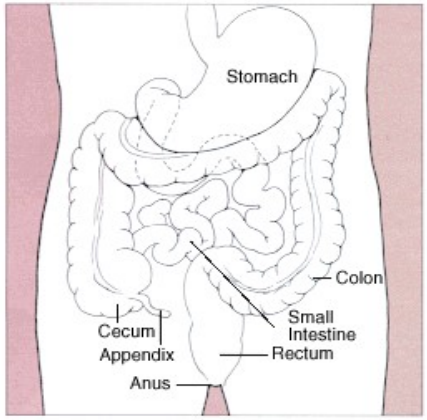
Oral: Drug Forms

- Tablets
- Capsules
- Troches
- Liquids

Rectal Route

Reasonably convenient and safe when oral route cannot be used

- *Advantages*:
  - Medications can be given when stomach is traumatized or if digestive enzymes can destroy drug
  - Good method if drug has bad taste or odor
  - Avoids irritation of UGI tract
- *Disadvantages*:
  - Unpredictable retention of drug; absorption is erratic



Tube or Catheter Route

- Drug introduced by tube or catheter in liquid form
- Examples:
  - PICC line - long, very thin, flexible tube (a catheter)
  - Nasogastric tube
- May need to flush the tube or catheter prior administration of medication or contrast

*Chapter 21 pg. 256

Inhalation

- High concentrations of a drug are deposited in the respiratory mucosa
- Produces bronchodilation or reduces inflammation
- Commonly used:
  - Oxygen therapy
  - Anesthesia
  - Aerosol inhalers

*Chapter 22 pg. 269

Topical

WARNING: DO NOT APPLY WITH BARE HANDS!

- Drug applied directly to the skin
- Diffused through skin and absorbed into bloodstream

- Lotions, sprays and ointments
- Transdermal patch – supplies precise dose of drug released over a specified time

*Chapter 22 pg. 273-276

Parenteral

Administered by injection or by a route other than the GI tract

- ***Intravenous*** – Administration directly into circulation (veins)
- ***Intra-arterial*** – Administration into or by entry of artery
- ***Intrathecal*** – Administration into the subarachnoid space within the brain or spinal cord
- ***Intramuscular-*** Administration into muscle tissue that lies under the subcutaneous tissue layer
- ***Subcutaneous or Intradermal*** – Administration below layer of skin but above muscle
- ***Intraosseous*** – Administration into a bone

Right: DOCUMENTATION

#6

- Follow Employer policy
- Any time a drug is administered to a patient, relevant information must be recorded in patient's chart/EPIC
- *<u>INCLUDING:</u>*
  - Name and dose of medication/drug
  - Route of administration (if parenterally include site)
  - Date and time
  - If the patient refused
  - Adverse effects or errors must also be documented thoroughly

Many ERRORS can occur……. So, what can you do to prevent them……

Right: DOCUMENTATION (cont.)

Medication errors associated with drug administration is among the most common legal problems which RTs are involved

- Follow Policies
- Knowledgeable of Policies
- Documentation is essential
- Do not rush through medication administration
- Avoid interruptions
- Write legibly (if paper chart)
- Use approved abbreviations, if in doubt spell it out
  - https://trh.ellucid.com/documents/view/6573

***Note*: Patient may refuse medication (or other treatments) at any time**

Let's Review the RIGHTS again

RIGHT medication	RIGHT dose	RIGHT patient
RIGHT time	RIGHT route	RIGHT documentation

When will an RT use the 6 RIGHTS?

Contrast Administration

IV

Oral

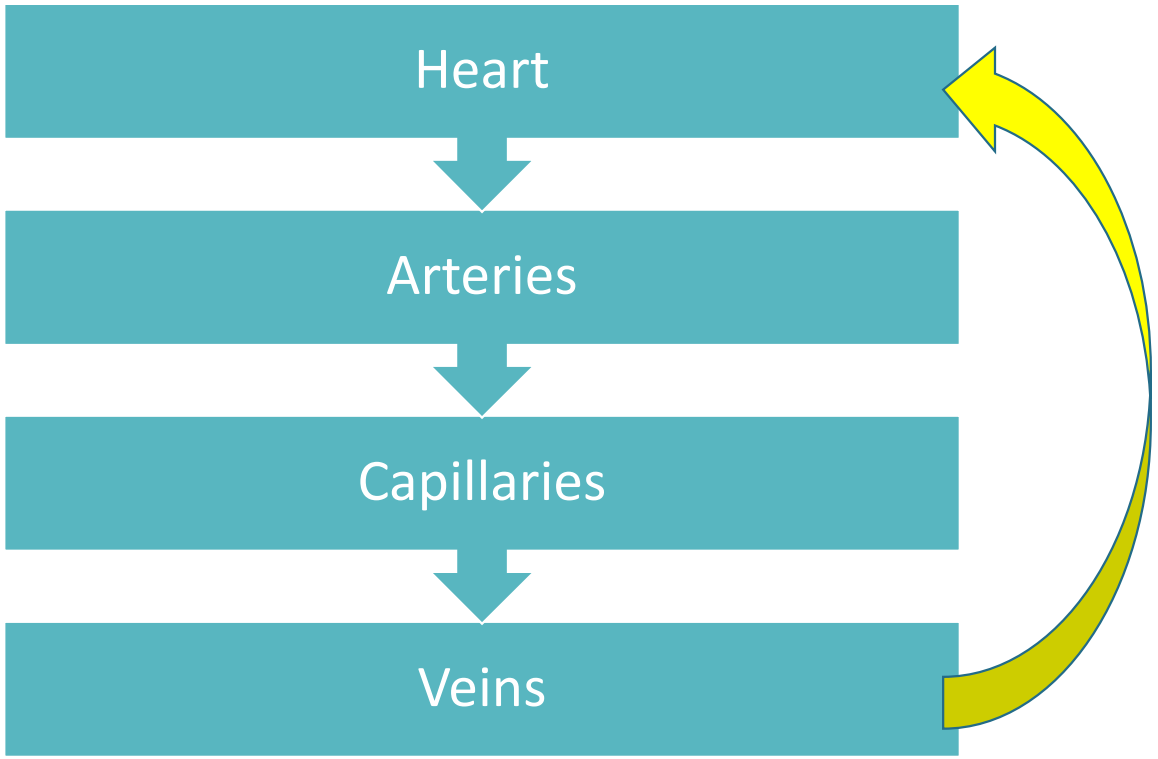
Rectal

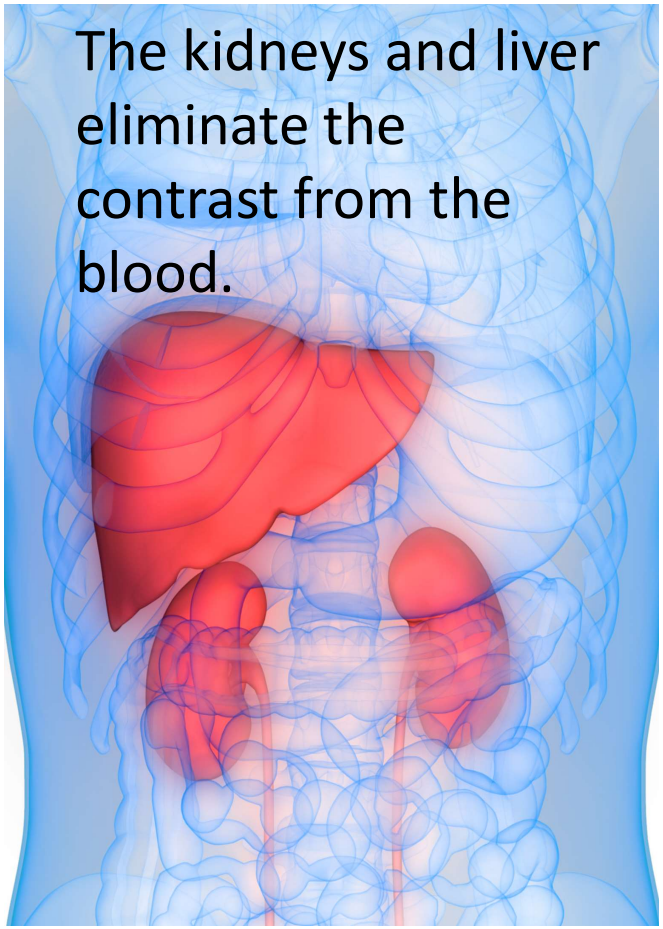
Intrathecal

IV Contrast Administration

- Introduce contrast directly into the blood stream
- Seen in CT, MRI, AIR etc.
- Contrast is clear and packaged in a glass bottle or vial
- Highlights the vessels/organs
- Ensure protocols and policies are followed precisely

How does contrast circulate once in the blood?





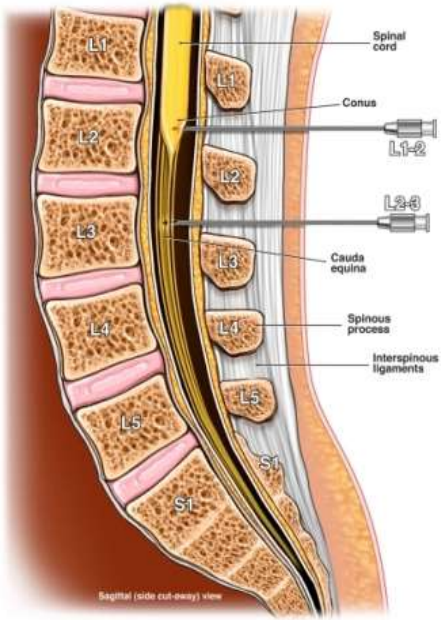
Oral, Rectal, Tube Contrast Administration

- Procedures in which you would see Oral Administration:
  - Esophagus
  - UGI
  - Small Bowel
- Procedures in which you would see Rectal Administration:
  - Barium Enema
- Procedures in which you would see Tube/Catheter Administration:
  - Fistulagram
  - Loopogram
  - T-tube cholangiogram

Intrathecal Contrast Administration

- Myelograms
- CT
- MRI

- Injection into the subarachnoid space (spinal canal)



Chemical Group

Classifications

The ASRT advocates that preparation, identification, and administration of contrast media, radiopharmaceuticals, and/or medications are within the scope of practice of radiologic technologists with appropriate clinical and didactic education and where federal or state law and/or institutional policy permit.”

*Chapter 21 pg. 259

Analgesics

Relieve pain without causing loss of consciousness

Two Groups

- **Opioid (narcotic)** - Treat moderate to severe pain
  - Morphine; oxycodone (OxyContin)
  - Side Effects: nausea, vomiting, constipation; can be very harsh to the GI system
  - Overdose of opioid = naloxone (Narcan) parenterally or intranasally administered
- **Nonopioid (non-narcotic)** - Treat mild to moderate pain
  - acetaminophen (Tylenol)

*Chapter 21 pg. 259

Anesthetics

Reversibly depress neuronal function, producing loss of ability to perceive pain and/or other sensations

Two Types

- **General -** Produce muscle relaxation and loss of consciousness
  - Inhalation : sevoflurane (Ultane)
  - IV : propofol (Diprovan)
- **Local -** Block nerve conduction from an area of the body to the central nervous system
  - mepivacaine (Carbocaine); lidocaine (Xylocaine); procaine hydrochloride (Novocain)

  - ***Side Effects:*** **irregular heartbeat, seizures, breathing issues, death**

*Chapter 21 pg. 259

Antianxiety (Anxiolytics)

Treatment of anxiety; Act on the Central Nervous System to calm/relax anxiousness

Benzodiazepines

- used often as a pre-operative drug for procedures (anxiety), relieves muscle spasm, and seizures
  - diazapam (Valium)
  - lorazepam (Ativan)
  - alprazolam (Xanax)
  - midazolam (Versed)

*Chapter 21 pg. 259-260

Antiarrhythmics

- Treat (arrhythmias) variations from normal rhythm of the heartbeat
- Depends on type of arrhythmia
  - Amiodarone (Cordarone) –used for ventricular arrhythmias
- Side Effects: Could cause adverse effects such as hypothyroidism and pulmonary fibrosis

*Chapter 21 pg. 260

Anticoagulants

Inhibit clotting of the blood (increase coagulation time)

Prevent/treat thromboembolic disorders

- Patients undergoing IR procedures receive anticoagulants
  - IV: Heparin; enoxaparin (Lovenox)
  - Oral: Warfarin (Coumadin)

Coagulants

Control hemorrhage or speed up coagulation

Oral and IV: Phytonadione (Mephyton)

Antidepressant

*Chapter 21 pg. 260

Treatment of depression; panic disorder; OCD; and depressive state of bipolar disorder

- fluoxetine (Prozac)
- sertraline (Zoloft)
- paroxetine (Paxil)
- duloxetine (Cymbalta)
- bupropion (Wellbutrin)

Treatment of 6-12 weeks for maximum effect

Drug interactions can occur if receiving drugs in combination with antidepressants

Side effects – nausea, vomiting, diarrhea

*Chapter 21 pg. 260

Antiemetic

Prevent/treat nausea and vomiting

- Most effective in prevention versus after the symptoms have started
    - - Oral and IV: prochlorperazine (Compazine); ondansetron (Zofran)

- Reduces motion sickness

  - metoclopramide (Reglan); prochlorperazine (Compazine); dimenhydrate (Dramamine)

*Chapter 21 pg. 261

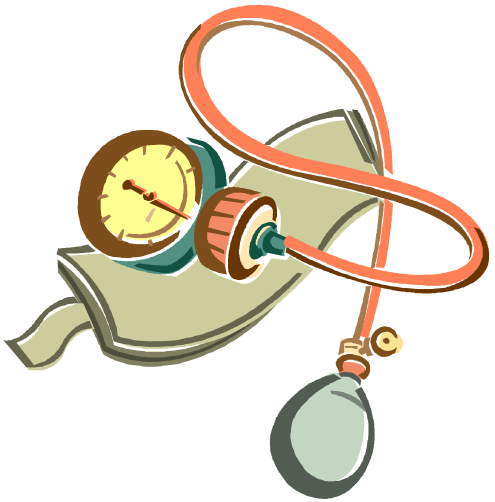
Antihistamine (Antiallergic)

Treat acute/chronic allergic disorders

- Treat symptoms (runny nose); upper respiratory infections; common cold (viral infections)
  - *Sedating*
    - Moderate/severe allergic reactions
    - Severe reactions injected intramuscularly
      - Oral and IV: diphenhydramine (Benadryl)
  - *Non-sedating*
      - Oral: loratadine (Claratin); fexofenadine (Allegra)

*Chapter 21 pg. 261

Antihypertensives



- Treat high blood pressure (hypertension)
- Hypertension caused by many factors = many different drugs used as treatment
- Commonly used in combination with other drugs
  - lisinopril (Zestril)
  - metoprolol (Lopressor, Toporol XL)
- Side Effect- persistent cough

Antibacterial (Antimicrobial)

Used to destroy or inhibit growth of microorganisms

- Antibiotics
  - *Broad spectrum*: Effective against large number of microorganisms
    - oxytetracycline (Terramycin); ciprofloxacin (Cipro)
  - *Narrow spectrum*: Effective against a smaller number of microorganisms
    - erthromycin (Erythrocin); penicillin

Antibacterial (Antimicrobial) cont.

- *Antiseptics* – Destroy microorganisms on living tissue
  - Alcohol, Betadines (skin preps) – cidastat, choraprep
- *Disinfectants* – Substances that are applied to non-living objects to destroy microorganisms that are living on the objects
  - Bleach

Anti-Inflammatory

Treat inflammation

- Effective and widely used for mild/moderate pain
  - *NSAIDS* – Nonsteriodal Anti-Inflammatory analgesic drugs
    - ibuprofen (Advil, Motrin)
    - acetaminophen (Tylenol)
- Side Effects: May increase risk of: GI irritation, bleeding, and acute renal failure can occur with all NSAIDS with increased duration of use

*Chapter 21 pg. 262

Bronchodilators

Treat asthma and COPD; Relax bronchial muscles and dilate respiratory passages

- Inhalation and Oral:
  - albuterol (Proventil) fast acting bronchodilator
  - tiotropium (Spiriva) long acting bronchodilator

Antidiarrheal

Helps to relieve diarrhea by slowing down the movement of the bowel

- May not be taken with certain medical conditions (bowel obstructions) or with certain medications
- Usually 2 day use maximum*
  - Pepto-Bismol
  - Imodium
  - Atropine
  - Diphenoxylate

- *Common Side Effects*: Constipation, bloating, feeling of fullness, drowsiness, nausea, vomiting, and pain in the abdomen.

Cathartics

Helps to empty bowels and stimulate intestinal motility

- Not to be used for extended periods of time
- May interact with other drugs causing improper absorption of that drug
  - MiraLAX
  - bisacodyl (Dulcolax)

- Side Effects: Abdominal cramps

*Chapter 21 pg. 262

Diuretics

Increase the amount of urine excreted by the kidneys (removes sodium and water from the body)

- Aids in treatment of edema (associated with congestive heart failure)
- Used in conjunction often times with treatment of high blood pressure
- Patients are monitored closely for excessive fluid loss
  - furosemide (Lasix)
  - hydrochlorothiazide

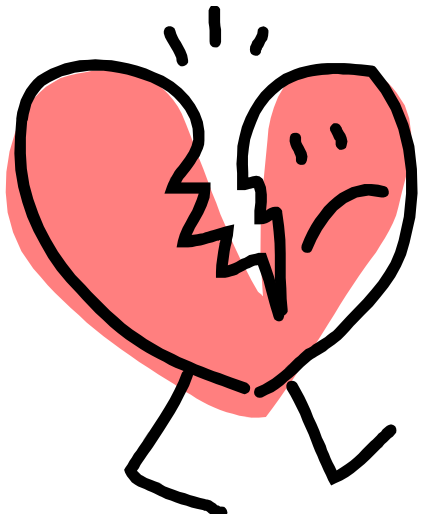
Sedatives (Hypnotics)

Depress the Central Nervous System; effect ranges from mild sedation to inducing sleep

- Treats anxiety related to painful or anxiety-provoking procedures; induces sleep for insomnia
- Extended use can lead to addiction
  - zolpidem (Ambian)
  - midazolam (Versed)
  - Valium
- Common Side Effects: Daytime fatigue and cognitive impairment

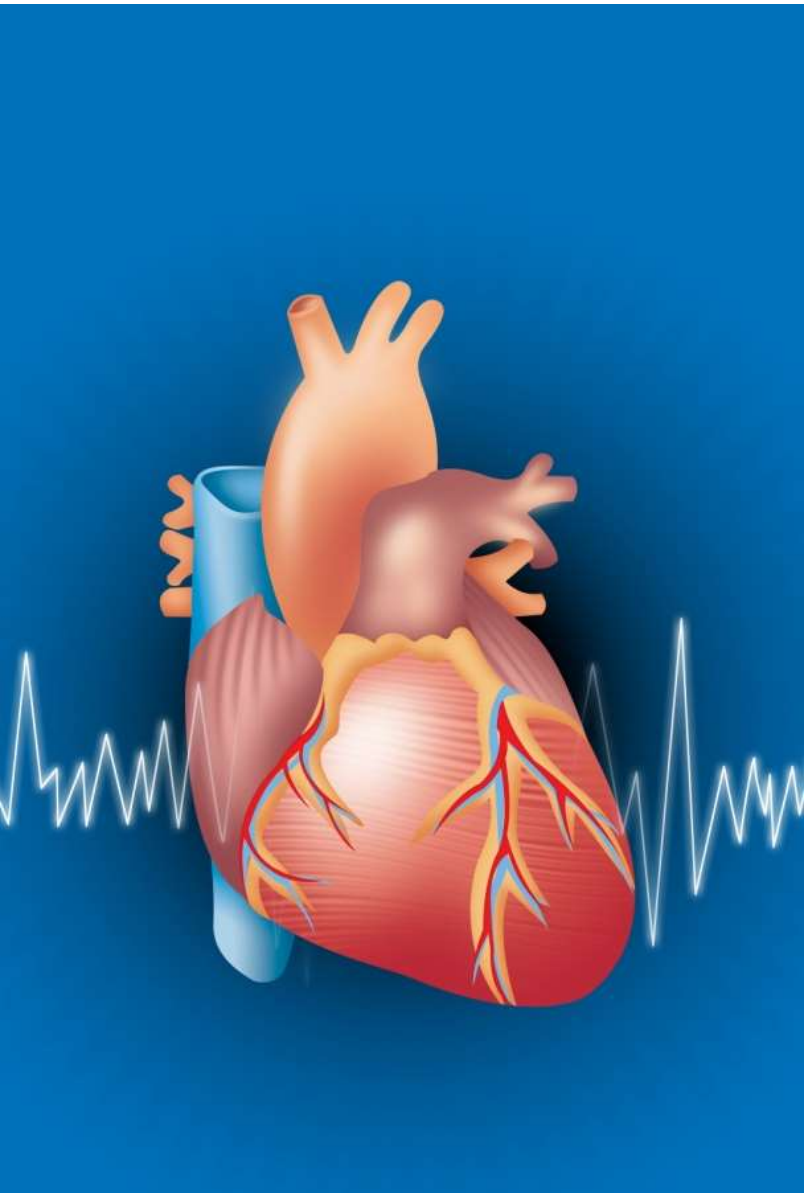
*Chapter 21 pg. 263

Vasodilators



Causes blood vessels to dilate and useful in treating vascular diseases (angina)

- IV, Oral, Topically
  - nitroglycerin (Nitrogard) – coronary vasodilator
- nitroprusside (Nitropress)– treats hypertensive crisis or heart failure



*Chapter 21 pg. 263

Vasoconstrictors

Cause blood vessels to constrict- increasing heart action and raising blood pressure

- Can treat shock symptoms
  - dopamine (Intropin)
  - norepinephrine (Levophed)
  - epinephrine (Adrenalin)

- Common Side Effects: Pain, burning, irritation, discoloration, sudden numbness, weakness, or cold feeling, slow or uneven heart rate, blue lips or fingernails, urinating less than usual or not at all, trouble breathing, high blood pressure

Patient Monitoring/Safety

- *Pharmacokinetics, Pharmacodynamics, Pharmacogenetics*
- *Continuous Monitoring*
  - *ED/In-Patient – Question –Have you had any pain medications?*
  - *Standing Precautions – Vertigo, Syncope, Nausea/Vomiting, Pain Medications*
- *Diagnostic Imaging*
  - *After Contrast administration – patient should not be left alone*
  - *Take note of patient's behavior or vital signs at the start of the exam, during the exam, with contrast administration, after contrast administration*