

Texas Department of State Health Services
Overview of Second-Line Tuberculosis Medications: Side Effects and Monitoring

This chart contains information regarding potential side effects and toxicity associated with second-line medications used to treat certain types of tuberculosis (TB), including drug-resistant TB. It also outlines general recommended assessments and monitoring specific to each medication. Consult a trusted drug book for full descriptions of medications and recommended assessments. This chart should be used as a guide, along with recommendations by the treating and consulting physicians.

| Medication (Abbreviations) | Side Effects and Symptoms of Medication Toxicity | Recommended Assessments and Monitoring |
|---|---|--|
| <p>Aminoglycosides/Injectable agents:</p> <ul style="list-style-type: none"> • Amikacin (AK) | <p>General- Rash or swelling of the face, shortness of breath (SOB), decreased urination, renal toxicity, electrolyte imbalance, muscle twitching or weakness, pain at injection site.</p> <p>Ototoxicity- Hearing loss, tinnitus.</p> <p>Vestibular Disturbance- dizziness, loss of balance.</p> | <p>Baseline, monthly:</p> <ul style="list-style-type: none"> • Medication Assessments* <ul style="list-style-type: none"> ○ Monthly toxicity assessment ○ Audiometry testing ○ Vestibular testing • Measurement of creatinine and electrolytes to include potassium, sodium, chloride, carbon dioxide, calcium and magnesium. <p>Other:</p> <ul style="list-style-type: none"> • <i>Adjust dose and/or interval for renal insufficiency.</i> • <i>Rule out pregnancy prior to administering drug.</i> • <i>Aminoglycosides can cause permanent hearing loss; early intervention is crucial.</i> |
| <p>Bedaquiline (BDQ)</p> | <p>General- Hepatotoxicity, headaches, arthralgias, rash.</p> <p>Cardiac – QTc prolongation; chest pain, SOB, fainting/near fainting, sudden fatigue, change in heart rhythm, tachycardia, syncope.</p> | <p>Baseline, monthly:</p> <ul style="list-style-type: none"> • Medication Assessments <ul style="list-style-type: none"> ○ Monthly toxicity assessment ○ Cardiac monitoring • Measurement of TSH levels and electrolytes to include potassium, calcium, magnesium. <p>Baseline, at 2 weeks, monthly</p> <ul style="list-style-type: none"> • ECG <p>Other:</p> <ul style="list-style-type: none"> • <i>Monitor for signs and symptoms of prolonged QTc interval.</i> • <i>Swallow tablet whole, take with food.</i> |
| <p>Clofazimine (CFZ)</p> | <p>General- bloody or black stools or diarrhea, jaundice; retinopathy, photosensitivity, acne. Rare instance-depression or thoughts of hurting self.</p> <p>Skin Discoloration- Clofazimine is a dye, it may cause skin discoloration, ichthyosis, xerosis. Hyperpigmentation resolves 1-2 years after discontinuation.</p> | <p>Baseline, monthly:</p> <ul style="list-style-type: none"> • Medication Assessments <ul style="list-style-type: none"> ○ Monthly toxicity assessment ○ Mental health assessment <p>Every three-months:</p> <ul style="list-style-type: none"> • Follow up assessment with prescribing physician • Clofazimine monitoring form |

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| Clofazimine (CFZ), continued | <p>GI Intolerance- Severe abdominal symptoms, bleeding, and bowel obstruction.</p> <p>Cardiac- Can cause prolongation of QTc.</p> | <p>Every three-months:</p> <ul style="list-style-type: none"> • Follow up assessment with prescribing physician • Clofazimine monitoring form <p>Other:</p> <ul style="list-style-type: none"> • <i>Prescriber must be enrolled in the Institutional Review Board (IRB) program to prescribe CFZ.</i> • <i>Ensure use of sunscreens, lotion.</i> • <i>Rule out pregnancy prior to administering drug.</i> |
| Cycloserine (CS) | <p>General- rash/hives, headaches, seizures, insomnia.</p> <p>Depression and Suicidal Ideation- Mental status/mood changes, aggression, depression, disorientation, hallucinations, inability to concentrate, lethargy, nightmares, slurred speech, suicidal thoughts, psychosis.</p> | <p>Baseline, monthly:</p> <ul style="list-style-type: none"> • Medication Assessments <ul style="list-style-type: none"> ○ Monthly toxicity assessment ○ Mental health assessment <p>Other:</p> <ul style="list-style-type: none"> • <i>Adjust with renal failure.</i> • Vitamin B6 should be used when giving Cycloserine. |
| Ethionamide (ETA) | <p>General- change in vision, headaches, photosensitivity, neuropathy, GI upset, hepatotoxicity, dizziness, hypoglycemia, peripheral neuropathy, hypersensitivity, hypotension, mental disturbance.</p> <p>Hypothyroidism- Unusual bruising or bleeding, ↑ tiredness, hair loss, skin changes, trouble concentrating, irritable, depression, irregular menses, metallic taste, salivation, gynecomastia, impotence.</p> | <p>Baseline:</p> <ul style="list-style-type: none"> • Monthly toxicity assessment • Measurement of TSH levels <p>Monthly:</p> <ul style="list-style-type: none"> • Monthly toxicity assessment <p>Every three months:</p> <ul style="list-style-type: none"> • Measurement of TSH levels |
| Fluoroquinolones: <ul style="list-style-type: none"> • Levofloxacin (LFX) • Moxifloxacin (MXF) | <p>General- GI upset, hepatotoxicity, hypersensitivity, dizziness, headaches, changes in heart rhythm, hypo- and hyperglycemia, photosensitivity, headaches, arthralgias, insomnia, agitation, psychosis, paranoia, depression, peripheral neuropathy, thrush, seizures.</p> | <p>Baseline, monthly:</p> <ul style="list-style-type: none"> • Monthly toxicity assessment <ul style="list-style-type: none"> ○ Ask about tendon pain <p>Other:</p> <ul style="list-style-type: none"> • Do not take with milk-based products, antacids, mineral supplements (iron or magnesium) within 2 hours of medication; avoid caffeinated foods and beverages. • <i>Ensure use of sunscreens.</i> |

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| Fluoroquinolones: • Levofloxacin (LFX) • Moxifloxacin (MFX), <i>continued</i> | Tendonitis- monitor for pain or rupture to tendons. Cardiac- MFX can cause prolongation of QTc. | |
| High Dose Isoniazid (INH) (Adults 15mg/kg) | General- Anemia, agranulocytosis, vasculitis, decreased platelets, fever, chills, rash. Hepatotoxicity- GI upset, N/V, clay color stools, dark urine, yellow eyes, jaundice. Peripheral Neuropathy- may cause numbness/tingling in extremities Optic Neuropathy- pain, blurred vision, trouble seeing to the side, loss of color vision, flashing lights. | Baseline, monthly: <ul style="list-style-type: none"> • Medication Assessments <ul style="list-style-type: none"> ○ Monthly toxicity assessment ○ Peripheral neuropathy monitoring • Measurement of LFTs Other: <ul style="list-style-type: none"> • <i>Add Vitamin B6 to regimen.</i> • <i>May interact with other drugs and foods. Monitor for serotonin syndrome.</i> |
| Linezolid (LZD) | General- Neuropathy, GI upset, change in vision, headaches, severe diarrhea, rash. Hematological- Lactic acidosis, bone marrow suppression, anemia, thrombocytopenia, pancytopenia: confusion, SOB, rapid pulse, fever, chills, dizziness, unusual bleeding/bruising, petechiae, purpura, bruising, change in urinary frequency, black/tarry stools, unusual tiredness or weakness, s/s of infection, pale skin, lips, or nail beds. Peripheral Neuropathy- numbness/tingling in extremities. May be permanent. Usually occurs after 12-20 weeks of treatment. Optic Neuropathy- pain, blurred vision, trouble seeing to the side, loss of color vision, flashing lights. May be irreversible. Usually occurs after 12-20 weeks of treatment. | Baseline, monthly: <ul style="list-style-type: none"> • Medication Assessments <ul style="list-style-type: none"> ○ Monthly toxicity assessment ○ Peripheral neuropathy monitoring ○ Visual acuity ○ Ishihara plates • Measurement of CBCs. Note: some guidelines recommend weekly measurements of CBC during the initial phase; consultation with a DSHS recognized TB medical consultant is recommended. Other: <ul style="list-style-type: none"> • <i>Add Vitamin B6 to regimen.</i> • <i>Monitor blood pressure.</i> • <i>May interact with other drugs and foods. Monitor for serotonin syndrome.</i> |

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| Para-amino Salicylic Acid (PAS) | <p>General- GI upset, diarrhea, hepatotoxicity, rash, severe itching or hives, hypokalemia.</p> <p>Hypothyroidism-Unusual bruising or bleeding, ↑ tiredness, hair loss, skin changes, trouble concentrating, irritable, depression, irregular menses, metallic taste, salivation, gynecomastia, impotence.</p> | <p>Baseline:</p> <ul style="list-style-type: none"> • Monthly toxicity assessment • Measurement of TSH levels and electrolytes <p>Monthly:</p> <ul style="list-style-type: none"> • Monthly toxicity assessment • Measurement of electrolytes <p>Every three months:</p> <ul style="list-style-type: none"> • Measurement of TSH levels <p>Other:</p> <ul style="list-style-type: none"> • <i>Sprinkle over applesauce or yogurt; or mix with acidic juice.</i> • <i>Do not chew granules.</i> • <i>Refrigerate.</i> |

*see TB 702 located at: dshs.texas.gov/idcu/disease/tb/forms/

Table and Recommendation References:

Curry International Tuberculosis Center, *Drug -Resistant Tuberculosis: A Survival Guide for Clinicians 3rd Edition*: currytbcenter.ucsf.edu/products/view/drug-resistant-tuberculosis-survival-guide-clinicians-3rd-edition; and

2019 American Thoracic Society Treatment of Drug-Resistant Tuberculosis, An Official ATS/CDC/ERS/IDSA Clinical Practice Guideline: atsjournals.org/doi/10.1164/rccm.201909-1874ST; and

Heartland National Tuberculosis Center - *Characteristics of Second-line Drugs for MDR-TB, February 2020*: heartlandntbc.org/assets/products/card1_side_effects_drug_interactions.pdf