

NordicAST VRE study 2012

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Acquired vancomycin resistance in enterococci

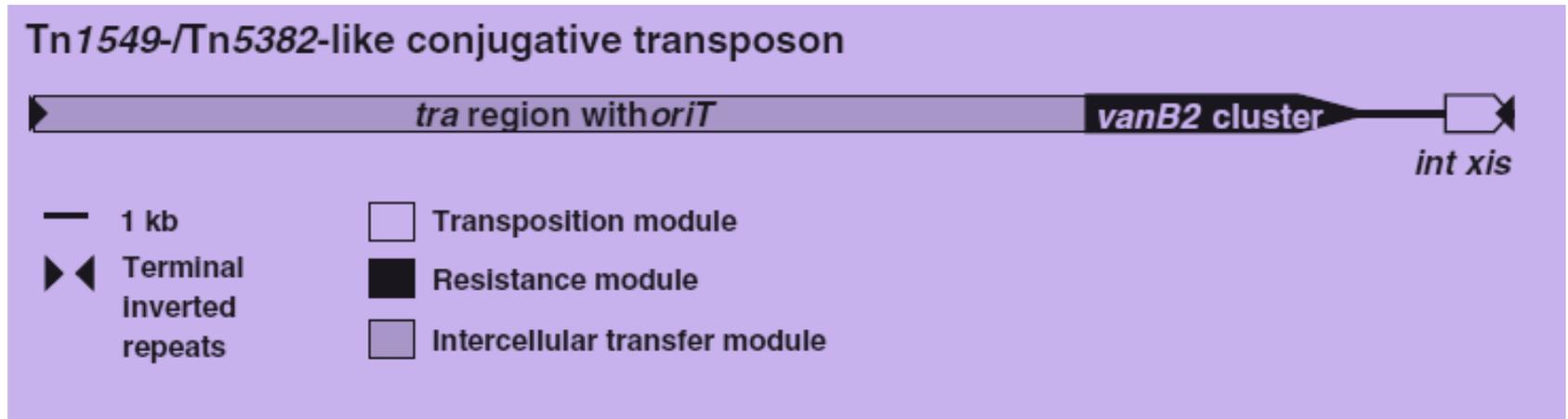
- *vanA, B, D, E, G, L, M* and *vanN*
- *vanB*
 - resistant to **vancomycin** (MIC 4-1024 mg/L)
 - susceptible to teicoplanin (MIC \leq 2 mg/L)

EUCAST MIC clinical breakpoints glycopeptides *Enterococcus* spp.

- vancomycin R $>$ 4 mg/L
- teicoplanin R $>$ 2 mg/L

vanB cluster spread

- Can be part of successful hospital adapted clones
- May transfer as part of large chromosomal elements or plasmids
- Predominant subtype *vanB2* integral part of;



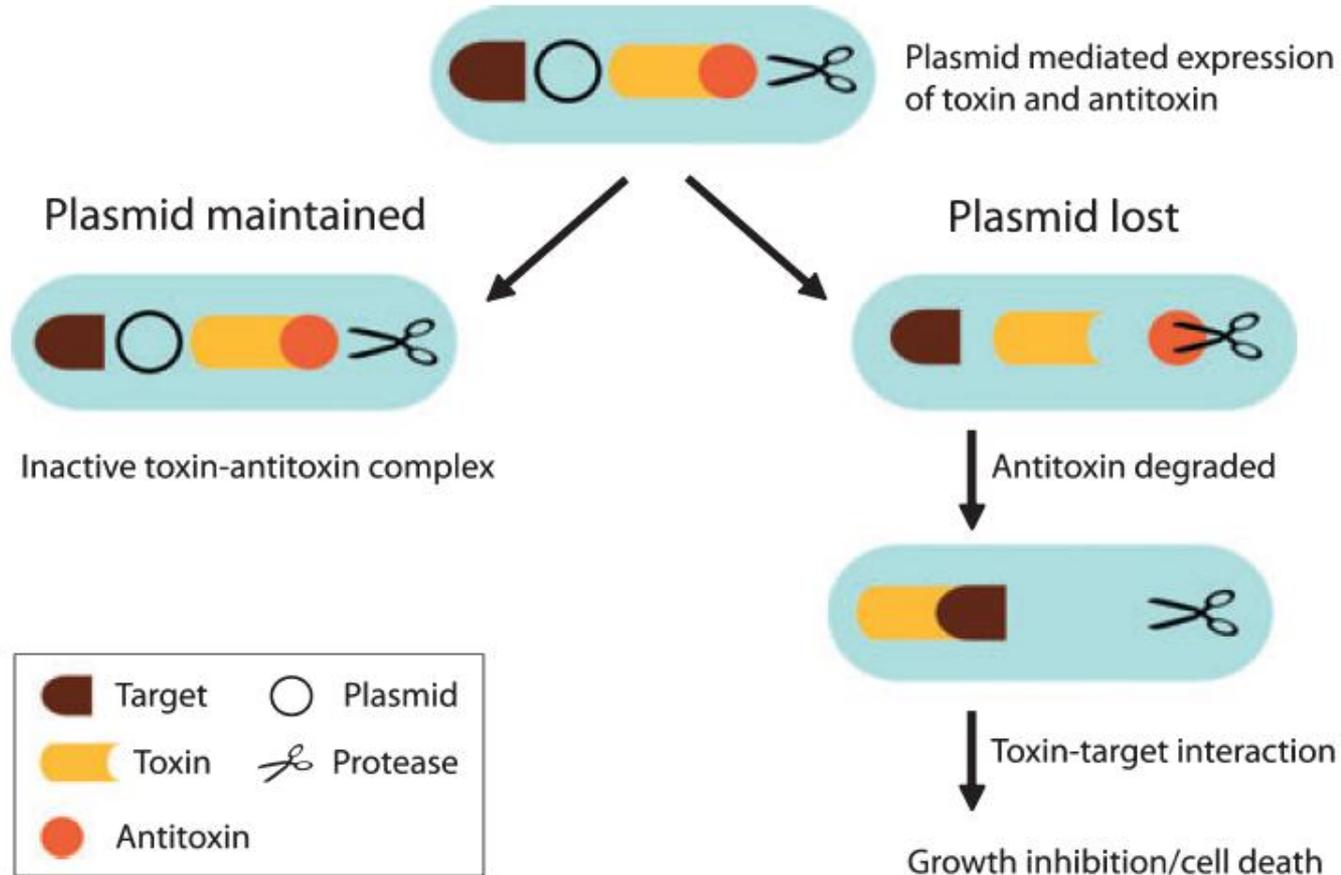
Bjørkeng et al., 2011. APMIS 119:247-58;

Hegstad et al., 2010 Clin Microbiol Infect 16:1541-54;

Hegstad et al., unpublished;

Lopez et al., 2009. Clin Microbiol Infect 15:586-8;

vanB cluster can be part of plasmids containing addiction systems



Bjørkeng et al., 2011. APMIS. 119:247-258

Hegstad et al., 2010 Clin Microbiol Infect 16:1541-54

Hegstad et al., unpublished results

Blinded material contained 27 isolates with a *van* genotype and 3 without

Species	<i>van</i> genotype	Vancomycin MIC range mg/L	No. of strains (No. of PFGE types)
<i>E. faecalis</i>	B1	8 - 24	3 (3)
<i>E. faecalis</i>	B2	4	1 (1)
<i>E. faecalis</i>	E	16	1 (1)
<i>E. faecalis</i>	G	16	1 (1)
<i>E. faecalis</i> ATCC 29212	-	3	3 (1)
<i>E. faecalis</i> ATCC 51299	B	16	3 (1)
<i>E. faecium</i>	B1	>256	1 (1)
<i>E. faecium</i>	B2	6 - >256	17 (15)

Included outbreak strains with low-level vancomycin resistance from Bergen (1996), Örebro (2002-03), Huddinge (2007) and Västerås (2008)

Participation and methods

- 34 Scandinavian labs participated
 - 13 Norwegian
 - 12 Swedish
 - 9 Danish
- Methods

	No. of labs
– Disk diffusion (6mm disks)	32
– Disk diffusion (Neosensitabs)	2
– BHI agar screen vanco 6 mg/L	21
– VRE Chrom Agar	14
– Vitek	7
– Phoenix	1

Results automated systems

Method (n=no. of labs)	False susceptible samples	False resistant samples
Vitek (n=7)	25 (13%)	0 (0%)
Phoenix (n=1)	4 (15%)	0 (0%)

- False susceptible = classified as S when containing *van* genotype
- False resistant = classified as R when containing no *van* genotype

Results disk diffusion

Method (n=no. of labs)	False susceptible samples	False resistant samples
6 mm disks (n=32)	60 (6,9%)	4 (4,2%)
Neosensitabs (n=2)	9 (17 %)	0 (0%)

- False susceptible = classified as S when containing *van* genotype
- False resistant = classified as R when containing no *van* genotype

If zone edge was fuzzy or colonies grew within the zone, the sample was considered R even though the zone size suggested S

Results agar screen

Method (n= no. of labs)	False susceptible samples	False resistant samples
BHI vanco 6 (n=21)	47 (8,3%)	4 (6,3%)
VRE ChromAgar (n=14)	8 (2,1%)	6 (14%)

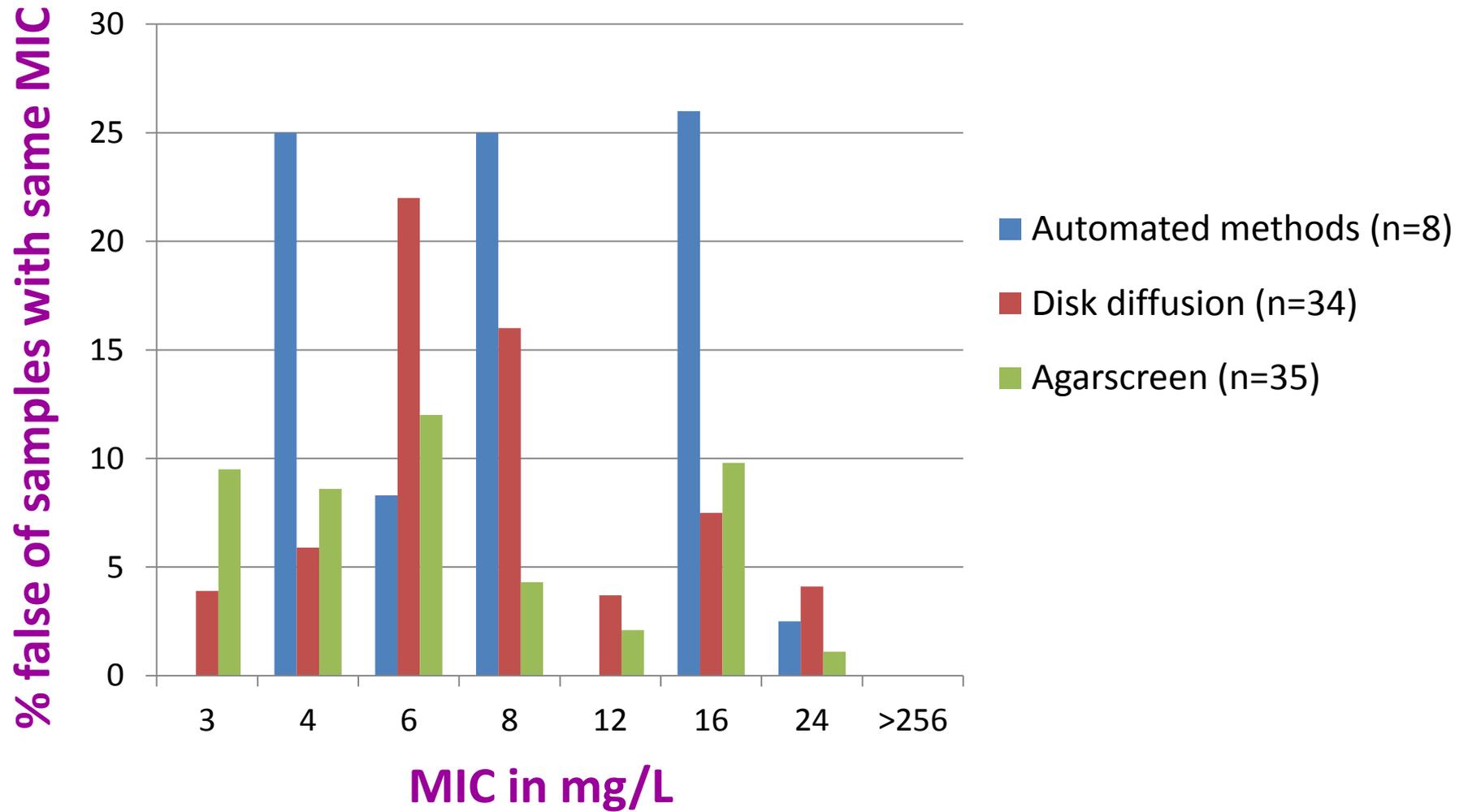
- False susceptible = No growth when containing *van* genotype
- False resistant = Growth when containing no *van* genotype

Resistant strains that were often classified as S

Strain no.	Species	PFGE type	van genotype	Vancomycin MIC mg/L	Range mm zones	No. of false susceptible		
						Disk diffusion (n=34)	Agarscreen (n=35)	Automated methods (n=8)
4	<i>E. faecium</i>	I	B2	8	6-15	7	2	0
6	<i>E. faecium</i>	II	B2	8	9-16	14	10	2
9	<i>E. faecalis</i>	III	B1	8	6-13	6	1	0
11	<i>E. faecium</i>	IV	B2	8	6-15	5	2	4
14	<i>E. faecalis</i>	V	G	16	7-11	0	0	6
13	<i>E. faecium</i>	VI	B2	16*	6-20	7	14	3
15	<i>E. faecium</i>	VI	B2	16*	6-19	5	5	4
20	<i>E. faecium</i>	VI	B2	16*	6-20	8	9	4
30	<i>E. faecalis</i>	VII	B2	4	6-23	2	3	2

* Outbreak strain from Västerås showed double zone by Etest

MIC distribution of false samples



Summary

Method	False susceptible samples	False resistant samples
Vitek	25 of 189 (13%)	0 of 21 (0%)
Phoenix	4 of 27 (15%)	0 of 3 (0%)
BHI vanco 6	47 of 567 (8,3%)	4 of 63 (6,3%)
VRE ChromAgar	8 of 378 (2,1%)	6 of 42 (14%)
Disk diffusion 6mm	60 of 864 (6,9%)	4 of 96 (4,2%)
Neosensitabs	9 of 54 (17 %)	0 of 6 (0%)

Comparing results by countries

Method	Country (no. of labs)	False susceptible samples in %	False resistant samples in %
Disk diffusion	Sweden (12)	1,5	0
	Norway (13)	10	2,6
	Denmark (9)	12	11
BHI vanco 6	Sweden (1)	3,7	0
	Norway (13)	7,1	0
	Denmark (7)	11	19
ChromID VRE	Sweden (7)	1,6	14
	Norway (6)	3,1	17
	Denmark (1)	0	0

Noen tanker

- *vanB* kan være vanskelig å fange opp med tilgjengelige metoder
 - Ingen av de testede metodene var feilfrie
 - Viktig med metoder som fungerer i rutinelab
 - Metoder med lite rom for tvil om tolkning er lettere å forholde seg til i rutinehverdagen
- Gode nok positive kontrollstammer for fenotypisk testing av lavgradig vankomycinresistens?
 - Vankomycin MIC-verdi (8 mg/L) som utfordrer testbetingelser
- Prosjekter som dette – brukes spesialisert personale eller leses de av som vanlige rutineprøver...

Stor takk til deltakerlaboratoriene

- Aalborg Sygehus
- Aarhus Universitetshospital
- Akershus Universitetssykehus
- Aleris Medilab
- Central Hospital Växsjö
- Centralsjukhuset Karlstad
- Førde Sentralsjukehus
- Hallands Sjukhus Halmstad
- Haukeland Universitetssykehus
- Herlev Hospital
- Hillerød Hospital
- Hvidovre Hospital
- Länssjukhuset i Kalmar
- Karolinska Universitetssjukhuset Huddinge
- Karolinska Universitetssjukhuset Solna
- Linköping Universitetssjukhuset
- Molde Sykehus
- Nordlandssykehuset Bodø
- Odense Universitetshospital
- Rikshospitalet Oslo
- Sahlgrenska Universitetssjukhuset
- Skånes Universitetssjukhus Lund
- Skånes Universitetssjukhus Malmö
- Slagelse Sygehus
- Statens Serum Institut
- Stavanger Universitetssjukehus
- St. Olavs Hospital
- Sykehuset i Vestfold
- Sykehuset Østfold
- Sørlandet Sykehus
- Ullevål Universitetssykehus
- Universitetssykehuset Nord-Norge
- Uppsala Akademiska Sjukhuset
- Velje Sygehus