MAYO CLINIC

Center for Tuberculosis

Navigating TB Treatment: Medications, Regimens, and Side Effects

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Objectives

- Recognize the drugs and standard treatment regimens for TB disease and TB infection
- Identify common side effects of TB medications
- Implement strategies to manage and mitigate these side effects in patients

TB INFECTION (TBI) TREATMENT REGIMENS

Preferred treatment regimens for TB Infection

3HP: Isoniazid and Rifapentine once weekly for 3 months (12 total doses)

- Recommended for people over 2 years of age
- Can be administered by directly observed therapy (DOT) or self-administered therapy (SAT)

4R: Rifampin daily for 4 months (120 total doses)

- Recommended for HIV-negative adults and children of all ages
- Especially good for persons who cannot tolerate isoniazid

3HR: Isoniazid and Rifampin daily for 3 months (90 total doses)

- Recommended for adults and children of all ages, including HIV-negative and HIV-positive patients as drug interactions allow

TBI Treatment:

Possible Adverse Effects of INH

- **Elevated serum liver enzyme concentrations:** Asymptomatic elevation of serum liver enzyme concentrations occurs in 10%–20% of people taking INH; liver enzyme concentrations usually return to normal even when treatment is continued.
- **Peripheral neuropathy:** Peripheral neuropathy occurs in less than 1% of people taking INH at conventional doses. It is more likely in the presence of other conditions associated with neuropathy. Persons with risk factors for neuropathy (e.g., pregnant women; breastfeeding infants; persons infected with HIV; those with diabetes, alcoholism, malnutrition, or chronic renal failure; or those who are of advanced age) are given pyridoxine (vitamin B6). Vitamin B6 can be administered at 25–50 mg/day with 6H, 9H, or 3HR, and at 50 mg/week with 3HP to prevent neuropathy.

TBI Treatment

Possible Adverse Effects of Rifampin (RIF) and Rifapentine (RPT)

- **Hepatotoxicity:** Shorter, rifamycin-based treatment regimens generally have a lower risk of hepatotoxicity than longer 6- or 9-month regimens of INH monotherapy. Evidenced by transient asymptomatic hyperbilirubinemia, hepatotoxicity may occur in 0.6% of persons taking RIF.

- **Cutaneous reactions:** Pruritus/itching (with or without a rash) or other cutaneous reactions may occur in some persons taking RIF. The reactions are generally self-limited and may not be a true hypersensitivity; continued treatment may be possible.

- **Hypersensitivity reactions:** Rarely, rifamycins can be associated with hypersensitivity reactions, including hypotension, anaphylaxis, nephritis or thrombocytopenia, and manifested by symptoms such as fever, headache, dizziness/lightheadedness, musculoskeletal pain, petechiae, and pruritus.

TBI Treatment

Possible Adverse Effects of Rifampin (RIF) and Rifapentine (RPT)

- **Gastrointestinal symptoms:** Symptoms such as nausea, anorexia, and abdominal pain are rarely severe enough to discontinue treatment.
- **Discoloration of body fluids:** Orange-red discoloration of body fluids, such as urine and breast milk, is expected and harmless, but patients should be advised beforehand. Soft contact lenses and dentures may be permanently stained.
- **Drug-drug interactions:** RIF and RPT have drug-drug interactions with numerous medications. They are known to reduce concentrations of methadone, warfarin, hormonal contraceptives, tricyclic antidepressants, haloperidol, diazepam, and phenytoin. Dose adjustment of the companion medication may be necessary. Women using hormonal contraceptives should be advised to consider an alternative method of contraception (e.g., a barrier method).

TB TREATMENT REGIMENS

Intensive Phase:

- 3-4 drugs
- 2 months

Continuation Phase:

- 2 drugs
- Additional 4-7 months

Figure 4.1 Example of pills used to treat TB disease. From left to right: isoniazid, rifampin, pyrazinamide, and ethambutol.

Regimen	Intensive Phase Drugs[1]	Intensive Phase Interval and Doses[2] (minimum duration)	Continuation Phase Drugs	Continuation Phase Interval and Doses[2,3] (minimum duration)	Range of total doses (Intensive and Continuation phases, combined)	Comments[3, 4]	Regimen effectiveness
1	**INH RIF PZA EMB**	7 days/week for 56 doses (8 weeks) *or* 5 days/week for 40 doses (8 weeks)	**INH RIF**	7 days/week for 126 doses (18 weeks) *or* 5 days/week for 90 doses (18 weeks)	182 to 130	This is the preferred regimen for patients with newly diagnosed pulmonary TB.	**greater**
2	**INH RIF PZA EMB**	7 days/week for 56 doses (8 weeks) *or* 5 days/week for 40 doses (8 weeks)	**INH RIF**	3 times weekly for 54 doses (18 weeks)	110 to 94	Preferred alternative regimen in situations in which more frequent DOT during continuation phase is difficult to achieve.	
3	**INH RIF PZA EMB**	3 times weekly for 24 doses (8 weeks)	**INH RIF**	3 times weekly for 54 doses (18 weeks)	78	Use regimen with caution in patients with HIV and/or cavitary disease. Missed doses can lead to treatment failure, relapse, and acquired drug resistance.	
4	**INH RIF PZA EMB**	7 days/week for 14 doses then twice weekly for 12 doses[5]	**INH RIF**	Twice weekly for 36 doses (18 weeks)	62	Do not use twice-weekly regimens in HIV-infected patients or patients with smear positive and/or cavitary disease. If doses are missed then therapy is equivalent to once weekly, which is inferior.	**lesser**

FIRST LINE TB MEDICATIONS

ISONIAZID (INH, H) [2 of 2]

Special circumstances	**Use in pregnancy/breastfeeding:** Safe during pregnancy; safe during breastfeeding (mother should receive pyridoxine supplementation). Up to 20% of the infant therapeutic dose will be passed to the baby in the breast milk. **Use in renal disease:** No dose adjustment for renal failure, but pyridoxine supplementation should be used. **Use in hepatic disease:** May exacerbate liver failure. Use with caution. **Drug interactions:** Isoniazid is a CYP3A4 inhibitor. INH may increase the concentrations of certain cytochrome P450 enzyme substrates, including phenytoin and carbamazepine.
Adverse reactions	• Mild, transient increase in serum transaminases is common. • Hepatitis (age-related). • Peripheral neuropathy. • Other reactions, including optic neuritis, arthralgias, CNS changes, drug-induced lupus, diarrhea, DRESS or hypersensitivity reaction, and seizures. • The liquid formulation contains sorbitol and can cause abdominal cramping.
Contraindications	Hypersensitivity or drug-induced hepatitis due to isoniazid; avoid if acute liver failure.
Monitoring	**Clinical monitoring of all patients on INH is essential.** Routine laboratory monitoring is recommended for certain patients receiving INH monotherapy. For patients receiving multiple TB drugs or other hepatotoxic drugs, with underlying liver disease (including viral hepatitis), or who are pregnant, baseline liver function testing is recommended. Follow-up liver function testing is determined by baseline concerns and symptoms of hepatotoxicity. Monitor concentrations of phenytoin or carbamazepine in patients receiving those drugs (increases phenytoin concentrations and risk of hepatotoxicity with carbamazepine), especially when undergoing INH monotherapy. Rifampin tends to lower concentrations of these drugs and balance effect of INH.

https://www.currytbcenter.ucsf.edu/products/page/chapter-5-medication-fact-sheets

RIFAMPIN (RIF, R) [2 of 2]

Special circumstances	**Use in pregnancy/breastfeeding:** Recommended for use in pregnancy; can be used while breastfeeding. **Use in renal disease:** Can be used without dose adjustment. **Use in hepatic disease:** Use with caution, can be associated with hepatotoxicity.
Adverse reactions	**Many drug interactions.** • Orange staining of body fluids. • Rash and pruritus. • GI upset, flu-like syndrome (usually only with intermittent administration). • Hepatotoxicity. • Hematologic abnormalities (thrombocytopenia, hemolytic anemia).
Contraindications	**Rifamycin allergy;** due to **drug interactions,** may be contraindicated with concurrent use of certain drugs.
Monitoring	Liver function monitoring if appropriate (if given with other hepatotoxic medications or if there are symptoms of hepatotoxicity); monitor drug concentrations of interacting medications.

https://www.currytbcenter.ucsf.edu/products/page/chapter-5-medication-fact-sheets

PYRAZINAMIDE (PZA, Z) [1 of 2]

Special circumstances	**Use in pregnancy/breastfeeding:** In the U.S. PZA was historically avoided in the TB regimens of most pregnant women with drug-susceptible TB due to lack of controlled data during pregnancy. However, WHO and the International Union Against TB and Lung Disease recommend routine use of PZA during pregnancy (as do some jurisdictions in the U.S.), and toxicity to the fetus has not been documented. Can be used for drug-resistant TB when the isolate is susceptible to PZA. Can be used while breastfeeding. **Use in renal disease:** Metabolites are cleared by the kidneys; dose 3 times a week and after hemodialysis. **Use in hepatic disease:** Use with caution; PZA is associated with hepatotoxicity in about 1% of patients. It can be quite severe and worsen even after stopping treatment.
Adverse reactions	• Gout (hyperuricemia) and arthralgias • Hepatotoxicity • Rash • Photosensitivity • Gastrointestinal upset
Contraindications	**Allergy to pyrazinamide; severe gout.**
Monitoring	Monitor transaminases; uric acid can be monitored in patients with history of gout or who receive medications that alter uric acid excretion. An elevated uric acid is an expected finding in every patient on pyrazinamide. If not present, may indicate patient is not taking the drug or there is malabsorption.

https://www.currytbcenter.ucsf.edu/products/page/chapter-5-medication-fact-sheets

ETHAMBUTOL (EMB, E) [1 of 2]

Special circumstances	**Use in pregnancy/breastfeeding:** Safe in pregnancy; can be used while breastfeeding. **Use in renal disease:** Use with caution—cleared by the kidneys; dose adjustment required for renal failure. Increased risk of toxicity with renal failure. If needed for use in the regimen, consider therapeutic drug monitoring. See **Chapter 7, *Co-morbidities and Special Situations — Renal Failure.*** **Use in hepatic disease:** Safe in liver disease.
Adverse reactions	Retrobulbar neuritis (dose-related—exacerbated during renal failure).
Contraindications	**Pre-existing optic neuritis; visual changes on ethambutol.**
Monitoring	Patients should be counseled to report any changes in vision. Baseline and monthly visual acuity and color discrimination monitoring should be performed (particular attention should be given to individuals on higher doses or with renal impairment).

https://www.currytbcenter.ucsf.edu/products/page/chapter-5-medication-fact-sheets

Additional Treatment Regimens

Recommended 4-mo Rifapentine-Moxifloxacin–Containing Regimen*	
Isoniazid†	300 mg daily for 17 wk
Rifapentine	1,200 mg daily for 17 wk
Pyrazinamide	Weight-based dosing daily for 8 wk: 40 to <55 kg: 1,000 mg; ≥55–75 kg: 1,500 mg >75 kg: 2,000 mg
Moxifloxacin	400 mg daily for 17 wk

4-month Rifapentine/ Moxifloxacin containing regimen: new ATS/IDSA/CDC guideline 2025

https://doi.org/10.1164/rccm.202410-2096ST

Why not use the 4-month daily HPMZ (containing RPT, Moxi) for everyone ??

1. Higher pill burden:
   a. HPMZ: 13-15 pills during first 2 mo; 11 pills daily next 2 mo
   b. RIPE: 7-11 pills during first 2 mo; 3-4 pills during next 4 mo.
2. Labs must confirm fluoroquinolone susceptibility (up front)
3. Drug shortages / supply chain concerns with rifapentine
   a. May impact health programs using the 12-week 3HP program for LTBI treatment – e.g. *how to prioritize use of rifapentine:*
      i. 72 RPT tablets for the 3HP program
      ii. 952 RPT tablets for 4 mo. HPMZ treatment program
4. Can be more expensive TB treatment regimen
5. Higher rates of patient intolerance reported with the HPMZ program

N Engl J Med 2021; 384:1705-1718
Open Forum Infect Dis. 2024 Mar 26;11(4)
MMWR Morb Mortal Wkly Rep 2022;71:285–289

Additional Treatment Regimens (culture-negative TB)

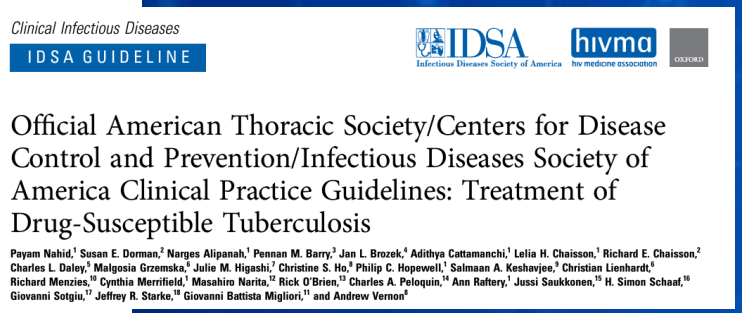
Systematic review of available clinical trials data in adult (>15 years of age) patients did not identify a significant difference in the risk of relapse in culture-negative tuberculosis treated for either 4 or 6 months.

Recommendation 9: We suggest that a 4-month treatment regimen is adequate for treatment of HIV-uninfected adult patients with AFB smear- and culture-negative pulmonary tuberculosis *(conditional recommendation; very low certainty in the evidence)*.

Intensive Phase:
- HRZE/RIPE
- 2 months

→

Continuation Phase:
- HR
- Additional 2 months


Clinical Infectious Diseases

IDSA GUIDELINE

Official American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America Clinical Practice Guidelines: Treatment of Drug-Susceptible Tuberculosis

Payam Nahid,[1] Susan E. Dorman,[2] Narges Alipanah,[1] Pennan M. Barry,[3] Jan L. Brozek,[4] Adithya Cattamanchi,[1] Lelia H. Chaisson,[1] Richard E. Chaisson,[2] Charles L. Daley,[5] Malgosia Grzemska,[5] Julie M. Higashi,[1] Christine S. Ho,[6] Philip C. Hopewell,[1] Salmaan A. Keshavjee,[9] Christian Lienhardt,[6] Richard Menzies,[10] Cynthia Merrifield,[1] Masahiro Narita,[12] Rick O'Brien,[13] Charles A. Peloquin,[14] Ann Raftery,[1] Jussi Saukkonen,[15] H. Simon Schaaf,[16] Giovanni Sotgiu,[17] Jeffrey R. Starke,[18] Giovanni Battista Migliori,[11] and Andrew Vernon[8]

Exceptions to the Rule

- Extra-pulmonary tuberculosis
- Drug-resistant tuberculosis
- Pediatric tuberculosis (<12)
- Extensive disease
- Comorbidities

Additional Treatment Regimens: Drug-Resistant TB

Q3: Treatment of Rifampin-Resistant, Fluoroquinolone Resistant TB	
Recommended BPaL Regimen‖	
Bedaquiline	400 mg daily for 2 wk, then 200 mg three times/wk for subsequent 24 wk
Pretomanid	200 mg daily for 26 wk
Linezolid	600 mg daily for 26 wk
Q4: Treatment of Rifampin-Resistant, Fluoroquinolone-Susceptible TB	
Recommended BPaLM Regimen¶	
Bedaquiline	400 mg daily for 2 wk, then 200 mg three times/wk for subsequent 24 wk
Pretomanid	200 mg daily for 26 wk
Linezolid	600 mg daily for 26 wk
Moxifloxacin	400 mg daily for 26 wk

https://doi.org/10.1164/rccm.202410-2096ST

BPaL and BPaLM

Adverse Drug Reactions

Nausea and Vomiting: Advise patients to take medications with food, if possible, and to stay hydrated. Antiemetic medications may be prescribed if necessary.

- Eat small, bland meals served cool. i.e. rice, crackers, toast.
- Sip water and other fluids
- Maintain oral hygiene
- Restrict fluids with meals
- Avoid alcohol and tobacco
- Avoid lying down after eating-sit upright 30-60 minutes
- May need anti-emetics and/or anti-nausea medication

Adverse Drug Reactions

Caused by	Adverse Reaction	Signs and Symptoms	Significance of Reaction*
Any drug	Allergic	• Skin rash	May be serious or minor

Skin rash: Assess the severity of the rash. Mild rashes may be managed with antihistamines, while severe rashes may require discontinuation of the medication and consultation with a healthcare provider.

Adverse Drug Reactions

Caused by	Adverse Reaction	Signs and Symptoms	Significance of Reaction*
Pyrazinamide Isoniazid Rifampin	Hepatitis (liver toxicity)	• Abdominal pain • Abnormal liver function test results • Brown urine, light colored stool • Fatigue • Fever for 3 or more days • Flu-like symptoms • Lack of appetite • Nausea • Vomiting • Yellow skin or eyes	Serious

Hepatotoxicity (liver damage): Monitor liver function tests regularly. Educate patients to avoid alcohol and other hepatotoxic substances. Discontinue the offending medication if severe liver damage occurs and consult a healthcare provider for alternative treatments.

Adverse Drug Reactions

Caused by	Adverse Reaction	Signs and Symptoms	Significance of Reaction*
Isoniazid	Nervous system damage	• Dizziness • Tingling or numbness around the mouth	Serious
	Peripheral neuropathy	• Tingling sensation, numbness, or pain in hands and feet	Serious

Peripheral Neuropathy (Tingling or numbness in hands and feet): Supplement with pyridoxine (vitamin B6) to prevent or reduce symptoms. Monitor patients for signs of neuropathy and adjust treatment as needed.

Adverse Drug Reactions

Caused by	Adverse Reaction	Signs and Symptoms	Significance of Reaction*
Pyrazinamide	Stomach upset	• Stomach upset, vomiting, lack of appetite	May be serious or minor
	Gout	• Abnormal uric acid level • Joint aches	Serious

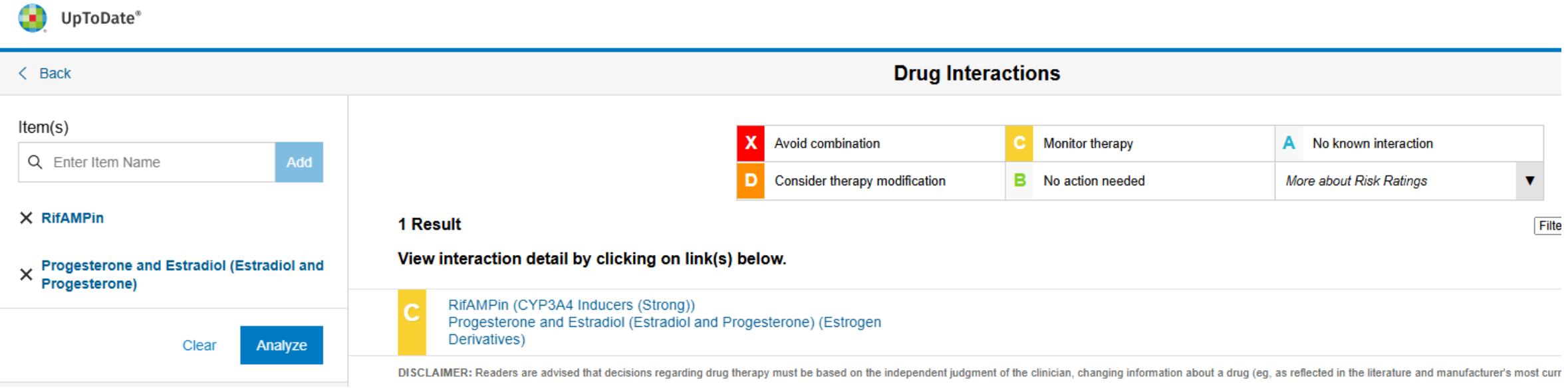
Gastrointestinal disturbances (diarrhea, abdominal pain): Encourage patients to maintain hydration and consider dietary adjustments. Antidiarrheal medications may be used if necessary.

Adverse Drug Reactions

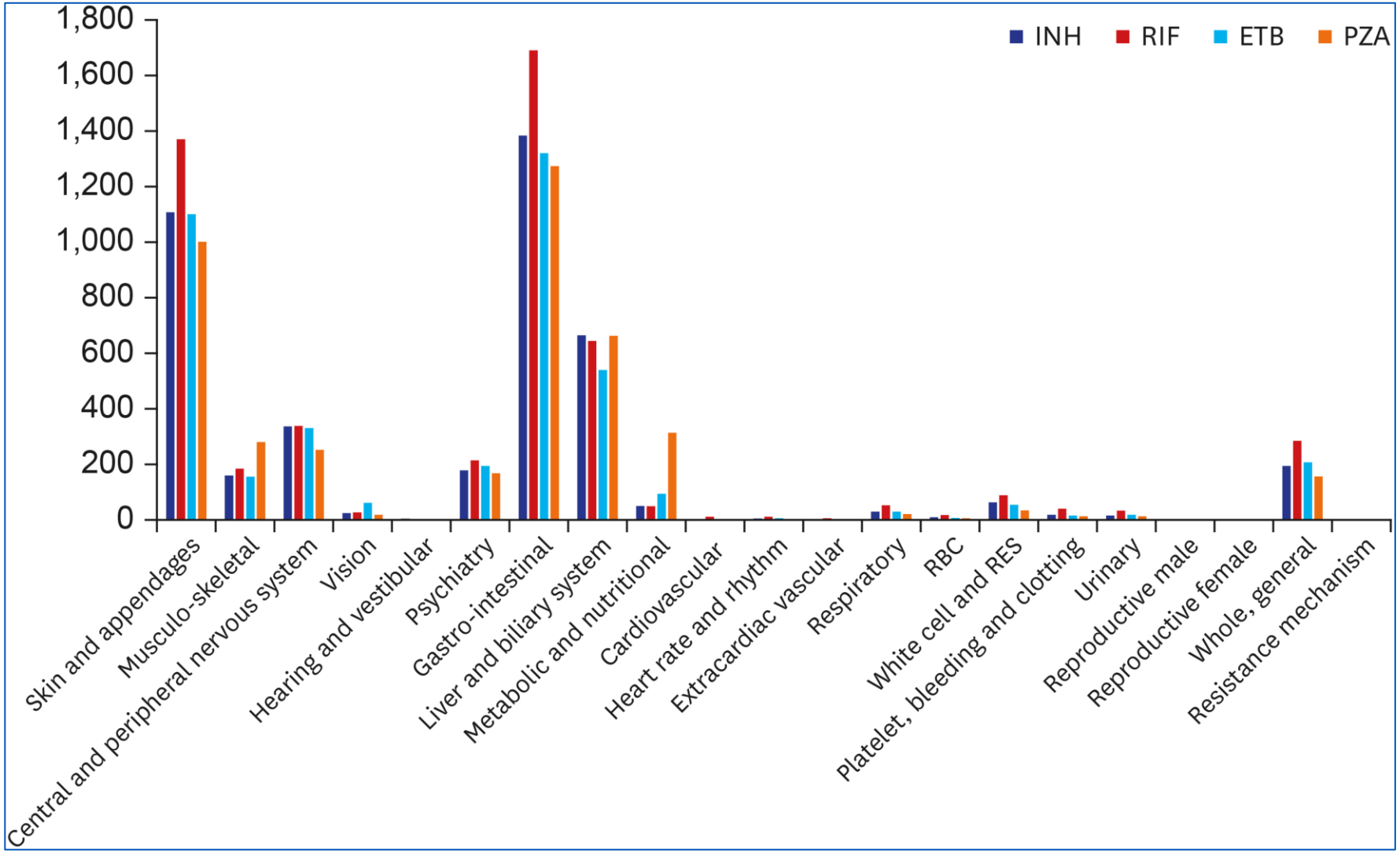
Caused by	Adverse Reaction	Signs and Symptoms	Significance of Reaction*
Rifampin	Bleeding problems due to low platelets	• Easy bruising • Slow blood clotting	Serious
	Discoloration of body fluids	• Orange urine, sweat, or tears • Permanently stained soft contact lenses	Minor
	Drug interactions	• Interferes with many medications, such as birth control pills or implants, blood thinners, some HIV medicines, and methadone	May be serious or minor

Orange discoloration of body fluids: Inform patients that this is a harmless side effect and does not require treatment. Ensure patients are aware that contact lenses and clothing may be stained.

Drug Interactions



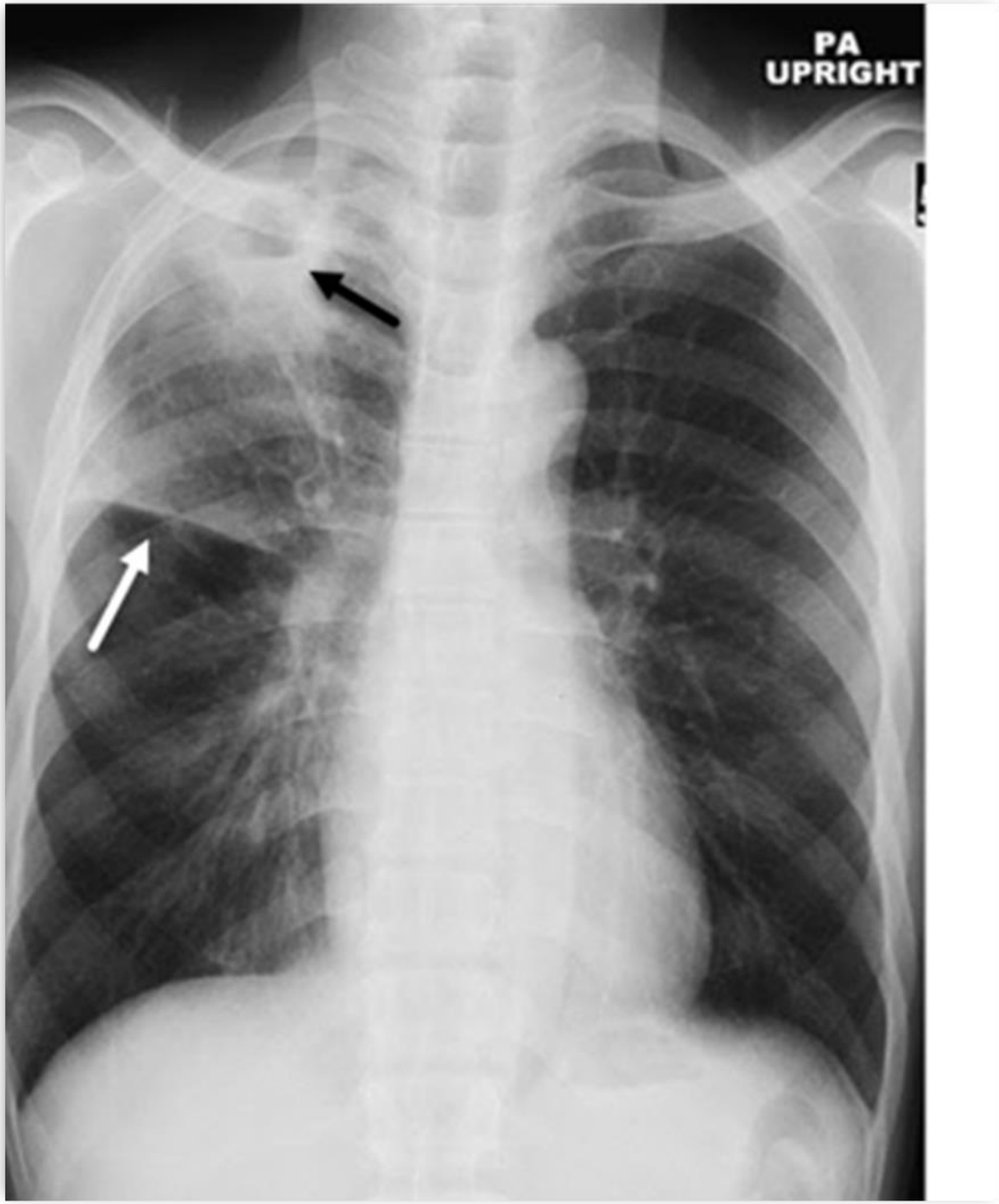
Adverse Drug Reactions



J Korean Med Sci 2022 Apr;37(16):e128. https://doi.org/10.3346/jkms.2022.37.e128

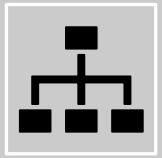
Case 1

- A 24year old female with systemic lupus erythematosus (SLE) patient for the past 6 years
- Presented with dry cough, fever, and weight loss for two months.
- CXR – right upper lobe consolidation
- GeneXpert +, no rifampin resistance
- Baseline liver enzymes, renal function test, serum electrolytes were within normal range.
- HIV negative
- No other co-morbidities: no history of hypertension, DM or renal disease.
- Started with rifampin, isoniazid, ethambutol, and pyrazinamide,with pyridoxine 50mg po daily.

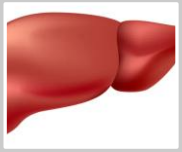


Case 1: History of Present Illness

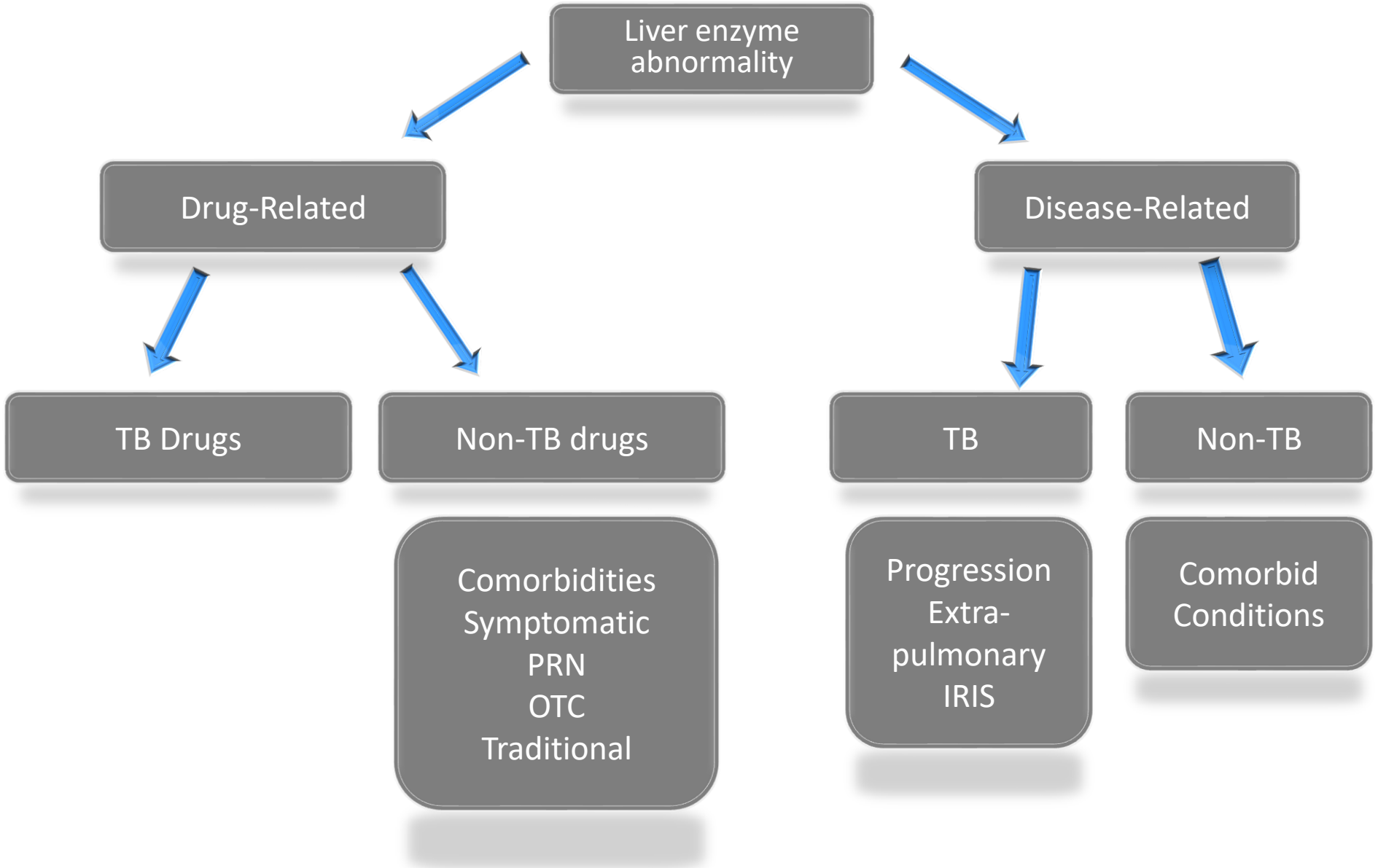
Complaints of nausea, vomiting and right upper quadrant pain of a week duration.



WBC: 6.8, Hgb 11.9, PLT 120,000.



Liver enzymes: ALT - 589, AST-431, Bilirubin (total 6 and direct 2.2).


Liver enzyme abnormality
Drug-Related
Disease-Related
TB Drugs
Non-TB drugs
TB
Non-TB
Comorbidities
Symptomatic
PRN
OTC
Traditional
Progression
Extra-pulmonary
IRIS
Comorbid Conditions

Hepatoxicity –Nursing Role

Nausea, vomiting

+ PLUS

Abdominal Pain, fatigue, and loss of appetite.

Later stage symptoms may include

Fever

Rash

Jaundice
(yellowing of the eyes and skin)

Nursing Assessment

Observe for signs of jaundice (yellowing of the skin and whites of eyes)

- Use pain assessment and approach when pain is reported

Ask the patient

- Do you drink alcohol? **If yes**, how much and when was your last drink?

Check:

- Latest liver function test (LFT), total bilirubin, serum albumin and electrolytes
- Viral hepatitis panel results
- Urine and stool color
- Patient's nutritional status (weight and BMI) and nutritional intake

Hepatoxicity –Nursing Role

Nursing Interventions

Seek urgent medical evaluation when these symptoms are present together and/or if liver enzymes are greater than or equal to 5 times the upper limit of normal.

- Stop all anti-TB medications and other hepatotoxic medications
- Evaluate and treat other potential causes

Counsel the patient:

- Comfort measure to minimize pain
- Limited activity to conserve energy
- Frequent small meals to maintain optimal energy metabolism
- Avoid alcohol

Discuss with the clinician:

- Whether oral or IV rehydration needed of patient shows signs of dehydration
- Nutrition consult of available
- Whether blood tests should be done/repeated (LFT, total bilirubin, albumin, viral serology)
- Plans for re-introduction of TB medications and whether to discontinue likely offending medications

Role of the Nurse –in the management of drug reactions

Resources

[Nursing Guide for Managing Side Effects to Drug-resistant TB Treatment | Curry International Tuberculosis Center (ucsf.edu)]

HEARTLAND NATIONAL TB CENTER
A PARTNERSHIP OF UT HEALTH NORTHEAST AND TCID

TUBERCULOSIS ADVERSE DRUG EVENTS

HEPATITIS	NEUROLOGICAL	RENAL	OPTHALMOLOGIC	HEMATOLOGICAL (rare)
INH	**Peripheral Neurotoxicity:**	Streptomycin	**Vision Changes:**	Rifampin Rifabutin
Rifampin	INH	Amikacin	Ethambutol	Ethambutol
PZA	Ethionamide	Capreomycin	Rifabutin	INH
Ethionamide	Linezolid		Linezolid	PZA
PAS	**Central Neurotoxicity:**	Rifampin	**Uveitis:**	Linezolid
Levofloxin (rare)	INH	Rifabutin	Rifabutin	Cycloserine (rare)
Ethambutol (rare)	Ethionamide		**Orange tears:**	Capreomycine (rare)
	Fluroquinolones		Rifampin	Levofloxacin (rare)
	Cycloserine			Moxifloxacin (rare)
	Amikacin			Streptomycin (rare)
	Linezolid			PAS (rare)

TOXICITY	SIDE EFFECTS
• Serious reactions	• Unpleasant reactions
• May require treatment and/or hospitalization	• Not damaging to health
• Requires changes in dose or stopping drug	• Do not usually require changes in therapy
May be life threatening: Hepatitis Kidney Failure Serious allergic reactions Vision changes, eye pain Neurological problems Thrombocytopenia Anemia	Gas Bloating Discoloration of body fluids Sleeping problems Photosensitivity Irritability

Consultation to healthcare providers at 1-800-TEX-LUNG
2303 S.E. Military Drive, San Antonio ,TX 78223
www.HeartlandNTBC.org

Revised 12-2010

ADVERSE DRUG EVENTS - SYMPTOMS

HEMATOLOGICAL (all of these are rare)
Low platelet count which impairs ability to clot and may cause bleeding - ***stop*** drug. **Rifampin, Rifabutin, rarely INH, Linezolid**, EMB, Ethion, FQN, PAS, PZA, Capreo, Strep.
Low white blood cell count which limits ability to figh infections, especially bacterial infections. **Rifabutin** especially in high doses, **INH, Linezolid, Rifampin, PAS, EMB**
Anemia. **Linezolid**, rarely INH, rifampin, Ethion, FQN, PZA, Cycloserine.

HEPATITIS
Early signs: fatigue, rash, poor appetite, nausea, bloating.
Later signs: vomiting, abdominal pain, jaundice, dark urine, light stools, neurological problems.
Laboratory evaluation: liver enzymes (AST/ALT) and bilirubin, clotting studies (evaluate extent of inflammation and liver function). *Medication must be stopped while LFTs done if signs of hepatitis present.*

GENERAL APPROACH
1.) Hold TB meds if LFT's > 3x normal and symptomatic.
2.) Hold TB meds if LFT's >5 normal even if no symptoms.
3.) Hold TB meds if T.bili is increased >2x normal and no other explanation

IMMUNE REACTIONS
Rash: may be mild and medications continued with or without benedryl.
Hives: medication should be stopped and restarted only after desensitization, preferably in hospital.
Swelling of lips: *stop* drug; do not restart.
Breathing difficulty or wheezing: *stop* drug; do not restart.
Drug fever: patient well except for fever; resolves with stopping drug.
Rifampin reaction: low platelets, renal failure, flu-like symptoms. **Stop** Rifamycins.
Drug induced lupus due to INH, rarely Rifampin. Drugs usually must be stopped.

NEUROLOGICAL TOXICITY
Peripheral neuropathy: tingling, pain and/or numbness of hands or feet. More common in those with diabetes, alcoholics, HIV infected. Usually can be treated with change in dose or addition of Vitamin B6. **INH, Ethionamide, Linezolid, rarely fluroquinoloines, EMB.**
Central neuropathy: headaches, sleep difficulty, loss of concentration, seizures, personality changes, memory loss. **INH, Ethionamide, Cycloserine, Levofloxin, Linezolid.**

SEROTONIN SYNDROME
Linezolid is a monoamine oxidase inhibitor (MAO) and interacts with other drugs that promote release of serotonin or block its re-uptake. Causes excessive CNS and peripheral serotonergic activity. May be fatal. Manifests as altered mental status, neurmuscular activity and autonomic dysfunction.

OPTHALMOLOGIC
Visual toxicity: change in color vision. Change in visual acuity. Ethambutol, Rifabutin, Linezolid, **Clofazamine**
Inflammation of eye (uveitis): pain, redness, blurring of vision. **Rifabutin**

MUSCULOSKELETAL
Athralgias: Common with **PZA, INH, fluroquinalones, Rifabutin** especially with high dose. Can be due to electrolyte abnormality. May occur with Amikacin, Streptomycin, Capreomycin.
Gout: High uric acid in persons on **PZA** (with kidney disease).
Tendonitis: *stop* exercise. Evaluate risk versus benefit of drug. Consider non-steroidal anti-inflammatory. May need to stop medication. **Fluroquinalones.**
Tendon rupture: Usually achilles tendon in ankle. **Fluroquinalones: *stop*** medication; stop exercise.

RENAL
Kidney failure: patient will feel ill and may have decreased urine output or swelling: **Streptomycin, Amikacin, Capreomycin, Rifampin, Rifabutin.**

Consultation to healthcare providers at 1-800-TEX-LUNG, www.HeartlandNTBC.org
Produced by Heartland National TB Center with funds awarded by the Centers for Disease Control and Prevention (CDC).
Adverse effect of treating LTBI serious enough to entail hospital admission or death also should be reported to the CDC through local public health authorities or by calling (404) 639-8401.

FOOD/DRUG INTERACTIONS

INH: Take 1 hour before or 2 hours after meals. May take with small snack if needed. Take 1 hour before or 2 hours after antacids. Avoid alcohol. Supplement Vitamin B6 as needed (25-50 mg).
Rifampin: Take 1 hour before or 2 hours after meal. May take with small snack if needed. Take 1 hour before antacids. Avoid alcohol.
Ethambutol: May be taken with food.
Moxifloxacin/Levofloxacin: Take 2 hours before or after aluminum magnesium or calcium containing antacids, iron, vitamins, sucralfate, milk containing products and food supplements.
PZA: May be taken with food
Ethionamide: Take with or after meals. Avoid alcohol. Supplement vitamin B6 50-100 mg daily.
Amikacin: Increase fluid intake. May be taken on a full or empty stomach.
Streptomycin: May affect the taste of food. Increase fluid intake.
Capreomycin: May need to increase intake of foods high in potassium, but assure normal renal function first. Increase fluid intake. May be taken on a full or empty stomach.
Para-Aminosalicylic Acid (PAS): Take with or immediately following meals. Increase fluid intake. Cycloserine: supplement vitamin B6 as directed. Avoid alcohol.
Linezolid: May be taken with food. Supplement vitamin B6 100 mg daily. Avoid food and drinks that contain tyramine. Do not use with drugs that promote release of serotonin or block its uptake (serotonin syndrome).

HEARTLAND NATIONAL TB CENTER
A PARTNERSHIP OF UT HEALTH NORTHEAST AND TCID

TUBERCULOSIS MEDICATION DRUG AND FOOD INTERACTIONS

Multiple significant interactions occur between TB medications and other medications. The absorption of many TB drugs is adversely affected by food and some medications.

Consultation to healthcare providers at **1-800-TEX-LUNG**
2303 S.E. Military Drive, San Antonio ,TX 78223
www.HeartlandNTBC.org

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INH DRUG INTERACTIONS

Hypoglycemics	Monitor glucose, may cause hyerglycemia
Tylenol	↑hepatotoxicity
Anticoagulants	↑anticoagulant effect
Valium (&others)	↑valium toxicity
Carbamazepines	↑toxicity of both
Disulfiram (Antabuse)	Psychotic episodes
Haldol	↑haldol toxicity
Ketoconazole	↓ketoconazole effect
Dilantin	↑dilantin toxicity
Theophyllin	↑theophyllin toxicity
Valproate	↑hepatic and CNS toxicity

RIFAMPIN DRUG INTERACTIONS

Anticoagulants	↓anticoagulants	Diltiazem	↓ diltiazem effect
Antidepressants	↓effect	Fluconazle	↓ fluconazole effect
Beta-Blockers	↓beta blockade	Itraconazole	↓ itraconazole effect
Contraceptives	↓contraceptive effect	Haloperidol	↓ haloperidal effect
Corticosteroids	Marked ↓ steroid effect	Methadone	↓ methadone effect
Cyclosporine	↓cyclosporine effect, ↑Rifampin	Dilantin	↓dilantin effect
Protease Inhibitors	Marked ↓ activity of PI, ↑Rifampin	Verapamil	↓ verapamil effect
Delavirdine	Marked ↓ delavirdine effect	Tetracyclines	↓ tetracycline effect
Efavirenz	Slight ↓ efavirenz effect, ↓ Rifampin	Trimethoprim-sulfamethoxazole	Possible Rifampin toxicity
Digoxin	↓ digoxin effect	Chloramphenicol	↓ chloramphenicol effect

Produced by Heartland National TB Center.
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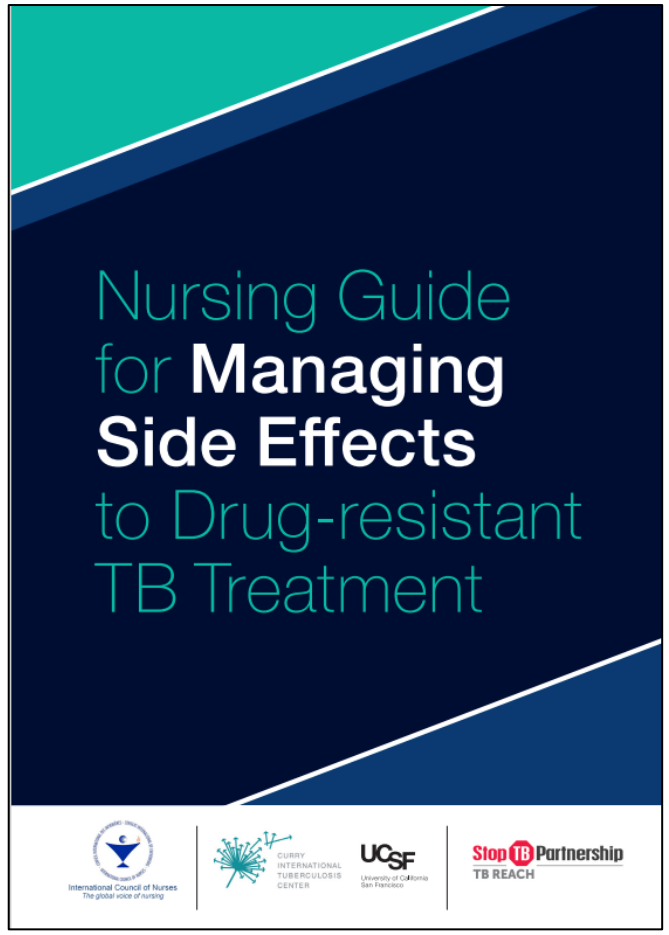

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Thank you