Meropenem: MOA, Indications, Dosage and Side Effects

Meropenem is a broad-spectrum antibacterial agent of the carbapenem family.

Mechanism of action of meropenem

Meropenem is a carbapenem antibiotic for parenteral use that exerts its action by interfering with bacterial wall synthesis. It penetrates the bacterial cell wall with its high levels of stability in all serine beta-lactamases and marked affinity for the penicillin-binding proteins (PBPs).

The in vitro antibacterial spectrum of meropenem includes the majority of clinically significant gram-positive and gram-negative, anaerobic strains of bacteria.

Indications of meropenem

- Pneumonias and nosocomial pneumonia.
- Urinary tract infections.
- Intra-abdominal infections.
- Gynecological infections such as endometritis.
- Skin and skin structure infections.
- Empiric treatment for presumed infections in adult patients with febrile neutropenia.
- Other polymicrobial infections.

Dosage and administration

Adults

The dose and duration of the therapy shall be established depending on the type and severity of infections and the condition of the patient.

The recommended daily dose is as follows:-

In the treatment of pneumonia, UTI, gynecological infections such as endometritis, skin and skin structure infections the dose is 500 mg intravenously every 8 hours.

In the treatment of nosocomial pneumonia, peritonitis, presumed infections in neutropenic patients, septicemia 1g intravenously every 8 hours in cystic fibrosis doses up to 2 grams every 8 hours.

In meningitis 2 grams every 8 hours.

As with other antibiotics, particular precaution is recommended in using meropenem as monotherapy in critically ill patients with known or suspected Pseudomonas aeruginosa lower respiratory tract infection.

Regular sensitivity testing is recommended when treating Pseudomonas aeruginosa infection.

Patients with impaired renal function dosage should be reduced in patients with a creatinine clearance of less than 51 ml/min as follows.

Creatinine clearance rate (ml/min)	Dosage based on unit doses of 500mg,1gm,2gm	Frequency
25-50	1 unit dose	Every 12 hours
10-25	Half unit dose	Every 12 hours
<10	Half unit dose	Every 24 hours

Hepatic insufficiency

Patients with hepatic insufficiency no dosage adjustment is necessary

In elderly patients, no dosage adjustment is required with normal renal function or creatinine clearance value of above 50 ml/min.

In children;

Infants under 3 months - efficacy and tolerability in infants under 3 months old have not been established therefore it is not recommended to be used below this age.

Children over 3 months

For children over 3 months to 12 months – 10-20 mg/kg every 12 hours.

Children over 50, kg weight an adult dose should be used.

4 years to 18 years with cystic fibrosis 25-40 mg/kg every 8 hours.

In meningitis 40 mg/kg every 8 hours.

Contraindications

Meropenem is contraindicated in patients with hypersensitivity to it.

Adverse effects

Serious adverse effects are rare. These may be encountered;

- Pain at the site of injection.
- Skin reactions.
- Abdominal pain.
- Nausea and vomiting.

Reconstitution procedure

The content of the vial should be reconstituted in 10 ml of water for injection for meropenem 500 mg IV injection and in 20 ml water for injection for meropenem 1 gm. As the product dissolves carbon dioxide is released creating a positive pressure in the vial. For ease use, the following

techniques should be used.

1. Hold the vial in an upright position and remove approximately 10 ml of air from the vial.
2. Add the recommended volume of the solvent slowly. Hold the syringe and plunger tightly. After completion remove the needle. Shake to obtain a clear solution. As the antibiotic dissolves carbon dioxide is released causing frothing which clears quickly.
3. High pressure inside the vial will be developed. Now depress the syringe plunger fully and hold the plunger tightly. Inside the needle to the upright vial up to the neck and withdraw approximately 10 MLS of gas.
4. Invert the vial. With a syringe plunger fully depressed insert the needle keeping it within the solution. The pressure aids withdrawal if the solution.
5. The bubble of carbon dioxide in the syringe clears quickly on tapping. As these are carbon dioxide smaller bubbles can be injected without ill effect.

Precaution

As with other beta-lactam antibiotics, rare hypersensitivity has been noted. Before initiating the therapy with meropenem careful inquiry should be made concerning the previous hypersensitivity reactions to beta-lactam antibiotics. If an allergic reaction to meropenem is noted the drug should be discontinued and appropriate measures are taken.

Its use in infections caused by methicillin-resistant staphylococci is not recommended.

The co-administration of meropenem with other nephrotoxic drugs should be considered with caution.

Pregnancy and lactation

Pregnancy

Animal studies have not shown any adverse effects on the developing fetus. Meropenem should not be used in pregnancy unless the potential benefit outweighs the potential risk to the baby.

Lactation

Meropenem is detectable at very low concentrations in animal breast milk. It should not be used in breastfeeding mothers unless its benefits outweigh the risks.

Overdose

Treatment of accidental overdose should be symptomatic. In normal individuals, rapid renal elimination will occur. In subjects with impaired renal function, hemodialysis will remove meropenem and its metabolites.