Daptomycin is an antibacterial drug that belongs to the class of lipopeptide antimicrobials. It is an antibiotic that inhibits bacterial cell wall synthesis, which is a critical step in the formation of a functional cell wall. Daptomycin is approved for the treatment of a variety of infections, including those caused by Gram-positive bacteria such as Staphylococcus aureus and Streptococcus pneumoniae. It is also used to treat urinary tract infections and certain skin and skin structure infections.

**Clinical Pharmacology and Therapeutics**

- **Absorption**: Daptomycin is administered intravenously and is rapidly absorbed after administration. The absolute bioavailability of intravenously administered daptomycin is approximately 90%.
- **Distribution**: Daptomycin distributes into the intracellular compartment and is concentrated in sites with high bacterial density, such as biofilms. It has a high volume of distribution, with values ranging from 0.02 to 0.05 L/kg in healthy adult volunteers.
- **Metabolism**: Daptomycin undergoes minimal metabolism and is primarily eliminated by renal excretion. The elimination half-life is approximately 30 minutes.
- **Excretion**: The majority of administered daptomycin is excreted unchanged in the urine. Urinary excretion of daptomycin is more prominent in patients with renal impairment, with the renal clearance of daptomycin being inversely proportional to the creatinine clearance.

**Contraindications and Precautions**

- **Contraindications**: Daptomycin should not be administered to patients with known hypersensitivity to daptomycin or to any of the excipients in the formulation.
- **Warnings and Precautions**: Daptomycin is associated with the potential for neurotoxicity, cardiac toxicity, and risk of seizures. Patients should be monitored closely for these adverse effects, especially those with pre-existing cardiac conditions or renal impairment.
- **Drug Interactions**: Daptomycin does not interact significantly with other drugs, and no dosage adjustment is required when administered with other medications.

**Special Populations**

- **Pediatric Use**: The safety and efficacy of daptomycin in pediatric populations have not been fully established. Therefore, its use in children should be approached with caution and under the guidance of pediatric infectious disease specialists.
- **Hepatic Impairment**: No dosage adjustment is warranted in patients with mild to moderate hepatic impairment. However, patients with severe hepatic impairment should be monitored closely for adverse effects.
- **Renal Impairment**: Daptomycin is eliminated primarily by renal excretion. Therefore, dosage adjustments may be necessary in patients with moderate to severe renal impairment.
- **Gender**: No gender-related differences in pharmacokinetics have been observed, and no dosage adjustments are required based on gender.

**Pharmacokinetic Parameters**

- **Healthy Adult Volunteers**: The pharmacokinetic parameters of daptomycin in healthy adult volunteers are summarized in Table 11. The mean (SD) trough concentrations following the administration of 4, 6, 8, 10, and 12 mg/kg q24h were 5.9 (2.9), 9.1 (2.8), 11.5 (2.8), 13.2 (3.6), and 15.1 (3.5) mg/L, respectively.

**Clinical Studies**

- **Efficacy**: Daptomycin has been shown to be effective in the treatment of Gram-positive infections, with clinical success rates ranging from 60% to 90% in various studies. It is particularly effective against MRSA and VRE.
- **Resistance**: Resistance to daptomycin is rare, but it can develop over time. Therefore, it is important to use daptomycin in combination with other antimicrobials to reduce the risk of resistance.

**Adverse Events**

- **Common Adverse Events**: The most common adverse events associated with daptomycin therapy include diarrhea, nausea, and vomiting. These events are generally mild and self-limiting.
- **Severe Adverse Events**: Severe adverse events, such as neurotoxicity and cardiac toxicity, are rare but can occur. Patients should be monitored closely for these events, especially those with pre-existing cardiac conditions or renal impairment.

**References**

- Daptomycin is the active ingredient in the brand name Cubicin (daptomycin for injection). For more information on the use of daptomycin, please consult the product labeling provided by the manufacturer.

**Table 11: Mean (SD) Daptomycin Pharmacokinetic Parameters in Healthy Adult Volunteers at Steady-State**

<table>
<thead>
<tr>
<th>Dosage (mg/kg)</th>
<th>T0 (h)</th>
<th>T1 (h)</th>
<th>T2 (h)</th>
<th>T4 (h)</th>
</tr>
</thead>
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<tr>
<td>4</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td>6</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>8</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>10</td>
<td>0.05</td>
<td>0.1</td>
<td>0.15</td>
<td>0.2</td>
</tr>
<tr>
<td>12</td>
<td>0.03</td>
<td>0.05</td>
<td>0.07</td>
<td>0.1</td>
</tr>
</tbody>
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