

FLOXIN[®] Tablets
(ofloxacin tablets)

To reduce the development of drug-resistant bacteria and maintain the effectiveness of FLOXIN[®] (Ofloxacin) Tablets and other antibacterial drugs, FLOXIN[®] (Ofloxacin) Tablets should be used only to treat or prevent infections that are proven or strongly suspected to be caused by bacteria.

DESCRIPTION

FLOXIN[®] (ofloxacin tablets) Tablets is a synthetic broad-spectrum antimicrobial agent for oral administration. Chemically, ofloxacin, a fluorinated carboxyquinolone, is the racemate, (±)-9-fluoro-2,3-dihydro-3-methyl-10-(4-methyl-1-piperazinyl)-7-oxo-7H-pyrido[1,2,3-de]-1,4-benzoxazine-6-carboxylic acid. The chemical structure is:

<INSERT STRUCTURE>

Its empirical formula is C₁₈H₂₀FN₃O₄, and its molecular weight is 361.4. Ofloxacin is an off-white to pale yellow crystalline powder. The molecule exists as a zwitterion at the pH conditions in the small intestine. The relative solubility characteristics of ofloxacin at room temperature, as defined by USP nomenclature, indicate that ofloxacin is considered to be *soluble* in aqueous solutions with pH between 2 and 5. It is *sparingly to slightly soluble* in aqueous solutions with pH 7 (solubility falls to 4 mg/mL) and *freely soluble* in aqueous solutions with pH above 9. Ofloxacin has the potential to form stable coordination compounds with many metal ions. This *in vitro* chelation potential has the following formation order: Fe⁺³ > Al⁺³ > Cu⁺² > Ni⁺² > Pb⁺² > Zn⁺² > Mg⁺² > Ca⁺² > Ba⁺².

FLOXIN Tablets contain the following inactive ingredients: anhydrous lactose, corn starch, hydroxypropyl cellulose, hypromellose, magnesium stearate, polyethylene glycol, polysorbate 80, sodium starch glycolate, titanium dioxide and may also contain synthetic yellow iron oxide.

CLINICAL PHARMACOLOGY

Following oral administration, the bioavailability of ofloxacin in the tablet formulation is approximately 98%. Maximum serum concentrations are achieved one to two hours after an oral dose. Absorption of ofloxacin after single or multiple doses of 200 to 400 mg is predictable, and the amount of drug absorbed increases proportionately with the dose. Ofloxacin has biphasic elimination. Following multiple oral doses at steady-state administration, the half-lives are approximately 4-5 hours and 20-25 hours. However, the longer half-life represents less than 5% of the total AUC. Accumulation at steady-state can be estimated using a half-life of 9 hours. The total clearance and volume of distribution are approximately similar after single or multiple doses. Elimination is mainly by renal excretion. The following are mean peak serum concentrations in healthy 70-80 kg male volunteers after single oral doses of 200, 300, or 400 mg of ofloxacin or after multiple oral doses of 400 mg.

Oral Dose	Serum Concentration 2 Hours After Admin. (µg/mL)	Area Under the Curve (AUC_(0-∞)) (µg·h/mL)
200 mg single dose	1.5	14.1
300 mg single dose	2.4	21.2
400 mg single dose	2.9	31.4
400 mg steady-state	4.6	61.0

Steady-state concentrations were attained after four oral doses, and the area under the curve (AUC) was approximately 40% higher than the AUC after single doses. Therefore, after multiple-dose administration of 200 mg and 300 mg doses, peak serum levels of 2.2 µg/mL and 3.6 µg/mL, respectively, are predicted at steady-state.

In vitro, approximately 32% of the drug in plasma is protein bound.

The single dose and steady-state plasma profiles of ofloxacin injection were comparable in extent of exposure (AUC) to those of ofloxacin tablets when the injectable and tablet formulations of ofloxacin were administered in equal doses (mg/mg) to the same group of subjects. The mean steady-state AUC₍₀₋₁₂₎ attained after the intravenous administration of 400 mg over 60 min was 43.5 µg•h/mL; the mean steady-state AUC₍₀₋₁₂₎ attained after the oral administration of 400 mg was 41.2 µg•h/mL (two one-sided t-test, 90% confidence interval was 103-109). (See following chart.)

<INSERT CHART>

Between 0 and 6 h following the administration of a single 200 mg oral dose of ofloxacin to 12 healthy volunteers, the average urine ofloxacin concentration was approximately 220 µg/mL. Between 12 and 24 hours after administration, the average urine ofloxacin level was approximately 34 µg/mL.

Following oral administration of recommended therapeutic doses, ofloxacin has been detected in blister fluid, cervix, lung tissue, ovary, prostatic fluid, prostatic tissue, skin, and sputum. The mean concentration of ofloxacin in each of these various body fluids and tissues after one or more doses was 0.8 to 1.5 times the concurrent plasma level. Inadequate data are presently available on the distribution or levels of ofloxacin in the cerebrospinal fluid or brain tissue.

Ofloxacin has a pyridobenzoxazine ring that appears to decrease the extent of parent compound metabolism. Between 65% and 80% of an administered oral dose of ofloxacin is excreted unchanged via the kidneys within 48 hours of dosing. Studies indicate that less than 5% of an administered dose is recovered in the urine as the desmethyl or N-oxide metabolites. Four to eight percent of an ofloxacin dose is excreted in the feces. This indicates a small degree of biliary excretion of ofloxacin.

The administration of FLOXIN with food does not affect the C_{max} and AUC_∞ of the drug, but T_{max} is prolonged.

Clearance of ofloxacin is reduced in patients with impaired renal function (creatinine clearance rate ≤50 mL/min), and dosage adjustment is necessary. (See **PRECAUTIONS: General and DOSAGE AND ADMINISTRATION.**)

Following oral administration to healthy elderly subjects (65-81 years of age), maximum plasma concentrations are usually achieved one to two hours after single and multiple twice-daily doses, indicating that the rate of oral absorption is unaffected by age or gender. Mean peak plasma concentrations in elderly subjects were 9-21% higher than those observed in younger subjects. Gender differences in the pharmacokinetic properties of elderly subjects have been observed. Peak plasma concentrations were 114% and 54% higher in elderly females compared to elderly males following single and multiple twice-daily doses. [This interpretation was based on study results collected from two separate studies.] Plasma concentrations increase dose-dependently with the increase in doses after single oral dose and at steady state. No differences were observed in the volume of distribution values between elderly and younger subjects. As in younger subjects, elimination is mainly by renal excretion as unchanged drug in elderly subjects, although less drug is recovered from renal excretion in elderly subjects. Consistent with younger subjects, less than 5% of an administered dose was recovered in the urine as the desmethyl and N-oxide metabolites in the elderly. A longer plasma half-life of approximately 6.4 to 7.4 hours was observed in

elderly subjects, compared with 4 to 5 hours for young subjects. Slower elimination of ofloxacin is observed in elderly subjects as compared with younger subjects which may be attributable to the reduced renal function and renal clearance observed in the elderly subjects. Because ofloxacin is known to be substantially excreted by the kidney, and elderly patients are more likely to have decreased renal function, dosage adjustment is necessary for elderly patients with impaired renal function as recommended for all patients. (See **PRECAUTIONS: General** and **DOSAGE AND ADMINISTRATION**)

Microbiology

Ofloxacin is a quinolone antimicrobial agent. The mechanism of action of ofloxacin and other fluoroquinolone antimicrobials involves inhibition of bacterial topoisomerase IV and DNA gyrase (both of which are type II topoisomerases), enzymes required for DNA replication, transcription, repair and recombination.

Ofloxacin has *in vitro* activity against a wide range of gram-negative and gram-positive microorganisms. Ofloxacin is often bactericidal at concentrations equal to or slightly greater than inhibitory concentrations.

Fluoroquinolones, including ofloxacin, differ in chemical structure and mode of action from aminoglycosides, macrolides and β -lactam antibiotics, including penicillins. Fluoroquinolones may, therefore, be active against bacteria resistant to these antimicrobials.

Resistance to ofloxacin due to spontaneous mutation *in vitro* is a rare occurrence (range: 10^{-9} to 10^{-11}). Although cross-resistance has been observed between ofloxacin and some other fluoroquinolones, some microorganisms resistant to other fluoroquinolones may be susceptible to ofloxacin.

Ofloxacin has been shown to be active against most strains of the following microorganisms both *in vitro* and in clinical infections as described in the **INDICATIONS AND USAGE** section:

Aerobic gram-positive microorganisms

Staphylococcus aureus (methicillin-susceptible strains)
Streptococcus pneumoniae (penicillin-susceptible strains)
Streptococcus pyogenes

Aerobic gram-negative microorganisms

Citrobacter (diversus) koseri
Enterobacter aerogenes
Escherichia coli
Haemophilus influenzae
Klebsiella pneumoniae
Neisseria gonorrhoeae
Proteus mirabilis
Pseudomonas aeruginosa

As with other drugs in this class, some strains of *Pseudomonas aeruginosa* may develop resistance fairly rapidly during treatment with ofloxacin.

Other microorganisms

Chlamydia trachomatis

The following *in vitro* data are available, **but their clinical significance is unknown.**

Ofloxacin exhibits *in vitro* minimum inhibitory concentrations (MIC values) of 2 μ g/mL or less against most ($\geq 90\%$) strains of the following microorganisms; however, the safety and effectiveness of ofloxacin in treating clinical infections due to these microorganisms have not been established in adequate and well-controlled trials.

Aerobic gram-positive microorganisms*Staphylococcus epidermidis* (methicillin-susceptible strains)*Staphylococcus saprophyticus**Streptococcus pneumoniae* (penicillin-resistant strains)**Aerobic gram-negative microorganisms***Acinetobacter calcoaceticus**Bordetella pertussis**Citrobacter freundii**Enterobacter cloacae**Haemophilus ducreyi**Klebsiella oxytoca**Moraxella catarrhalis**Morganella morganii**Proteus vulgaris**Providencia rettgeri**Providencia stuartii**Serratia marcescens***Anaerobic microorganisms***Clostridium perfringens***Other microorganisms***Chlamydia pneumoniae**Gardnerella vaginalis**Legionella pneumophila**Mycoplasma hominis**Mycoplasma pneumoniae**Ureaplasma urealyticum*

Ofloxacin is not active against *Treponema pallidum* (See **WARNINGS**.)

Many strains of other streptococcal species, *Enterococcus* species, and anaerobes are resistant to ofloxacin.

Susceptibility Tests

Dilution techniques: Quantitative methods are used to determine antimicrobial minimum inhibitory concentrations (MIC values). These MIC values provide estimates of the susceptibility of bacteria to antimicrobial compounds. The MIC values should be determined using a standardized procedure. Standardized procedures are based on a dilution method¹ (broth or agar) or equivalent with standardized inoculum concentrations and standardized concentrations of ofloxacin powder. The MIC values should be interpreted according to the following criteria:

For testing aerobic microorganisms other than *Haemophilus influenzae*, *Neisseria gonorrhoeae*, and *Streptococcus pneumoniae*:

<u>MIC (μg/mL)</u>	<u>Interpretation</u>
≤ 2	Susceptible (S)
4	Intermediate (I)
≥ 8	Resistant (R)

For testing *Haemophilus influenzae*:^a

<u>MIC (μg/mL)</u>	<u>Interpretation</u>
≤ 2	Susceptible (S)

^a This interpretive standard is applicable only to broth microdilution susceptibility tests with *Haemophilus influenzae* using *Haemophilus* Test Medium¹.

The current absence of data on resistant strains precludes defining any results other than "Susceptible". Strains yielding MIC results suggestive of a "nonsusceptible" category should be submitted to a reference laboratory for further testing.

For testing *Neisseria gonorrhoeae*:^b

<u>MIC (µg/mL)</u>	<u>Interpretation</u>
≤ 0.25	Susceptible (S)
0.5-1	Intermediate (I)
≥ 2	Resistant (R)

^b These interpretive standards are applicable only to agar dilution tests using GC agar base and 1% defined growth supplement incubated in 5% CO₂.

For testing *Streptococcus* species including *Streptococcus pneumoniae*:^c

<u>MIC (µg/mL)</u>	<u>Interpretation</u>
≤ 2	Susceptible (S)
4	Intermediate (I)
≥ 8	Resistant (R)

^c These interpretive standards are applicable only to broth microdilution susceptibility tests using cation-adjusted Mueller-Hinton broth with 2-5% lysed horse blood.

A report of "Susceptible" indicates that the pathogen is likely to be inhibited if the antimicrobial compound in the blood reaches the concentration usually achievable. A report of "Intermediate" indicates that the result should be considered equivocal, and, if the microorganism is not fully susceptible to alternative, clinically feasible drugs, the test should be repeated. This category implies possible clinical applicability in body sites where the drug is physiologically concentrated or in situations where a high dosage of drug can be used. This category also provides a buffer zone which prevents small uncontrolled technical factors from causing major discrepancies in interpretation. A report of "Resistant" indicates that the pathogen is not likely to be inhibited if the antimicrobial compound in the blood reaches the concentration usually achievable; other therapy should be selected.

Standardized susceptibility test procedures require the use of laboratory control microorganisms to control the technical aspects of the laboratory procedures. Standard ofloxacin powder should provide the following MIC values:

<u>Microorganism</u>		<u>MIC Range (µg/mL)</u>
<i>Escherichia coli</i>	ATCC 25922	0.015-0.12
<i>Haemophilus influenzae</i>	ATCC 49247 ^d	0.016-0.06
<i>Neisseria gonorrhoeae</i>	ATCC 49226 ^e	0.004-0.016
<i>Pseudomonas aeruginosa</i>	ATCC 27853	1-8
<i>Staphylococcus aureus</i>	ATCC 29213	0.12-1
<i>Streptococcus pneumoniae</i>	ATCC 49619 ^f	1-4

^d This quality control range is applicable to only *H. influenzae* ATCC 49247 tested by a microdilution procedure using *Haemophilus* Test Medium (HTM)¹.

^e This quality control range is applicable only to *N. gonorrhoeae* ATCC 49226 tested by an agar dilution procedure using GC agar base with 1% defined growth supplement incubated in 5% CO₂.

^f This quality control range is applicable to only *S. pneumoniae* ATCC 49619 tested by a microdilution procedure using cation-adjusted Mueller-Hinton broth with 2-5% lysed horse blood.

Diffusion techniques: Quantitative methods that require measurement of zone diameters also provide reproducible estimates of the susceptibility of bacteria to antimicrobial compounds. One such standardized procedure² requires the use of standardized inoculum concentrations. This procedure uses paper disks impregnated with 5- μ g ofloxacin to test the susceptibility of microorganisms to ofloxacin.

Reports from the laboratory providing results of the standard single-disk susceptibility test with a 5- μ g ofloxacin disk should be interpreted according to the following criteria:

For testing aerobic microorganisms other than *Haemophilus influenzae*, *Neisseria gonorrhoeae*, and *Streptococcus pneumoniae*:

<u>Zone Diameter (mm)</u>	<u>Interpretation</u>
≥ 16	Susceptible (S)
13-16	Intermediate (I)
≤ 12	Resistant (R)

For testing *Haemophilus influenzae*:⁹

<u>Zone Diameter (mm)</u>	<u>Interpretation</u>
≥ 16	Susceptible (S)

⁹ This zone diameter standard is applicable only to disk diffusion tests with *Haemophilus influenzae* using *Haemophilus* Test Medium (HTM)² incubated in 5% CO₂.

The current absence of data on resistant strains precludes defining any results other than "Susceptible". Strains yielding zone diameter results suggestive of a "nonsusceptible" category should be submitted to a reference laboratory for further testing.

For testing *Neisseria gonorrhoeae*:^h

<u>Zone Diameter (mm)</u>	<u>Interpretation</u>
≥ 31	Susceptible (S)
25-30	Intermediate (I)
≤ 24	Resistant (R)

^h These zone diameter standards are applicable only to disk diffusion tests using GC agar base and 1% defined growth supplement incubated in 5% CO₂.

For testing *Streptococcus* species including *Streptococcus pneumoniae*:ⁱ

<u>Zone Diameter</u>	<u>Interpretation</u>
≥ 16	Susceptible (S)
13-15	Intermediate (I)
≤ 12	Resistant (R)

ⁱ These zone diameter standards are applicable only to disk diffusion tests performed using Mueller-Hinton agar supplemented with 5% defibrinated sheep blood and incubated in 5% CO₂.

Interpretation should be as stated above for results using dilution techniques. Interpretation involves correlation of the diameter obtained in the disk test with the MIC for ofloxacin.

As with standardized dilution techniques, diffusion methods require the use of laboratory control microorganisms that are used to control the technical aspects of the laboratory procedures. For the diffusion technique, the 5- μ g ofloxacin disk should provide the following zone diameters in these laboratory quality control strains:

<u>Microorganism</u>		<u>Zone Diameter (mm)</u>
<i>Escherichia coli</i>	ATCC 25922	29-33
<i>Haemophilus influenzae</i>	ATCC 49247 ^j	31-40
<i>Neisseria gonorrhoeae</i>	ATCC 49226 ^k	43-51
<i>Pseudomonas aeruginosa</i>	ATCC 27853	17-21
<i>Staphylococcus aureus</i>	ATCC 25923	24-28
<i>Streptococcus pneumoniae</i>	ATCC 49619 ^l	16-21

^j This quality control range is applicable only to *H. influenzae* ATCC 49247 tested by a disk diffusion procedure using *Haemophilus* Test Medium (HTM)² incubated in 5% CO₂.

^k This quality control range is applicable only to *N. gonorrhoeae* ATCC 49226 tested by a disk diffusion procedure using GC agar base with 1% defined growth supplement incubated in 5% CO₂.

^l This quality control range is applicable only to *S. pneumoniae* ATCC 49619 tested by a disk diffusion procedure using Mueller-Hinton agar supplemented with 5% defibrinated sheep blood and incubated in 5% CO₂.

INDICATIONS AND USAGE

To reduce the development of drug-resistant bacteria and maintain the effectiveness of FLOXIN (Ofloxacin) Tablets and other antibacterial drugs, FLOXIN (Ofloxacin) Tablets should be used only to treat or prevent infections that are proven or strongly suspected to be caused by susceptible bacteria. When culture and susceptibility information are available, they should be considered in selecting or modifying antibacterial therapy. In the absence of such data, local epidemiology and susceptibility patterns may contribute to the empiric selection of therapy.

FLOXIN (ofloxacin tablets) Tablets are indicated for the treatment of adults with mild to moderate infections (unless otherwise indicated) caused by susceptible strains of the designated microorganisms in the infections listed below. Please see **DOSAGE AND ADMINISTRATION** for specific recommendations.

Acute bacterial exacerbations of chronic bronchitis due to *Haemophilus influenzae* or *Streptococcus pneumoniae*.

Community-acquired Pneumonia due to *Haemophilus influenzae* or *Streptococcus pneumoniae*.

Uncomplicated skin and skin structure infections due to *Staphylococcus aureus*, *Streptococcus pyogenes*, or *Proteus mirabilis*.

Acute, uncomplicated urethral and cervical gonorrhea due to *Neisseria gonorrhoeae*. (See **WARNINGS**.)

Nongonococcal urethritis and cervicitis due to *Chlamydia trachomatis*. (See **WARNINGS**.)

Mixed Infections of the urethra and cervix due to *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. (See **WARNINGS**.)

Acute pelvic inflammatory disease (including severe infection) due to *Chlamydia trachomatis* and/or *Neisseria gonorrhoeae*. (See **WARNINGS**.)

NOTE: If anaerobic microorganisms are suspected of contributing to the infection, appropriate therapy for anaerobic pathogens should be administered.

Uncomplicated cystitis due to *Citrobacter diversus*, *Enterobacter aerogenes*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, or *Pseudomonas aeruginosa*.

Complicated urinary tract infections due to *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Citrobacter diversus**, or *Pseudomonas aeruginosa**.

Prostatitis due to *Escherichia coli*.

* = Although treatment of infections due to this organism in this organ system demonstrated a clinically significant outcome, efficacy was studied in fewer than 10 patients.

Appropriate culture and susceptibility tests should be performed before treatment in order to isolate and identify organisms causing the infection and to determine their susceptibility to ofloxacin. Therapy with ofloxacin may be initiated before results of these tests are known; once results become available, appropriate therapy should be continued.

As with other drugs in this class, some strains of *Pseudomonas aeruginosa* may develop resistance fairly rapidly during treatment with ofloxacin. Culture and susceptibility testing performed periodically during therapy will provide information not only on the therapeutic effect of the antimicrobial agent but also on the possible emergence of bacterial resistance.

CONTRAINDICATIONS

FLOXIN (ofloxacin) is contraindicated in persons with a history of hypersensitivity associated with the use of ofloxacin or any member of the quinolone group of antimicrobial agents.

WARNINGS

THE SAFETY AND EFFICACY OF OFLOXACIN IN PEDIATRIC PATIENTS AND ADOLESCENTS (UNDER THE AGE OF 18 YEARS), PREGNANT WOMEN, AND LACTATING WOMEN HAVE NOT BEEN ESTABLISHED. (See PRECAUTIONS:Pediatric Use, Pregnancy, and Nursing Mothers subsections.)

In the immature rat, the oral administration of ofloxacin at 5 to 16 times the recommended maximum human dose based on mg/kg or 1-3 times based on mg/m² increased the incidence and severity of osteochondrosis. The lesions did not regress after 13 weeks of drug withdrawal. Other quinolones also produce similar erosions in the weight-bearing joints and other signs of arthropathy in immature animals of various species. (See **ANIMAL PHARMACOLOGY**.)

Convulsions, increased intracranial pressure, and toxic psychosis have been reported in patients receiving quinolones, including ofloxacin. Quinolones, including ofloxacin, may also cause central nervous system stimulation which may lead to: tremors, restlessness/agitation, nervousness/anxiety, lightheadedness, confusion, hallucinations, paranoia and depression, nightmares, insomnia, and rarely suicidal thoughts or acts. These reactions may occur following the first dose. If these reactions occur in patients receiving ofloxacin, the drug should be discontinued and appropriate measures instituted. Insomnia may be more common with ofloxacin than some other products in the quinolone class. As with all quinolones, ofloxacin should be used with caution in patients with a known or suspected CNS disorder that may predispose to seizures or lower the seizure threshold (e.g., severe cerebral arteriosclerosis, epilepsy) or in the presence of other risk factors that may predispose to seizures or lower the seizure threshold (e.g., certain drug therapy, renal dysfunction). (See **PRECAUTIONS: General, Information for Patients, Drug Interactions** and **ADVERSE REACTIONS**.)

Serious and occasionally fatal hypersensitivity (anaphylactic/anaphylactoid) reactions have been reported in patients receiving therapy with quinolones, including ofloxacin. These reactions often occur following the first dose. Some reactions were accompanied by cardiovascular collapse, hypotension/shock, seizure, loss of consciousness, tingling, angioedema (including tongue, laryngeal, throat or facial edema/swelling), airway obstruction (including bronchospasm, shortness of breath and acute respiratory distress), dyspnea, urticaria/hives, itching, and other serious skin reactions. A few patients had a history of hypersensitivity reactions. The drug should be discontinued immediately at the first appearance of a skin rash or any other sign of hypersensitivity. Serious acute hypersensitivity reactions may require treatment with epinephrine and other resuscitative measures, including oxygen, intravenous fluids, antihistamines, corticosteroids, pressor amines, and airway management, as clinically indicated. (See **PRECAUTIONS** and **ADVERSE REACTIONS**.)

Serious and sometimes fatal events, some due to hypersensitivity, and some due to uncertain etiology, have been reported in patients receiving therapy with quinolones, including ofloxacin. These events may be severe and generally occur following the administration of multiple doses. Clinical manifestations may include one or more of the following: fever, rash or severe dermatologic reactions (e.g., toxic epidermal necrolysis, Stevens-Johnson Syndrome);

vasculitis; arthralgia; myalgia; serum sickness; allergic pneumonitis; interstitial nephritis; acute renal insufficiency/failure; hepatitis; jaundice; acute hepatic necrosis/failure; anemia, including hemolytic and aplastic; thrombocytopenia, including thrombotic thrombocytopenic purpura; leukopenia; agranulocytosis; pancytopenia; and/or other hematologic abnormalities. The drug should be discontinued immediately at the first appearance of a skin rash or any other sign of hypersensitivity and supportive measures instituted. (See **PRECAUTIONS: Information for Patients** and **ADVERSE REACTIONS**.)

Pseudomembranous colitis has been reported with nearly all antibacterial agents, including ofloxacin, and may range in severity from mild to life-threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhea subsequent to the administration of any antibacterial agents.

Treatment with antibacterial agents alters the normal flora of the colon and may permit overgrowth of clostridia. Studies indicate a toxin produced by *Clostridium difficile* is one primary cause of "antibiotic-associated colitis".

After the diagnosis of pseudomembranous colitis has been established, therapeutic measures should be initiated. Mild cases of pseudomembranous colitis usually respond to drug discontinuation alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation, and treatment with an antibacterial drug clinically effective against *C. difficile* colitis. (See **ADVERSE REACTIONS**.)

Ruptures of the shoulder, hand, and Achilles tendons that required surgical repair or resulted in prolonged disability have been reported with ofloxacin and other quinolones. Ofloxacin should be discontinued if the patient experiences pain, inflammation, or rupture of a tendon. Patients should rest and refrain from exercise until the diagnosis of tendinitis or tendon rupture has been confidently excluded. Tendon rupture can occur at any time during or after therapy with ofloxacin.

Ofloxacin has not been shown to be effective in the treatment of syphilis. Antimicrobial agents used in high doses for short periods of time to treat gonorrhea may mask or delay the symptoms of incubating syphilis. All patients with gonorrhea should have a serologic test for syphilis at the time of diagnosis. Patients treated with ofloxacin for gonorrhea should have a follow-up serologic test for syphilis after three months and, if positive, treatment with an appropriate antimicrobial should be instituted .

PRECAUTIONS

General:

Prescribing FLOXIN (Ofloxacin) Tablets 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.

Adequate hydration of patients receiving ofloxacin should be maintained to prevent the formation of a highly concentrated urine.

Administer ofloxacin with caution in the presence of renal or hepatic insufficiency/impairment. In patients with known or suspected renal or hepatic insufficiency/impairment, careful clinical observation and appropriate laboratory studies should be performed prior to and during therapy since elimination of ofloxacin may be reduced. In patients with impaired renal function (creatinine clearance ≤ 50 mg/mL), alteration of the dosage regimen is necessary. (See **CLINICAL PHARMACOLOGY** and **DOSAGE AND ADMINISTRATION**.)

Moderate to severe phototoxicity reactions have been observed in patients exposed to direct sunlight while receiving some drugs in this class, including ofloxacin. Excessive sunlight should be avoided. Therapy should be discontinued if phototoxicity (e.g., a skin eruption) occurs.

As with other quinolones, ofloxacin should be used with caution in any patient with a known or suspected CNS disorder that may predispose to seizures or lower the seizure threshold (e.g., severe cerebral arteriosclerosis, epilepsy) or in the presence of other risk factors that may predispose to seizures or lower the seizure threshold (e.g., certain drug therapy, renal dysfunction). (See **WARNINGS** and **Drug Interactions**.)

A possible interaction between oral hypoglycemic drugs (e.g., glyburide/glibenclamide) or with insulin and fluoroquinolone antimicrobial agents have been reported resulting in a potentiation of the hypoglycemic action of these drugs. The mechanism for this interaction is not known. If a hypoglycemic reaction occurs in a patient being treated with ofloxacin, discontinue ofloxacin immediately and consult a physician. (See **Drug Interactions** and **ADVERSE REACTIONS**.)

As with any potent drug, periodic assessment of organ system functions, including renal, hepatic, and hematopoietic, is advisable during prolonged therapy. (See **WARNINGS** and **ADVERSE REACTIONS**.)

Information for Patients:

Patients should be advised:

- Patients should be counseled that antibacterial drugs including FLOXIN (Ofloxacin) Tablets should only be used to treat bacterial infections. They do not treat viral infections (e.g., the common cold). When FLOXIN (Ofloxacin) Tablets are prescribed to treat a bacterial infection, patients should be told that although it is common to feel better early in the course of therapy, the medication should be taken exactly as directed. Skipping doses or not completing the full course of therapy may (1) decrease the effectiveness of the immediate treatment and (2) increase the likelihood that bacteria will develop resistance and will not be treatable by FLOXIN (Ofloxacin) Tablets or other antibacterial drugs in the future.
- to drink fluids liberally;
- that mineral supplements, vitamins with iron or minerals, calcium- , aluminum- or magnesium-based antacids, sucralfate or Videx®, (Didanosine), chewable/buffered tablets or the pediatric powder for oral solution should not be taken within the two-hour period before or within the two-hour period after taking ofloxacin (See **Drug Interactions**);
- that ofloxacin can be taken without regard to meals;
- that ofloxacin may cause neurologic adverse effects (e.g., dizziness, lightheadedness) and that patients should know how they react to ofloxacin before they operate an automobile or machinery or engage in activities requiring mental alertness and coordination (See **WARNINGS** and **ADVERSE REACTIONS**);
- to discontinue treatment and inform their physician if they experience pain, inflammation, or rupture of a tendon, and to rest and refrain from exercise until the diagnosis of tendinitis or tendon rupture has been confidently excluded;
- that ofloxacin may be associated with hypersensitivity reactions, even following the first dose, to discontinue the drug at the first sign of a skin rash, hives or other skin reactions, a rapid heartbeat, difficulty in swallowing or breathing, any swelling suggesting angioedema (e.g., swelling of the lips, tongue, face; tightness of the throat, hoarseness), or any other symptom of an allergic reaction (See **WARNINGS** and **ADVERSE REACTIONS**);
- to avoid excessive sunlight or artificial ultraviolet light while receiving ofloxacin and to discontinue therapy if phototoxicity (e.g., skin eruption) occurs;
- that if they are diabetic and are being treated with insulin or an oral hypoglycemic drug, to discontinue ofloxacin immediately if a hypoglycemic reaction occurs and consult a physician (See **PRECAUTIONS: General** and **Drug Interactions**);

- that convulsions have been reported in patients taking quinolones, including ofloxacin, and to notify their physician before taking this drug if there is a history of this condition.

Drug Interactions:

Antacids, Sucralfate, Metal Cations, Multivitamins: Quinolones form chelates with alkaline earth and transition metal cations. Administration of quinolones with antacids containing calcium, magnesium, or aluminum, with sucralfate, with divalent or trivalent cations such as iron, or with multivitamins containing zinc or with Videx[®], (Didanosine), chewable/buffered tablets or the pediatric powder for oral solution may substantially interfere with the absorption of quinolones resulting in systemic levels considerably lower than desired. These agents should not be taken within the two-hour period before or within the two-hour period after ofloxacin administration. (See **DOSAGE AND ADMINISTRATION**.)

Caffeine: Interactions between ofloxacin and caffeine have not been detected.

Cimetidine: Cimetidine has demonstrated interference with the elimination of some quinolones. This interference has resulted in significant increases in half-life and AUC of some quinolones. The potential for interaction between ofloxacin and cimetidine has not been studied.

Cyclosporine: Elevated serum levels of cyclosporine have been reported with concomitant use of cyclosporine with some other quinolones. The potential for interaction between ofloxacin and cyclosporine has not been studied.

Drugs metabolized by Cytochrome P450 enzymes: Most quinolone antimicrobial drugs inhibit cytochrome P450 enzyme activity. This may result in a prolonged half-life for some drugs that are also metabolized by this system (e.g., cyclosporine, theophylline/methylxanthines, warfarin) when co-administered with quinolones. The extent of this inhibition varies among different quinolones. (See other **Drug Interactions**.)

Non-steroidal anti-inflammatory drugs: The concomitant administration of a non-steroidal anti-inflammatory drug with a quinolone, including ofloxacin, may increase the risk of CNS stimulation and convulsive seizures. (See **WARNINGS** and **PRECAUTIONS: General**.)

Probenecid: The concomitant use of probenecid with certain other quinolones has been reported to affect renal tubular secretion. The effect of probenecid on the elimination of ofloxacin has not been studied.

Theophylline: Steady-state theophylline levels may increase when ofloxacin and theophylline are administered concurrently. As with other quinolones, concomitant administration of ofloxacin may prolong the half-life of theophylline, elevate serum theophylline levels, and increase the risk of theophylline-related adverse reactions. Theophylline levels should be closely monitored and theophylline dosage adjustments made, if appropriate, when ofloxacin is co-administered. Adverse reactions (including seizures) may occur with or without an elevation in the serum theophylline level. (See **WARNINGS** and **PRECAUTIONS: General**.)

Warfarin: Some quinolones have been reported to enhance the effects of the oral anticoagulant warfarin or its derivatives. Therefore, if a quinolone antimicrobial is administered concomitantly with warfarin or its derivatives, the prothrombin time or other suitable coagulation test should be closely monitored.

Antidiabetic agents (e.g., insulin, glyburide/glibenclamide): Since disturbances of blood glucose, including hyperglycemia and hypoglycemia, have been reported in patients treated concurrently with quinolones and an antidiabetic agent, careful monitoring of blood glucose is recommended when these agents are used concomitantly. (See **PRECAUTIONS: General** and **Information for Patients**.)

Carcinogenesis, Mutagenesis, Impairment of Fertility:

Long-term studies to determine the carcinogenic potential of ofloxacin have not been conducted.

Ofloxacin was not mutagenic in the Ames bacterial test, *in vitro* and *in vivo* cytogenetic assay, sister chromatid exchange (Chinese Hamster and Human Cell Lines), unscheduled DNA Repair (UDS) using human fibroblasts, dominant lethal assays, or mouse micronucleus assay. Ofloxacin was positive in the UDS test using rat hepatocytes and Mouse Lymphoma Assay.

Pregnancy: Teratogenic Effects. Pregnancy Category C.

Ofloxacin has not been shown to have any teratogenic effects at oral doses as high as 810 mg/kg/day (11 times the recommended maximum human dose based on mg/m² or 50 times based on mg/kg) and 160 mg/kg/day (4 times the recommended maximum human dose based on mg/m² or 10 times based on mg/kg) when administered to pregnant rats and rabbits, respectively. Additional studies in rats with oral doses up to 360 mg/kg/day (5 times the recommended maximum human dose based on mg/m² or 23 times based on mg/kg) demonstrated no adverse effect on late fetal development, labor, delivery, lactation, neonatal viability, or growth of the newborn. Doses equivalent to 50 and 10 times the recommended maximum human dose of ofloxacin (based on mg/kg) were fetotoxic (i.e., decreased fetal body weight and increased fetal mortality) in rats and rabbits, respectively. Minor skeletal variations were reported in rats receiving doses of 810 mg/kg/day, which is more than 10 times higher than the recommended maximum human dose based on mg/m².

There are, however, no adequate and well-controlled studies in pregnant women. Ofloxacin should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. (See **WARNINGS**.)

Nursing Mothers:

In lactating females, a single oral 200-mg dose of ofloxacin resulted in concentrations of ofloxacin in milk that were similar to those found in plasma. Because of the potential for serious adverse reactions from ofloxacin in nursing infants, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother. (See **WARNINGS** and **ADVERSE REACTIONS**.)

Pediatric Use:

Safety and effectiveness in pediatric patients and adolescents below the age of 18 years have not been established. Ofloxacin causes arthropathy (arthrosis) and osteochondrosis in juvenile animals of several species. (See **WARNINGS**.)

Geriatric Use:

In phase 2/3 clinical trials with ofloxacin, 688 patients (14.2%) were ≥ 65 years of age. Of these, 436 patients (9.0%) were between the ages of 65 and 74 and 252 patients (5.2%) were 75 years or older. There was no apparent difference in the frequency or severity of adverse reactions in elderly adults compared with younger adults. The pharmacokinetic properties of ofloxacin in elderly subjects are similar to those in younger subjects. Drug absorption appears to be unaffected by age. Dosage adjustment is necessary for elderly patients with impaired renal function (creatinine clearance rate ≤ 50 mL/min) due to reduced clearance of ofloxacin. In comparative studies, the frequency and severity of most drug-related nervous system events in patients ≥65 years of age were comparable for ofloxacin and control drugs. The only differences identified were an increase in reports of insomnia (3.9% vs 1.5%) and headache (4.7% vs 1.8%) with ofloxacin. It is important to note that these geriatric safety data are extracted from 44 comparative studies where the adverse reaction information from 20 different controls (other antibiotics or placebo) were pooled for comparison with ofloxacin. The clinical significance of such a comparison is not clear. (See **CLINICAL PHARMACOLOGY** and **DOSAGE AND ADMINISTRATION**.)

ADVERSE REACTIONS

The following is a compilation of the data for ofloxacin based on clinical experience with both the oral and intravenous formulations. The incidence of drug-related adverse reactions in patients during Phase 2 and 3 clinical trials was 11%. Among patients receiving multiple-dose therapy, 4% discontinued ofloxacin due to adverse experiences.

In clinical trials, the following events were considered likely to be drug-related in patients receiving multiple doses of ofloxacin:

nausea 3%, insomnia 3%, headache 1%, dizziness 1%, diarrhea 1%, vomiting 1%, rash 1%, pruritus 1%, external genital pruritus in women 1%, vaginitis 1%, dysgeusia 1%.

In clinical trials, the most frequently reported adverse events, regardless of relationship to drug, were:

nausea 10%, headache 9%, insomnia 7%, external genital pruritus in women 6%, dizziness 5%, vaginitis 5%, diarrhea 4%, vomiting 4%.

In clinical trials, the following events, regardless of relationship to drug, occurred in 1 to 3% of patients:

Abdominal pain and cramps, chest pain, decreased appetite, dry mouth, dysgeusia, fatigue, flatulence, gastrointestinal distress, nervousness, pharyngitis, pruritus, fever, rash, sleep disorders, somnolence, trunk pain, vaginal discharge, visual disturbances, and constipation.

Additional events, occurring in clinical trials at a rate of less than 1%, regardless of relationship to drug, were:

Body as a whole:	asthenia, chills, malaise, extremity pain, pain, epistaxis
Cardiovascular System:	cardiac arrest, edema, hypertension, hypotension, palpitations, vasodilation
Gastrointestinal System:	dyspepsia
Genital/Reproductive System:	burning, irritation, pain and rash of the female genitalia; dysmenorrhea; menorrhagia; metrorrhagia
Musculoskeletal System:	arthralgia, myalgia
Nervous System:	seizures, anxiety, cognitive change, depression, dream abnormality, euphoria, hallucinations, paresthesia, syncope, vertigo, tremor, confusion
Nutritional/Metabolic:	thirst, weight loss
Respiratory System:	respiratory arrest, cough, rhinorrhea
Skin/Hypersensitivity:	angioedema, diaphoresis, urticaria, vasculitis
Special Senses:	decreased hearing acuity, tinnitus, photophobia
Urinary System:	dysuria, urinary frequency, urinary retention

The following laboratory abnormalities appeared in $\geq 1.0\%$ of patients receiving multiple doses of ofloxacin. It is not known whether these abnormalities were caused by the drug or the underlying conditions being treated.

Hematopoietic:	anemia, leukopenia, leukocytosis, neutropenia, neutrophilia, increased band forms, lymphocytopenia, eosinophilia, lymphocytosis, thrombocytopenia, thrombocytosis, elevated ESR
Hepatic:	elevated: alkaline phosphatase, AST (SGOT), ALT (SGPT)
Serum chemistry:	hyperglycemia, hypoglycemia, elevated creatinine, elevated BUN
Urinary:	glucosuria, proteinuria, alkalinuria, hyposthenuria, hematuria, pyuria

Post-Marketing Adverse Events:

Additional adverse events, regardless of relationship to drug, reported from worldwide marketing experience with quinolones, including ofloxacin:

Clinical:

Cardiovascular System:	cerebral thrombosis, pulmonary edema, tachycardia, hypotension/shock, syncope
Endocrine/Metabolic:	hyper- or hypoglycemia, especially in diabetic patients on insulin or oral hypoglycemic agents (See PRECAUTIONS: General and Drug Interactions .)
Gastrointestinal System:	hepatic dysfunction including: hepatic necrosis, jaundice (cholestatic or hepatocellular), hepatitis; intestinal perforation; pseudomembranous colitis (the onset of pseudomembranous colitis symptoms may occur during or after antimicrobial treatment), GI hemorrhage; hiccough, painful oral mucosa, pyrosis (See WARNINGS .)
Genital/Reproductive System:	vaginal candidiasis
Hematopoietic:	anemia, including hemolytic and aplastic; hemorrhage, pancytopenia, agranulocytosis, leukopenia, reversible bone marrow depression, thrombocytopenia, thrombotic thrombocytopenic purpura, petechiae, ecchymosis/bruising (See WARNINGS .)
Musculoskeletal:	tendinitis/rupture; weakness; rhabdomyolysis (See WARNINGS .)
Nervous System:	nightmares; suicidal thoughts or acts, disorientation, psychotic reactions, paranoia; phobia, agitation, restlessness, aggressiveness/hostility, manic reaction, emotional lability; peripheral neuropathy, ataxia, incoordination; possible exacerbation of: myasthenia gravis and extrapyramidal disorders; dysphasia, lightheadedness (See WARNINGS and PRECAUTIONS .)
Respiratory System:	dyspnea, bronchospasm, allergic pneumonitis, stridor (See WARNINGS .)
Skin/Hypersensitivity:	anaphylactic (-toid) reactions/shock; purpura, serum sickness, erythema multiforme/Stevens-Johnson Syndrome, erythema nodosum, exfoliative dermatitis, hyperpigmentation, toxic epidermal necrolysis, conjunctivitis, photosensitivity, vesiculobullous eruption (See WARNINGS and PRECAUTIONS .)
Special Senses:	diplopia, nystagmus, blurred vision, disturbances of: taste, smell, hearing and equilibrium, usually reversible following discontinuation
Urinary System:	anuria, polyuria, renal calculi, renal failure, interstitial nephritis, hematuria (See WARNINGS and PRECAUTIONS .)

Laboratory:

Hematopoietic: prolongation of prothrombin time

Serum chemistry: acidosis, elevation of: serum triglycerides, serum cholesterol, serum potassium, liver function tests including: GGTP, LDH, bilirubin

Urinary: albuminuria, candiduria

In clinical trials using multiple-dose therapy, ophthalmologic abnormalities, including cataracts and multiple punctate lenticular opacities, have been noted in patients undergoing treatment with other quinolones. The relationship of the drugs to these events is not presently established.

CRYSTALLURIA and CYLINDRURIA HAVE BEEN REPORTED with other quinolones.

OVERDOSAGE

Information on overdosage with ofloxacin is limited. One incident of accidental overdosage has been reported. In this case, an adult female received 3 grams of ofloxacin intravenously over 45 minutes. A blood sample obtained 15 minutes after the completion of the infusion revealed an ofloxacin level of 39.3 µg/mL. In 7 h, the level had fallen to 16.2 µg/mL, and by 24 h to 2.7 µg/mL. During the infusion, the patient developed drowsiness, nausea, dizziness, hot and cold flushes, subjective facial swelling and numbness, slurring of speech, and mild to moderate disorientation. All complaints except the dizziness subsided within 1 h after discontinuation of the infusion. The dizziness, most bothersome while standing, resolved in approximately 9 h. Laboratory testing reportedly revealed no clinically significant changes in routine parameters in this patient.

In the event of an acute overdose, the stomach should be emptied. The patient should be observed and appropriate hydration maintained. Ofloxacin is not efficiently removed by hemodialysis or peritoneal dialysis.

DOSAGE AND ADMINISTRATION

The usual dose of FLOXIN (ofloxacin tablets) Tablets is 200 mg to 400 mg orally every 12 h as described in the following dosing chart. These recommendations apply to patients with normal renal function (i.e., creatinine clearance >50 mL/min). For patients with altered renal function (i.e., creatinine clearance ≤50 mL/min), see the **Patients with Impaired Renal Function** subsection.

Patients with Normal Renal Function:

Infection†	Unit Dose	Frequency	Duration	Daily Dose
Acute Bacterial Exacerbation of Chronic Bronchitis	400 mg	q12h	10 days	800 mg
Comm. Acquired Pneumonia	400 mg	q12h	10 days	800 mg
Uncomplicated Skin and Skin Structure Infections	400 mg	q12h	10 days	800 mg
Acute, Uncomplicated Urethral and Cervical Gonorrhea	400 mg	single dose	1 day	400 mg
Nongonococcal Cervicitis/Urethritis due to <i>C. trachomatis</i>	300 mg	q12h	7 days	600 mg
Mixed Infection of the urethra and cervix due to <i>C. trachomatis</i> and <i>N. gonorrhoeae</i>	300 mg	q12h	7 days	600 mg

Acute Pelvic Inflammatory Disease	400 mg	q12h	10-14 days	800 mg
Uncomplicated Cystitis due to <i>E. coli</i> or <i>K. pneumoniae</i>	200 mg	q12h	3 days	400 mg
Uncomplicated Cystitis due to other approved pathogens	200 mg	q12h	7 days	400 mg
Complicated UTI's	200 mg	q12h	10 days	400 mg
Prostatitis due to <i>E. Coli</i>	300 mg	q12h	6 weeks	600 mg
†DUE TO THE DESIGNATED PATHOGENS (See INDICATIONS AND USAGE .)				

Antacids containing calcium, magnesium, or aluminum; sucralfate; divalent or trivalent cations such as iron; or multivitamins containing zinc; or Videx®, (Didanosine), chewable/buffered tablets or the pediatric powder for oral solution should not be taken within the two-hour period before or within the two-hour period after taking ofloxacin. (See **PRECAUTIONS**.)

Patients with Impaired Renal Function:

Dosage should be adjusted for patients with a creatinine clearance ≤ 50 mL/min.

After a normal initial dose, dosage should be adjusted as follows:

Creatinine Clearance	Maintenance Dose	Frequency
20-50 mL/min	the usual recommended unit dose	q24h
<20 mL/min	1/2 the usual recommended unit dose	q24h

When only the serum creatinine is known, the following formula may be used to estimate creatinine clearance.

$$\text{Men: Creatinine clearance (mL/min)} = \frac{\text{Weight (kg)} \times (140 - \text{age})}{72 \times \text{serum creatinine (mg/dL)}}$$

Women: 0.85 x the value calculated for men.

The serum creatinine should represent a steady-state of renal function.

Patients with Cirrhosis:

The excretion of ofloxacin may be reduced in patients with severe liver function disorders (e.g., cirrhosis with or without ascites). A maximum dose of 400 mg of ofloxacin per day should therefore not be exceeded.

HOW SUPPLIED

FLOXIN (ofloxacin tablets) Tablets are supplied as 200 mg light yellow, 300 mg white, and 400 mg pale gold film-coated tablets. Each tablet is distinguished by "FLOXIN" and the appropriate strength. FLOXIN Tablets are packaged in bottles in the following configurations:

- 200 mg tablets – bottle of 50 tablets (NDC 0062-1540-02)
- 300 mg tablets – bottle of 50 tablets (NDC 0062-1541-02)
- 400 mg tablets – bottle of 100 tablets (NDC 0062-1542-01)

FLOXIN Tablets should be stored in well-closed containers. Store below 86°F (30°C).

ANIMAL PHARMACOLOGY

Ofloxacin, as well as other drugs of the quinolone class, has been shown to cause arthropathies (arthrosis) in immature dogs and rats. In addition, these drugs are associated with an increased incidence of osteochondrosis in rats as compared to the incidence observed in vehicle-treated rats. (See **WARNINGS**.) There is no evidence of arthropathies in fully mature dogs at intravenous doses up to 3 times the recommended maximum human dose (on a mg/m² basis or 5 times based on mg/kg basis), for a one-week exposure period.

Long-term, high-dose systemic use of other quinolones in experimental animals has caused lenticular opacities; however, this finding was not observed in any animal studies with ofloxacin.

Reduced serum globulin and protein levels were observed in animals treated with other quinolones. In one ofloxacin study, minor decreases in serum globulin and protein levels were noted in female cynomolgus monkeys dosed orally with 40 mg/kg ofloxacin daily for one year. These changes, however, were considered to be within normal limits for monkeys.

Crystalluria and ocular toxicity were not observed in any animals treated with ofloxacin.

FLOXIN[®] is a trademark of ORTHO-McNEIL PHARMACEUTICAL, INC.
U.S. Patent No. 4,382,892

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2. National Committee for Clinical Laboratory Standards. Performance Standards for Antimicrobial Disk Susceptibility Tests - Sixth Edition. Approved Standard NCCLS Document M2-A6, Vol. 17, No. 1, NCCLS, Wayne, PA, January 1997.

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