Imipenem and Meropenem (Carbapenems)

Imipenem and Meropenem (Carbapenems) are broad spectrum beta-lactam antibiotics that cause bacterial death by weakening the cell wall. These antibiotics are indicated to treat mixed infections, including aerobic and anaerobic bacteria. Side effects include gastrointestinal distress such as nausea, vomiting, and diarrhea. The patient may develop suprainfection or seizure activity. Carbapenems are administered only parenterally by IV or IM route. Due to the similarities in structure to penicillin, those with a penicillin allergy are commonly not prescribed carbapenems. Imipenem in specific is always combined with cilastatin to prevent degradation by renal dehydropeptidase I in the renal tubules.

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Mechanism

Carbapenems
Carpet-penny

Imipenem and Meropenem belong to a class of medications known as carbapenems. Carbapenems are similar in structure to the penicillins.

Broad-spectrum Antibiotic
Broad-spectrum of Colors with ABX-guy

Carbapenems are broad-spectrum beta-lactam antibiotics that include imipenem, meropenem, ertapenem, and doripenem. The structure of these antibiotics makes them highly resistant to most beta-lactamases, which are enzymes produced by some bacteria. Unlike other antibiotics, beta-lactam antibiotics target both aerobic and anaerobic bacteria.

Bactericidal
Bacteria-sliders

Imipenem and Meropenem are bactericidal antibiotics. These drugs inhibit cell wall synthesis by binding to specific proteins and weakening the bacterial cell wall. The disruption of the cell wall's integrity causes bacterial lysis and death.

Indications

Gram Positive and Gram Negative Infections
Graham-cracker Positive-angel and Graham-cracker Negative-devil

Carbapenems are indicated to treat mixed infections by targeting both aerobic and anaerobic microorganisms. These antibiotics are highly active against gram-positive cocci as well as most gram-negative cocci and bacilli. The drug is resistant to nearly all beta-lactamases and can penetrate the gram-negative cell envelope. The broad antimicrobial spectrum that carbapenems cover promotes their utility for patients undergoing chemotherapy.

Side Effects

GI Distress
GI with Flare-gun

Symptoms of gastrointestinal distress are the most common side effects of carbapenem administration. The patient may experience symptoms of nausea, vomiting, or diarrhea. Upset stomach or abdominal pain may also occur in patients prescribed carbapenems.

Suprainfections
Super-bacteria

Carbapenems are indicated for patients who fail to respond to more narrow-spectrum antibiotics. A small percentage of patients taking carbapenems develop suprainfections with bacteria or fungi. Suprainfections result from opportunistic pathogens that infect the body during treatment for another primary infection.

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Seizures

Caesar

Although rare, seizures are a possible side effect of carbapenems. Imipenem has the greatest risk of inducing seizure activity. If seizures develop, stop drug administration and consult the physician for an alternative antibiotic.

Considerations

Penicillin Allergy

Pencil-villain and Allergy-alligator

Carbapenems are similar in structure to the penicillins and are therefore associated with a risk for allergic cross-hypersensitivity. Because of this, administration of carbapenems is commonly avoided in patients with a reported penicillin allergy.

IV or IM Route

IV In-muscle

Since carbapenems cannot be absorbed from the gastrointestinal tract, the antibiotics are administered either intravenously or intramuscularly. Parenteral administration of carbapenems leads to body fluids and tissue distribution. The medication penetrates the meninges and fosters therapeutic concentrations in the cerebrospinal fluid.

Imipenem Combined with Cilastatin

Emmy-penny Combined with Silly-string

Imipenem is always administered with cilastatin, which is an inhibitor of renal dehydropeptidase I. Without cilastatin, imipenem is susceptible to degradation by renal dehydropeptidase I in the renal tubules.

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