CARDIOVASCULAR SYSTEM

CARDIAC GLYCOSIDES

*Drug examples:* Digoxin (*Digitek, Lanoxin, Lanoxicaps*)

- **Mechanism of actions:** cardiac glycosides increase myocardial contractility and decrease the heart rate, by that improving the efficiency of the heart.
- **Metabolism:** metabolized by the liver and gastrointestinal (GI) tract and excreted in the urine. Caution should be exercised in patients with impaired liver function.
- **Indications:** heart failure, atrial fibrillation, atrial flutter, paroxysmal atrial tachycardia.
- **Side effects:** bradycardia, nausea, vomiting, diarrhea, digoxin toxicity.

ANTIARRHYTHMICS

*Drug examples:* Propranolol (Inderal)

- **Mechanism of action:** these agents decrease automaticity (ability of each cell to beat independently) of the heart and prolong the heart cycles, by that decreasing or eliminating arrhythmia.
- **Metabolism:** metabolized by the liver and excreted in the urine and feces. Caution should be exercised in patients with impaired liver functions.
- **Indications:** heart arrhythmias (atrial arrhythmias, AV junctional arrhythmias, ventricular arrhythmias).
- **Side effects:** fatigue, hypotension, heart failure, bradycardia, heart block.

Alpha 1 receptors – stimulation produces contractions (vasoconstriction) of smooth muscles of artery walls

Alpha 2 receptors – stimulation produces relaxation (vasodilation) of smooth muscles of artery walls

Beta 1 receptors (found mostly in the heart) – stimulation causes heart to beat faster and more forcefully

Beta 2 receptors (found mostly in smooth muscles of the bronchial walls and blood vessels) – stimulation dilates bronchi and relaxes blood vessels

CENTRALLY ACTING ADRENERGIC INHIBITORS

*Drug examples:* Clonidine (*Catapres, Catapres-TTS*)

- **Mechanism of action:** stimulate alpha receptors and inhibit vasoconstriction (constriction of blood vessels) and heart acceleration (increased heart rate), thus reducing peripheral resistance which leads to decreased blood pressure.
- **Metabolism:** metabolized by the liver and excreted in the urine and feces. Caution should be exercised in patients with impaired liver or kidney functions..
- **Indications:** moderate hypertension.
**Side effects:** depression, drowsiness, edema, dry mouth, impotence.

**PERIPHERALLY ACTING ADRENERGIC INHIBITORS**

*Drug examples:* Doxazosin (*Cardura*), Terazosin (*Hytrin*)

**Mechanism of action:** reduce effect of norepinephrine (a chemical substance that leads to vasoconstriction), thus reducing blood pressure.

**Metabolism:** metabolized by the liver and excreted in bile and feces. Caution should be exercised in patients with impaired liver function.

**Indications:** moderate or essential hypertension.

**Side effects:** drowsiness, edema, orthostatic hypotension, diarrhea, nasal stuffiness.

**BETA-ADRENERGIC BLOCKERS**

*Drug examples:* Atenolol (*Tenormin*), Atenolol/Chlorthalidone (*Tenoretic*), Metoprolol (*Lopressor*), Metoprolol Succinate ER (*Toprol-XL*), Propranolol (*Inderal*)

**Mechanism of action:** block beta-receptors, thereby decreasing heart rate and cardiac output (the amount of blood the heart ejects with each contraction).

**Metabolism:** minimally metabolized in the liver and excreted in the urine and feces.

**Indications:** mild hypertension, angina pectoris, MI, heart failure

**Side effects:** bradycardia, hypotension, nausea, vomiting, bronchospasm, AV block.

**ACE (ANGIOTENSIN CONVERTING ENZYME) INHIBITORS AND ANGIOTENSIN II RECEPTOR BLOCKERS**

*Drug examples:* Benazepril (*lotensin*), Enalapril (*Vasotec*), Lisinopril (*Prinivil, Zestril*), Quinapril (*Accupril*), Ramipril (*Altace*); Irbesartan (*Avapro*), Losartan (*Cozaar*), Olmesartan (*Benicar*), Valsartan (*Diovan*)

**Mechanism of action:** block the effects of angiotensin II (either by blocking conversion of angiotensin I to angiotensin II, or by blocking angiotensin II receptors) which is a vasoconstrictor (constrict blood vessels) leading to reduced peripheral resistance and lower blood pressure.

**Metabolism:** Metabolized by the liver and excreted in feces and urine. Caution should be exercised in patients with impaired liver or kidney functions.

**Indications:** hypertension, heart failure.

**Side effects:** headache, fatigue, dizziness, cough, symptoms of upper respiratory tract infection.

**CALCIUM CHANNEL BLOCKERS**

*Drug examples:* Diltiazem (*Cardizem*), Diltiazem ER (*Cartia XT*), Amlodipine (*Norvasc*), Nifedipine (*Procardia*), Verapamil (*Calan, Isoptin*)

**Mechanism of action:** block calcium channels leading to relaxation of the arterial walls which, in turn, leads to decreased peripheral resistance and decreased blood pressure.
**Metabolism:** metabolized by the liver and excreted in the urine. Caution should be exercised in patients with impaired liver or kidney functions.

**Indications:** mild hypertension, prevention of angina, arrhythmias.

**Side effects:** dizziness, AV blocks, headache, edema, nausea, ventricular asystole (absent contractions of heart ventricles).

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**DIURETICS**

*Drug examples:* Triamterene/Hydrochlorothiazide (*Dyzaide*), Hydrochlorothiazide (*Microzide, Esidrix, Oretic*), Furosemide (*Lasix*), Spironolactone (*Aldactone*)

**Mechanism of action:** increase urine output by that decreasing edema, circulating blood volume, and cardiac output (the amount of blood the heart pumps out with each beat), which leads to decreased blood pressure.

**Metabolism:** most of these drugs are metabolized by the liver and excreted in the urine. Caution should be exercised in patients with impaired liver or kidney functions.

**Indications:** hypertension, edema, heart failure.

**Side effects:** fatigue, dizziness, orthostatic hypotension, rash, electrolyte imbalance.

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**NITRATES**

*Drug examples:* Isosorbide dinitrate (*Isordil*), Nitroglycerin (*Nitro-Bid, Nitroquick, Nitrostat*)

**Mechanism of action:** produce vasodilation (dilation of blood vessels), decrease preload and afterload, and reduce myocardial oxygen consumption.

**Metabolism:** metabolized by the liver and excreted in the urine. Caution should be exercised in patients with impaired liver or kidney function.

**Indications:** acute angina pectoris, surgical hypertension.

**Side effects:** headache, dizziness, orthostatic hypotension, tachycardia, flushing, palpitations, nausea/vomiting.

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**ANTILIPEMICS**


**Mechanism of action:** depending on the type of drug – either decrease synthesis of cholesterol, or increase breakdown of cholesterol, or increase clearance of cholesterol from the bloodstream.

**Metabolism:** most of these drugs are metabolized by the liver and excreted either in bile, urine, or feces.

**Indications:** hypercholesterolemia (increased levels of cholesterol in blood).

**Side effects:** headache, dizziness, diarrhea, abdominal pain, pancreatitis, constipation, flatulence, liver damage.