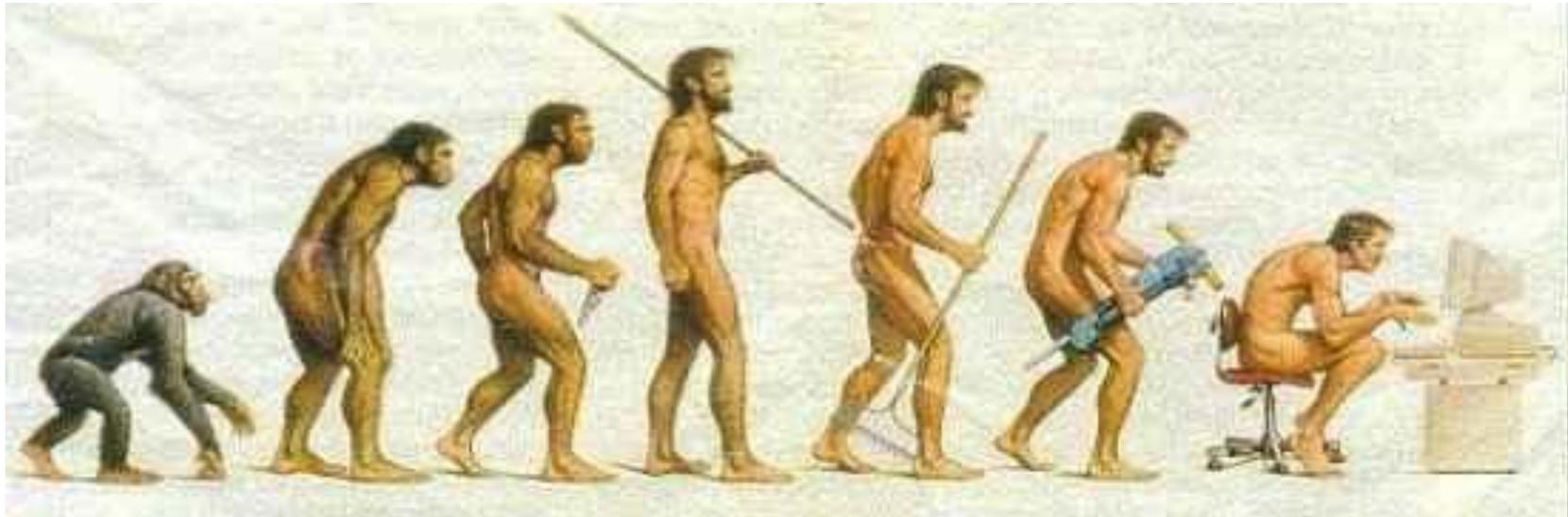


Investigation of possible outbreak of NDM-5 producing ST16 *Klebsiella pneumoniae* among patients in Denmark with no history of recent travel using whole-genome sequencing



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First report of a health-care associated outbreak with NDM-5 producing *Klebsiella pneumoniae* in Europe

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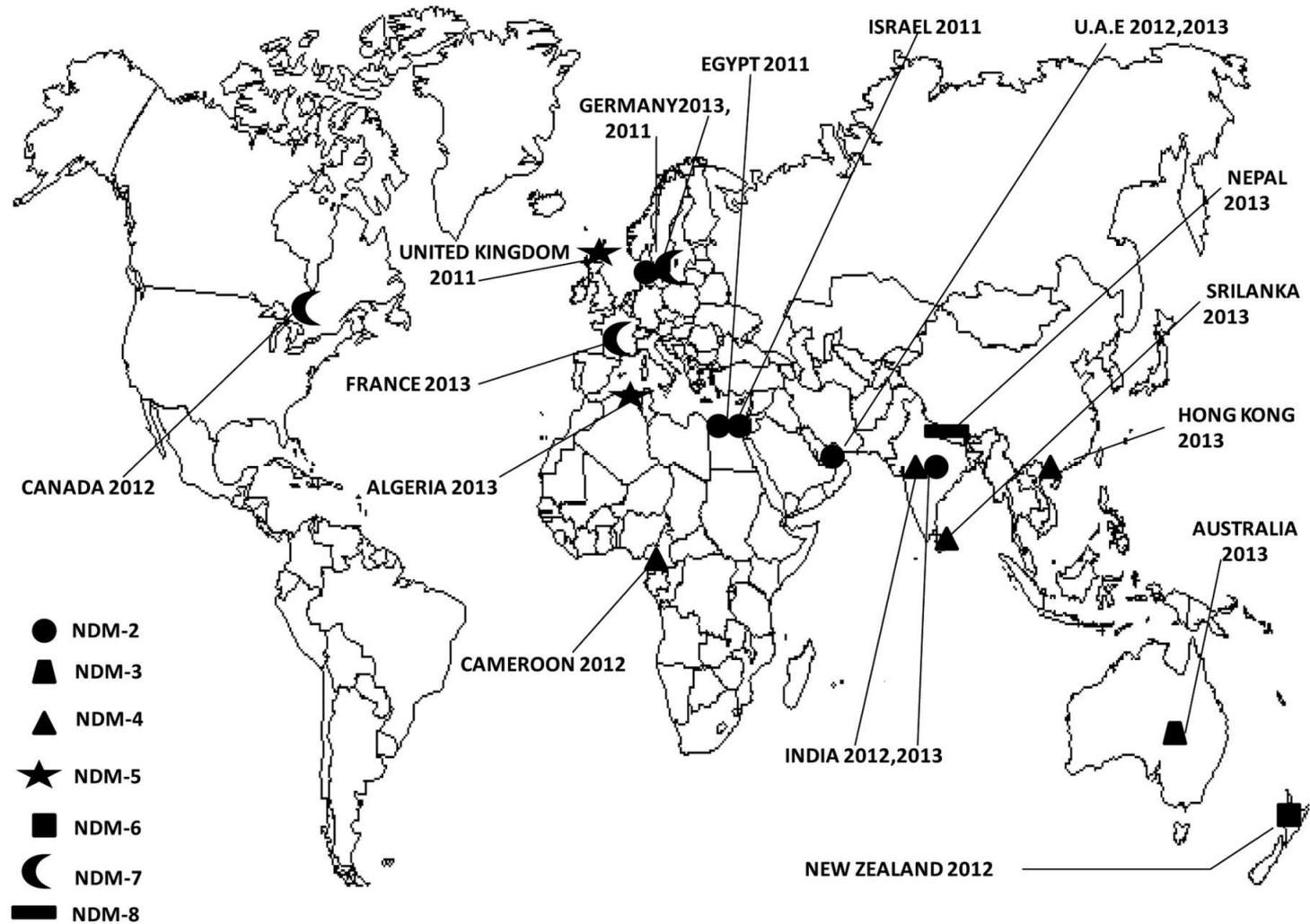
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NDM-5

- First detected in n 2011 in a *E. coli* cultured from an UK patient transferred from India.
- Differs from NDM-1 by two amino acid substitutions, at positions 88 (Val → Leu) and 154 (Met → Leu).
- Still rare, single cases in *E. coli* from India, Algeria, China and Spain.

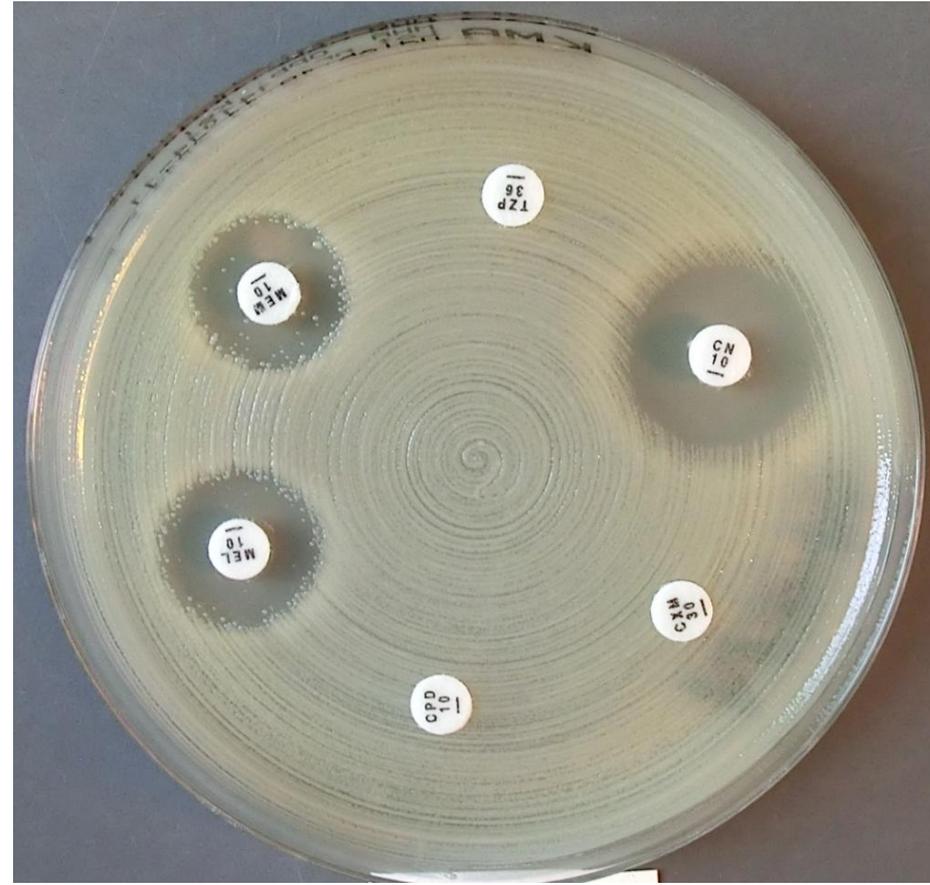
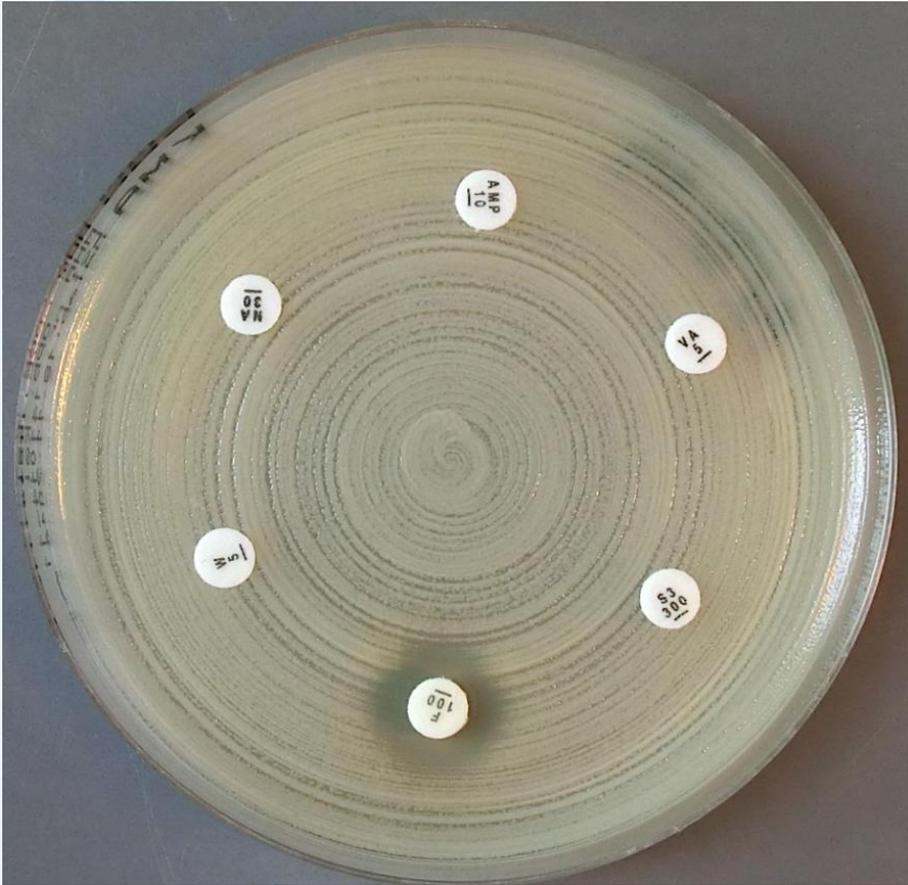
Geographic distribution of NDM variants detected worldwide.



Asma Sassi et al. *Antimicrob. Agents Chemother.*
2014;58:5606-5608

Antimicrobial Agents and Chemotherapy

Urindyrkning fra ITA med $10E5$ K.pneumoniae



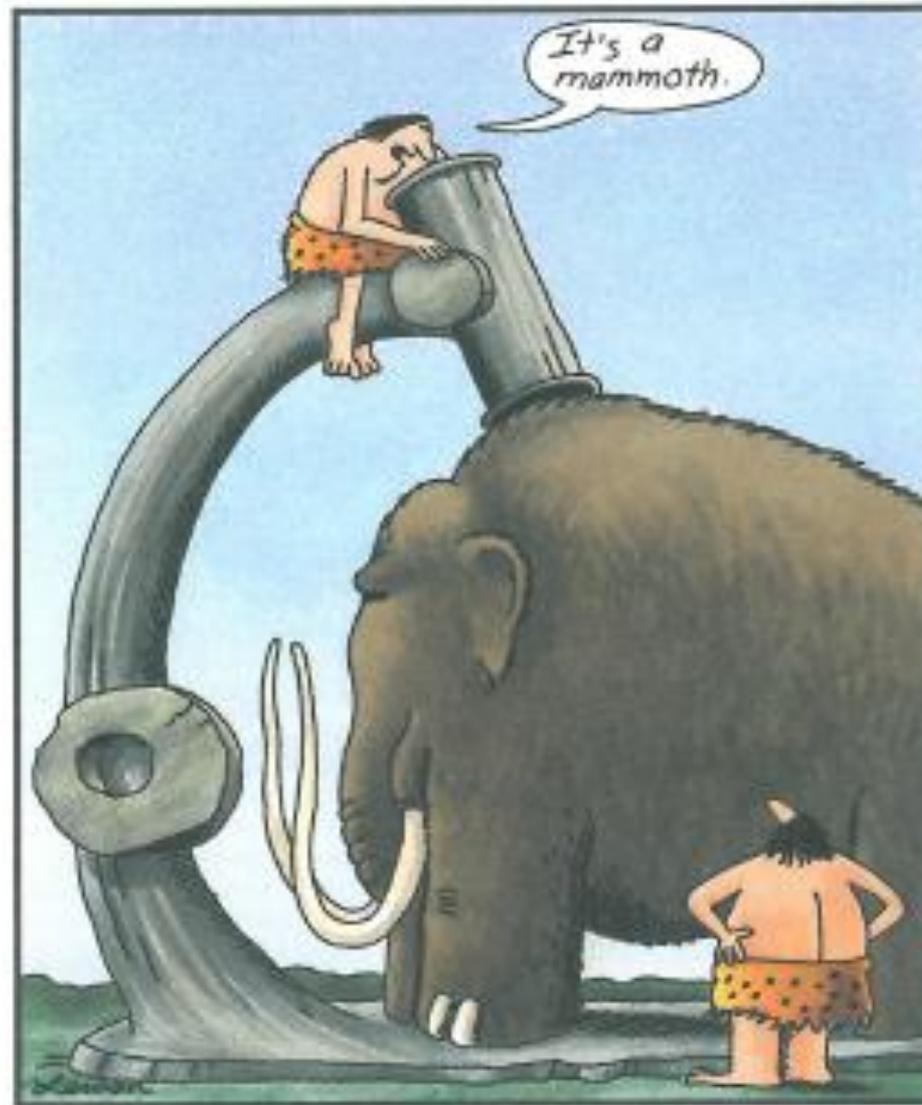
ESBL+



Table 1. Description of the five Danish ST16 NDM-5 producing *Klebsiella pneumoniae* isolates

Isolate name	Patient No.	Sample date (dd/mm/yyyy)	Hospital/ General practitioner	Department	Origin	SNP profile	Resistance profile ¹	Beta-lactams
CPO-2014-0020	1	28-07-2014	General practitioner	-	urine		1	<i>bla</i> _{NDM-5} , <i>bla</i> _{CTX-M-15} , <i>bla</i> _{SHV-1} , <i>bla</i> _{OXA-1} , <i>bla</i> _{TEM-1b}
CPO-2014-0029	2	03-09-2014	Nordsjælland Hospital	Dept. of General surgery	abscess - aspirate	3 SNP difference to CPO-2014-0020	1	<i>bla</i> _{NDM-5} , <i>bla</i> _{CTX-M-15} , <i>bla</i> _{SHV-1} , <i>bla</i> _{OXA-1} , <i>bla</i> _{TEM-1b}
CPO-2014-0032	3	02-10-2014	Nordsjælland Hospital	Intensive Care Unit	urine	identical SNP-profile as CPO-2014-0029	1	<i>bla</i> _{NDM-5} , <i>bla</i> _{CTX-M-15} , <i>bla</i> _{SHV-1} , <i>bla</i> _{OXA-1} , <i>bla</i> _{TEM-1b}
CPO-2014-0041	1	29-10-2014	Nordsjælland Hospital	Dept. of Respiratory Medicine & Infectious diseases	urine catheter	9 SNP difference to CPO-2014-0020	1	<i>bla</i> _{NDM-5} , <i>bla</i> _{CTX-M-15} , <i>bla</i> _{SHV-1} , <i>bla</i> _{OXA-1} , <i>bla</i> _{TEM-1b}
CPO-2015-0003	4	06-01-2015	Slagelse Hospital	Dept. of Respiratory Medicine	respiratory secretion	2 SNP difference to CPO-2014-0020	1	<i>bla</i> _{NDM-5} , <i>bla</i> _{CTX-M-15} , <i>bla</i> _{SHV-1} , <i>bla</i> _{OXA-1} , <i>bla</i> _{TEM-1b}

WGS (Whole Giant Searching)



Early microscope

Resistance and virulence genes:

- Meropenem MIC~ 24 µg/mL. Susceptible to gentamicin and colistin.
- WGS data showed presence of:
 - *bla*_{NDM-5}
 - *bla*_{CTX-M-15}
 - *bla*_{SHV-1}
 - *bla*_{OXA-1}
 - *bla*_{TEM-1}
 - *strA* and *strB*
 - *aadA2*
 - *aac(6')-Ib-cr*
 - *aph(3')-Ia*
 - *oqxA* and *oqxB*
 - *QnrB66*
 - *mph(A)*
 - *catB3*
 - *Sul1* and *Sul2*
 - *tet(A)*
 - *dfrA12* and *dfrA14*.
- *K. pneumoniae* virulence factors:
 - Type-1 and type-3 fimbriae
 - Yersiniabactin
- Capsule serotype K51
- MLST type ST16

