

Drug-Nutrient Interactions

1. Describe and explain the significance of the drug-receptor complex.

Out of range of effective dose: Side effects. Drug has to latch to competitive receptor. Competing for active site. Drugs go to sites that are close but wrong ones. With MAOI inhibitors, antagonist mechanism: replaces monoamine oxidase. Can't break down monoamines.

2. What is a tyramine free/reduced diet, when is it used and why is it used?

A diet used for persons receiving MAOIs (or a drug with similar action) for treatment. The tyramine free/reduced diet is to prevent the adverse reactions associated with consuming foods containing tyramine and other amines while receiving irreversible monomine oxidase inhibitors (MAOI) therapy. Tyramine is normally found in many foods, especially aged, fermented, and spoiled products.

3. What are 4 major areas of drug/nutrient interactions?

Changes in:

1. dietary intake
2. nutrient and drug absorption
3. mucosal tissue (affects absorption)
4. nutrient metabolism and excretion

Altered:

1. food intake
2. digestion & absorption
3. metabolism
4. excretion of nutrients

Drug	Drug action	Side effects	Xero-stomia?
Atenolol Tenormin	β -blocker. Antihypertensive. Decreased BP, heart rate, prevention of angina pectoris, MI. Competitively blocks stimulation of β -adrenergic receptor w/i vascular smooth muscle; decreases rate of SA node discharge, increases recovery time;	N&V, diarrhea, mesenteric arterial thrombosis, ischemic colitis	
Aspirin	Blocks pain impulses in CNS, inhibition of prostaglandin synthesis, antipyretic action results from vasodilation of peripheral vessels; decreases platelet aggregation.	N&V, GI bleeding, diarrhea, heartburn, anorexia, hepatitis	
Ibuprofen Advil Nuprin	NSAID, analgesic, antipyretic. Inhibits prostaglandin synthesis by decreasing enzyme needed for biosynthesis.	N&V, anorexia, diarrhea, jaundice, cholestatic hepatitis, constipation, flatulence, cramps, <u>drymouth</u> , peptic ulcer, GI bleeding	Yes
Tums Calcium carbonate Maalox	Neutralizes gastric acidity.	Constipation, anorexia, N&V, flatulence, diarrhea, rebound hyperacidity, eructation	
Lansoprazole Prevacid	Anti-ulcer proton pump inhibitor. Suppresses gastric secretion by inhibiting hydrogen/potassium ATPase enzyme system in gastric parietal cell; characterized as gastric acid pump inhibitor since it blocks final step of acid production.	Diarrhea, abdominal pain, N&V, constipation, flatulence, acid regurgitation, anorexia, irritable colon.	

Drug	Drug action	Side effects	Xero-stomia?
Metronidazole	Direct acting amebicide, trichomonacide, anaerobic bacteriocide; binds & degrades DNA or organism: bacteria, clostridium, giardia or other causing sepsis.	N&V, diarrhea, epigastric distress, anorexia, constipation, abdominal cramps, metallic taste, pseudomembranous colitis, dry mouth	Yes
Tetracycline	Broad spectrum anti-infective. Inhibits microorganism protein synthesis & phosphorylation; bacteriostatic on gram negative microbes.	N&V, abdominal pain, diarrhea, anorexia, enterocolitis, hepatotoxicity, flatulence, abdominal cramps, epigastric burning, stomatitis	
Bismuth subsalicylate Pepto-Bismol	Antidiarrheal. Inhibits prostaglandin synthesis; responsible for GI hypermotility; stimulated absorption of fluids and electrolytes; antimicrobial, antisecretory effects.	Increased fecal impaction (high doses), dark stools, constipation	
Omeprazole Prilosec	GERD; antiulcer, proton pump inhibitor. Suppresses gastric secretion by inhibiting hydrogen/potassium ATPase enzyme system in gastric acid pump inhibitor (PPI); inhibits last step of acid production.	Diarrhea, abdominal pain, N&V, constipation, flatulence, acid regurgitation, abdominal swelling, anorexia, irritable colon, esophageal candidiasis, dry mouth	Yes

1. For the following list of drugs, what is the reason/function of the drug; how does it affect the GI tract and what nutritional issues does this causes; and what food/MNT issues need to be dealt with when a pt is taking this drug:

Kaopectate or Kaolin
 Prinivil
 Metronidazole
 Ciprofloxacin
 Metamucil
 Azulfidine
 Methylprednisolone
 Neomycin
 Lomotil

Drug	Function of Drug	How it affects the GI tract	Nutritional issues caused	Food/MNT issues
Kaopectate or Kaolin /pectin Attapulgite <i>Uses:</i> <i>Diarrhea, mild to moderate</i>	Antidiarrheal.	Decreases gastric motility, water content of stool; adsorbent, demulcent. Constipation (chronic use).	Monitor for dehydration in children.	Decreases action of all other drugs.
Prinivil Lisinopril Zestril <i>Uses: Mild to moderate hypertension, adjunctive therapy of systolic CHF</i>	Antihypertensive, angiotensin converting enzyme (ACE) inhibitor. Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE; prevents conversion of angiotensin I to angiotensin II; results in dilation of arterial, venous vessels.	GI: N&V, anorexia, constipation, flatulence, GI irritation. GU: Proteinuria, renal insufficiency, sexual dysfunction, impotence	High potassium diet (bananas, orange juice, avocados, broccoli, nuts, spinach) s/b avoided; hyperkalemia may occur.	Alcohol: increases hypotension (large amounts). Interference: Glucose/insulin tolerance tests, ANA titer. Do not discontinue medication abruptly.
Drug	Function of Drug	How it affects the GI tract	Nutritional issues caused	Food/MNT issues
Metronidazole <i>Uses:</i> <i>Intestinal amebiasis, bacterial anaerobic infections,</i>	Direct acting amebicide, trichomonacide, anaerobic bacteriocide; binds & degrades DNA in organism: bacteria, clostridium, giardia or other causing sepsis.	N&V, diarrhea, epigastric distress, anorexia, constipation, abdominal cramps, metallic taste, pseudomembranous colitis, dry mouth GU: darkened urine, vaginal dryness, polyuria, albuminuria, dysuria, cystitis, decreased libido, nephrotoxicity, incontinence, dyspareunia	Xerostomia; Give with or after a meal to avoid GI symptoms, metallic taste; crush tab if needed. Alcohol: Increased disulfiram-like reaction; Alcohol should not be used while taking this anti-infective.	Anticoagulants, oral: increased risk of bleeding. Identify urine output; if decreasing, notify prescriber (may indicate nephrotoxicity); also check for increased BUN, creatinine. Assess bowel pattern qd; if severe diarrhea occurs, discontinue drug.
Ciprofloxacin	Bactericidal action against gram-positive	GI: Nausea, constipation,	Caffeine: increases	Sucralfate: decreases

<p><i>Uses:</i> infectious diarrhea, adult urinary tract infections;</p>	<p>organisms. Urinary anti-infectives. Interferes with conversion of intermediate DNA fragments into high-molecular-weight DNA in bacteria; DNA gyrase inhibitor.</p>	<p>increased ALT, AST, flatulence, insomnia, heartburn, vomiting, diarrhea, oral candidiasis, dysphagia, pseudomembranous colitis</p>	<p>caffeine levels. Dairy products: decreases absorption. Food: decreases absorption. Enteral feeding: decreases absorption of ciprofloxacin;</p>	<p>absorption of ciprofloxacin; warfarin: increases warfarin effect; zinc sulfate: decreases absorption of ciprofloxacin. Antacids: decrease absorption of ciprofloxacin; Anticoagulants, oral: increases effect of anticoagulants; iron salts: decreases absorption of ciprofloxacin. Lab test interference: Increases AST, ALT, BUN, creatinine, alkaline phosphatase</p>
Drug	Function of Drug	How it affects the GI tract	Nutritional issues caused	Food/MNT issues
<p>Metamucil</p> <p><i>Uses:</i> Chronic constipation, ulcerative colitis, irritable bowel syndrome</p>	<p>Promotes peristalsis by combining with water in the intestine to form a gel-like substance that is easily evacuated. Decreased constipation, decreased diarrhea in colitis. Uses:</p>	<p>GI: N&V, anorexia, diarrhea, cramps, intestinal/esophageal blockage.</p>	<p>Monitor blood, urine electrolytes; check I/O ratio to identify fluid loss. Adequate fluid consumption is necessary.</p>	<p>Decreases absorption of: cardiac glycosides, oral anticoagulants, salicylates. Lab test interference: increases blood glucose.</p>
<p>Azulfidine sulfasalazine</p> <p><i>Uses:</i> Treatment of ulcerative colitis</p>	<p>Antiinflammatory. Prodrug to deliver sulfapyridine and 5-aminosalicylic acid to colon; antiinflammatory in connective tissue.</p>	<p>GI: N&V, abdominal pain, stomatitis, hepatitis, glossitis, pancreatitis, diarrhea, anorexia. GU: Renal failure, toxic nephrosis,</p>	<p>Give with full glass of water to maintain adequate hydration; increase fluids to 2L/d to decrease crystallization in kidneys; contact lens, urine, skin</p>	<p>Iron, folic acid will be poorly absorbed. Digoxin: decreases effectiveness; anticoagulants, oral: increases toxicity; hypoglycemics, oral: increases toxicity; Avoid OTC meds (aspirin,</p>

		increased BUN, creatinine, crystalluria.	may be yellow-orange.	vit C) unless directed by prescriber.
Methylprednisolone <i>Uses: severe inflammation, shock, adrenal insufficiency, collagen disorders, psoriasis, eczema, contact dermatitis, pruritus</i>	Corticosteroid; Decreases inflammation by suppression of migration of polymorphonuclear leukocytes, fibroblasts; reverses increased capillary permeability and lysosomal stabilization; antipruritic, antiinflammatory	GI: diarrhea, nausea, abdominal distention, GI hemorrhage, increased appetite, pancreatitis	Do not discontinue abruptly: adrenal crisis can result.; Avoid OTC products: salicylates, alcohol in cough products, cold preparations.	Insulin: increased need for insulin; barbiturates: decrease action, increase metabolism; diuretics: increase hypokalemia; hypoglycemic agents: increases need for hypoglycemic agents; Lab test interference: increases: cholesterol, sodium, blood glucose, uric acid, calcium, urine glucose; decreases: calcium, potassium, T4, T3,
Drug	Function of Drug	How it affects the GI tract	Nutritional issues caused	Food/MNT issues
Neomycin <i>Uses: pre-operatively to sterilize bowel, infectious diarrhea, severe systemic infections of GI tract.</i>	Interferes with protein synthesis in bacterial cell by binding to 30S ribosomal subunit causing inaccurate peptide sequence to form in protein chain, resulting in bacterial death.	GI: N&V, anorexia, increased ALT, AST, bilirubin, hepatomegaly, hepatic necrosis, splenomegaly; GU: oliguria, hematuria, renal damage, azotemia, renal failure, nephrotoxicity		Vancomycin: increases ototoxicity, neurotoxicity, nephrotoxicity
Lomotil diphenoxyate w/atropine/difenoxin with atropine <i>Uses: diarrhea</i>	Inhibits gastric motility by acting on mucosal receptors responsible for peristalsis, related to narcotic analgesics as adjunct.	GI: N&V, abdominal pain, glossitis, colitis; GU: urine retention	Monitor electrolytes (potassium, sodium, chloride) if on LT therapy; fluid status, skin turgor. assess	Alcohol: increases action of alcohol; Increases action of: anticholinergics, antihistamines (increases CNS depression), barbiturates, CNS

(May be habit-forming)			for abdominal distention and toxic megacolon, which may occur in ulcerative colitis; dry mouth: freq. sips of water.	depressants; MAOIs: hypertensive crisis: do not use together. opiates: increases action of narcotics; sedative/hypnotics: increases CNS depression
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1. For the following list of drugs, what is the reason/function of the drug; how does it work and what nutritional issues does this cause; and what food/MNT issues need to be dealt with when a pt is taking this drug?

Capoten (captopril)

Lactulose

Neomycin

Steroids

Lasix

Glucotrol (glipizide) a sulfonylurea

Glucophage (metformin) a biguanide - has some micronutrient issues

Avandia (rosiglitazone) an alpha-glucosidase inhibitor

Prandin (repaglinide) a meglitinide

Humalog (lispro)

Humulin R (regular)

Humulin N (NPH)

Humulin U (ultralente)

Lantus (insulin glargine)

Drug	Function of Drug	How it works	Nutritional issues caused	Food/MNT issues
Capoten (captopril)	Antihypertensive, angiotensin converting enzyme (ACE) inhibitor.	Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE; prevents conversion of angiotensin I to angiotensin II; results in dilation of arterial, venous vessels.	Loss of taste	Alcohol, acute ingestion: increases hypotension Insulin: increases hypoglycemia Antidiabetics: increases hypoglycemia NSAIDS: decreases captopril effect
Lactulose	Laxative	Increases osmotic pressure; draws fluid into colon; prevents absorption of ammonia in colon; increases water in stool	Give w/full glass of fruit juice, water, milk to increase palatability of oral form; increase fluids by 2 L/d.	Neomycin:decreases effectiveness
Neomycin <i>Uses: pre-operatively to sterilize bowel, infectious diarrhea, severe systemic infections of GI tract.</i>	Antiinfective	Interferes with protein synthesis in bacterial cell by binding to 30S ribosomal subunit causing inaccurate peptide sequence to form in protein chain, resulting in bacterial death.	GI: N&V, anorexia, increased ALT, AST, bilirubin, hepatomegaly, hepatic necrosis, splenomegaly; GU: oliguria, hematuria, renal damage, azotemia, renal failure, nephrotoxicity	Vancomycin: increases ototoxicity, neurotoxicity, nephrotoxicity
Steroids				

Drug	Function of Drug	How it works	Nutritional issues caused	Food/MNT issues
Lasix furosemide	Loop diuretic; decreased BP	Acts on ascending loop of Henle in kidney, inhibiting reabsorption of electrolytes Na & Cl, causing excretion of sodium, calcium, magnesium, chloride, water, and some potassium in the distal tubule of the kidney; resp. for slight antihypertensive effect & peripheral vasodilation.		N&V, dry mouth, anorexia, cramps, oral or gastric irritations, pancreatitis; precaution: DM,
Glucotrol (glipizide), a sulfonylurea	Antidiabetic; Stable Type 2 NIDDM Decrease in polyuria, polydipsia, polyphagia, clear sensorium, absence of dizziness, stable gait.	Causes functioning B-cells in pancreas to release insulin, leading to drop in blood glucose levels, may improve insulin binding to insulin receptors or increase the number of insulin receptors with prolonged admin; may also reduce basal hepatic glucose secretion.	N&V, diarrhea, heartburn	<u>alcohol</u> : disulfiram-like reaction (nausea, headache, cramps, flushing, hypoglycemia) <u>insulin</u> : increases hypoglycemia; <u>corticosteroids</u> : possible decrease action of glipizide <u>diuretics</u> : possible decrease action of glipizide <u>MAOIs</u> : increase hypoglycemia <u>NSAIDs</u> : increase hypoglycemia <u>Oral contraceptives</u> : possible decrease action of glipizide <u>Salicylates</u> : increase hypoglycemia <u>Avoid OTC</u> ; <u>Avoid alcohol</u>

Drug	Function of Drug	How it works	Nutritional issues caused	Food/MNT issues
<p>Glucophage (metformin) a biguanide</p> <p>has some micro nutrient issues.</p>	<p>Antidiabetic, oral</p> <p>Stable Type 2 DM</p>	<p>Inhibits hepatic glucose production and increases sensitivity of peripheral tissue to insulin.</p>	<p>N&V, diarrhea, heartburn, anorexia, metallic taste</p>	<p><u>Decreased Vit B12 concentration (HEMA)</u></p> <p><u>Diuretics:</u> increases hypoglycemia</p> <p><u>Estrogens:</u> increases hypoglycemia</p> <p><u>Glucocorticoids:</u> increases risk of lactic acidosis</p> <p><u>Oral contraceptives:</u> increases hypoglycemia</p>
<p>Avandia rosiglitazone</p> <p>a thiazolidinedione</p>	<p>Antidiabetic, oral</p> <p>Stable, Type 2 NIDDM</p> <p>alone or in combination with sulfonylureas, metformin, or insulin</p>	<p>Improves insulin resistance by hepatic glucose metabolism, insulin receptor kinase activity, insulin receptor phosphorylation.</p>	<p>diarrhea</p>	<p>Avoid OTC or herbals</p>
<p>Precose (acarbose)</p> <p>an alpha-glucosidase inhibitor</p>	<p>Oral antidiabetic</p> <p>Stable, Type 2 NIDDM</p> <p>alone or in combination with a sulfonylurea</p> <p>Decreased blood glucose levels in DM; does not increase insulin production.</p>	<p>Delays the digestion of ingested CHOs, results in a smaller rise in blood glucose after meals; does not increase insulin production</p>	<p>Abdominal pain, diarrhea, flatulence,</p>	<p>Insulin: increases hypoglycemia;</p> <p>corticosteroids: increases hypoglycemia;</p> <p>digestive enzymes: decreases effect of acarbose</p> <p>diuretics: increases hypoglycemia;</p> <p>Estrogens: increases hypoglycemia;</p> <p>Sulfonylureas: increases hypoglycemia</p> <p>Alfalfa: possible increase in hypoglycemia</p>

Drug	Function of Drug	How it works	Nutritional issues caused	Food/MNT issues
Prandin	Antidiabetic Stable Type 2 DM	Causes functioning B-cells in pancreas to release insulin, leading to drop in blood glucose levels; closes ATP-dependent potassium channels in the B-cell membrane; this leads to opening of calcium channels; increased calcium influx induces insulin secretion.	N&V, diarrhea, constipation, dyspepsia	Corticosteroids: decrease repaglinide effect; Coumarins: increase repaglinide effect; Diuretics: decrease repaglinide effect; Estrogens: decrease repaglinide effect; NSAIDs: increase repaglinide effect; Oral contraceptives: decrease repaglinide effect; Salicylates: increase repaglinide effect; Sulfonamides: increase repaglinide effect Avoid alcohol (disulfiram reaction); Avoid OTC
Humalog (lispro)	Pancreatic hormone	Decreases blood glucose; by transport of insulin into cells and the conversion of glucose to glycogen indirectly increases blood pyruvate and lactate, decreases phosphate and potassium; insulin may be beef, port, human (processed by recombinant DNA tech.)	Dry mouth	Hypoglycemia, rebound hypoglycemia (Somogyi effect 12-72 hr or longer) Alcohol: increases hypoglycemia; Avoid OTC drugs & alcohol; B-adrenergic blockers: signs/symptoms of hypoglycemia may be masked; Estrogens: increase insulin need; glucocorticoid steroids: increase insulin need; MAOIs: decrease insulin need; Oral anticoagulants: decrease insulin need; Oral hypoglycemics: increase hypoglycem.

Drug	Function of Drug	How it works	Nutritional issues caused	Food/MNT issues
Humulin R (regular)	Pancreatic hormone	Same as above.		
Humulin N (NPH)	Pancreatic hormone	Same as above.		
Humulin U (ultralente)	Pancreatic hormone	Same as above.		
Lantus (insulin glargine)	Pancreatic hormone	Same as above.		