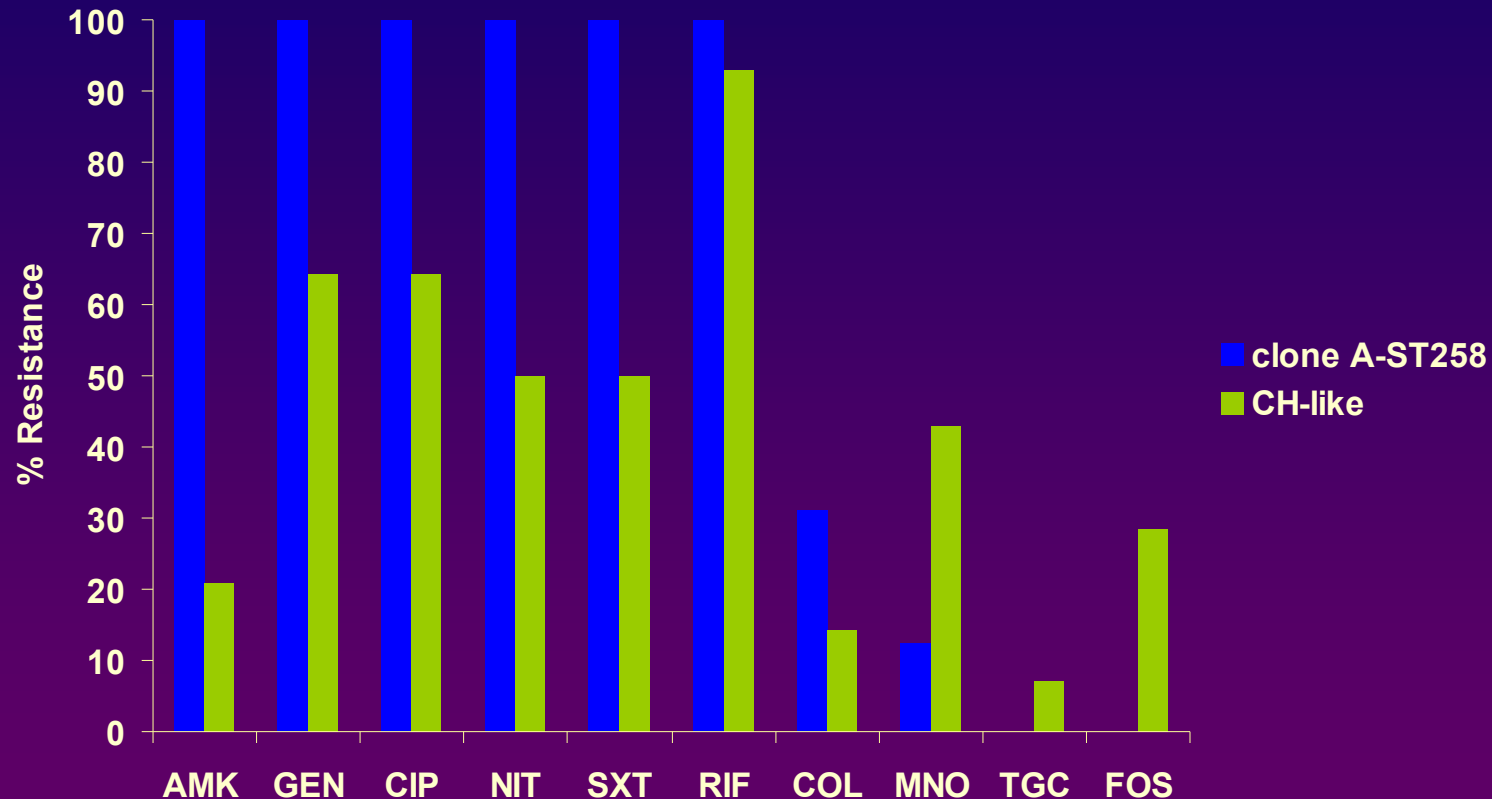
**36%**  
CH-derived platform



**64%**  
CLONAL TYPE A  
ST258/ Tn4401a

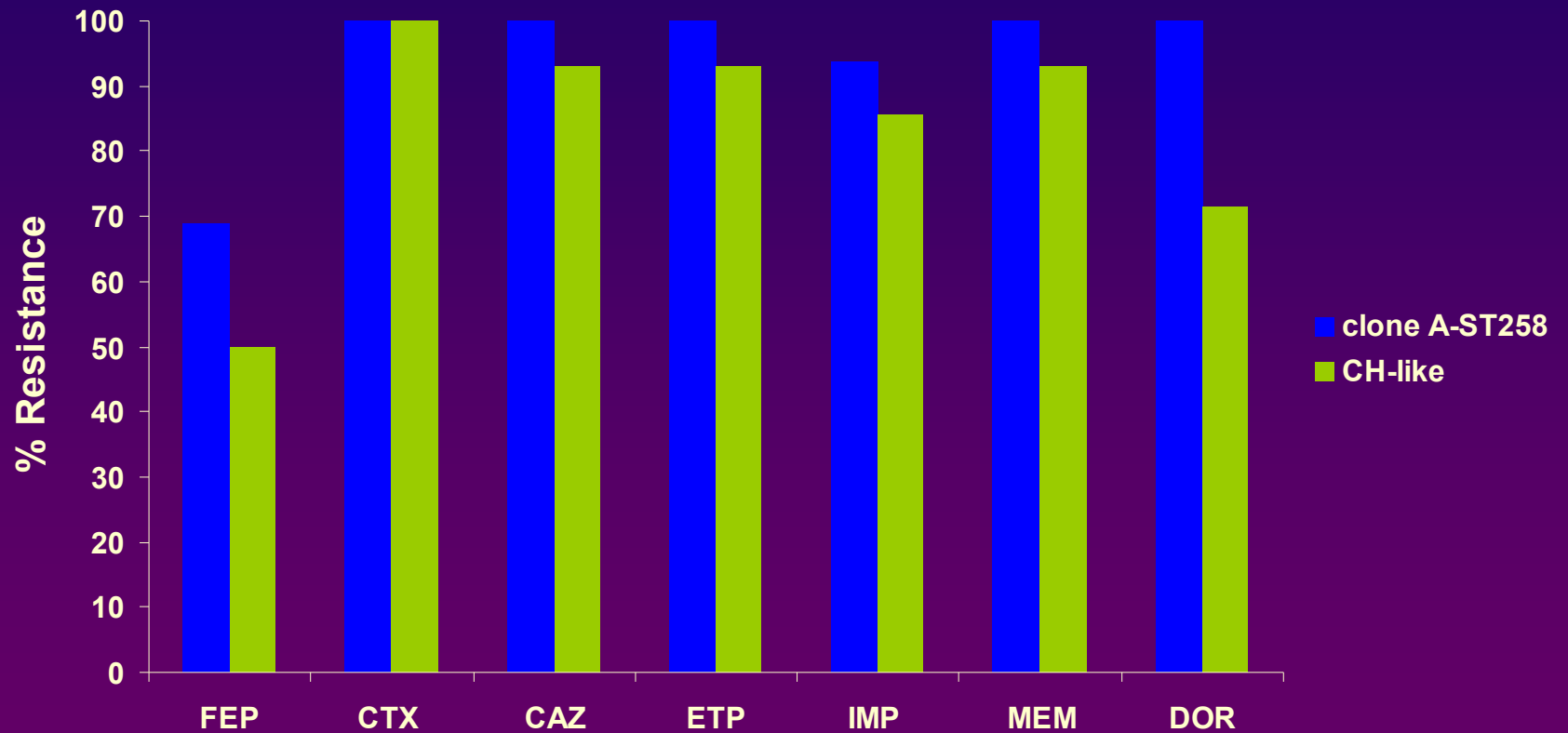


# % Resistance to Non- $\beta$ -lactam antibiotics



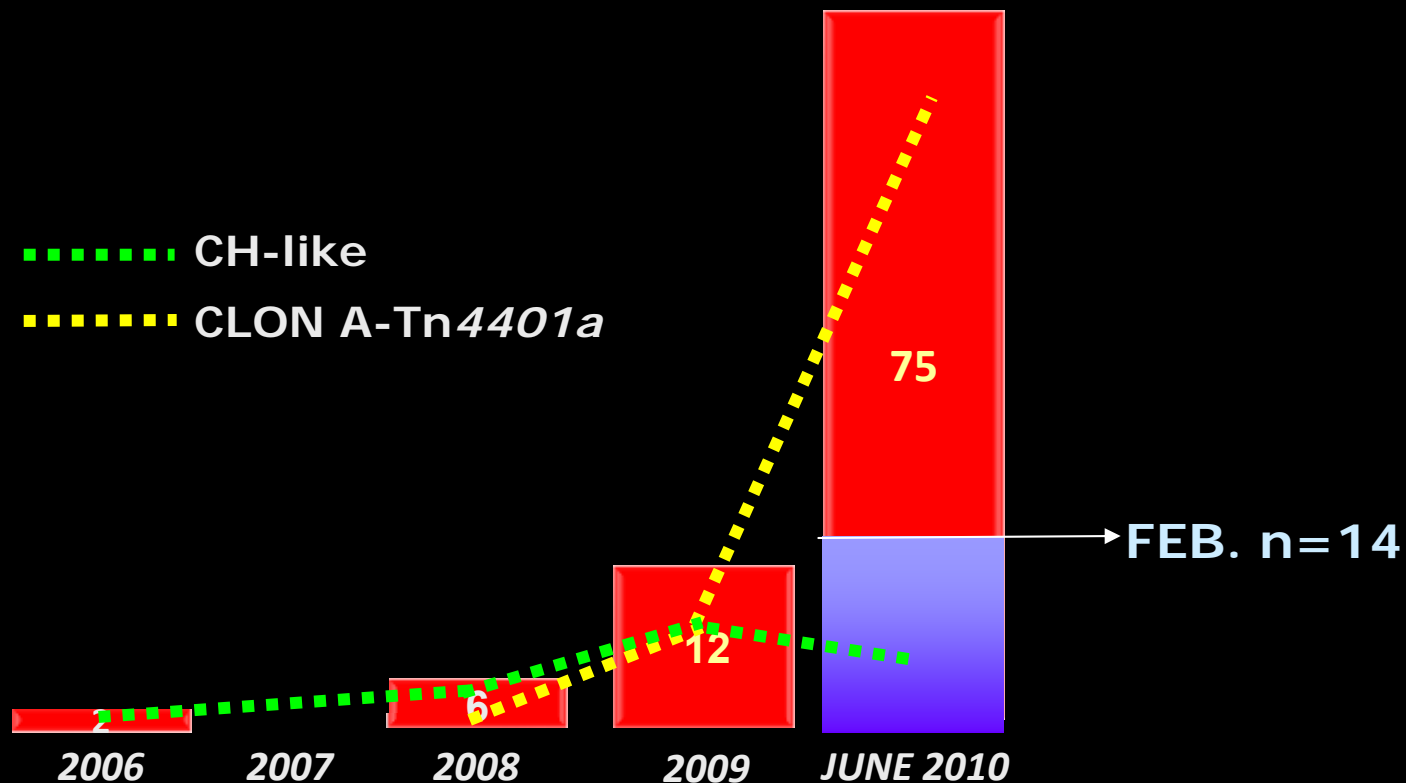
COL, MNO, TGC and FOS were the drugs with major activity *in vitro* for both groups.  
KPN-ST258 have higher % of R to AMK, GEN, CIP, NIT and SXT.  
Strains that harbor the CH-like platform are more susceptible to these antibiotics

## % Resistance to $\beta$ -lactam antibiotics



Both groups show high level of R to all  $\beta$ -lactam antibiotics.

# REGIONAL ALERT



**n=93 isolates**  
**At least 27 institutions affected**

# CONCLUSIONS

First occurrence of KPC in Argentina in 2006:

- active surveillance since 2007 (70 hospitals WHONET-Arg. Network)
- development and implementation of algorithm for carbapenemase search (class A/MBL) adapted to the local epidemiology since 2007.

Reception of 30 clinical isolates with *bla*<sub>KPC-2</sub>  
12 hospitals, 3 cities, 5 species

Two distinctive groups were discriminated based on the genetic platform:

(i) 16 Kpn isolates from BA belonged to the same PFGE clonal type and to the ST258, and contained *bla*<sub>KPC-2</sub> in Tn4401a;

(ii) 14 ETB (3 Kpn, 3 *Cfr*, 3 *Ecl*) contained *bla*<sub>KPC-2</sub> flanked by *ISKpn8-ΔblaTEM-1* and *ISKpn6-like* (NO CLONAL RELATIONSHIP)

**Rapid dissemination of *bla*<sub>KPC-2</sub> in Argentina is caused by both: (1) the clonal spread of *Kpn*-ST258 carrying Tn4401a and (2) the horizontal interspecies dissemination of the CH-like platform.**