Chapter 6, Part 2 General Principles of Pharmacology

Drug Classifications
- There are numerous drug classifications in the medical field
- Most EMS medications are:
  - ____________________________________ medications
  - ____________________________________ medications
  - Respiratory medications
  - Gastrointestinal system medications
  - ____________________________________ Medications

Central Nervous System Medications
- ______________________________________ & Antagonists
- Anesthetics
- Anti-anxiety & Sedative-Hypnotic Drugs
- Antiseizure or Anti-epileptic Drugs
- Central Nervous System ____________________________
- Psychotherapeutic Medications
- Parkinson’s Medications

Analgesics
- ______________________________________: the absence of the sensation of pain
- Anesthesia: the absence of all sensation
- ______________________________________ Agonists: decrease the sensory neuron’s ability to propagate pain impulses
  - Derived from poppy plant or synthetic
- Nonopioid Analgesics: have opioid characteristics but are not opioid based
  - NSAIDS, Aspirin
  - Also used as ____________________________________

Opioid Antagonists:
- Reverse the effects of ______________________________________
  - ______________________________________(Naloxone)
- Adjunct Medications: given concurrently with other drugs to enhance the effect
  - antihistamines and caffeine
- Opioid Agonist-Antagonists: displays both agonist and antagonist properties
  - ______________________________________(kills pain but does not depress breathing)

Anesthetics
- Creates a loss of ________________________________
- Provide ______________________________________
- Used in EMS for sedation for cardioversion, RSI, and chemical restraint
- ______________________________________, Versed

Anti-anxiety & Sedative-Hypnotic Drugs
- Used to decrease anxiety, induce ________________________________, and assist in sleeping
- Sedation: a state of decreased anxiety
- ________________________________ : the instigation of sleep
3 main types
Alcohol

Barbiturates

**Autonomic Nervous System Medications**
- The two neurotransmitters of the ANS are:
  - _______ and _______.
- Acetylcholine: main neurotransmitter of the parasympathetic nervous system
- Norepinephrine: main neurotransmitter of the sympathetic nervous system

**Benzodiazepines and Barbiturates**
- Both __________________________________ the membrane of the CNS neurons which decrease their response to stimuli
- Benzodiazepines are frequently prescribed for oral use and are relatively safe
- Barbiturates have __________________________ general depressant activities and a larger potential for abuse

**Drugs that Affect the Parasympathetic Nervous System**
- The parasympathetic system uses __________________________ (ACh) as a neurotransmitter.
- Receptors that are specialized for acetylcholine are termed cholinergic receptors
- Medications that stimulate these are called __________________________
- Medications that block these are called __________________________

**Cholinergics**
- Cholinergics stimulate the effect a ACh by binding with the cholinergic receptors
- Parasympathetic effects create __________________________
  - Salivation _______
  - Lacrimation _______
  - Urination _______
- Limited medical use for glaucoma and specific poisonings
- __________________________ are cholenergics

**Anticholinergics**
- __________________________ the parasympathetic nervous system
- Multiple types and classes
- Prototype anticholinergic is __________________________
  - Reverses the effects of SLUDGE
  - Also used to __________________________ the heart

**Neuromuscular Blocking Agents**
- Produces paralysis without affecting consciousness
- Most often used by EMS for __________________________
- Non-depolarizing agents: allows electrical charge in neurons to continue
  - Vecuronium Bromide (__________________________ )
- __________________________ agents: causes loss of electrical charge in neurons
  - Succinylcholine (Anectine)
Drugs That Affect the Sympathetic Nervous System

- Work on receptors of the SNS by either stimulation or _____________ of the receptors
- Sympathomimetics: drugs that ________________ the SNS
  - Epinephrine, Norepinephrine
- Sympatholytics: drugs that ________________ the SNS
  - Many antihypertensives
  - Labetelol, Propranolol

Alpha and Beta Receptors of the SNS

- _________________: cause peripheral vasoconstriction, mild bronchoconstriction, and stimulate metabolism
- _________________: prevent overrelease of norepinephrine
- _________________: increase heart rate and increases cardiac contractility, automaticity, and conduction
- _________________: vasodilation and bronchodilation

Effects of Adrenergic Receptors (Page 340)

Receptor Specific Drugs (Page 342)

Classifications of Cardiovascular Drugs (1 of 2)

- _________________: used to treat and prevent abnormal cardiac rhythms.
- _________________:
  - Drugs used to treat hypertension.

Classifications of Cardiovascular Drugs (2 of 2)

- _________________ Agents:
  - Drugs used to stop bleeding.
- _________________ Agents:
  - Drugs used to treat high cholesterol.

Antidysrhythmics

- _________________ Channel Blockers: affects the sodium influx of the conduction system of the heart
  - Quinidine, Lidocaine, Procainamide
- _________________ blockers: beta adrenergic antagonist. Blocks the beta 1 receptors
  - Propranolol

Antidysrhythmics

- _________________ Channel blockers (antiadrenergics): blocks the efflux of potassium
  - Bretylium, Amiodarone
- _________________ channel blockers: blocks the efflux of calcium
  - Verapamil, Adenosine, Digoxin

Antihypertensives

- _________________=Cardiac Output X Peripheral Vascular Resistance
- _________________ Output=Heart Rate X Stroke Volume
- Antihypertensives manipulate one or more of these factors
Actions of Antihypertensives

- **Antiotensin-Converting Enzyme (ACE) Inhibitors**
  - Decreases the amount of ________________ thus lowering peripheral vascular resistance

- **Calcium Channel Blockers**
  - Indirectly causes ________________
  - Procardia (Nifedipine) is the prototype

- **Direct ________________**
  - Many different types; but results in dilation of the arterioles or the arterioles and veins

Hemostatic Agents

- ________________ : the stoppage of bleeding

- Hemostatic agents are used to inhibit clots or promote coagulation

  3 Main Types:
  - **Antiplatelets (platelet function inhibitor):** decrease formation of platelets
    - Aspirin
  - ________________ : interrupt the clotting cascade
    - Heparin
  - ________________(Thrombolytics): break up clots
    - Streptokinase, Alteplase (tPa), Reteplase

Drugs Used to Affect the Respiratory System

Antiasthmatic Medications

- **Beta 1 specific agents:** ________________ smooth muscles
  - Albuterol is the prototype

- **Bronchodilators:** ________________ the bronchioles
  - Epinephrine

- **Anti-Inflammatory (Corticosteroids)**
  - ________________, Prednisone

Nasal Decongestants

- Nasal congestion is caused by ________________ and engorged nasal capillaries

- Alpha 1 agonists constrict these capillaries
  - Phenylephrine, pseudoephedrine

- ________________ congestion occurs after stoppage of long term use

- Over usage can cause ________________ and hypertension

Antihistamines

- Stop the effects of histamines by blocking its ________________

- ________________ : endogenous substance that affects many organ systems noted for its effects during an allergic reaction

- Diphenhydramine (Benadryl) and Promethazine (Phenergan) are common antihistamines

Cough Suppressants

3 Types:

- ________________ : suppress the stimulus to cough
  - Codeine and hydrocodone (Opioid based)
– Diphenhydramine and Tessalon (Non opioids)

• ____________________________ : increase the productivity of a cough
• ____________________________ : makes mucus more watery

30 □ Drugs Used to Affect the Gastrointestinal System

31 □ Main Indications for GI Drug Therapy

• ____________________________ Ulcers
• Constipation
• Diarrhea and Emesis
• ____________________________

32 □ Drugs Affecting the Pancreas

• Diabetes mellitus is the most important disease involving the
  ____________________________ .
• ____________________________—a substance that decreases blood glucose level.
• ____________________________—a substance that increases blood glucose level.

33 □ Oral Hypoglycemics

• Orinase (chlorpropamide)
• ____________________________ (glipizide)
• ____________________________ (glyburide)

34 □ Hypoglycemic Agents

• ____________________________ is a 50%sugar solution given intravenously for acute hypoglycemia.
• ____________________________ is indicated for emergency treatment when an IV is unobtainable.

35 □ Classifications of Drugs for Other Body Systems

36 □ Drugs Used to Affect the Eyes

• ____________________________ drugs are used to treat conditions involving the eyes, primarily glaucoma and trauma.

37 □ Drugs Used to Affect the Ears

• Most drugs used to treat conditions involving the ear are aimed at eliminating underlying ____________________________ or fungal infections or at breaking up impacted ear wax.

38 □ Drugs Affecting Sexual Behavior

• L-dopa (Levodopa) has demonstrated increased libido as a side effect.
• Sildenafil ____________________________ , Vardenafil ____________________________ and Tadalafil ____________________________ increase blood flow to the penis by relaxing vascular smooth muscle
• NOTE: If you treat a patient with chest pain who has taken Viagra recently, do NOT give ____________________________ or any other nitrate.

39 □ Drugs Used to Treat Infectious Diseases and Inflammation (1 of 3)

• ____________________________

– An antibiotic agent may either kill the offending bacteria or so decrease the bacteria’s
growth that the patient’s immune system can effectively fight the infection.

- Fungi are parasitic microorganisms that cannot synthesize their own food.

**Drugs Used to Treat Infectious Diseases and Inflammation (2 of 3)**

- **Antimicrobial and ____________________________________ Drugs.**
  - Although most diseases treated with these drugs are uncommon in developed countries, they are leading causes of death in third-world countries.
  - They include ____________________________________ , leprosy, and helminthiasis.

**Drugs Used to Treat Infectious Diseases and Inflammation (3 of 3)**

- **Tuberculosis, caused by bacteria, is increasing in the United States.**
  - ____________________________________ (non-steroidal anti-inflammatory drugs)—Commonly used as analgesics and antipyretics.
  - Uricosuric drugs—Used to treat gout.
  - Serums, vaccines, and other immunizing agents.

**Drugs Used to Treat Poisoning and Overdoses**

The treatment for poisoning and overdose depends greatly on the substance involved.

- Syrup of ____________________________________
- Activated ____________________________________
- Mucomyst (for acetaminophen OD)
- ____________________________________ (for organophosphates)
- Pralidoxime (2-PAM) (for organophosphates)

**Specific Drugs for EMT-Is**

1. **Epinephrine 1:1,000**
   - ____________________________________ (Narcan)
   - D50W
   - Benadryl
   - Lidocaine
2. ______________________________
   - Nitrous Oxide

**Epinephrine 1:1,000 (1 of 3)**

- ____________________________________ Agonist
- Stimulates sympathetic nervous system
- Primary drug for ____________________________________ reactions
- Actions:
  - Increases strength of cardiac contractions
  - Peripheral ____________________________________
  - Bronchodilator
  - Reverses effects of ____________________________________

**Epinephrine 1:1,000 (2 of 3)**

Adult Dosage:

- ____________________________-____________________mg IM (may be given IV or IM)
- ____________________________________________________________________ must be used with elderly and those with cardiac history
May be given via Auto-Injector
May be ______________ as directed by medical control

Epinephrine 1:1,000 (3 of 3)
Pediatric Dosage:

- __________ - __________ mg IM (may be given IV or SC)
- May be given via Auto-Injector
- May be repeated as directed by medical ________________________________

Naloxone (Narcan) (1 of 3)

- ___________________________ Antagonist
- Reverses the effects of narcotic (opioid) overdoses
  - __________________________ depression
  - Seizures
- Used for known overdoses and unconsciousness due to unknown cause

Naloxone (Narcan) (2 of 3)

- Can produce ___________________________
  - Lower doses are often recommended to those with legitimate opiate dependence
- Be prepared for ____________________________. Restraints should be applied prior to administration
- Has no ill effects if not an overdose

Naloxone (Narcan) (2 of 3)

- Adult Dosage:
  - __________ IV Push
  - Repeated prn to titrate to LOC and ____________________________
  - Can also be given via ET Tube
- Pediatric Dosage:
  - __________/kg up to 2mg IV
- Narcan has very short half-life. Be prepared to repeat as needed

D50W (1 of 3)

- D50 is a 50% dextrose (sugar solution)
- __________________________ Solution
- Used to increase sugar levels in hypoglycemic patients
- Works very rapidly
- Indicated in patients with altered LOC due to ____________________________

D50W (2 of 3)

- Must have a __________________________ IV line
- Will cause __________________________ of the skin if IV infiltrates
- Use as large an IV catheter as possible
- Watch for infiltration as drug is being administered

D50W (3 of 3)

- Adult Dosage:
  - _________ grams slow IV push
- Pediatric Dosage:
– ________/kg of D25W to a max of 100cc (25gm)
– D25W can be achieved by diluting D50W ________ to 1 with normal saline

53 Glucagon (1 of 3)
● Polypeptide ____________________________ identical to human glucagon
● Increases blood glucose and relaxes smooth muscles of the GI tract
● Acts only on liver ____________________________ , converting it to glucose
● Indications: hypoglycemia where patient cannot take oral glucose and an ___________ is unobtainable

54 Glucagon (2 of 3)
● Contraindications: Allergic
● Dosage: _________-__________ mg IV, IM, or SC
● Short half life if given IV (8-13 minutes)
● Takes approximately ____________-__________ minutes to reach full effects given IM and slightly longer if given SC
● Side Effects: N/V
● Repeat X 1 if patient does not regain ____________________________ however repeat doses are not normally needed since oral glucose can then be given and the repeat dosage may not work if liver glycogen is depleted

55 Glucagon (3 of 3)
Special Notes:
● After patient responds, watch ____________________________
● Supplemental ____________________________ required after Glucagon to restore liver glycogen
● Comes in a dry powder and must be constituted
● Normally does not contraindicate D50W
● ____________________________ is ALWAYS the drug of choice
● SPEMS Protocol dosage is:
  – Adult _____________mg IM
  – Pediatric _____________mg IM

56 Benadryl
● ____________________________
● Blocks the production of histamine release during an allergic reaction
● No contraindications except for allergy
● Adult Dosage: _________ mg IV or IM
● Pediatric Dosage: _________ mg/kg up to _________ mg

57 Lidocaine
● ____________________________
● Also used for pain management (numbing effect) in intraosseous infusions
  – Numbs the ____________________________ space in bone
● Contraindicated if allergic (Novacain)
● Dosage (Adult and Pedi): _________ mg/kg up to _________ mg

58 Nitrous Oxide (1 of 3)
● AKA Nitronox
● Inorganic gas, Inhaled ____________________________
• Mixture of nitrous oxide and oxygen
  – Concentrations range from _________ to _________%
• The exact mechanism of action is not known
• Indications: mild to severe pain
• Contraindications: ________________________________. Use with caution with head trauma, ICP, COPD, pneumothorax, and bowel obstruction

59 Nitrous Oxide (2 of 3)
• Adverse Effects: delirium, ________________________________, respiratory depression, N/V
• Dosage: Inhaled at 20-50% concentration
• Normally given via ________________________________ held device

60 Nitrous Oxide (3 of 3)
Special Considerations:
• Ensure crew ________________________________
• Only use with a ________________________________ gas system to ensure unused gas is collected and not expelled into air
• Careful what you say. Patients can be open to suggestions. Keep environment quiet and calm

61 Zofran (1 of 2)
• AKA Ondansetron
• Anti- ________________________________ (blocks the serotonin 5-HT3 receptor
• Indications: ________________________________
• Contraindications: Allergic, Children < _________ yoa, intestinal obstruction, and seizure disorder
• Adult IV dosage: _________ - _________ mg

62 Zofran (2 of 2)
• Pediatric dose: _________ mg/kg to a max of 2-6mg for children ≥ 2 yoa
• Side effects: ________________________________ , dizziness, drowsiness, blurred vision, hypotension, constipation, diarrhea, and fatigue
### Effects of Adrenergic Receptors

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<td>Beta 1 (β₁)</td>
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