Daptomycin (Cubicin)

Daptomycin is a member of a newer class of antibiotics called cyclic lipopeptides. As the phenomenon of antibiotic-resistant bacteria becomes more prevalent, the need for newer, alternative mechanisms of action to combat infection has similarly expanded. While this antibiotic has a relatively narrow window of therapeutic indications and some significant adverse effects, it has nonetheless proven its value in treating gram-positive skin and soft tissue infections, along with bacteremia, endocarditis, VRE, and MRSA.

PLAY PICMONIC

Mechanism Of Action

Lipopeptide Antibiotic
Lip-o-pepper-tie with ABX-guy
Daptomycin is classified as a lipopeptide antibiotic. It consists of a cyclic peptide linked to a lipid tail. In the presence of calcium, it inserts into the bacterial cell membrane and causes depolarization, leading to cell death.

Disrupts Cell Membrane
Disrupting Cell
Once incorporated into the bacterial cell membrane, daptomycin forms ion-conducting channels that lead to membrane depolarization. This disrupts membrane potential and results in bacterial cell death.

Causes Rapid Depolarization
Rapid-rabbit and D-polar-bear
Daptomycin inserts into the bacterial cell membrane in a calcium-dependent manner, forming ion channels that disrupt membrane potential. Loss of membrane potential inhibits essential cellular functions such as DNA, RNA, and protein synthesis, ultimately resulting in cell death.

Gram-Positive Cocci
Graham-cracker Positive-angel with Cock-eyes
This antibiotic demonstrates maximum efficacy on thin-walled gram-positive cocci, particularly those causing skin and soft tissue infections, bacteremia, endocarditis, and VRE.

Indication

MRSA
MR. Saw
Daptomycin has also demonstrated usefulness in combating methicillin-resistant Staphylococcus aureus (MRSA), which is a dangerous organism, given the growing difficulty in satisfactorily eradicating it with standard antibiotics.

Side Effects

Myopathy
Mayo-party-hat
A common side effect of Daptomycin is myopathy, similar to statin medications. Thus, practitioners should be cautious of myopathy in patients on these medications, particularly if they are given simultaneously.

Rhabdomyolysis

Raptor-muscle-lights

Daptomycin can lead to muscle tissue damage. In some instances, the muscular involvement may be so severe and rapid that it results in rhabdomyolysis. This side effect is described as the destruction of muscle cells and the subsequent release of their intracellular components into circulation. This can be evaluated by measuring serum levels of creatinine phosphokinase, or CPK. This side effect is a rather high-yield association to recall, so be sure to remember that both statins and Daptomycin are capable of muscular destruction, especially if they are used in conjunction. For this reason, the serum CPK should be measured.

Allergic Pneumonitis

Allergy-alligator Lungs-on-fire

Allergic pneumonitis is an immune-mediated inflammatory reaction in the lungs. It presents with symptoms such as fever, cough, and shortness of breath. It can cause characteristic pulmonary infiltrates on imaging. This condition is more likely to develop with prolonged daptomycin and usually resolves upon discontinuation of the drug.

Considerations & Patient Education

Inactivated by Surfactant

Stopped by Surf-surfactant

One of the major limitations of this antibiotic is that it is inactivated by surfactant, rendering it useless against pneumonia.

Not Used (Avoid) for Pneumonia

Avoid-sign Nude-mona

Because Daptomycin is neutralized by surfactant, it should not be used to treat pneumonia.