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.

<table>
<thead>
<tr>
<th>Medication (Abbreviations)</th>
<th>Side Effects and Symptoms of Medication Toxicity</th>
<th>Recommended Assessments and Monitoring</th>
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<tr>
<td><strong>Aminoglycosides/ Injectable agents:</strong></td>
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| • Amikacin (AK) | 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. Ototoxicity- Hearing loss, tinnitus. Vestibular Disturbance- dizziness, loss of balance. | Baseline, monthly:  
  • Medication Assessments*  
    o Monthly toxicity assessment  
    o Audiometry testing  
    o Vestibular testing  
  • Measurement of creatinine and electrolytes to include potassium, sodium, chloride, carbon dioxide, calcium and magnesium. Other:  
    • Adjust dose and/or interval for renal insufficiency.  
    • Rule out pregnancy prior to administering drug.  
    • Aminoglycosides can cause permanent hearing loss; early intervention is crucial. |
| **Bedaquiline (BDQ)** | General- Hepatotoxicity, headaches, arthralgias, rash. Cardiac – QTc prolongation; chest pain, SOB, fainting/near fainting, sudden fatigue, change in heart rhythm, tachycardia, syncope. | Baseline, monthly:  
  • Medication Assessments  
    o Monthly toxicity assessment  
    o Cardiac monitoring  
  • Measurement of TSH levels and electrolytes to include potassium, calcium, magnesium. Baseline, at 2 weeks, monthly  
  • ECG Other:  
    • Hold all medications if QTc > 450ms and patient has symptoms of cardiac toxicity.  
    • Hold all medications if QTc ≥500ms with or without cardiac toxicity symptoms.  
    • Repeat ECG within 48 hours after stopping medications.  
    • Swallow tablet whole, take with food. |
| **Clofazimine (CFZ)** | General- bloody or black stools or diarrhea, jaundice; retinopathy, photosensitivity, acne. Rare instance-depression or thoughts of hurting self. | Baseline, monthly:  
  • Medication Assessments  
    o Monthly toxicity assessment  
    o Mental health assessment |
# Overview of Second-Line Tuberculosis Medications: Side Effects and Monitoring

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| **Clofazimine (CFZ), continued** | **Skin Discoloration** - Clofazimine is a dye, it may cause skin discoloration, ichthyosis, xerosis. Hyperpigmentation resolves 1-2 years after discontinuation. **GI Intolerance** - Severe abdominal symptoms, bleeding, and bowel obstruction. **Cardiac** - Can cause prolongation of QTc. | **Every three-months:**  
- Follow up assessment with prescribing physician  
- Clofazimine monitoring form  
**Other:**  
- Prescriber must be enrolled in the Institutional Review Board (IRB) program to prescribe CFZ.  
- Ensure use of sunscreens, lotion.  
- Rule out pregnancy prior to administering drug. |
| **Cycloserine (CS)** | **General** - rash/hives, headaches, seizures, insomnia.  
**Depression and Suicidal Ideation** - Mental status/mood changes, aggression, depression, disorientation, hallucinations, inability to concentrate, lethargy, nightmares, slurred speech, suicidal thoughts, psychosis. | **Baseline, monthly:**  
- Medication Assessments  
  - Monthly toxicity assessment  
  - Mental health assessment  
**Other:**  
- Adjust with renal failure.  
- **Vitamin B6** should be used when giving Cycloserine. |
| **Ethionamide (ETA)** | **General** - change in vision, headaches, photosensitivity, neuropathy, GI upset, hepatotoxicity, dizziness, hypoglycemia, peripheral neuropathy, hypersensitivity, hypotension, mental disturbance.  
**Hypothyroidism** - Unusual bruising or bleeding, ↑ tiredness, hair loss, skin changes, trouble concentrating, irritable, depression, irregular menses, metallic taste, salivation, gynecomastia, impotence. | **Baseline:**  
- Monthly toxicity assessment  
- Measurement of TSH levels  
**Monthly:**  
- Monthly toxicity assessment  
**Every three months:**  
- Measurement of TSH levels |
| **Fluoroquinolones:**  
- **Levofloxacin (LFX)**  
- **Moxifloxacin (MFX)** | **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. | **Baseline, monthly:**  
- Monthly toxicity assessment  
  - Ask about tendon pain  
**Other:**  
- **Do not take with** milk-based products, antacids, mineral supplements (iron or magnesium) within 2 hours of medication; avoid caffeiinated foods and beverages.  
- Ensure use of sunscreens. |
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<td><strong>Fluoroquinolones:</strong></td>
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<tr>
<td>• Levofloxacin (LFX)</td>
<td>Tendonitis- monitor for pain or rupture to tendons.</td>
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<tr>
<td>• Moxifloxacin (MFX),</td>
<td>Cardiac- MFX can cause prolongation of QTc.</td>
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<tr>
<td><strong>High Dose Isoniazid (INH)</strong></td>
<td>General- Anemia, agranulocytosis, vasculitis, decreased platelets, fever, chills, rash.</td>
<td><strong>Baseline, monthly:</strong></td>
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<td>(Adults 15mg/kg)</td>
<td>Hepatotoxicity- GI upset, N/V, clay color stools, dark urine, yellow eyes, jaundice.</td>
<td>• Medication Assessments</td>
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<td>Peripheral Neuropathy- may cause numbness/tingling in extremities</td>
<td>o Monthly toxicity assessment</td>
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<tr>
<td></td>
<td>Optic Neuropathy- pain, blurred vision, trouble seeing to the side, loss of color vision, flashing lights.</td>
<td>o Peripheral neuropathy monitoring</td>
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<td></td>
<td>• Measurement of LFTs</td>
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<tr>
<td><strong>Linezolid (LZD)</strong></td>
<td>General- Neuropathy, GI upset, change in vision, headaches, severe diarrhea, rash.</td>
<td><strong>Baseline, monthly:</strong></td>
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<td>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.</td>
<td>• Medication Assessments</td>
</tr>
<tr>
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<td>Peripheral Neuropathy- numbness/tingling in extremities. May be permanent. Usually occurs after 12-20 weeks of treatment.</td>
<td>o Monthly toxicity assessment</td>
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<td>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.</td>
<td>o Peripheral neuropathy monitoring</td>
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<td></td>
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<td>o Visual acuity</td>
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<td></td>
<td>o Ishihara plates</td>
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<td>• 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.</td>
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<td><strong>Other:</strong></td>
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<td>• Add Vitamin B6 to regimen.</td>
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<td>• Monitor blood pressure.</td>
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<td>• May interact with other drugs and foods. Monitor for serotonin syndrome.</td>
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# Texas Department of State Health Services

## Overview of Second-Line Tuberculosis Medications: Side Effects and Monitoring

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| Para-amino Salicylic Acid (PAS) | **General**- GI upset, diarrhea, hepatotoxicity, rash, severe itching or hives, hypokalemia. **Hypothyroidism**- Unusual bruising or bleeding, ↑ tiredness, hair loss, skin changes, trouble concentrating, irritable, depression, irregular menses, metallic taste, salivation, gynecomastia, impotence. | **Baseline:**  
  - Monthly toxicity assessment  
  - Measurement of TSH levels and electrolytes  
**Monthly:**  
  - Monthly toxicity assessment  
  - Measurement of electrolytes  
**Every three months:**  
  - Measurement of TSH levels  
**Other:**  
  - **Sprinkle over applesauce or yogurt; or mix with acidic juice.**  
  - **Do not chew granules.**  
  - **Refrigerate.** |

*see TB 702 located at: [dshs.texas.gov/idcu/disease/tb/forms/](http://dshs.texas.gov/idcu/disease/tb/forms/)*

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**Table and Recommendation References:**

