Doxycycline hyclate
Doxin®
100 mg Capsule
Antibacterial

FORMULATION
Each capsule contains:
Doxycycline (as hyclate)
Equivalent to Doxycycline ..... 100 mg

PRODUCT DESCRIPTION
Doxycycline hyclate (Doxin) 100 mg: Red gelatin capsule with scarlet opaque cap and body

PHARMACODYNAMICS
Doxycycline is a broad-spectrum, bacteriostatic antibiotic antibiotic. It is primarily bacteriostatic and exerts its antimicrobial effect by reversibly binding to bacterial ribosomes. Doxycycline is more lipid soluble than other tetracyclines, which enables it to penetrate and possess directly through the lipid bilayer of the bacterial cell wall. As with other tetracyclines, an energy-dependent active transport system is used for passage through the inner cytoplasmic membrane. Once inside the bacterial cell wall, doxycycline inhibits protein synthesis by binding specifically to the 30S ribosomes. The drug prevents the binding of amino-acid tRNA to the mRNA-ribosome complex. This prevents the addition of amino acids to the growing peptide chain. Doxycycline will inhibit rapidly multiplying organisms.

ANTIMICROBIAL SPECTRUM OF ACTIVITY
Tetracyclines, including doxycycline, have a similar antimicrobial spectrum of activity against a wide range of Gram-positive and Gram-negative organisms. The mechanism of these organisms to tetracyclines is common.

Since many strains of Gram-positive and Gram-negative microorganisms have been shown to be resistant to tetracyclines, culture and susceptibility testing should be performed. Doxycycline is usually active against most (but not 95% of) streptococcus faecalis have been found resistant to tetracyclines. Therefore, tetracyclines should not be used for streptococcal infections unless the organism has been demonstrated to be susceptible.

Doxycycline has been found to be active against the usual erythromycin forms of *Mycoplasma* (adequate but not against the gonorrhoeic form of the disease).

PHARMACOKINETICS
Doxycycline is rapidly and almost completely absorbed (90% to 100%) from the GI tract after oral administration. Absorption takes place primarily in the stomach and upper small intestine.

When a 200 mg dose of doxycycline is administered to normal adult subjects, the mean peak serum concentrations (Cmax) of 2.6 mcg/ml occur within 2 hours, decreasing to 1.45 mcg/ml at 24 hours.

The ingestion of food or milk does not significantly influence the absorption of doxycycline.

Doxycycline readily penetrates most body tissues, fluid and/or exudates and the volume of distribution has been measured as 0.7 L/kg. Plasma protein binding ranges from 82% to 93%.

Excessive accumulation of doxycycline does not appear to occur when usual recommended dosages of the drug are used in patients with normal renal function. The serum half-life of doxycycline is about 18 hours. Studies have shown that 54% to 92% of the drug is excreted unchanged in the urine over a 72 hour period. Fecal recovery of the drug has been found to be 5% to 40% over a 5 day period. The serum t½ is reported to be 18 to 26 hours after a single dose, and 20 to 28 hours after multiple doses. The serum half-life of doxycycline is not significantly prolonged by impairment of renal function.

In patients with normal renal function, about 20% to 26% of a single oral dose of doxycycline undergoes urinary excretion over a 72 hour period. This increases to 40% to 50% after a 5 day dose. The fraction of doxycycline excreted in the urine for 72 hours may decrease to about 1% to 5% in patients with creatinine clearance less than 10 mL/minute. Studies show that doxycycline is not removed significantly from the circulation by hemodialysis or by the intestine by chelate formation.

INDICATIONS
Indicated in the treatment of infections caused by susceptible strains of the following microorganisms in the conditions listed below:

- Sexually transmitted diseases due to *Chlamydia trachomatis, Ureaplasma urealyticum, Haemophilus ducreyi*, and *Calymmatobacterium granulomatis*
- Rickettsial infections such as *Rickettsiae rickettsiae, Rickettsiae akari, Coxiella burnetii* and the spotted fever group
- Respiratory tract infections due to *Mycoplasma pneumoniae, Haemophilus influenzae, Streptococcus pneumoniae*, and *Klebsiella spp.*
- Gastrointestinal infections due to *Vibrio cholerae*, and *Shigella spp.*
- Systemic infections caused by *Rickettsiae, Borrelia recurrentis, Yersinia pestis, Francisella tularensis, Bartonella bacilliformis*, and *Brucella spp.*
- Infections caused by *Staphylococcus aureus, Escherichia coli, Enterobacter aerogenes, Shigella spp.* and *Acinetobacter spp.*

When penicillin is contraindicated. Doxycycline is an alternative drug in the treatment of the following infections:

- Uncomplicated gonorrhoea caused by *Neisseria gonorrhoeae*
- Syphilis caused by *Treponema pallidum*
- Yaws caused by *Treponema pertenue*
- Listeriosis due to *Listeria monocytogenes*
- Anthrax due to *Bacillus anthracis*
- Vincent's infection caused by *Fusobacterium fusiformae*
- Actinomycosis caused by *Actinomyces spp.*
- Infections caused by *Clostridium spp.*

In acute intestinal amebiasis, doxycycline may be a useful adjunct to amebicides
In severe acne, doxycycline may be a useful adjunctive therapy
In refractory prostatitis and prostatitis caused by *Chlamydia trachomatis*, doxycycline may be a useful adjunctive therapy.

Prophylaxis
Doxycycline is indicated for the prophylaxis of malaria due to *Plasmodium falciparum* in short-term travelers (<4 months) to areas with Chloroquine and/or pyrimethamine-sulfadoxine resistant strains.

DOSAGE/ADMINISTRATION
Usual adult dose: Orally, 200 mg on the first day of treatment (100 mg every 12 hours) followed by a maintenance dose of 100 mg/day for the duration of therapy with meals to reduce gastric irritation.

- Management of more severe infections (particularly chronic infections of the urinary tract): 100 mg every 12 hours.
- Or as prescribed by a physician.

Infection/Condition	Dose	Duration of Therapy
Sexually Transmitted Diseases • Chlamydial cervicitis	100 mg every 12 hours	7 days
• Pelvic inflammatory disease in ambulatory patients	Cefoxitin 2 g IM or oral Amoxicillin 3 g or oral Ampicillin 3.5 g or aqueous procaine penicillin G 4.8 million units IM as a 2 sites or Ceftriaxone 250 mg IM, both of these regimens followed by oral Doxycycline 100 mg twice daily	10 to 14 days

Infection/Condition	Dose	Duration of Therapy
• Early syphilis, for pregnant patients allergic to penicillin	100 mg every 12 hours	14 days
• Syphilis of more than one year's duration (patients allergic to penicillin)	100 mg every 12 hours	4 weeks
• Uncomplicated gonococcal infection	100 mg every 12 hours or 300 mg not followed in one hour by a normal 300 mg dose	7 days
• Uncomplicated urethral, endocervical, or rectal infection	100 mg every 12 hours	7 days
• Nongonococcal urethritis	100 mg every 12 hours	7 days
• Acute epididymo-orchitis	100 mg every 12 hours	at least 10 days
Acne vulgaris	100 mg once daily	12 weeks
Traveller's diarrhea	Treatment: 200 mg on the first day of travel (administered as a single dose or as 100 mg every 12 hours) Prophylaxis: 100 mg daily Note: Doxycycline is not recommended for prophylaxis use of the drug beyond 21 days is unavailable.	1 day 7 days
Cholera	Treatment and prophylaxis: 300 mg	Single dose
Leptospirosis	Treatment: 100 mg every 12 hours for 2 days. Prophylaxis: 200 mg on a weekly basis throughout stay in the area and 200 mg upon completion of the trip	2 days Single dose
Tick and louse-borne relapsing fevers and tularemia	100 or 200 mg depending on severity	Single dose
Scrub typhus	200 mg	Single dose
Malaria	Treatment of chloroquine-resistant falciparum malaria: 200 mg daily for at least 7 days. Due to the potential rapid action of the infection, give a rapid-acting schizonticide such as quinine in conjunction with Doxycycline. Here that quinine dosage recommendations vary in different areas. Prophylaxis: 100 mg daily. Start prophylaxis 1 to 2 days before travel to malarious areas. Continue daily during travel in these areas and 4 weeks after leaving said areas.	7 days Single dose
Dental Infections • Refractory Periodontitis in Adults • Periodontal abscess (if allergic to Penicillin)	100 mg every 12 hours 100 mg every 12 hours	7 days 7 days

CONTRAINDICATIONS
- Known hypersensitivity to tetracyclines or to any component of the product
- Use in children below the age of eight years, infants and children below 8 years of age (except for use as an alternative treatment for inhalational anthrax post-exposure)
- Patients with myasthenia gravis
- Patients with systemic lupus erythematosus

WARNINGS AND PRECAUTIONS
Prolonged Therapy:
- **As with other tetracyclines, doxycycline can cause hard bones when administered to a pregnant woman.** Brown discoloration of the deciduous teeth can also occur when the drug is given during the last half of pregnancy, and can have effects on the developing bone manifested by retardation of skeletal development. Evidence of embryotoxicity has also been noted in animals treated early in pregnancy. **Doxycycline should not be used during pregnancy or by women of childbearing potential unless the benefits of therapy outweigh the potential hazard to the fetus. The potential benefits must be evaluated before beginning therapy, and patients should be informed of the potential hazard to the fetus and tetracycline therapy should be stopped immediately.**

Tooth Development: Tetracyclines should not be administered during the LAST HALF OF PREGNANCY, INFANCY AND CHILDHOOD UP TO THE AGE OF 8 YEARS) MAY CAUSE PERMANENT DISCOLORATION OF THE TEETH (YELLOW-GREY-BROWN). The adverse effect is more common during long-term use of the medicines but has also been observed after repeated short-term courses. Enamel hypoplasia has also been reported. **Tetracyclines, including doxycycline, should therefore not be used in this age group except for anthrax, including inhalational anthrax (post-exposure), unless other drugs are not likely to be effective or are contraindicated.**

If IV tetracyclines form a vitreal solution, they should be infused slowly to minimize to fluids growth rate has been observed in premature human infants given tetracycline in oral doses of 25 mg/kg/day body weight every 6 hours. This reaction was shown to be due to the drug's solvent propylene glycol.

- **Clostridium difficile-associated diarrhea (CDAD):** There have been observed with the use of nearly all antibacterial agents, including doxycycline, and may range in severity from mild to life-threatening. **It is important to consider the diagnosis in patients who present with diarrhea following administration of antibacterial agents.**

- **Esophageal Ulcers:** Esophagitis and esophageal ulcers have been reported rarely in patients receiving doxycycline. Most of these patients took the medication immediately before going to bed and/or without adequate amount of fluid (see **DOSAGE AND ADMINISTRATION**). Esophageal ulcers usually heal rapidly when the drug is discontinued. Therefore, clinicians should be alert to the possibility of esophageal ulcers when doxycycline has been administered.

- **Photosensitivity:** Photosensitivity manifested by exaggerated sunburn reaction has been observed in patients receiving tetracyclines, including doxycycline. Some, direct exposure to sunlight or UV radiation should be avoided during treatment. Therapy should be discontinued at the first evidence.

- **Tissue Hyperpigmentation:** Tetracyclines may induce hyperpigmentation in many organs, including nails, bone, skin, eyes, thyroid, sclerae, heart valves and permanent dentition. Another family cases of tetracycline but has also been observed after repeated short-term courses. Enamel hypoplasia has also been reported. **Tetracyclines, including doxycycline, should therefore not be used in this age group except for anthrax, including inhalational anthrax (post-exposure), unless other drugs are not likely to be effective or are contraindicated.**

- **Autoimmune Syndromes:** Tetracycline has been associated with the development of autoimmune adverse drug reactions including exacerbation of systemic lupus erythematosus, autoimmune hepatitis, pericarditis, myalgia, and serum sickness. In symptomatic patients, liver function tests, ANA, CBC, and other appropriate tests should be performed to monitor patients. Use of antibacterial drugs may exacerbate myasthenia gravis symptoms.

- **Pseudotumor cerebri:** Bulging fontanels in infants and increased intracranial hypertension in adults and adolescents have been reported in individuals receiving tetracyclines. These conditions disappeared promptly when the drug was discontinued.

- **Myasthenia gravis:** Because of the potential neuromuscular blockade, tetracyclines should be used with caution in patients with myasthenia gravis.

- **Porphyria:** Rare cases of porphyria have been observed in patients receiving tetracyclines.

- **Venereal Disease:** When treating venereal disease, when concomitant syphilis is suspected, proper diagnostic procedures including dark-field examinations should be utilized. In all such cases, monthly serological tests should be made for at least four months.

Other Precautions
- Doxycycline after substantial but not complete suppression of the unusual blood stages of *Plasmodium vivax*. Doxycycline does not suppress *P. falciparum* in unusual blood stage gametocytes. Individuals completing this prophylactic regimen may still transmit infection to mosquitoes without clinical illness.
- Incision and drainage or other surgical procedures should be performed in combination with antibiotic therapy, when indicated.
- Use with caution in patients with hepatic impairment or those receiving potentially hepatotoxic drugs since oral and parenteral tetracyclines, including doxycycline, have been associated with abnormal hepatic function.
- As with any potent drug, periodic assessment of organ system function, including renal, hepatic, hematopoietic, is recommended during prolonged therapy.
- The use of tetracycline or doxycycline has been associated with the development of a reversible Fanconi-like tubular syndrome (see **UNDESIRABLE EFFECTS**). In addition, use of expired tetracyclines has also caused a lupus erythematosus-like syndrome.
- Prescribing doxycycline in the absence of a proven or strongly suspected bacterial infection or a prophylactic indication is unlikely to provide benefit to the patient and increases the risk of the development of drug-resistant bacteria.
- As with other antibacterial drugs, long term or repeated use may result in overgrowth of non-susceptible organisms, including fungi. The use of tetracyclines may increase incidence of vaginal candidiasis. Use with caution in patients with a history of or predisposition to candidiasis overgrowth.

INTERACTIONS WITH OTHER MEDICAMENTS

Drugs	Nature of Interaction
Aminoglycosides, penicillins	Bactericidal drugs such as doxycycline may interfere with the bactericidal action of aminoglycosides and penicillins.
Antacids containing aluminum, calcium, magnesium	Decrease the serum absorption concentrations of doxycycline.
Alcohol, barbiturates, carbamazepine, phenytoin, primidone, rifampicin (rifampin), ritonavir (ritonavir) enzyme inducers)	Concomitant use of these drugs with doxycycline may decrease the serum t½ of doxycycline. This effect may be due to induction of hepatic microsomal enzymes by the interacting agent. An increase in the dosage of doxycycline may be required when these drugs are administered concomitantly with drugs known to be enzyme inducers.
Bismuth subsalicylate, proton pump inhibitors, antacids containing aluminum, calcium or magnesium, and iron and iron salts, zinc containing preparations	These drugs interfere with oral doxycycline absorption. It has been reported that concomitant administration of ferrous sulfate with doxycycline can decrease absorption of doxycycline given orally and shortened serum t½ after a single IV injection. In the event that iron therapy is considered necessary, there is no reason to discontinue tetracycline therapy. The interval between administration of each drug should be wide as possible.
Quinapril	Quinapril contains magnesium carbonate and may interfere with the absorption of doxycycline.
Colestipol	Doxycycline may increase the plasma concentration of colestipol. Administration of these drugs should only be undertaken with caution and close monitoring.
Ergot alkaloids, methoxyflurane, methotrexate	The toxic effects of these drugs may be increased during concomitant use with doxycycline.
Live vaccines	There are theoretical concerns that anti-infectives with antibacterial activity against V.Cs (the live, attenuated strain of Salmonella typhi vaccine) may interfere with the efficacy of the vaccine. As a consequence of the vaccine. Administration of doxycycline vaccine and containing live, attenuated Salmonella typhi of the V.Cs strain should be delayed until after the last dose has been taken.
Methoxyflurane	Concomitant therapy has resulted in fatal renal toxicity.
Oral anticoagulants (e.g., Warfarin)	Concomitant therapy may result in prolongation of the patient's prothrombin time. Reduction of anticoagulant dose may be necessary.
Oral contraceptives	Doxycycline may decrease the efficacy of contraceptives and increase the incidence of breakthrough bleeding. Patients using oral contraceptives as a second form of contraception may be at increased risk of unintended pregnancy.
Oral retinoids, retinoids A	Use of these drugs with concomitant hypervitaminosis (pseudotumor cerebri) have been reported after taking tetracyclines and oral retinoids, such as isotretinoin, acitretin, and etretinate. Concomitant use of these drugs is not recommended.
Other drugs	Carbenicillin, chloramphenicol, kaolin-pectin, and sucralfate may decrease tetracycline absorption. Disulfiram (Antabuse tablets), sodium bicarbonate, sodium lactate, acetazolamide, and ethacrynamide may reduce the plasma levels of doxycycline. Strontium ranelate should not be given with tetracyclines because of possible complex formation. Tetracyclines have been reported to produce increased concentrations of digoxin, histaminium, lithium, and theophylline (although these interactions are not strongly established).

Interference with Laboratory Tests:
- False elevations of urinary catecholamine determinations using glucose oxidase reagent (e.g., Clinistix®, Tes-Tape®) have been reported.
- False elevations of urinary catecholamine levels may occur due to interference with the fluorescence test.

STATEMENT ON USAGE FOR HIGH RISK GROUPS
Pregnancy: Pregnancy Category D. Studies in animals have shown that tetracyclines cross the placenta, are bound in fetal tissues, and can have toxic effects on the developing fetus (often related to retardation of skeletal development). Evidence of embryotoxicity has also been noted in animals treated early in pregnancy (see **WARNINGS AND PRECAUTIONS**).

Lactation: Tetracyclines are excreted in human milk. Since doxycycline may cause serious adverse effects to the infant, the drug should not be used during breastfeeding (see **WARNINGS AND PRECAUTIONS**).

Children: Until the safety of doxycycline has been established, the drug should not be used in children below 8 years old (see **WARNINGS AND PRECAUTIONS**).

Elderly: No special precautions are necessary in the elderly.

Renal Impairment: Studies have shown that the administration of the usual recommended doses of doxycycline will not result in excessive accumulation of the antibiotic in patients with renal impairment.

Hepatic Impairment: Abnormal hepatic function has been reported rarely with the use of both oral and parenteral tetracyclines, including doxycycline.

Effects on Ability to Drive and Use Machines: Since doxycycline may cause visual disturbances such as blurring of vision, patients should be advised to refrain from driving or operating machinery.

UNDESIRABLE EFFECTS
Due to oral doxycycline's virtually complete absorption, side effects of the lower bowel, particularly diarrhea, have been infrequent. The following adverse reactions have been observed in patients on tetracyclines:

Gastrointestinal: Anorexia, nausea, vomiting, glossitis, dysphagia, stomatitis, pancreatitis, hepatic failure, jaundice

Hypersensitivity Reactions (Immunologic): Anaphylactoid purpura, anaphylactic shock, anaphylactoid purpura, anaphylactoid reaction, angioedema, laryngoedema, erythema multiforme, exfoliative dermatitis, urticaria, pericarditis, exacerbation of systemic lupus erythematosus, serum sickness-like reactions, lymphadenopathy, eosinophilia, pericarditis, peripheral edema, gloss-erythrocytic, photosensitivity (dermatologic reactions (pancytopenia, coexisting mainly of lymphocytes and hemolysis of the hemolytic type, and hypoplastic anemia or pharmacologic), pulmonary infiltrates with eosinophilia (erythematous, maculopapular, morbilliform), serum sickness), serum sickness-like reactions, lesions (abscesses syndrome, exacerbation of systemic lupus erythematosus, hypersensitivity reactions, pericarditis, pericardial effusion).

Gastrointestinal: Abdominal discomfort/pain, anorexia, bulky bone stool, black hairy tongue, C[bd]-lysodeoxycholestanol, cholestatic hepatitis, dysphagia, enterocolitis, esophagitis, esophageal ulcers, gastritis, glossitis, glossodynia, hepatic failure, hepatitis, jaundice, hepatotoxicity, inflammatory lesions (with monilial overgrowth) in the anogenital region, nausea, pancreatitis, proctitis, pruritus ani, rare throat, stomatitis, tooth discoloration and enamel hypoplasia, vomiting (projectile vomiting (multifactorial) intracranial hypertension, bulging fontanels, diplopia, and visual disturbances (changes in color vision) have been reported rarely.

Hepatotoxicity: Elevations of alkaline aminotransferase (ALT), aspartate aminotransferase (AST), bilirubin values; hepatotoxicity with transient increases in liver function tests, cholestasis, hepatitis (autoimmune, cholestatic), hepatic failure, jaundice

In some cases severe and sometimes fatal hepatotoxicity, associated with fatty changes in the liver and pancreatitis, has occurred in pregnant women receiving high doses of intravenous tetracyclines. Similar reactions have not been reported with the oral form. However, hepatotoxicity has also occurred with oral tetracycline therapy and has been rarely reported with doxycycline.

Renal: Acute renal failure; increased urinary excretion of nitrogen and increased BUN (apparently dose-related) concentrations, with or without increased serum creatinine concentrations; Fanconi-like syndrome (characterized by nausea, vomiting, lethargy, polyuria, polydipsia, hypokalemia, hypophosphatemia, metabolic acidosis); hepatic dysfunction, azotemia; hepatic failure, hepatitis, hepatotoxicity

Hematologic: Anemia, aplastic anemia, hemolytic anemia, agranulocytosis, atypical lymphocytes, acrocytosis, hypochromic anemia, increase in prothrombin time, leukocytosis, leukopenia, neutropenia, porphyria, thrombocytopenia, thrombocytopenic purpura, basophilic stippling of erythrocytes

Tetracyclines have also been associated with reductions in serum vitamin K concentration, including a case of bilirubin deficiency and concomitant coagulation anemia.

Musculoskeletal: Arthralgia, myalgia; increased muscle weakness in patients with myasthenia gravis

Nervous System: Anxiety, bulging fontanels/increased intracranial pressure in infants, benign intracranial hypertension in juveniles and adults (with papilledema), dizziness, drowsiness, headache, impaired hearing, loss of permanent vestibular function, lightheadedness, nausea, nystagmus, syncope, tinnitus, vertigo

Other Adverse Effects: Decreased prothrombin activity, increased erythrocyte sedimentation rate, exacerbation/potentiation of systemic lupus erythematosus, hypersensitivity reactions, pericarditis, pericardial effusion, worsening of renal function, immunologic reactions (serum sickness-like reactions, lesions (abscesses syndrome), exacerbation of systemic lupus erythematosus, hypersensitivity reactions, pericarditis, pericardial effusion).

Overdosage: Symptoms of acute overdosage are reported to produce known/doubt microscopic dissolution of thyroid tissue. No abnormalities of thyroid function are known to occur.

Gastric disturbances, nausea, vomiting, diarrhea, anorexia, fever, chills, malaise, macular rashes, exacerbation of cutaneous lesions, and leukocytosis) has also been commonly observed in patients with relapsing fever.

Ocular inflammation has occurred after the use of ocular preparations processed with thimerosal in some patients on tetracyclines.

STORAGE AND SHELF LIFE
Acute overdosage with tetracyclines is extremely rare, and if it occurs, no specific treatment is required. Any gastrointestinal upset should be treated symptomatically. As tetracyclines form insoluble complexes with calcium, antacids may be administered in appropriate circumstances.

Effects does not start with half-life and thus would not be of benefit in treating cases of overdosage.

STORAGE CONDITIONS
Store at temperature not exceeding 30°C
Protect from out of sight and reach of children.

ADVERSE DRUG REACTION REPORTING STATEMENT
For suspected adverse drug reaction, send medical attention immediately and report to the FDA or www.fda.gov.ph AND Drolab Pharma Inc. at (02) 8-DROLAB (8-376522) or medinfo@drolab.com.ph. For reporting undesirable effects, you can help provide more information on the safety of this medicine.

AVAILABILITY
Aluminum Foil Strip packs x 10's | Box of 5's

CAUTION: Food, Drug, Device, and Cosmetics Act prohibits dispensing without prescription.

DATE OF REVISION OF THE PACKAGE INSERT: April 2018

DATE OF FIRST AUTHORIZATION: May 2007

Manufactured for:
ARMSTRONG LABORATORIES, INC.
UNILAB Pharma Campus, Barangay Manalupan
Biñan, Laguna, Philippines

For the distributor:
DRO-LAB PHARMA, INC.
No. 30 Orchid Street, Mandaluyong City
Metro Manila, Philippines

Reg. IP(PH).