Quinupristin/dalfopristin-resistant *Enterococcus faecium* isolated from human stools, retail chicken and retail pork: EIP enterococci project

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CDC

Enterococcal Disease

- Third most common cause of nosocomial bacteremia in the past decade[1]
- Although *E. faecalis* is the most common enterococcal species isolated from human blood and urine, *E. faecium* is more frequently associated with resistance to ampicillin and vancomycin[2]
- 26.3% of enterococci from ICU patients were resistant to vancomycin (NNIS 2000)

1. Garbutt JM *et al*. Clin Infect Dis 2000 Mar;30(3):466-72
2. Huycke MM *et al.* Emerg Infect Dis 1998 Apr-Jun;4(2):239-49
3. Am J Infect Control 2001:29;404-21

Streptogramins

Synercid® (quinupristin/dalfopristin)

- Approved in 1999 for the treatment on vancomycin-resistant *E. faecium*

Virginiamycin

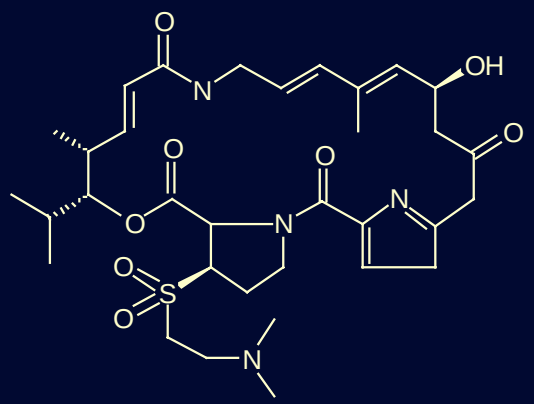
- Used since 1974 for growth promotion in poultry, cattle and swine

Streptogramin Structures

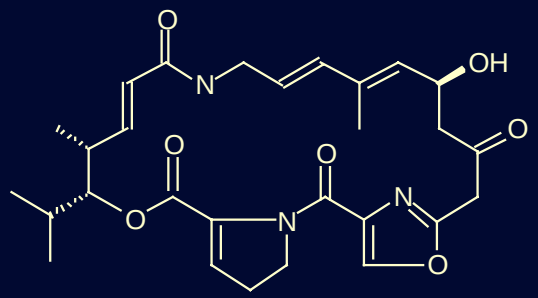
SYNERCID®

VIRGINIAMYCIN

Type A (Macrolactones)

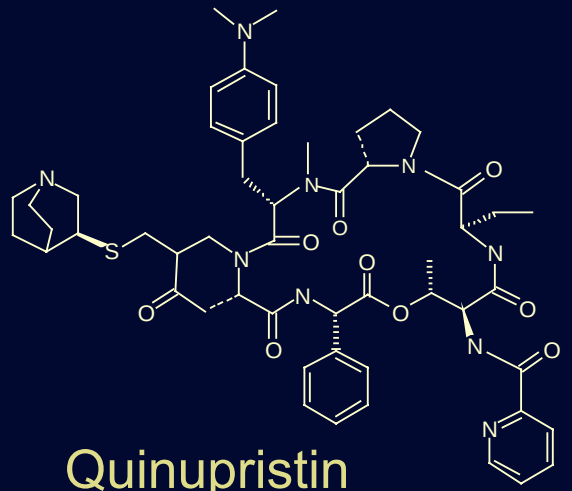


Dalfopristin



Virginiamycin M

Type B (cyclic hexadepsipeptides)



Quinupristin

Virginiamycin S

Emerging Infections Program Survey for Antimicrobial-Resistant Enterococci: July 1998 - June 2000

- **Stools** submitted for routine culture to public health laboratories from outpatients in Oregon, Georgia and Minnesota (n=334, July 1998 to June 1999)

- **Chicken** carcasses purchased from grocery stores near the above sites and a university hospital in Maryland (n=407, July 1998 to June 1999)

- **Ground pork** purchased from the same sites as the chicken study and stores near a university hospital in Michigan (n=585, July 1999-June 2000)

Isolation of *E. faecium* on selective and nonselective plates

After an enrichment in enterococosseal broth, bacteria were subcultured onto each of the following four plates:

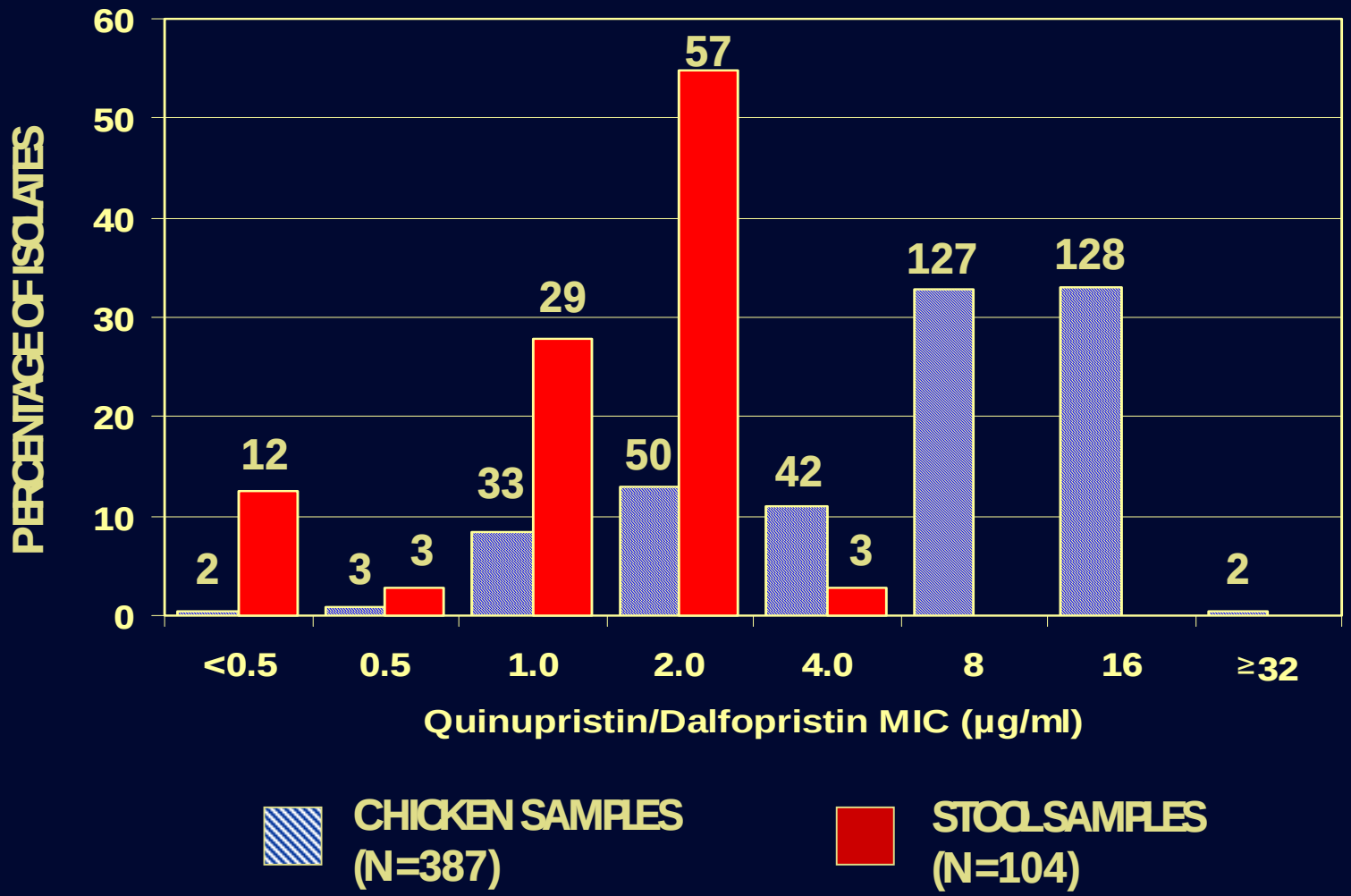
Quinupristin/Dalfopristin (4 µg/ml)

Gentamicin (100 µg/ml)

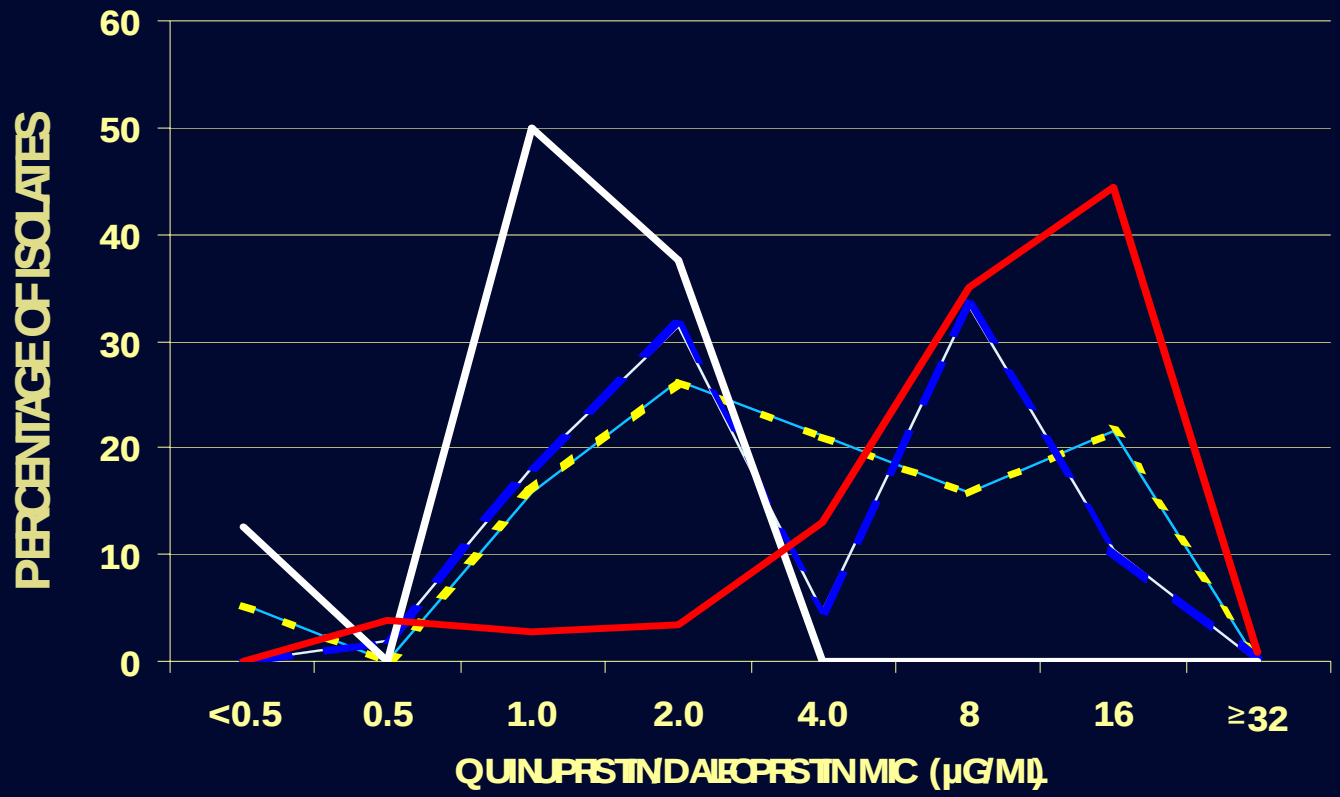
Vancomycin (10 µg/ml)

Nonselective (no antimicrobial added)

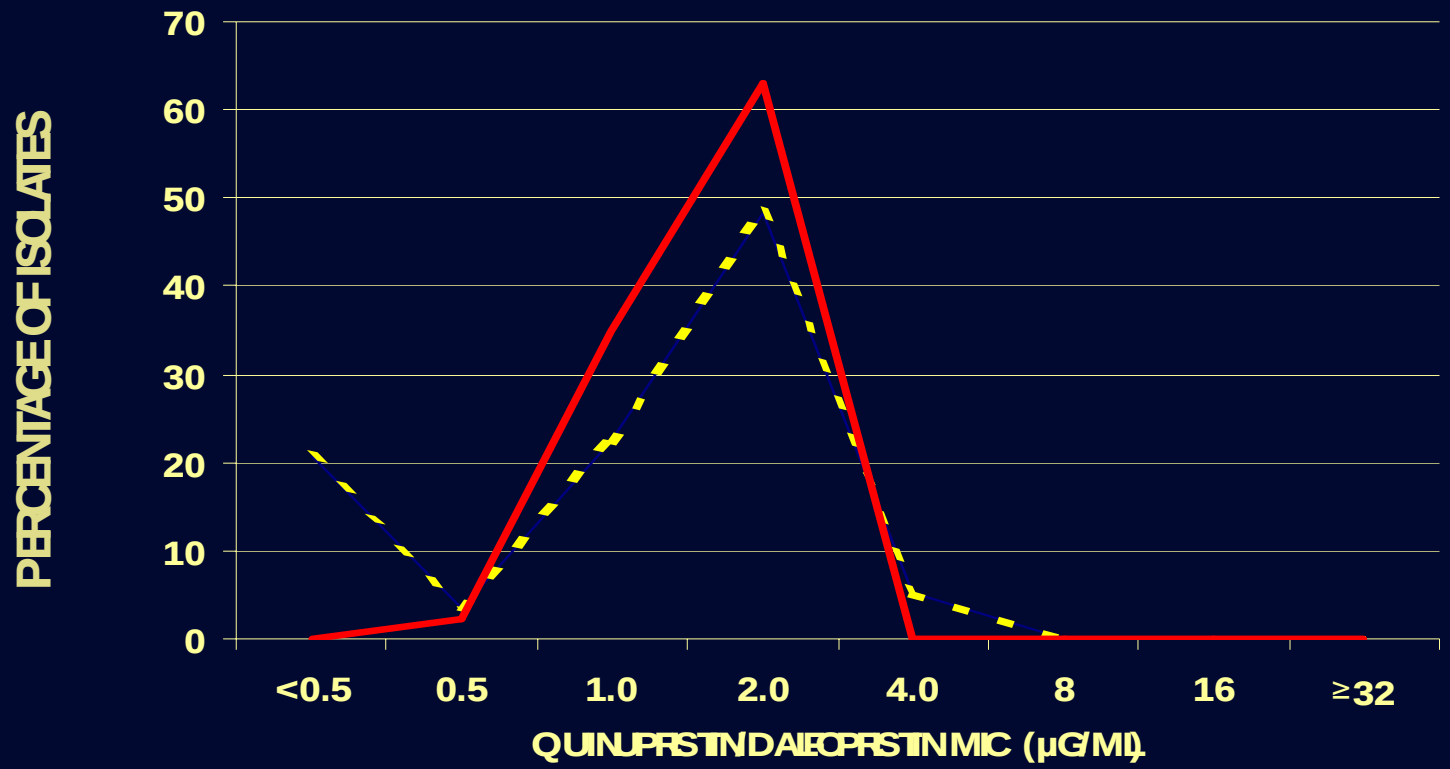
Overall percentage of *E. faecium* from retail chicken and human stool by Quinupristin/Dalfopristin MIC (July 1998 to June 1999)



Quinupristin/Dalfopristin MICs of *E. faecium* from retail chicken isolated on different plates



Quinupristin/Dalfopristin MICs of *E. faecium* from human stool isolated on different plates

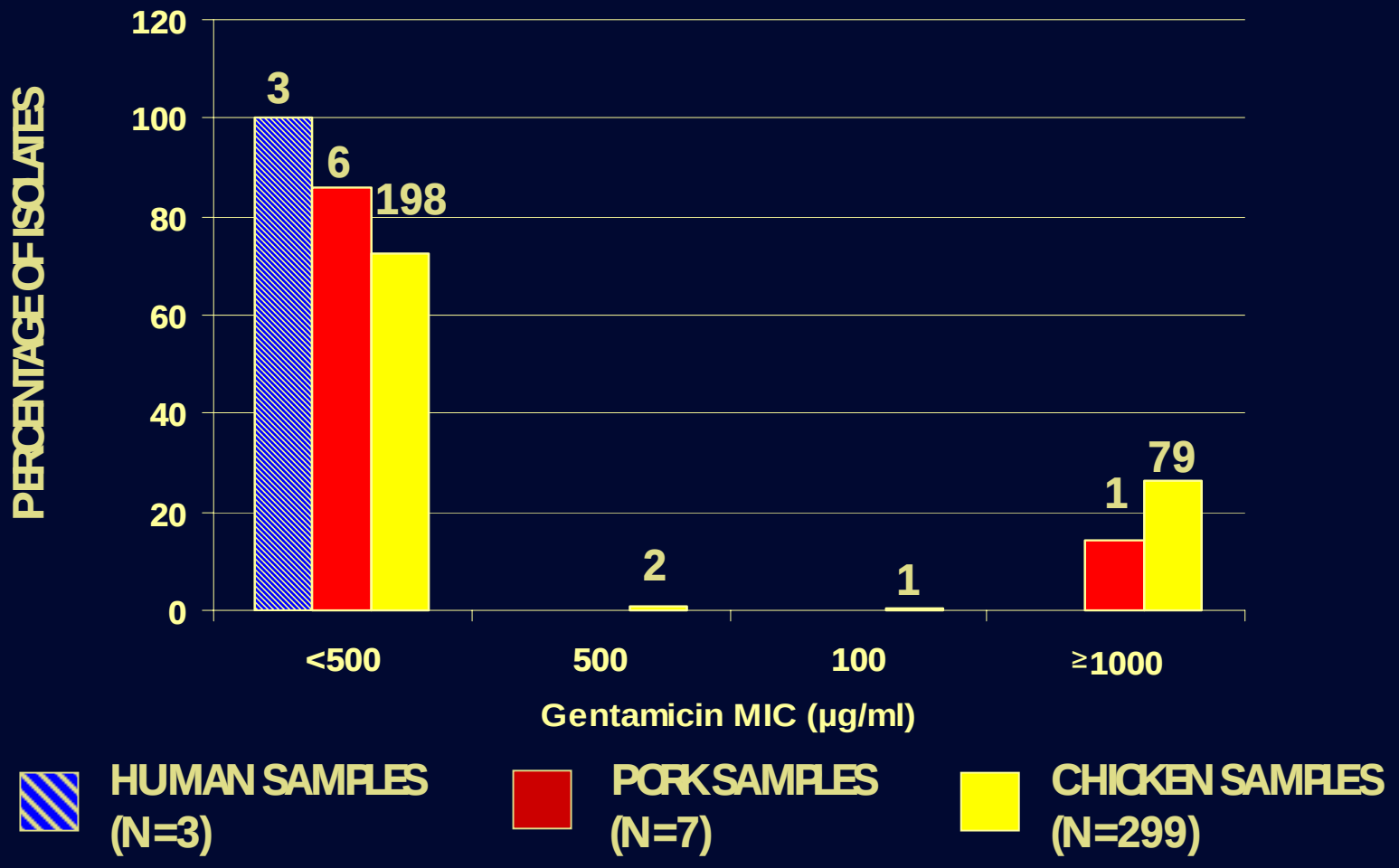


NO E. FAECIUM FROM STOOL WERE ISOLATED ON VANCOMYCIN OR GENTAMICIN PLATES

Preliminary Results from Retail Ground Pork (July 1999-June 2000)

- Of 897 enterococcal isolates from pork, species identification was only performed on quinupristin/dalfopristin-resistant strains (n=348)
- 7/348 (2.0%) of the quinupristin/dalfopristin-resistant isolates were identified as *E. faecium*
- 1/7 had a quinupristin/dalfopristin MIC of 16 µg/ml
- 6/7 had a quinupristin/dalfopristin MIC of 8 µg/ml
- All 7 quinupristin/dalfopristin-resistant *E. faecium* from pork were isolated on nonselective plates

Gentamicin MICs of Quinupristin/Dalfopristin-resistant *E. faecium* from retail chicken, pork and human stool



Conclusions:

- Quinupristin/dalfopristin-resistant *E. faecium* are more common in retail chicken than pork and human populations.

- Quinupristin/dalfopristin-resistant *E. faecium* from retail chickens are more likely than isolates from pork or human stools to also express high-level gentamicin resistance.

- Quinupristin/dalfopristin-resistant *E. faecium* from retail chicken could potentially colonize humans.

- The possibility that genetic determinants of quinupristin/dalfopristin resistance could be transferred to human pathogens poses a serious threat to public health.

Mechanisms of Streptogramin Resistance in *E. faecium*

Streptogramin A

- acetyltransferases- *vat*D/E

Streptogramin B

- lactonases- *vgb*
- target modification- *erm*A/B
- efflux- *not described in enterococci*