doxycycline [dox-i-kye-klen]
- Doxytab
- Vibra-Tabs
- Atridox, Doryx, Doxy, Doxy Caps

Classification:
- Tetracyclines

Pharmacologic Category: UK

- Antibacterial
- Tetracycline anti-infective

Indications:
- Doxycycline is bacteriostatic against susceptible bacteria.
- Spectrum of activity includes activity against some gram-positive pathogens:
  - Staphylococcus aureus
  - Staphylococcus epidermidis
  - Streptococcus pyogenes
  - Clostridium perfringens
  - Clostridium tetani
  - Haemophilus influenzae
  - Propionibacterium acnes
  - Neisseria gonorrhoeae
  - Neisseria meningitidis
  - Neisseria pertussis
  - Mycoplasma pneumoniae
  - Treponema pallidum
  - Borrelia burgdorferi
  - Yersinia pestis
  - Yersinia enterocolitica
  - Actinomyces israelii
  - Neisseria catarrhalis
  - Listeria monocytogenes
  - Bacillus anthracis

-他の著者による解説
- doxycycline may be used to treat anthrax in pregnant women and children due to the seriousness of the disease.

- Use Cautiously with:
  - Cachectic or debilitated patients
  - Renal disease
  - Hepatic impairment
  - Nephrogenic diabetes insipidus
  - OB:
    - Permanent staining of teeth (unless used for anthrax; children)
    - Staining of teeth in infant if used during last half of pregnancy
    - Cretinism (higher in children)
    - Headache
    - Nephrogenic diabetes insipidus
    - OB:
      - Permanent staining of teeth
      - Staining of teeth in infant if used during last half of pregnancy
      - Cretinism
      - Headache

- Contraindications/Precautions:
  - Use Cautiously in:
    - Cachectic or debilitated patients
    - Renal disease
    - Hepatic impairment

- Drug-Drug Interactions:
  - May affect:
    - Effect of warfarin
    - Effect of estrogen-containing oral contraceptives
    - Anticoagulants
    - Calcium, iron, and magnesium form insoluble compounds
    - warfarin
    - Estrogen-containing oral contraceptives
    - Anticoagulants
  - Drug-Food Interactions:
    - Calcium in foods or dairy products
    - Iron

- Metabolism and Excretion:
  - 20–40% excreted unchanged in urine; some inactivation in intestine and some enterohepatic circulation with excretion in bile and feces.

- Half-life:
  - 14–17 hr

- Common Adverse Reactions:
  - Skin:
    - Drug Rash with Eosinophilia and Systemic Symptoms
    - Erythema Multiforme
    - Stevens-Johnson Syndrome
    - Toxic Epidermal Necrolysis
    - Photosensitivity
  - Hematologic:
    - Anemia, leukopenia, thrombocytopenia
  - CNS:
    - Headache
    - Dizziness
    - Vomiting
    - Nausea
  - GI:
    - Diarrhea
    - Abdominal pain
    - Nausea
    - Vomiting
    - Nausea
    - Vomiting
  - Derm:
    - Rash
    - Pruritus
    - Urticaria

- Other Reactions:
  - Local:
    - Skin irritation at IV site
  - Genetic Implication:

- Dosage and Administration:

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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</thead>
<tbody>
<tr>
<td>PO</td>
<td>1–2 hr</td>
<td>1–5 hr</td>
<td>12 hr</td>
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<tr>
<td>IV</td>
<td>q 4–6 hr</td>
<td>q 24 hr</td>
<td>q 24 hr</td>
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</tbody>
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- Drug Interaction:
  - Cholestyramine
  - Barbiturates
  - Carbamazepine
  - Estrogen-containing oral contraceptives
  - Oral anticoagulants

- Pregnancy Category:
  - D (pregnancy risk D: Positive evidence of risk in human fetal development)

- Contraindicated in:
  - Hypersensitivity
  - Some products contain alcohol or bisulfites

- Use Cautiously with:
  - Cachectic or debilitated patients
  - Renal disease
  - Hepatic impairment

- Pregnancy:
  - Risk of permanent staining of teeth
  - OB:
    - Permanent staining of teeth
    - Staining of teeth in infant if used during last half of pregnancy
    - Cretinism
    - Headache

- Nursing:
  - Breastfeeding:
    - Discontinued
Route/Dosage

More common infections

PO (Adults and Children ≥45 kg): Most infections — 100 mg q 12 hr on the 1st day, then 100–200 mg once daily or 50–100 mg q 12 hr (converted — 100 mg q 12 hr for 7 days or 200 mg once daily for 7 days [slurred-release tablets] or 300 mg followed 1 hr later by another 300-mg dose; Moderate pyelonephritis — 100 mg once daily; Osteomyelitis — 100 mg twice daily; Periostitis — 20 mg twice daily; Abscess — 40 mg once daily; ascending

PO, IV (Children ≥8 yr and ≥45 kg): 100 mg q 12 hr IV change to 100 mg twice daily PO when clinically appropriate for a total of 60 days; one or two other anti-infectives may be added initially, depending on clinical situation.

PO, IV (Children ≥8 yr): 2.2 mg/kg q 12 hr IV change to 2.2 mg/kg twice daily PO when clinically appropriate for a total of 60 days; one or two other anti-infectives may be added initially, depending on clinical situation.

PO (Children ≥8 yr): 2.2 mg/kg q 12 hr; some patients may require intravenous therapy initially depending on clinical situation.

Cutaneous anthrax

PO (Adults): 100 mg twice daily for 60 days; some patients may require intravenous therapy initially depending on clinical situation.

PO (Children ≥8 yr and ≥45 kg): 100 mg q 12 hr; some patients may require intravenous therapy initially depending on clinical situation.

PO (Children ≥8 yr and ≥45 kg): 2.2 mg/kg q 12 hr; some patients may require intravenous therapy initially depending on clinical situation.

PO (Children ≥8 yr): 2.2 mg/kg q 12 hr; some patients may require intravenous therapy initially depending on clinical situation.

NURSING IMPLICATIONS

Assessment

Infections: Assess for infection (vital signs, appearance of wound, sputum, urine, and stool; WBC) at beginning of and during therapy.

Obtain specimen for culture and sensitivity before initiating therapy. First dose may be given before receiving results.

Monitor bowel function. Diarrhea, abdominal cramping, fever, and bloody stools should be reported to health care professional promptly as a sign of pseudomembranous colitis. May begin up to several weeks following cessation of therapy.

Assess for rash periodically during therapy. May cause Stevens-Johnson syndrome or toxic epidermal necrolysis. Discontinue therapy if severe or if accompanied with fever, general malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, hepatitis and/or eosinophilia.

IV: Assess IV site frequently, may cause thrombophlebitis.

Self Test Considerations: Monitor renal and hepatic functions and CBC periodically during long-term therapy.

May cause ↑ ALT, serum alkaline phosphatase, bilirubin, and ancrease in transaminases.

May cause ↑ in urinary catecholamine levels.

Potential Nursing Diagnoses

Risk for infection (Indications) (Side Effects)

Noncompliance (Patient/Family Teaching)

Implementation

Do not confuse Oracea with Orencia.

May cause yellow-brown discoloration and softening of teeth and bones if administered prenatally or during early childhood. Not recommended for children under 8 yr of age or during pregnancy or lactation, index used for the treatment of acne.

The Oracea product is only indicated for rosacea, not for infections.

PO: Administer around the clock, at least 1 hr before or 2 hr after meals. May be taken with food or milk if stomach discomfort occurs. Administer with cool glass of water at least 1 hr before going to bed to avoid esophageal ulceration. Use calibrated measuring device for liquid preparations. Shake liquid preparations well. Do not administer within 1–3 hr of other medications.

Capsules may also be administered by careful opening and sprinkling capsule contents on a spoonful of applesauce. The applesauce should be swallowed without chewing and followed with a cool 8-ounce glass of water to ensure complete swallowing of the capsule contents. The applesauce should not be hot.

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CONTINUED
and it should be soft enough to be swallowed without chewing. If mixture cannot be taken immediately, discard; do not store for later use.

Do not open, break, crush or chew extended release capsules and tablets.

To prepare doses for infants and children exposed to anthrax (used only in a Declared Public Health Emergency): place one 100 mg tablet in a small bowl and crush to a fine powder with a metal spoon, leaving no large pieces. Add 4 level tsp of lowfat milk, lowfat chocolate milk, regular chocolate milk, chocolate pudding or an apple juice and sugar mixture made by combining 4 teaspoons of sugar and 4 teaspoons of apple juice. Mix food or drink and doxycycline powder until powder dissolves. Store in a covered container for 24 hrs if refrigerated (if made with milk or pudding) or at room temperature (if made with juice). Number of teaspoons to administer is based on child’s weight (0–12.5 lbs—½ tsp; 12.5–25 lbs—1 tsp; 25–37.5 lbs—1 ½ tsp; 37.5–50 lbs—2 tsp; 50–62.5 lbs—2 ½ tsp; 62.5–75 lbs—3 tsp; 75–87.5 lbs—3 ½ tsp; 87.5–100 lbs—4 tsp).

Avoid administration of calcium, antacids, magnesium-containing medications, sodium bicarbonate, or iron supplements within 1–3 hr of oral doxycycline.

Patient/Family Teaching

Instruct patient to take medication around the clock and to finish the drug completely. Advise patient on how to prepare doses and to eat or drink the mixture immediately after crushing tablets. Food and drinks other than milk, chocolate milk, regular chocolate milk, chocolate pudding, or an apple juice and sugar mixture made by combining 4 teaspoons of sugar and 4 teaspoons of apple juice may be used. Advise patient that sharps used for doxycycline are not recommended. Avoid rapid administration to avoid extravasation.

Side effects

Nausea, vomiting, diarrhea. Cough, pharyngitis, back pain, rash, fever, photosensitivity, arthralgia. Rare: hypocalcemia, eosinophilia, leukopenia, diarrhea, bone pain, bone fractures, pyrexia, erythema multiforme, skin necrosis.

In pediatric patients, skin rash, photosensitivity, edema, diarrhea, photosensitivity, rash, stomatitis, decreased appetite, intestinal perforation, thrombocytopenia, cough, lymphadenopathy, skin necrosis, bone pain, weight gain, bone fractures, arthralgia. Rare: hypocalcemia, rash, fever, photosensitivity, pallor, arthralgia.

Contraindications

Allergic hypersensitivity to doxycycline or other tetracyclines; CAPI TALS indicate l ife-threatening, u nderlines indicate most frequent.

Indications

Advise patient to avoid taking antacids, calcium, magnesium-containing medications, sodium bicarbonate, and iron supplements within 1–3 hr of oral doxycycline.

Instruct patient to notify health care professional immediately if rash, diarrhea, abdominal cramping, fever, or bloody stools occur and not to treat with antidiarrheals without consulting health care professionals.

Advise female patients to use a nonhormonal method of contraception while taking tetracyclines and until next menstrual period.

Caution patients to use sunscreen and protective clothing to prevent photosensitivity reactions.

Advise patient to report the signs of superinfection (black, furry overgrowth on the tongue, vaginal itching or discharge, loose or foul-smelling stools). Skin rash, pruritus, and urticaria should also be reported.

Advise patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult with health care professional before taking other medications.

Advise patient to notify health care professional of medication regimen before treatment or surgery.

Advise patient to notify health care professional if symptoms do not improve within 1–3 days or do not improve within 2 weeks for other systemic preparations.

Caution patients to discard outdated or decomposed doxycycline; they may be toxic.

**Malaria Prophylaxis:** Advise patient to avoid being bitten by mosquitoes by using protective measures, especially from dusk to dawn (e.g., staying in well-screened areas, using mosquito nets, covering the body with clothing, and using an effective insect repellent). Doxycycline prophylaxis should begin 1–2 days before travel to the malarious area and after completion of travel to the malarious area. Should be continued for 4 more weeks to avoid development of malaria. Do not exceed 4 mo.

**Evaluation/Desired Outcomes**

- Resolution of the signs and symptoms of infection. Length of time for complete resolution depends on the organism and site of infection.
- Decrease in acne lesions.
- Treatment of inhalational anthrax (postexposure) or treatment of cutaneous anthrax.
- Prevention of malaria.
- Reduction in inflammatory lesions associated with rosacea.

**Why was this drug prescribed for your patient?**