DRUGS TO TREAT PAIN
AND
INFLAMMATION

PTA1010

Following this lecture the student will:

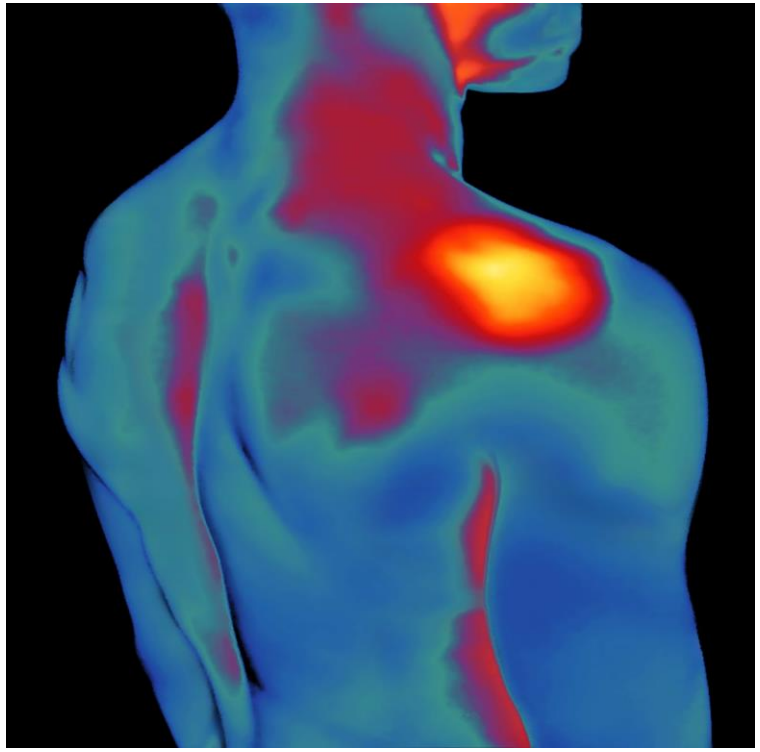
- State the general principles of pain and inflammation medications
- Recognize and list common side effects for pain and inflammation medications
- State general rehabilitation concerns for this class of medications
- Recognize commonly used medications in these classes of drugs

How are pain, inflammation and muscle spasms related?

Five Cardinal Signs of Inflammation:

- HEAT
- ERYTHEMA- redness
- SWELLING
- PAIN
- LOSS OF FUNCTION

RICE or PRICE or Movement?



Medications for **PAIN MANAGEMENT**

OPIOIDS

- characterized by their potential ability to produce physical dependence.
- are classified as **controlled substances** in the United States.
- Used to treat acute pain, trauma, myocardial infarction, CA pain.

Non- OPIOIDS

- **SUB- TYPES**:
  - Salicylates (aspirin)
  - Non-steroidal anti-inflammatories (NSAIDS)
  - Acetaminophen (Tylenol)
  - Muscle relaxants

Used to treat moderate and or chronic pain

Acetaminophen: Pain Reduction

- Analgesic
- Antipyretic
- **No anti-inflammatory** properties
- Does not have clotting and GI side-effects
- Risk of liver damage with overdose

https://www.britannica.com/video/187090/theories-Tylenol-pain

Muscle Relaxants:

Skeletal muscle relaxants are used to treat conditions associated with hyperexcitable skeletal muscle— spasticity and muscle spasms.

- Skeletal muscle relaxants do not prevent muscle contraction:
  they attempt to:
  - normalize muscle excitability
  - decrease pain
  - improve motor function.

Adverse effects, include nausea, light-headedness, vertigo, ataxia, and headache.

Examples: diazepam, flexeril

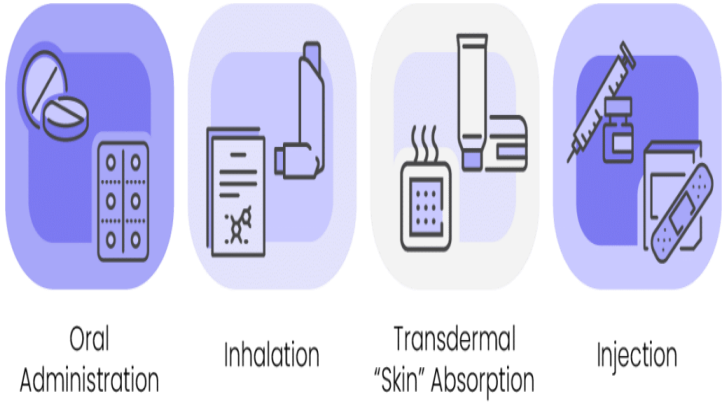
- **Spasticity** occurs in many patients following an injury to the central nervous system (CNS).

Adverse Effects: transient drowsiness, nausea, light-headedness, vertigo, ataxia, and headache.

Examples: baclofen, dantrolene, gabapentin, and tizanidine.

Drug Delivery Methods:

- Oral
- IV- epidural, intrathecal infusion, continuous infusion (opioid)
- Transdermal patches (opioid)
- Transmucosal (lollipop); Intranasal spray (opioid)
- Injection- (opioid)



Side Effects:

OPIOID

- Sedation
- Drowsiness
- Respiratory depression
- Orthostatic hypotension
- GI distress
- Constipation

NON-OPIOID

- Anticoagulant effects (NSAIDS)
- GI distress
- Hypertension
- Hepatotoxicity
- Reye syndrome- (aspirin- children, teenagers)

Anti- Inflammatory Effects of NSAIDS

- **Aspirin:**
- **Ibuprofen:** Advil, Motrin (less side effects)
- **Naproxen:** Naprosyn, Aleve(joint inflammation)

Reduced **prostaglandin** production=

⇊ inflammation and edema

⇊ fever

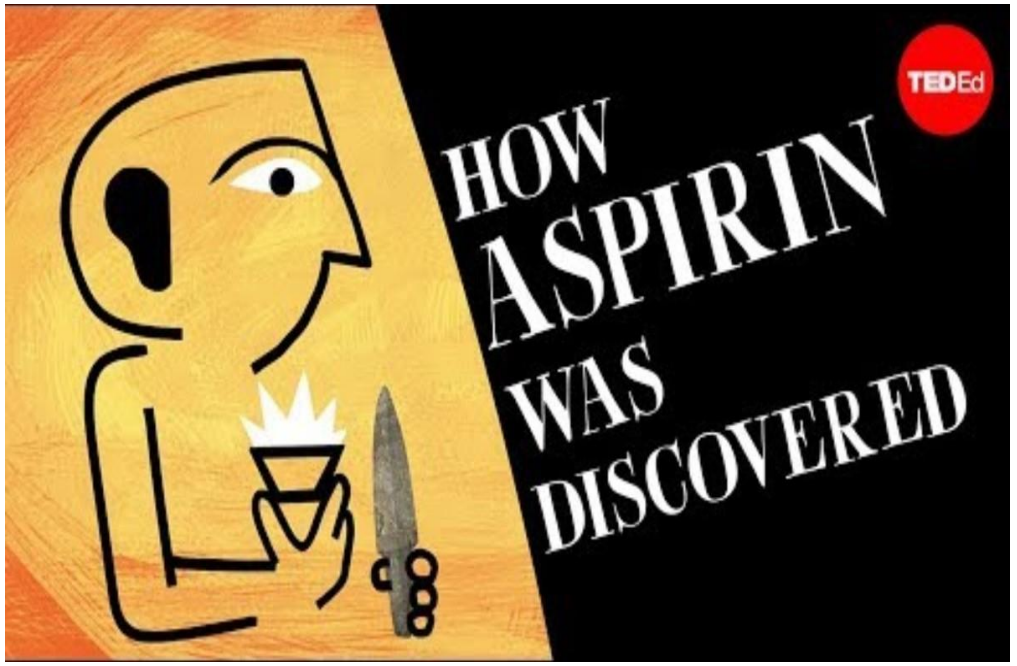
⇊ gastric protection

⇊ reproductive system-contractions

⇊ renal blood flow- Na/H2O

⇊ platelet aggregation

⬆ bronchoconstrictor (may induce asthma)



Specialized Anti- inflammatory Medications

- **DMARDS**- specialize in reducing joint inflammation and disease progression in Rheumatoid dz.
- Side Effects: (drug specific)
  - fever, chills, sore throat, fatigue, loss of appetite, and **nausea or vomiting;**
  - **GI distress** (diarrhea, indigestion), irritation of the oral mucosa, and rashes and itching of the skin.[3]
  - **GI distress**, allergic reactions (skin rashes), and hair loss.
  - **GI distress** and include loss of appetite, nausea, and other forms of GI distress
  - aplastic anemia, allergic reactions, autoimmune blistering of the skin and mucous membranes (pemphigus), myasthenia gravis.

- **Glucocorticoids- (corticosteroids)** reduce pain and inflammation.
- Side Effects:

  bone loss

  muscle wasting

  hypertension

  aggravation of diabetes

  increased risk of infection

  glaucoma, cataracts

In Summary:

- By decreasing pain and inflammation, drugs help facilitate a more active and vigorous program of exercise and functional activity.
- Opioid analgesics are commonly administered to patients undergoing physical rehabilitation, and can have positive and negative effects that influence physical therapy.
- Aspirin and the other NSAIDs are among the most frequently used drugs in the rehabilitation population. Aside from the possibility of stomach discomfort, these drugs have a remarkable lack of adverse effects that could directly interfere with physical therapy.
- In inflammatory conditions, NSAIDs can be used for prolonged periods without the serious side effects associated with steroidal drugs.
- Acetaminophen is also frequently employed for pain relief in many physical rehabilitation patients. Acetaminophen is often equal to an NSAID in analgesic properties but lacks anti-inflammatory effects.

Case Study 1

- **Brief History.** B.W., a 75-year-old woman, fell at home and experienced a sudden sharp pain in her left hip. She was unable to walk and was taken to a nearby hospital where x-ray examination showed an impacted fracture of the left hip. The patient was alert and oriented at the time of admission. She had a history of arteriosclerotic cardiovascular disease and diabetes mellitus, which were managed successfully by various medications. The patient was relatively obese, and a considerable amount of osteoarthritis was present in both hips. Two days after admission, a total hip arthroplasty was performed under general anesthesia. Meperidine (Demerol) was given intramuscularly as a preoperative sedative. General anesthesia was induced by IV administration of thiopental (Pentothal) and sustained by inhalation of sevoflurane (Ultane). The surgery was completed successfully, and physical therapy was initiated at the patient's bedside on the subsequent day.
- **Problem/Influence of Medication.** At the initial therapy session, the therapist found the patient to be extremely lethargic and disoriented. She appeared confused about recent events and was unable to follow most commands. Apparently, she was experiencing some residual effects of the general anesthesia.

1. How can the therapist safely begin rehabilitation given this patient's confusion?

2. Can any interventions help the patient overcome the residual anesthetic effects?

Case Study 2:

- **Brief History.** A.T. is a 61-year-old woman with a history of chronic obstructive pulmonary disease. Her respiratory condition is managed pharmacologically by inhaling a combination of a long-acting bronchodilator (salmeterol) and an antiinflammatory steroid (fluticasone). She is also being seen in her home by a physical therapist to improve respiratory function, reduce fatigue, and increase functional ability. She recently developed a painful, blistering rash over her lateral thorax that was diagnosed as herpes zoster (shingles). A.T. had chickenpox as a child, and this episode of shingles was attributed to a flare-up of the varicella zoster virus that remained in her body. The rash gradually diminished, but she continued to experience sharp, stabbing pain due to post-herpetic neuralgia. She consulted her physician, who prescribed a Lidoderm patch containing 5 percent lidocaine. This patch was applied to the skin over the painful area.
- **Problem/Influence of Medication.** A.T. asked the therapist if she could also apply a heating pad over the painful area to help provide analgesia. She had been leaving the patch on continuously and only taking the old patch off when it was time to apply a new one.

1. What should the therapist tell this patient about applying heat over the lidocaine patch?

2. What are the typical recommendations for applying and changing the patch?

Case Study 3

- **Brief History.** F.D. is a 28-year-old man who sustained complete paraplegia below the L-2 spinal level during an automobile accident. Through the course of rehabilitation, he was becoming independent in self-care, and he had begun to ambulate in the parallel bars and with crutches while wearing temporary long leg braces. He was highly motivated to continue this progress and was eventually fitted with permanent leg orthoses. During this period, spasticity had increased in his lower extremities to the point where dressing and self-care were often difficult. Also, the ability of the patient to put his leg braces on was often compromised by lower extremity spasticity. The patient was started on oral baclofen (Lioresal) at an initial oral dosage of 15 mg/day. The daily dosage of baclofen was gradually increased until he was receiving 60 mg/day. Despite the higher dose, F.D.'s spasticity was only partially controlled, and he still had problems when he was trying to sleep or during ADLs such as bathing and dressing.
- **Problem/Influence of Medication.** The physician wanted to further increase the oral dose to 80 mg/day, but the therapist was concerned that this would create sedation and cognitive impairments. Moreover, F.D. had already noticed some weakness in his arms and upper torso due to the effects of baclofen on his nonspastic muscles. A higher dose would probably cause additional motor impairment to the point where his ability to transfer and ambulate would be compromised.

1. Why does oral baclofen affect F.D.'s nonspastic muscles?

2. Is there an alternative way to administer this drug to better focus its effects on the spastic lower extremity muscles with less effect on F.D.'s trunk and upper extremities?

3. How can the therapist address alternative administration methods with the physician and patient?

Case Study 4

- **Brief History.** N.P., a 45-year-old woman, was involved in an automobile accident approximately 6 months ago. She received multiple contusions from the accident, but no major injuries were sustained. Two months later, she began to develop pain in the right shoulder. This pain progressively increased, and she was treated for bursitis using anti-inflammatory drugs. Her shoulder motion became progressively more limited; however, any movement of her glenohumeral joint caused rather severe pain. She was reevaluated and a diagnosis of adhesive capsulitis was made. The patient was admitted to the hospital, and while she was under general anesthesia, a closed manipulation of the shoulder was performed. When the patient recovered from the anesthesia, meperidine (Demerol) was prescribed for pain relief. This drug was given orally at a dosage of 75 mg every 4 hours. Physical therapy was also initiated the afternoon following the closed manipulation. Passive range-of-motion exercises were used to maintain the increased joint mobility achieved during the manipulative procedure.

1. When should the therapist schedule the treatment session so that meperidine is reaching peak effects?

2. What precautions should the therapist use during the initial treatments given the potential side effects of this drug?

Case 5

- **Brief History.** D.B., a 38-year-old man, began to develop pain in his right shoulder. He was employed as a carpenter and had recently been working long hours building a new house. The increasing pain required medical attention. A physician evaluated the patient and diagnosed subacromial bursitis. The patient was referred to physical therapy, and a program of heat, ultrasound, and exercise was initiated to help resolve this condition.
- **Problem/Influence of Medication.** During the initial physical therapy evaluation, the therapist asked if the patient was taking any medication for the bursitis. The patient said the physician advised him to take aspirin or ibuprofen as needed to help relieve the pain. When asked if he had done this, the patient said that he had taken some aspirin once or twice, especially when his shoulder pain kept him awake at night. When he was asked specifically what type of analgesic he had taken, he named a commercial acetaminophen preparation.
- *Questions to Consider*

1. How does acetaminophen differ from NSAIDs such as aspirin and ibuprofen, and why is this difference important in this case?

2. What should the therapist tell D.B. about taking over-the-counter pain medications?

Case 6

- **Brief History.** A.T., a 75-year-old woman, was diagnosed with rheumatoid joint disease several years ago. She is currently being seen three times each week in physical therapy as an outpatient for a program of paraffin and active exercise to her wrists and hands. Resting splints were also fabricated for both hands, and these are worn at night to prevent joint deformity. The patient was also instructed in a home exercise program to maintain joint mobility in both upper extremities. Pharmacological management in this patient originally consisted of NSAIDs, beginning with aspirin and later switching to ibuprofen. As her condition worsened, she was also placed on prednisone, an anti-inflammatory steroid (glucocorticoid) that can decrease joint inflammation and perhaps also suppress the autoimmune response underlying RA. Prednisone was administered orally at a dosage of 20 mg each day.
- **Problem/Influence of Medication.** The combination of an NSAID, a glucocorticoid, and the physical therapy program seemed to be quite effective in reducing the patient's pain and joint stiffness. However, while preparing the patient for her paraffin treatment, the therapist noticed the skin on A.T.'s hands and wrists was very thin and bruised very easily. Likewise, her skeletal muscles were weaker than would be expected even with her advanced age, and substantial skeletal muscle wasting was apparent throughout her trunk and extremities.
- ***1. What is causing the skin changes and muscle wasting?***
- ***2. What might be an alternative drug strategy to modify disease progression in RA?***
- ***3. What can the therapist do to try to offset the general loss of muscle mass and strength?***