

Katzung pharmacology

Lec- 4 & 5

Q & A

1. A 32-year-old woman with hypertension wishes to become pregnant. Her physician informs her that she will have to switch to another antihypertensive drug. Which of the following drugs is absolutely contraindicated in pregnancy?
- (A) Atenolol
 - (B) Losartan
 - (C) Methyldopa
 - (D) Nifedipine
 - (E) Propranolol

1. Methyldopa is often recommended in pregnant patients because it has a good safety record. Calcium channel blockers (choice **D**) and β blockers (choices **A** and **E**) are not contraindicated. In contrast, ACE inhibitors and ARBs (choice **B**) have been shown to be teratogenic. The answer is **B**.

2. A patient is admitted to the emergency department with severe tachycardia after a drug overdose. His family reports that he has been depressed about his hypertension. Which one of the following drugs increases the heart rate in a dose-dependent manner?
- (A) Captopril
 - (B) Hydrochlorothiazide
 - (C) Losartan
 - (D) Minoxidil
 - (E) Verapamil

2. ACE inhibitors (choice A), ARBs (choice C), and diuretics (choice B) do not significantly increase heart rate. Although dihydropyridine calcium channel blockers do not usually reduce rate markedly (and may increase it), verapamil (choice E) and diltiazem do inhibit the sinoatrial node and predictably decrease rate. Other direct vasodilators (choice D) regularly *increase* heart rate, and minoxidil, a very efficacious vasodilator, causes severe tachycardia that must be controlled with β blockers. The answer is **D**.

3. Which one of the following is characteristic of nifedipine treatment in patients with essential hypertension?
- (A) Competitively blocks angiotensin II at its receptor
 - (B) Decreases calcium efflux from skeletal muscle
 - (C) Decreases renin concentration in the blood
 - (D) Decreases calcium influx into smooth muscle
 - (E) Decreases calcium flux into the urine

3. Nifedipine is a prototype L-type calcium channel blocker and lowers blood pressure by reducing calcium influx into vascular smooth muscle. It has no effect on angiotensin-converting enzyme. Calcium efflux from skeletal muscle cells does not involve the L-type Ca channel. The plasma renin level may *increase* as a result of the compensatory response to reduced blood pressure. Calcium channel blockers have negligible effects on urine calcium. The answer is **D**.

4. A 73-year-old man with a history of a recent change in his treatment for moderately severe hypertension is brought to the emergency department because of a fall at home. Which of the following drug groups is most likely to cause postural hypotension and thus an increased risk of falls?
- (A) ACE inhibitors
 - (B) Alpha₁-selective receptor blockers
 - (C) Arteriolar dilators
 - (D) Beta₁-selective receptor blockers
 - (E) Nonselective β blockers

4. Drug-induced postural (orthostatic) hypotension is usually due to venous pooling or excessive diuresis and inadequate blood volume. Venous pooling is normally prevented by α -receptor activation in vascular smooth muscle; thus, orthostatic hypotension is caused or exacerbated by α_1 blockers, eg, prazosin. The answer is **B**.

5. A significant number of patients started on ACE inhibitor therapy for hypertension are intolerant and must be switched to a different class of drug. What is the most common manifestation of this intolerance?
- (A) Angioedema
 - (B) Glaucoma
 - (C) Headache
 - (D) Incessant cough
 - (E) Ventricular arrhythmias

5. Chronic, intolerable cough is an important adverse effect of captopril and other ACE inhibitors. It may be reduced or prevented by prior administration of aspirin. These drugs are very commonly used in hypertensive diabetic patients because of their proven benefits in *reducing* diabetic renal damage. The ACE inhibitors are not associated with glaucoma; angioedema is not as common as cough; and headache and arrhythmias are rare. The answer is **D**.

6. Which one of the following is a significant unwanted effect of the drug named?
- (A) Constipation with verapamil
 - (B) Heart failure with hydralazine
 - (C) Hemolytic anemia with atenolol
 - (D) Hypokalemia with aliskiren
 - (E) Lupus-like syndrome with hydrochlorothiazide

6. Hydralazine (choice B) is sometimes *used* in heart failure. Beta blockers (choice C) are not associated with hematologic abnormalities, but methyldopa is. The thiazide diuretics (choice E) often cause mild hyperglycemia, hyperuricemia, and hyperlipidemia but not lupus; hydralazine is associated with a lupus-like syndrome. Aliskiren (choice D) and other inhibitors of the renin-angiotensin-aldosterone system may cause *hyperkalemia*, not hypokalemia. Verapamil (choice A) often causes constipation, probably by blocking L-type calcium channels in the colon. The answer is A.

7. Comparison of prazosin with atenolol shows that
- (A) Both decrease heart rate
 - (B) Both increase cardiac output
 - (C) Both increase renin secretion
 - (D) Both increase sympathetic outflow from the CNS
 - (E) Both produce orthostatic hypotension

7. Atenolol, but not prazosin, may decrease heart rate (choice **A**). Prazosin—but not atenolol—may increase cardiac output, a compensatory effect (choice **B**). Prazosin may increase renin output (a compensatory response), but β blockers inhibit its release by the kidney (choice **C**). By reducing blood pressure, both may increase central sympathetic outflow (a compensatory response). Beta blockers do not cause orthostatic hypotension. The answer is **D**.

8. A patient with hypertension and angina is referred for treatment. Metoprolol and verapamil are among the drugs considered. Both metoprolol and verapamil are associated with which one of the following?
- (A) Diarrhea
 - (B) Hypoglycemia
 - (C) Increased PR interval
 - (D) Tachycardia
 - (E) Thyrotoxicosis

8. Neither β blockers nor calcium channel blockers cause diarrhea. Hypoglycemia is not a common effect of any of the antihypertensive drugs. Thyroid disorders are not associated with either drug group. However, calcium blockers, especially verapamil and diltiazem, and β blockers are associated with depression of calcium-dependent processes in the heart, for example, contractility, heart rate, and atrioventricular conduction. Therefore, *bradycardia* and increased PR interval may be expected. The dihydropyridines do not often cause cardiac depression, probably because they evoke increased sympathetic outflow as a result of their dominant vascular effects. The answer is C.

9. A 45-year-old man is brought to the emergency department with mental obtundation. He is found to have a blood pressure of 220/160 and retinal hemorrhages. Which one of the following is used in severe hypertensive emergencies, is short-acting, acts on a G protein-coupled receptor, and must be given by intravenous infusion?

- (A) Aliskiren
- (B) Captopril
- (C) Fenoldopam
- (D) Hydralazine
- (E) Losartan
- (F) Metoprolol
- (G) Nitroprusside
- (H) Prazosin
- (I) Propranolol

9. Fenoldopam, nitroprusside, and propranolol are the drugs in the list that have been used in hypertensive emergencies. Fenoldopam and nitroprusside are used by infusion only, but nitroprusside releases nitric oxide, which acts on intracellular guanylyl cyclase. The answer is C.

10. Which of the following is very short-acting and acts by releasing nitric oxide?
- (A) Atenolol
 - (B) Captopril
 - (C) Diltiazem
 - (D) Fenoldopam
 - (E) Hydrochlorothiazide
 - (F) Losartan
 - (G) Minoxidil
 - (H) Nitroprusside
 - (I) Prazosin

10. The two agents in this list that act via a nitric oxide mechanism are hydralazine and nitroprusside (see Table 11–2). However, hydralazine has a duration of action of hours, whereas nitroprusside acts for seconds to minutes and must be given by intravenous infusion. The answer is H.

END