

# **Hypertension Medication Management**



# **Drug Classes**

- **Diuretics**
- Angiotensin-converting enzyme (ACE) inhibitors
- Angiotensin-II receptor blockers (ARBs)
- Beta blockers
- Calcium channel blockers

- - Renin inhibitors
  - Alpha blockers
  - Central agonists
  - Vasodilators
  - Combination medications

## Drug Class: Diuretics

- Help the body get rid of excess sodium (salt) and water by allowing more to be passed into the urine by the kidneys. This reduces the amount of fluid in the bloodstream leading to lower pressure.
- Usually taken once or twice a day or as directed by the physician.
- Unless otherwise directed, try not to take med too late in the evening so as not to be awakened during the night for urination.

### 3 basic types of diuretics that work in different parts of the kidney:

- Thiazide diuretics: Hydrochlorothiazide (HCTZ), Chlorthalidone (Hygroton), Clorothiazide (Diuril), Indapamide (Lozol), Metolazone (Zaroxolyn)
- Loop diuretics: Furosemide (Lasix), Bumetanide (Bumex), Torsemide (Demadex)
- Potassium-sparing diuretics: Spironolactone (Aldactone), Amiloride (Midamor), Triamterene (Dyrenium)
- Combinations diuretics are also available: Triamterene + HCTZ (Maxzide, Dyazide), Amiloride+ HCTZ (Moduretic), Spironolactone + HCTZ (Aldactazide)

# Side Effects/Monitoring

- May decrease the body's supply of Potassium.
  - Watch for symptoms such as weakness, leg cramps, or tiredness.
  - o Dietary changes or a potassium supplement may be suggested by the physician to help replenish potassium.
  - o Also, the physician may change the drug to a Potassium-sparing diuretic. This may decrease the amount of potassium lost in the urine.
- Increases urination. Try not to take too late in the evening or too close to bedtime.
- Low blood pressure.
- Because of the change in blood volume, blood sugar levels may increase. Notify the physician if this is significant.
- Prolonged use may trigger an attack in someone who suffers from gout.
- A small percentage of men may experience erectile dysfunction.
- Try to take Metolazone (Zaroxolyn) about 30 minutes BEFORE a dose of a loop diuretic (Lasix, Bumex, Demadex). This will increase the amount of fluid excreted.

### Drug Class: Angiotensin Converting Enzyme (ACE) Inhibitors

- Angiotensin is a chemical that causes the arteries throughout the body to become more narrow especially in the kidneys.
- These medications help to prevent the production of Angiotensin by blocking the enzyme that is needed for its conversion to an active form. This in turn helps the blood vessels relax and open up, which helps to lower blood pressure
- These are usually taken once or twice a day, or as directed by the physician.
- The progression of kidney disease or dysfunction due to high blood pressure or diabetes may be slowed.

#### Medications in this class include:

Benazepril (Lotensin), Moexipril (Univasc), Captopril (Capoten), Perindopril (Aceon), Enalapril (Vasotec), Quinapril (Accupril), Fosinopril (Monopril), Ramipril (Altace), Lisinopril (Prinivil, Zestril), Trandolapril (Mavik)

Notice the generic names of these medications end with the letters "PRIL"

#### Side Effects/Monitoring

- · Watch for a chronic dry or hacking cough. If this becomes severe or a nuisance, notify the physician.
- Low blood pressure
- Loss of taste
- Skin rashes
- Potassium imbalance
- In rare instances kidney damage
- · Women who are pregnant or considering pregnacy should see their physician immediately. These drugs could potentially harm the fetus.

# Drug Class: Angiotensin-II Recptor Blockers (ARBs)

- These drugs are somewhat similar to ACE Inhibitors.
- ARBs block the effects of Angiotensin on the body, a chemical which causes the arteries to become narrow. Angiotensin needs a receptor (like a "key fits into a lock") in order to constrict blood vessels. ARBs block these receptors, resulting in blood vessels staying relaxed and open. This helps to lower blood pressure.
- SO- Whereas ACE inhibitors help prevent Angiotensin from <u>becoming</u> active, ARBs help block the receptors so that however much Angiotensin <u>is</u> <u>already</u> active is less likely to work.
- The progression of kidney disease or dysfunction due to high blood pressure or diabetes may slowed.

#### Side Effects/Monitoring

- Chronic dry or hacking cough but not as prevalent as ACE inhibitors
- Low blood pressure
- · Occasional dizziness
- Women who are pregnant or considering pregnancy, should notify their physician immediately. These drugs could potentially harm the fetus.

#### Medications in this class include:

Candesartan (Atacand), Losartan (Cozaar), Eprosartan (Teveten), Telmisartan (Micardis), Irbesartan (Avapro), Valsartan (Diovan)

Notice that the generic names for these drugs end with the letters "SARTAN"

### Drug Class: Beta Blockers

- Beta Blockers interfere with specific receptors in the body (beta receptors).
- These medications reduce the heart rate, reduce the heart's workload (strength of contractions), and reduce the output of blood (stoke volume). All of these actions help to lower blood pressure and preserve heart muscle.
- Beta blockers may also be useful in patients with heart failure, who have had a heart attack, or have an irregular heart rhythm.
- These medications are usually taken once or twice a day or as directed by a physician. Dosing is usually started low, then increased as tolerated. ("Start low...Go slow")

#### Medications in this class include:

Acebutolol (Sectral), Metoprolol tartrate (Lopressor), Atenolol (Tenormin), Metoprolol succinate (Toprol XL), Betaxolol (Kerlone), Penbutolol (Levatol), Bisoprolol (Zebeta), Pindolol (Visken), Carteolol (Cartrol), Propranolol (Inderal), Carvedilol (Coreg), Sotalol (Betapace), Nadolol (Corgard), Timolol (Blocadren), Nebivolol (Bystolic), Labetolol (Trandate, Normodyne) – has both beta blocker & alpha blocker effects

Notice that the generic names for these drugs end with the letters "OLOL"

# Side Effects/Monitoring

- Insomnia
- Low blood pressure
- Nightmares
- Tiredness ("washed-out" feeling)
- Depression
- Slow heartbeat
- Symptoms or aggrevation of asthma
- Erectile dysfunction may occur.
- May affect blood sugar and response to insulin.
   Monitor blood sugar closely.
- Irregular heart rhythms notify physician immediately.
- Consult physician if you are pregnant or considering pregnancy.
- Do not suddenly stop beta blockers or skip a number of doses. Can result in heart racing, elevated blood pressure, anxiety, and chest pain.
- Beta blockers may not be indicated for patients with emphysema or COPD – discuss usage with physician.

#### Drug Class: Renin Inhibitors

- Renin is an enzyme produced in the kidneys that starts a chain of chemical steps which increase blood pressure. This chain reaction leads to the steps which include Angiotensin.
- This class of medication helps to block the production of Renin. This is turn helps to reduce blood pressure
- Usually taken once daily.

#### Medications in this class include:

Aliskiren (Tekturna)

# Side Effects/Monitoring

- Low blood pressure
- Potassium disturbances
- Swelling in legs or feet. If severe or nuisance, or occurs anywhere else in the body, contact the physician.
- Use with caution in patients who already have decreased kidney function.
- Do not use if pregnant or considering pregnancy. May result in harm to the fetus. Consult the physician.

### Drug Class: Calcium Channel Blockers

- Help decrease the amount blood vessels can contract and helps them to dilate.
- The vessels narrow when calcium flows through calcium channels in the muscle cells within the arteries. This causes blood pressure to increase.
- The medication helps to block calcium entry into these channels allowing the vessels to widen.
- > These effects lower blood pressure and heart rate.
- Usually taken once to three times a day depending on formulation of the tablet/capsule or as directed by the physician.
- Some drugs in this class may also be used to help control heart rate and rhythm.

#### Medications in this class include:

Amlodipine (Norvasc), Felodipine (Plendil), Isradipine (DynaCirc), Nicardipine (Cardene), Nifedipine (Procardia), Nisoldipine (Sular), Diltiazem (Cardizem, Tiazac, Cartia), Verapamil (Calan, Isoptin, Verelan)

Note that most of the generic names end in the letters "IPINE" –EXCEPT for Diltiazem and Verapamil

### Side Effects/Monitoring

- Avoid grapefruit juice while on these medications.
   The levels of drug in the body may increase and become toxic.
- Swelling of feet or legs
- · Swollen gums
- Headache (although may be used for migraines)
- Low blood pressure
- Low heart rate
- Erectile dysfunction may occur.
- Monitor for changes in heart rhythm notify physician immediately if noted.

# Drug Class: Alpha Blockers

- Reduces the resistance within arteries by blocking alpha receptors. This relaxes the muscle tone in the walls of the blood vessels and helps to lower blood pressure.
- Usually taken once daily.
- May also be used in men to help with symptoms associated with enlarged prostate.

#### Medications in this class include:

Doxazosin (Cardura), Prazosin (Minipres), Terazosin (Hytrin), Labetolol (Normadyne, Trandate) –has both alpha blocker and beta blocker effects

#### Side Effects/Monitoring

- Low blood pressure
- Dizziness
- Fast heart rate
- Rapid drop in blood pressure upon standing up (orthostatic hypotension). May be directed to take medication at night to "sleep through" this side effect.
- Men: this class of medication not usually indicated if taking drugs for erectile dysfunction (Viagra, Cialis, Levitra). Consult physician.

#### Drug Class: Central Agonists

- Central agonists help to decrease the ability of the blood vessel to tense up or contract.
- These medications follow a different pathway than either alpha blockers or beta blockers.
- By decreasing constriction in the blood vessels, the blood pressure within the vessels is decreased.
- May be taken once or multiple times a day—as directed by the physician.

#### Medications in this class include:

Clonidine (Catapres), Guanfacine (Tenex), Methyldopa (Aldomet)

## Side Effects/Monitoring

- · Low blood pressure
- Erectile dysfunction may occur.
- Dry mouth, constipation, blurred vision
- Drowsiness/Sluggishness
- Fever
- Anemia
- May produce a greater drop in blood pressure when standing or walking, or feel faint. If this persists or is severe, notify the physician.
- Do not stop these medications suddenly because blood pressure may rise very quickly.
- Methyldopa may be considered for pregnancy because the adverse effects are infrequent for the pregnant woman or the developing fetus.
- Clonidine is available in a once-a-week patch. There are different dosages and absorption through the skin may be variable in different patients.

## Drug Class: Vasodilators

- These drugs act on small arteries through direct effects on the muscle in the walls of the arteries.
- This causes the muscles in the walls of the arteries to relax, allowing the vessels to dilate or widen.
- Therefore, blood flows easier through the vessels and helps to reduce blood pressure.
- Usually taken once or multiple times a day as directed by the physician.

#### Medications in this class include:

Hydralazine (Apresoline), Minoxidil (Loniten)

#### Side Effects/Monitoring

# Hydralazine

- Headaches
- Swelling (especially around the eyes)
- · Heart palpitations
- Low blood pressure
- Joint aches/pain.

Most side effects will usually go away after a few weeks. If they persist or are severe, inform the physician.

#### Minoxidil

- Fluid retention
- Marked weight gain
- Excessive hair growth

Usually only used in resistant cases of severe high blood pressure or when kidney failure is present.

# **Drug Class: Combination Drugs**

- Combination drugs are 2 or 3 medications contained in the same pill.
- Dosages are fixed in the combination pill, so it may be more difficult to adjust dosages.
- However, it may be easier to take the medication because the patient is taking fewer pills.
- Refer to the previous slides on each medication class for information on the drugs contained in the combination pill.

#### Medications in this class include:

#### **ACE Inhibitor + Diuretic**

Benazepril + HCTZ (Lotensin HCT) Captopril + HCTZ (Capozide) Enalapril + HCTZ (Vaseretic) Fosinopril + HCTZ (Monopril HCT) Lisinopril + HCTZ (Prinzide, Zestoretic)

Moexipril + HCTZ (Uniretic) Quinapril + HCTZ (Accuretic)

#### ARBs + Diuretic

Candesartan + HCTZ (Atacand HCT) Eprosartan + HCTZ (Teveten HCT) Irbesartan + HCTZ (Avalide) Losartan + HCTZ (Hyzaar) Olmesartan + HCTZ (Benicar HCT) Telmisartan + HCTZ (Micardis HCT) Valsartan + HCTZ (Diovan HCT)

# <u>Calcium Channel Blocker</u> + ACE Inhibitor

Amlodipine + Benazepril (Lotrel) Verapamil + Trandolapril (Tarka) Felodipine + Enalapril (Lexxel)

# <u>Calcium Channel Blocker</u> + ARBs + Diuretic

Amlodipine + Valsartan + HCTZ (Exforge HCT)

#### Beta Blocker + Diuretic

Nadolol + Bendroflumethazide (Corzide) Atenolol + Chlorthalidone (Tenoretic)

Bisoprolol + HCTZ (Ziac)
Metoprolol tartrate+HCTZ
(LopressorHCT)

Propranolol + HCTZ (Inderide)

### **Central Agonist + Diuretic**

Clonidine + Chlorthalidone (Clorpres) Methyldopa + HCTZ (Aldoril)

#### Renin Antagonist + Diuretic

Aliskiren + HCTZ (Tekturna HCT)

# Calcium Channel Blocker

+ Renin Antagonist

Aliskiren + Valsartan (Valturna)

#### Calcium Channel Blocker + ARBs

Amlodipine + Olmesartan (Azor) Amlodipine + Telmisartan (Twynsta) Amlodipine + Valsartan (Exforge)

# Medications That Increase Blood Pressure

# Over-the-Counter Medications - Cold remedies - Nasal decongestants - Appetite suppressants - Non-steroidal anti-inflammatory drugs (NSAIDS) such as adult aspirin, Advil, Motrin, and Aleve - Steroids (Medrol dose paks, Deltasone) - Tricyclic antidepressants (Elavil, Asendin, others) - Cyclosporine (Neoral, Sandimmune, others) - Epoetin alpha (Procrit, Epogen) - COX-2 inhibitors (Celebrex, Vioxx, Bextra)