**Clinical Pharmacology**

Doxycycline inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit. It competes with GNRA (guanine-nucleotide binding) sites located on 50S subunits and blocks RNA-dependent protein synthesis leading to bacterial death. Doxycycline can inhibit the growth of both Gram-positive and Gram-negative bacteria, some protozoa, and some fungi. Doxycycline is bacteriostatic against these microorganisms. The bactericidal activity that occurs with higher doses and longer treatment times is not usually observed. Doxycycline can be used for the treatment of infections caused by susceptible microorganisms.

**Pharmacokinetics**

Doxycycline is rapidly absorbed after oral administration, reaching peak plasma concentrations within 2-4 hours. It is extensively bound to plasma proteins and tissue proteins. The volume of distribution is approximately 0.5-1.5 liters/kg. Doxycycline is metabolized in the liver, with about 60% of the orally administered dose eliminated in the urine and about 40% in the feces. Small amounts of unchanged drug are excreted in the urine. Doxycycline is eliminated primarily by renal and biliary routes, with the elimination half-life of about 10 hours in normal individuals. In patients with renal impairment, the half-life of doxycycline is increased, and dosage adjustments may be necessary.

**Dosage and Administration**

- **For Adults:** The usual dose is 100 mg/day in single or divided doses, with the first dose taken 1 hour before or 2 hours after food. The dose may be increased to 200 mg/day for severe infections. In patients with severe renal insufficiency, the dose should be reduced to 50 mg/day.
- **For Children:** The usual dose is 2.0-4.0 mg/kg/day in single or divided doses, with the first dose taken 1 hour before or 2 hours after food. The dose may be increased to 4.0 mg/kg/day for severe infections.

**Interactions**

- **Drug Interactions:** Doxycycline may increase the effects of anticoagulants, oral contraceptive agents, and some other medications that affect blood coagulation. It may also interact with other antibiotics, antifungals, and antivirals.
- **Herbal Interactions:** Doxycycline may interact with garlic, horseradish, and other foods that can alter the absorption of doxycycline.

**Precautions and Warnings**

- **Precautions:** Doxycycline should be used with caution in patients with liver disease, renal impairment, or卟啉症.
- **Warnings:** Doxycycline should be used with caution in patients with hypertension, hyperuricemia, or diabetes mellitus.

**Contraindications**

Doxycycline is contraindicated in patients with hypersensitivity to tetracyclines or any component of the product.

**Adverse Reactions**

Doxycycline may cause gastrointestinal disturbances such as nausea, vomiting, diarrhea, and flatulence. Other common side effects include rashes, photosensitivity, and phototoxicity.

**Special Populations**

- **Pregnancy:** Doxycycline is not recommended for use during pregnancy due to the risk of ototoxicity and embryotoxicity.
- **Lactation:** Doxycycline can pass into breast milk, so breastfeeding is not recommended during therapy.

**Overdosage**

- **Signs and Symptoms:** Overdose of doxycycline can cause gastrointestinal disturbances, headache, dizziness, and hypotension.
- **Management:** Overdose is managed by supportive care and measures to decrease absorption. If needed, supportive care and hemodialysis may be indicated.

**Antibiotic Resistance**

- **Drug Resistance:** Resistance to tetracyclines is becoming more common and may limit the effectiveness of doxycycline in some populations.
- **Prevention:** To prevent the development of resistant bacteria, doxycycline should be used only for infections caused by susceptible organisms and in accordance with local drug resistance patterns.

**References**


**Table 1. Susceptibility Test Interpretive Criteria for Doxycycline and Tetracycline**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Minimal Inhibitory Concentration (mcg/mL)</th>
<th>Zone Diameter (mm)</th>
<th>Zone Diameter (mm)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>S</td>
<td>I</td>
<td>R</td>
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<tr>
<td>Adenomyia capsulata</td>
<td>≥16</td>
<td>≥16</td>
<td>&gt;16</td>
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<tr>
<td>Acinetobacter baumannii</td>
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<td>≥16</td>
<td>&gt;16</td>
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<td>Acinetobacter lwoffii</td>
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<td>≥16</td>
<td>&gt;16</td>
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<td>&gt;16</td>
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<td>Acinetobacter pittii</td>
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<td>≥16</td>
<td>&gt;16</td>
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<td>Actinomyces naeslundii</td>
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<td>≥16</td>
<td>&gt;16</td>
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<td>≥16</td>
<td>&gt;16</td>
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<td>Alcaligenes faecalis ATCC 29212</td>
<td>≥16</td>
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<td>&gt;16</td>
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</table>

**INDICATIONS AND USAGE**

- **Respiratory Tract Infections**: Doxycycline may be used for the treatment of infections caused by susceptible microorganisms, such as respiratory tract infections caused by Haemophilus influenzae, Moraxella catarrhalis, and Streptococcus pneumoniae.
- **Upper Respiratory Tract Infections**: Doxycycline may be used for the treatment of upper respiratory tract infections caused by Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis.
- **Skin and Skin Structures**: Doxycycline may be used for the treatment of skin and skin structure infections caused by susceptible microorganisms, such as Staphylococcus aureus and Streptococcus pyogenes.
- **Gastrointestinal Tract Infections**: Doxycycline may be used for the treatment of gastrointestinal tract infections caused by susceptible microorganisms, such as Campylobacter jejuni and Helicobacter pylori.
- **Urinary Tract Infections**: Doxycycline may be used for the treatment of urinary tract infections caused by susceptible microorganisms, such as Escherichia coli and Proteus mirabilis.
and hepatic studies should be performed before treatment is started and the blood serology repeated monthly for at least four months. In venereal disease when coexistent syphilis is suspected, a dark-field examination should be done. Patients should be counseled that antibacterial drugs including doxycycline should only be used to complete the full course of therapy. If this occurs, patients should contact their physician as soon as possible. Patients should be given instructions to:
- to drink fluids liberally along with doxycycline to reduce the risk of esophageal irritation and ulceration.
- to avoid excessive sunlight or artificial ultraviolet light while receiving doxycycline and to discontinue

Prescribing doxycycline tablets in the absence of a proven or strongly suspected bacterial infection is unlikely to provide benefit and the patient may experience adverse reactions and may select or develop drug-resistant bacteria.

Drug Interactions: Drug interactions that may occur in patients taking tetracyclines include:

- Blood: Heaptic amonia, hexosamines, phosphatases, and alkaline phosphatase.

- Use of this drug for more than 7 days may cause new cases of acne or make existing acne worse.

- In human studies with tetracyclines, altered bone mineralization has been reported in growing long bones and delayed or impaired osseous consolidation has been noted in fractures treated with tetracyclines.

- Additional anthelmintics should be used and the stools should be examined for ova and parasites. A small prospective study of 81 pregnancies describes 43 pregnant women treated for 10 days with doxycycline during early pregnancy. All 43 mothers delivered infants normal at 1 year of age.

- While in clinical trials, 15% of patients taking tetracycline (parenteral and oral) developed dermatologic reactions. Although these reactions have been caused by both the oral and parenteral administration of tetracyclines, rare cases of severe, generalized erythematous eruptions have been observed. These reactions are usually characterized by arthralgias and myalgias, which may precede the skin eruptions. In many patients, the eruptions are associated with eosinophilia. Eosinophilia has been reported in association with tetracycline-induced skin eruptions. While the exact mechanisms of these reactions are not known, it is believed that they are due to an immunologic response to tetracyclines.

- Laboratory Tests: Patients should be observed for abnormal reactions such as dermatitis, urticaria, fever, and eosinophilia. Patients with severe or persistent reactions should be removed from therapy and the appropriate measures taken. In case of overdose, discontinue medication, treat symptomatically and institute supportive measures. Deaths have occurred in children receiving tetracyclines for acne or other dermatologic conditions.

- Drug Interactions: Drug interactions that may occur in patients taking tetracyclines include:

- Use of isotretinoin and doxycycline should be avoided because isotretinoin is also known to cause

- The mechanism by which tetracyclines cause these reactions is not known. However, they are more common in patients who have had other experiences with tetracyclines. It is believed that these reactions are due to an immunologic response to tetracyclines. Patients should be monitored closely for these reactions.

- Use of tetracyclines may cause a brownish discoloration of the teeth, most prominent in deciduous teeth. (See)

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