

Vitamin B, Hypertriglyceridemia, Warfarin, and What Meds to Take with Food

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In 2022, Penn Medicine Lancaster General Health Ambulatory Pharmacy Services developed a new resource to help guide LG Health providers when choosing and prescribing pharmaceuticals for our patients. The idea was to produce one-page primers about specific drugs, or groups of drugs, noting recommended therapies, dosing, risk factors, and other important considerations.

Each “Pearl of the Week” (POTW), as we’ve named them, is offered as a PDF and includes related graphics to create interest while highlighting the most important information.

Pharmacy Pearl of the Week

More than 30 Pearls are now available on topics such as Gout Management, Non-Steroidal Anti-Inflammatory Drug (NSAID) Safety, Human Immunodeficiency Virus Pre-Exposure Prophylaxis (HIV PrEP), Patch Therapies, Asthma and Diabetes medications, and many more.

This quiz was developed using information from past Pearls. To access all Pearls in their entirety, visit Pearls of the Week under the Pharmacy section of the StarNet Physician page.


QUESTIONS

1. Many patients require or take vitamins to supplement their diet. The “proper” name for Vitamin B1 is Thiamine. What are the “proper” names of the other available forms of vitamin B – B2, B3, B5, B6, B7, B9, and B12?
2. Well-known secondary contributing factors to hypertriglyceridemia (HTG) include obesity, uncontrolled diabetes, hypothyroidism, and kidney and liver disease, but some medications can contribute as well. List at least three medications that can contribute to HTG, along with the pharmacotherapy recommended for patients aged 40-75 years with moderate HTG and an atherosclerotic cardiovascular disease risk of $\geq 7.5\%$.

3. Warfarin, a high-risk anticoagulant, is commonly used for those in whom direct oral anticoagulants are contraindicated or cost prohibitive. Thus, it is vital to counsel patients about the international normalized ratio (INR), as well as ensure they know the correct dose/regimen.
 - a. List three examples of warfarin drug-drug interactions that *increase* the INR.
 - b. List three examples of warfarin drug-drug interactions that *decrease* the INR.
 - c. List three drug-food interactions that *decrease* the INR.
4. Properly counseling patients on whether to take medications with or without food is important to improve medication absorption and efficacy, and in some cases to lessen the risk of side effects. How would you counsel patients on the following medications? Should they be taken with food or not?
 - a. Oral iron.
 - b. Protease inhibitors.
 - c. Hydroxychloroquine.
 - d. Sucralfate.
 - e. NSAIDs.

ANSWERS

1. The “proper” name for Vitamin B2 is Riboflavin; B3 = Niacin, B5 = Pantothenic acid, B6 = Pyridoxine, B7 = Biotin, B9 = Folic acid, and B12 = Cyanocobalamin. See Fig. 1 on page 58 for more information related to Vitamin B2; similar information about all the B vitamins is available via the Pearls of the Week on the Physician/Pharmacy StarNet page.



B2 (Riboflavin)

Activity: Beta-oxidation of fatty acids (energy production)
Dietary Sources: Milk, eggs, meats, fish, green vegetables
Deficiency: Sore throat, cheilitis, glossitis, dermatitis
Dietary Supplement: 100 mg PO 1-2x/day
Migraine Prevention: 400 mg PO daily

Fig. 1. From September 16, 2022 Pearl of the Week: Know Your Vitamin B's.

HTG Category	TG Level	Pharmaco-therapy	Non-Pharm
Moderate	150-499 mg/dL (fasting or non)	Statin [#]	- Address secondary factors
Severe (pancreatitis risk)	≥500 mg/dL (fasting)	Statin [#] Omega-3 fatty acids Fibrates [*]	- Address secondary factors - Very low-fat diet - Avoid carbs & alcohol

Statins are recommended for those aged 40-75 years with moderate HTG and an ASCVD risk of ≥7.5% in which secondary factors have been addressed/controlled

Fig. 2. From November 18, 2022 Pearl of the Week: Hypertriglyceridemia.

2. Medications known to contribute to hypertriglyceridemia can include hormone-related drugs such as tamoxifen, immune-related drugs such as interferon, as well as beta-blockers. See Fig. 2 for a chart showing that statins are the pharmacotherapy recommended for patients aged 40-75 years with moderate HTG and an atherosclerotic cardiovascular disease risk of ≥7.5%.

3a. Three medications that interact with warfarin to increase the INR are amiodarone, metronidazole, and sulfamethoxazole/trimethoprim.

3b. Three medications that interact with warfarin to decrease the INR are carbamazepine, phenobarbital, and ritonavir.

3c. Three foods high in vitamin K content that decrease the INR include broccoli, green tea, and liver.

Additional information about warfarin interactions is available in the July 29, 2022 Pearl of the Week.

4. The answers below derive from Fig. 3, which – though not exhaustive – sorts common medications into categories taken “with food” vs. on an “empty stomach.”

- a. Oral iron is recommended to be taken on an empty stomach at least one hour before food to maximize absorption. However, this is likely to cause stomach upset and nausea. Many recommend taking oral iron with food to improve medication adherence.
- b. Protease inhibitors should be taken with food to avoid GI intolerance.
- c. Hydroxychloroquine should be taken with food or milk to avoid GI intolerance.

- d. Sucralfate should be taken on an empty stomach an hour or more before eating so that the medication can effectively coat and line the stomach and heal gastric ulcers.
- e. NSAIDs should be taken with food to avoid GI ulceration.

With Food		
Acarbose (with first bite of meal)	Itraconazole <u>caps/tabs</u> (high-fat meal)	Phosphate binders (mechanism of action)
Allopurinol (GI intolerance)	Ivabradine (increased absorption)	Protease inhibitors (GI intolerance)
Carvedilol <u>ER and IR</u> (orthostasis)	Melformin (GI intolerance)	Rivaroxaban (doses ≥20 mg)
Dronedarone (increased absorption)	NSAIDs (GI ulceration)	oral Steroids (GI intolerance)
Hydroxychloroquine (or glass of milk)	Orlistat (during or 1 hour after)	Tamsulosin (30 min after)
Empty Stomach		
Bisphosphonates* (≥30 min prior + water)	<u>oral</u> Iron (≥1 hour prior)	<u>oral</u> Semaglutide (≥30 min prior)
Efavirenz (limited bioavailability)	Isoniazid (take with food if GI upset)	Sucralfate (≥1 hour prior)
Entecavir (separate by ≥2 hours)	Itraconazole <u>solution</u> (limited bioavailability)	<u>oral</u> Tacrolimus (limited bioavailability)
Gemfibrozil (≥30 min prior)	Levofloxacin <u>solution</u> (1-2 hours after meal)	Zafirlukast (separate by ≥2 hours)
H2RAs & PPIs (30-60 min prior)	Levothyroxine (≥30 min prior)	Zaleplon (reduced absorption)

Fig. 3. From January 13, 2023 Pearl of the Week: Food or No Food?

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