Meropenem

Updated September 2016

Meropenem is a semi-synthetic β-lactam antibiotic that belongs in the penicillin-based group of drugs called carbapenems. It is the same drug class as Imipenem. Like all β-lactam antibiotics, meropenem interferes with bacterial wall synthesis after binding to penicillin-binding proteins (PBPs) in the cell wall. Meropenem has a broad antibacterial spectrum and is relatively resistant to bacteria that produce β-lactamase. Meropenem should only be used in veterinary patients when culture results indicate it as the best antibiotic choice.

Metabolism and Pharmacodynamics

- Solubility: Water soluble
- Bioavailability: 84% bioavailable after SQ injection in dogs with wide distribution in body tissues and fluid
- Half-life: ~40 minutes in dogs
- Elimination: Renal

Mechanism of action and spectrum of activity

- Bacteriocidal
- Time-dependent with significant post-antibiotic effect
- Rapid bacterial lysis after penetration through the cell wall and interference of bacterial wall synthesis
- Gram-negative aerobes, gram-positive aerobes, and anaerobic bacteria

Advantage over other drugs in the same class (Imipenem)

- Improved activity against *Pseudomonas aeruginosa* and *Enterobacteriaceae spp.* (*E. coli, Klebsiella, Salmonella)*
- Reduced risk of renal toxicity

<u>Dosing Recommendations:</u>

- For treatment of documented infections sensitive to meropenem, with an MIC ≤ 0.12 μg/mL
    - Intravenous administration in hospital: 8 mg/kg IV q8hrs
    - Subcutaneous administration in hospital or at home: 8 mg/kg SQ q12hrs
- For severe sepsis/septic shock or treatment of *Pseudomonas spp*. with an MIC = 1 μg/mL
    - Intravenous administration in hospital: 12 mg/kg IV q8hrs
    - Subcutaneous administration in hospital or at home: 12 mg/kg SQ q12hrs

Meropenem

Updated September 2016

Dosage form:

- Powder for injection 500mg and 1g vials

Preparation and administration:

- Dilute to 20 mg/mL – stable in refrigerator for up to 5 days after reconstitution
  - *Please note that it may be more economical and easier to reconstitute more than 1 vial at a time. See example below*
  - To dilute a single 500mg vial - Add 25ml sterile 0.9% saline to vial
  - To dilute a single 1g vial – Withdraw and discard 50ml from a 100ml bag of 0.9% saline. Remove another 10ml from the bag and add to the vial to reconstitute. Withdraw contents of the vial and inject back into the saline bag.
- IV: administer dose over 15-30 minutes
- SQ: can be administered in-hospital and at home by owner

Precautions/contraindications:

- GI effects are uncommonly reported in humans
- Likely safe in pregnancy and lactation
- Hair loss may occur at the site of repeated SQ injections
- Should not be used in patients with known sensitivity to β-lactam antibiotics

Available through the IVG Compounding Pharmacy

The cost per vial is:

$48.50 for 500mg vial

$63.50 for 1g vial

(as of Dec. 2016)

Example

A 30kg dog has a resistant urinary tract infection that is sensitive to meropenem. The dog is stable and ready to be discharged from the hospital. The owner is comfortable giving SQ injections at home. The easiest way to dilute meropenem is to do 2 vials at a time. Instructions to the owner may read as such:

1. Withdraw 20ml from the 100ml bag of 0.9% saline.
2. Inject 10ml into each of the 2 vials of meropenem. Swirl gently to reconstitute.
3. Withdraw the contents from each vial and then inject back into the bag of saline. The concentration of this solution is 20 mg/mL. Store the bag in the fridge and discard after 5 days.
4. Fluffy's dose is 240mg (12ml). Give 12ml of the prepared solution under the skin every 12 hours for 12 days.

Dispense 6 vials for full course of medication

References:

1. Bidgood T, Papich MG. Plasma pharmacokinetics and tissue fluid concentrations of meropenem after intravenous and subcutaneous administration in dogs. Am J Vet Res 2002;63:1622-1628.
2. Boothe DM. Small Animal Clinical Pharmacology and Therapeutics. 2nd ed. Chapter 7 – Antimicrobial drugs. Elsevier 2012.
3. Plumb's Veterinary Drugs online. Meropenem monograph. Accessed September 29, 2016.