

First 2008
VIVA 4

How are bacteria classified?

“Please discuss the classification of bacteria”

Most commonly whether violet dye stains their peptidoglycan walls, and shape (cocci or bacilli)
Other classification schemes include, resistance to antibiotics, virulence, whether they tolerate aerobic or anaerobic conditions

“Please give two examples of gram positive cocci/bacilli and gram negative cocci/bacilli”

Gram negative

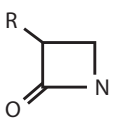
cocci - *Neisseria gonorrhoea/meningitidis*
bacilli - *E. coli, Pseudomonas*

Gram positive

cocci - *Staphylococcus, Streptococcus*
bacilli - *Clostridium, Listeria*

“Could you describe the antibiotic actions and resistance of ampicillin, vancomycin, gent and ciprofloxacin?”

Ampicillin is a beta lactam



Betalactams contain a beta lactam ring and inhibit cell wall synthesis by binding penicillin-binding proteins (PBPs)

Resistance mechanisms

alteration of PBP such as MRSA
must diffuse through porins on outer cell membrane (gram negatives)
enzymes may destroy the antibiotic - betalactamases

Gentamicin is an aminoglycoside

Mechanism of action

is to interfere with the 30S Ribosome production of proteins
abnormal proteins are inserted in the cell wall causing lysis

Resistance

modification of porins to prevent penetration into the outer membrane
anaerobic environments which prevent entry through the inner membrane
efflux mechanisms to pump the aminoglycoside out of the cytoplasm
point mutations in the 30S ribosome

Vancomycin is a glycopeptide

Mechanism of action

interferes with cell wall synthesis at an early stage (before betalactams) preventing transglycosylation reaction stopping new subunits of the cell wall developing

Resistance

gram negatives outer membranes block the entry of the very large vancomycin
mutations acquired in plasmid exchange written by the Van A-D genes

Ciprofloxacin is a fluoroquinolone

Mechanism of action

is via inhibition of DNA gyrase, thereby inhibiting cell division

Resistance is by active efflux mechanisms (*Streptococcus*)