LESSON 4

Analgesic, Anti-Inflammatory, and Antigout Agents.

TEXT ASSIGNMENT

Paragraphs 4-1 through 4-8.

LESSON OBJECTIVES

4-1. Given one of the following terms: analgesic, anti-pyretic, anti-inflammatory agent, rheumatism, arthritis, or gout, and a list of definitions select the definition of the given term.

4-2. Given the trade or generic name of an analgesic, anti-inflammatory, or anti-gout agent and a list of trade and/or generic names, select the appropriate name for that agent.

4-3. Given the trade and/or generic name of an analgesic, anti-inflammatory, or anti-gout agent and a group of statements pertaining to indications, use, side effects, or cautions and warnings, select the statement that best applies to that drug.

4-4. Given a group of statements, select the statement that best describes the cause of gout.

SUGGESTION

After studying the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.
LESSON 4

ANALGESIC, ANTI-INFLAMMATORY, AND ANTIGOUT AGENTS

Section I. BACKGROUND

4-1. INTRODUCTION TO ANALGESIC, ANTI-INFLAMMATORY, AND ANTI-GOUT AGENTS

Since the beginning of time, every civilization has sought a perfect medicinal agent that would relieve pain. As far back as the third century B.C., physicians were administering the juice of the opium poppy to patients for the relief of pain. Opium derivatives are still widely used in the treatment of severe pain. Fortunately, agents with less abuse potential have been discovered for the relief of pain. This lesson will focus on analgesics, anti-inflammatory, and anti-gout agents.

4-2. DEFINITIONS

a. Analgesic. An analgesic is an agent that relieves pain.

b. Antipyretic. An antipyretic is an agent that lowers elevated body temperature.

c. Anti-Inflammatory Agent. An anti-inflammatory agent is a drug that decreases inflammation.

d. Rheumatism. Rheumatism is a condition characterized by inflammation of connective tissue.

e. Arthritis. Arthritis is a form of rheumatism in which the inflammation is confined to body joints.

f. Gout. Gout is a form of arthritis that is caused by an excess of uric acid in the blood that periodically precipitates in the peripheral joints as monosodium urate.

Section II. ANALGESIC AGENTS

4-3. BACKGROUND

Analgesic agents relieve pain. Some agents (like morphine or meperidine) are used to relieve severe pain, while others (like acetaminophen) are administered to relieve less severe pain. The material in this section of the lesson will consider agents used to relieve less severe pain.
4-4. SPECIFIC ANALGESIC AGENTS

a. **Acetaminophen (Tylenol®).** Acetaminophen is used as an analgesic and as an antipyretic. It is not an anti-inflammatory agent: Acetaminophen will not relieve the swelling or redness found in arthritis or rheumatism. Side effects associated with this agent are itching or skin rash (most likely caused by hypersensitivity reactions), hemolytic anemia (persons with G-6-PD deficiency are especially susceptible), and kidney damage. This drug may cause liver damage with chronic use. Acetaminophen is available in capsule, elixir, suspension, syrup, tablet, chewable tablet, and suppository forms.

b. **Aspirin (A.S.A.).** Aspirin is used as an analgesic, anti-pyretic, and anti-inflammatory agent. Aspirin produces gastric irritation. Taking aspirin with a full glass of water or milk (8 fluid ounces) can help minimize stomach irritation. Tinnitus (ringing of the ears) is a symptom of aspirin overdose. Aspirin interacts with a variety of medications. One, the effects of oral hypoglycemic or insulin is increased when aspirin is administered concurrently with them. Two, since aspirin has some anti-coagulant effects, concurrent administration of aspirin, and some anti-coagulants can result in increased risk of patient bleeding. Patients should be cautioned against taking any oral aspirin preparation that has a strong vinegar-like odor. Aspirin is available in a variety of dosage forms (tablets, enteric coated tablets--dissolve in the intestines, and suppositories).

c. **Aspirin, Magnesium Hydroxide, and Aluminum Hydroxide Tablets (Cama®).** This aspirin-containing product is an analgesic, anti-inflammatory, and antipyretic agent. The magnesium hydroxide and aluminum hydroxide is in the formulation to reduce the stomach irritation associated with the aspirin. Patients taking this medication should be told not to take this medication with tetracyclines because the tetracycline’s therapeutic effect might be decreased: This medication and tetracyclines should not be taken within one hour of each other. This product should be taken with at least 8 fluid ounces of water. Patients should be cautioned against taking this product if it has a strong vinegar-like odor.

d. **Propoxyphene Hydrochloride (Darvon®).** Propoxyphene is a centrally acting opioid analgesic. The drug may produce side effects such as dizziness, drowsiness, or blurred vision. Patients taking propoxyphene should be cautioned against taking alcohol or other central nervous system depressants while they are taking propoxyphene. Propoxyphene is a Note Q controlled substance.

e. **Propoxyphene Napsylate (Darvon N®).** Propoxyphene napsylate is used as an analgesic. It may produce such side effects as drowsiness and dizziness. Patients should be warned against taking alcohol or other central nervous system depressants when they are taking this drug. Darvon N® is a Note Q controlled substance.
f. **Pentazocine (Talwin®).** Pentazocine is a centrally acting opioid analgesic. Side effects associated with this agent are gastrointestinal upset, sedation, blurred vision, hallucinations, mental confusion, and shortness of breath. This medication should be used with caution in-patients who have a history of drug abuse or dependence. The oral dosage form (Talwin NX®) is combined with naloxone, a narcotic antagonist, to discourage the abuse of this substance. When the tablet is dissolved and then injected, the naloxone negates the euphoric effects of the pentazocine. Patients taking pentazocine should not take alcohol or any other central nervous system depressant at the same time, since this agent is a central nervous system depressant.

g. **Butalbital with Aspirin and Caffeine (Fiorinal®).** This product contains butalbital (a short-to-intermediate-acting barbiturate--50 mg), aspirin (325 mg), and caffeine (40 mg). The product is used as an analgesic. Side effects associated with this agent are gastrointestinal upset and sedation. This product may cause drug dependence. Patients taking this drug should not take any alcohol or any other central nervous system depressant. Fiorinal® is a Note Q controlled substance. **(NOTE:** Fiorinal® with Codeine is another formulation of this product. It is used to raise the threshold of pain.)

Section III. ANTI-INFLAMMATORY AGENTS

4-5. **BACKGROUND**

In certain conditions (that is, arthritis) or injuries, affected tissues become inflamed. The net effect of such inflammation is to surround the affected area and “wall it off” so that the movement of toxic products or bacteria from the affected part is delayed. Blood flow to the area is increased and certain changes happen in the capillaries to increase the fluid level of the tissues. Hence, the area becomes swollen. Redness of the area follows. Although this is a protective mechanism for the body, it is desirable at times to use drugs to decrease this effect.

4-6. **SPECIFIC ANTI-INFLAMMATORY AGENTS**

a. **Indomethacin (Indocin®).** Indomethacin is used in the treatment of various medical problems, including certain types of arthritis. Indomethacin is used to relieve swelling, inflammation, joint pain, stiffness, and fever. Patients hypersensitive to aspirin may also be hypersensitive to indomethacin. Side effects associated with the agent are gastrointestinal upset, headache, dizziness, and ringing or buzzing in the ears. Patients should be instructed to take this medication with food or milk or right after meals in order to lessen the possibility of gastrointestinal upset. Furthermore, in order to lessen gastrointestinal upset, patients should be instructed not to regularly drink alcoholic beverages or take aspirin unless their physician has told them otherwise. Since the drug does have the side effect of dizziness, the patient should be told not to drive or operate hazardous machinery until he or she has been taking the drug and has determined its effects on alertness.
b. **Ibuprofen (Motrin®).** Ibuprofen is used to treat the symptoms of arthritis. Ibuprofen relieves swelling, joint pain, stiffness, and inflammation. Some patients may have to take the drug for one to two weeks before they begin to feel its full effects. Side effects associated with the use of this agent include skin rashes, itching of skin, ringing or buzzing in the ears, dizziness, or a bloated feeling. Since the drug can cause some stomach irritation, the patient should not take alcohol or aspirin regularly while taking this drug unless the patient’s physician has directed otherwise. Furthermore, since the drug does cause dizziness in some patients, the patient should be instructed not to drive or operate hazardous machinery until he or she has been taking the drug and has determined it affects on alertness.

c. **Tolmetin (Tolectin®).** Tolmetin is used to treat the symptoms of arthritis. The information for this drug is the same as for fenoprofen (Nalfon®)—see d above.

d. **Naproxen (Naprosyn®).** Naproxen is used to treat the symptoms of arthritis. Naproxen relieves swelling, joint pain, stiffness, and inflammation. Side effects associated with this agent include black tarry stools, blurred vision, skin rash, ringing or buzzing in the ears, and dizziness. Since this drug can cause some stomach irritation, the patient should not take alcohol or aspirin regularly while taking this drug unless the patient’s physician directs otherwise. The drug may be taken with food, antacids, or milk to reduce stomach irritation.

e. **Sulindac (Clinoril®).** This drug is used to treat arthritis. This drug should be given with food twice daily; otherwise, the information for this drug is the same as is listed under naproxen (Naprosyn).

f. **Piroxicam (Feldene®).** This drug is a unique agent because it has a 45-hour half-life. This long half-life permits once daily dosing. Piroxicam is used in the treatment of rheumatoid arthritis, ankylosing spondylitis, and osteoarthritis. The average daily dose is 20 mg. Gastrointestinal side effects are encountered in approximately 20 percent of patients.

g. **Celecoxib (Celebrex®).** This drug is unique because it may cause less risk of gastrointestinal side effects than other anti-inflammatory agents. Celecoxib is used in the treatment of rheumatoid and osteo arthritis.
Section IV. ANTIGOUT AGENTS

4-7. BACKGROUND

a. Gout is a metabolic disease characterized by attacks of acute pain, tenderness, and swelling of such joints as the instep, ankle, great toe, and elbow. Gout is caused by the deposition of sodium urate micro crystals. This condition is seen primarily in males. It is thought that heredity plays a major factor in gout, because gout occurs more often in relatives of those who have gout than in the population in general.

b. Gout is caused by defective purine metabolism. Humans lack the enzyme uricase, an enzyme that converts uric acid to allantoin. Uric acid is a major end product of the metabolism of purine (indirectly of amino acid metabolism). The level of uric acid in the plasma and urine is normally high (saturated). Sometimes a moderate increase in uric acid production can lead to the deposition of sodium urate microcrystals as described above.

c. The treatment of gout is usually designed to (1) relieve pain and (2) increase the elimination of uric acid from the body. Drugs administered to increase the elimination of uric acid from the body are referred to as uricosuric agents.

4-8. DRUGS USED TO TREAT GOUT

a. Colchicine. While the exact mechanism of action of colchicine is unknown, the administration of the drug causes a decrease in the amount of urate crystals deposited in the various parts of the body--the result is a decrease in the inflammatory process. This drug is the oldest and most effective agent used in the treatment of acute attacks of gout. The usual dose of an acute gout attack is 1.2 milligrams immediately, then 0.6 milligram every 30 minutes to one hour until nausea and vomiting or diarrhea starts or pain is relieved. Each patient must initially titrate his own dosage. If seven tablets caused adverse effects the first administration, the patient should reduce the dosage to six tablets on the next acute attack. The usual side effect associated with the administration of colchicine is gastrointestinal irritation. Occasionally antidiarreheals are prescribed to offset this adverse effect. The patient should be informed to allow an interval of at least three days between treatments--otherwise, toxic effects may occur from accumulation.
b. **Allopurinol (Zyloprim®).** Allopurinol acts by decreasing the production of uric acid. This drug is not effective in the treatment of acute gout attacks, because it has no anti-inflammatory action. In fact, allopurinol may actually intensify the inflammation seen during an acute gout attack. Although the drug cannot be used to treat acute gout attacks, the patient should be instructed to continue taking allopurinol if he has such an attack. Allopurinol may produce such side effects as skin rash and gastrointestinal upset. If the drug causes too much gastrointestinal upset, the patient can take it after meals. The patient taking allopurinol should be instructed to drink at least 10 to 12 full glasses (8 fluid ounces per glass) of fluids each day--unless informed otherwise by his physician. This is done to prevent the formation of kidney stones while taking the drug.

c. **Probenecid (Benemid®).** Probenecid increases the urinary excretion of uric acid. This anti-gout agent has the following side effects associated with its use: bloody urine, lower back pain, and painful urination. The patient should be instructed not to drink too much alcohol while taking this drug since doing so could lessen the therapeutic effect of probenecid. Furthermore, the patient should be told not to take aspirin with this agent because salicylates antagonize the uricosuric action of probenecid.
EXERCISES, LESSON 4

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the question or best completes the incomplete statement.

After you have completed all the exercises, turn to “Solutions to Exercises” at the end of the lesson, and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. Rheumatism is best described as:
   a. A form of arthritis that is caused by an excess of uric acid in the blood.
   b. A painful inflammation of body joints.
   c. A condition characterized by inflammation of connective tissue.
   d. A painful form of arthritis that causes gradual destruction of body joints.

2. Arthritis is best described as:
   a. A form of rheumatism in which the inflammation is limited to body joints.
   b. A destructive condition that attacks body joints by the accumulation of uric acid.
   c. A chronic condition characterized by the inability of the body’s joints to become lubricated.
   d. An acute inflammation of the body joints and related connective tissue caused by infection or excess amounts of certain chemical substances in the body.

3. A patient complains that some aspirin she has at home is beginning to smell like vinegar. What should you tell her?
   a. Take the medication as usual -- nothing is wrong with it.
   b. Take the aspirin with at least 8 fluid ounces of water or milk.
   c. Never take more than two of those aspirin tablets at one time since the vinegar-like smell indicates the aspirin has increased in potency.
   d. Discard the aspirin and obtain a fresh supply.
4. A patient has been prescribed propoxyphene napsylate (Darvon N®). What should the patient be told?
   
a. Take the medication with at least eight fluid ounces of water or milk.

b. This medication should be taken at least one hour after taking tetracyclines.

c. This medication should not be taken with alcohol or other CNS depressants.

d. This medication should not be taken if it has a strong vinegar-like odor.

5. An elderly patient complains that he has been taking Motrin® for three days without experiencing much relief from his arthritis. What should the patient be told?
   
a. Continue taking the drug since some patients have to take it for one or two weeks before they begin to feel its full effects.

b. See the physician because the dosage probably needs to be increased.

c. Stop taking the drug until pharmacy personnel ensure that the medication is not expired.

d. Double the dose of the medication so the effects can be felt faster.

6. Gout is caused by:
   
a. The defective metabolism of allantoin.

b. The inflammation of connective tissue surrounding the body joints.

c. Defective purine metabolism that causes sodium urate micro-crystals to be deposited in certain body joints.

d. The incomplete elimination of uric acid from the body.
7. What should a patient who is taking Benemid® be told?
   
   a. This medication should not be taken with aspirin.
   
   b. This medication should not be taken with alcohol or other CNS depressants since Benemid® is a CNS depressant.
   
   c. This medication should not be taken on an empty stomach since it causes severe tissue irritation.
   
   d. This medication should be taken with antidiarrheals to lessen gastrointestinal irritation.
   
8. Select the use of pentazocine (Talwin®).
   
   a. Anti-gout agent.
   
   b. Anti-inflammatory agent.
   
   c. Antipyretic.
   
   d. Analgesic.

SPECIAL INSTRUCTIONS FOR EXERCISES 9 THROUGH 12. Match the drug name in Column A with its corresponding name in Column B.

<table>
<thead>
<tr>
<th>COLUMN A</th>
<th>COLUMN B</th>
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</thead>
<tbody>
<tr>
<td>9. Benemid®</td>
<td>a. Ibuprofen</td>
</tr>
<tr>
<td>10. Motrin®</td>
<td>b. Butazolidin®</td>
</tr>
<tr>
<td>11. Cama®</td>
<td>c. Aspirin, magnesium hydroxide, and aluminum hydroxide tablets</td>
</tr>
<tr>
<td>12. Allopurinol</td>
<td>d. Probenecid</td>
</tr>
<tr>
<td></td>
<td>e. Zyloprim®</td>
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<td></td>
<td>f. Colchicine</td>
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</tbody>
</table>

Check Your Answers on Next Page
SOLUTIONS TO EXERCISES, LESSON 4

1. c (para 4-2d)
2. a (para 4-2e)
3. d (para 4-4b)
4. c (para 4-4d)
5. a (para 4-6b)
6. c (para 4-7a,b)
7. a (para 4-8d)
8. d (para 4-4f)
9. d Benemid®. (para 4-8d)
10. a Motrin®. (para 4-6b)
11. c Cama®. (para 4-4c)
12. e Allopurinol. (para 4-8c)

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