Tobramycin sulfate, a water-soluble antibiotic of the aminoglycoside group, is derived from the fermentation of Streptomyces tenebrarius. To reduce the development of drug-resistant bacteria and maintain the effectiveness of this and other antibiotics, it is important to use this medication only when it is needed. Tobramycin is especially useful in the treatment of infections caused by strains of bacteria resistant to other antibiotics. This drug may not be effective against certain strains of fungi or viruses.

**Mechanism of Action**

Tobramycin interferes with the synthesis of bacterial and fungal cell walls. At toxic concentrations, it may produce injury to mammalian cells. It is bactericidal in vitro for most of the bacteria and fungi for which it is active. It is more active against Gram-negative than Gram-positive bacteria.

**Sensitivity**

Sensitivity of various microorganisms to this antibiotic is given in Table 1. Sensitivity in the general population is unknown and probably low. It is not known whether cross-allergenicity among aminoglycosides exists. It is not known whether the testing of susceptibility has any clinical relevance.

**Susceptibility Testing**

Standardized procedures are based on a dilution method (broth or agar) and should be used to determine antibiotic sensitivity when testing clinical isolates. Microorganisms to be tested should normally be grown in broth at 30°C for 18 to 24 hours. When using dilution procedures, the dilutions should be made in a broth that is essentially neutral in pH and ionic strength. For dilution tests, the inoculum should be approximately 10^5 to 10^6 cells per milliliter. Isolates with different characteristics may require different test procedures. The results of in vitro tests should be compared with the performance of standard quality-control strains that are known to be susceptible and resistant to tobramycin.

**Dosage and Administration**

Tobramycin comes in several forms:

- **Injection**: 5 mg/mL or 10 mg/mL for intravenous (IV) administration and 1 mg/mL for intramuscular (IM) injection.
- **Ophthalmic**: 0.3% and 0.5% for topical application.
- **Otic**: 0.125% and 0.3% for topical use.
- **Subconjunctival**: 1 mg/mL for ophthalmic use.

**Dosage Adjustment**

Dosage adjustments may be necessary in patients with impaired renal function or in those receiving concurrent drugs that are nephrotoxic or neurotoxic. The dosage usually ranges from 3.5 to 6.0 mg/kg/day, given in 2 to 3 divided doses.

**Monitoring**

Serum levels and renal function should be monitored periodically. In patients with normal renal function, a single dose should not exceed 7 mg/kg. In patients with impaired renal function, dosage should be reduced to 3 to 5 mg/kg, and in those with creatinine clearance below 30 mL/min, dosage should be reduced to 2 to 4 mg/kg.

**Contraindications**

This drug is contraindicated in patients with a known hypersensitivity to tobramycin or any other aminoglycoside. It should not be used in patients with a history of severe allergic reactions to sensitivity to any aminoglycoside.

**Warnings**

Aminoglycosides, including tobramycin, are nephrotoxic and ototoxic. In particular, they cause irreversible hearing loss, which is usually preventable if recognized early. The risk of ototoxicity is increased in patients with pre-existing hearing deficits, those receiving other neurotoxic or nephrotoxic drugs, and those with pre-existing renal or hepatic disease. Prophylactic use of these antibiotics is not recommended to prevent postoperative wound infections. The use of aminoglycosides in pregnant women can cause respiratory distress in newborn infants. It is unknown whether tobramycin is excreted in human milk and should be used with caution in breastfeeding women.

**Precautions**

Patients with impaired renal function may be at a higher risk of developing nephrotoxicity. Elderly patients may have reduced renal function that may not be evident in the blood urea nitrogen and serum creatinine levels. Elderly patients may be at a higher risk of developing nephrotoxicity. Elderly patients may be at a higher risk of developing nephrotoxicity. Elderly patients may be at a higher risk of developing nephrotoxicity.

**Adverse Reactions**

The most serious adverse reactions are ototoxicity and nephrotoxicity. Other adverse reactions include nausea, vomiting, diarrhea, headache, lethargy, pain at the injection site, mental confusion, and fever. Rarely, nephrotoxicity may not become apparent until long after the drug has been discontinued.

**Interactions**

Aminoglycosides should not be administered concurrently with other nephrotoxic or neurotoxic drugs, such as cisplatin or cyclosporine. Furosemide and other diuretics may increase the risk of nephrotoxicity.

**Stability**

Tobramycin is stable in diluent for 24 hours at room temperature and 4°C.

**References**

The data summarized here are based on in vitro and animal data and clinical experience with tobramycin.

**Table 1. Susceptibility Interpretive Criteria for Tobramycin**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Sensitivity Range (mcg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>0.5-16</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>0.5-16</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>1-16</td>
</tr>
</tbody>
</table>

**Table 2. Acceptable Quality Control Ranges for Tobramycin**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Acceptable Quality Control Ranges (mcg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Escherichia coli</em></td>
<td>0.1-2</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>0.1-2</td>
</tr>
</tbody>
</table>

**Figures**

- **Figure 1**: Graph showing the relationship between serum trough and peak drug levels and serum creatinine values.
- **Figure 2**: Chart illustrating the expected serum trough drug levels for different dosing regimens.

**Further Reading**