

# ARTHRITIS: OSTEOARTHRITIS & OSTEOPOROSIS

## OBJECTIVES

At the conclusion of this course, the learner will be able to:

1. List several types of arthritis.
2. Briefly describe rheumatoid arthritis and gout.
3. Detail osteoarthritis and osteoporosis in terms of its etiology, prevalence, pathophysiology, signs and symptoms, complications, diagnosis, prevention and treatment, including pharmacological interventions and the latest research about the cardiovascular side effects of the COX-2 inhibitors and the effect of this research on the withdrawal some medications from the market and stronger warnings.
4. Describe some osteoarthritis resources and associations and the services that they provide.

## INTRODUCTION

Arthritis is an inflammatory disease of the bone joints that is marked with a limitation of movement, swelling and pain. It can be caused by an infection in the joint, a buildup of uric acid or simply with the degeneration of a joint or joints as an individual grows older and perhaps, genetics.

Arthritis is the number one chronic disorder that leads to disability in our country among people 15 years of age and older. In 2005, it was estimated that 66 million people, that is, one out of every 3 adults in our nation is affected by arthritis. Additionally, it affects about 300,000 children and it is estimated that it costs the United States in excess of \$86.2 billion every year. Women are more affected than males. (Arthritis Foundation, 2004)

## TYPES OF ARTHRITIS

There are more than 100 different types of arthritis. Some of these types include the below.

- *Osteoarthritis*- is the most common form of arthritis. It is a degenerative joint disease in which the cartilage that covers the ends of bones in the joint deteriorates, causing pain and a loss of movement as a result of the bone rubbing against bone rather than cartilage.

- *Rheumatoid arthritis*- is one of the most disabling forms of arthritis. It affects primarily women. This form is an autoimmune disease where the joint lining becomes inflamed as a result of the person's immune system.
- *Gout*- primarily affects mostly men. This form of arthritis affects small joints, specifically the great toe. A defect in body chemistry, that is, a buildup of uric acid leads to gout. This form can be successfully controlled with dietary changes and medications.
- *Ankylosing spondylitis*- when the bones of the spine become inflamed they fuse together, thus leading to ankylosing spondylitis, which affects the spine.
- *Juvenile arthritis*- this term encompasses all types of arthritis that can occur among the pediatric population. Some of these types are ankylosing spondylitis, juvenile rheumatoid arthritis and juvenile lupus among other types.
- *Systemic lupus erythematosus (lupus)*- is serious systemic disorder that inflames and damages joints as well as other connective tissue throughout the entire body.
- *Scleroderma*- is a disease that attacks the body's connective tissue. It causes a hardening and thickening of the skin.
- *Fibromyalgia*- affects primarily women. It leads to widespread pain that affects muscles and their attachments to the bone. (Arthritis Foundation, 2004)
- *Septic arthritis*- develops when a bacteria such as streptococcus (pneumoniae), staphylococcus, group B streptococcus, Mycobacterium tuberculosis and candida albicans. It occurs most often among children less than 3 years of age and primarily affects the hip. The onset is generally quite rapid with a low-grade fever, severe joint pain and joint swelling.
- *Psoriatic arthritis*- can be mild affecting only a couple of joints or it can be more severe affecting the spine. Genetics may play a role in this form of arthritis. Generally, people with psoriasis have a greater incidence of arthritis than those without this skin disorder.
- *Fungal arthritis*- this rare form of arthritis is also referred to as mycotic arthritis. Fungi that lead to this form include blastomycosis, histoplasmosis, candidiasis, coccidioidomycosis, sporotrichosis, and cryptococcosis. The infection typically begins in the lungs and then progresses. The knees are most often

affected. Immunocompromised patients are at greatest risk.  
(MDchoice, Inc., 2005)

## **OSTEOARTHRITIS, RHEUMATOID ARTHRITIS AND GOUT**

*Osteoarthritis*, known as degenerative joint disease, is the most commonly seen form of arthritis among the elderly population. Osteoarthritis results from the wearing out or deterioration of the smooth cartilage lining of the joint. This loss of cartilage makes the joints rougher than they had been when the cartilage was in place. Although it can also affect the hands, degenerative osteoarthritis is most often seen in the knees, spine and hips- the weight bearing joints of the body. This form of arthritis cannot be cured but those that suffer from it rarely become bedridden or crippled as a result of it. Post menopausal osteoarthritis is the result of the depletion of hormonal estrogen after menopause. It is a variation of the larger diagnosis of osteoarthritis from other causes.

*Rheumatoid arthritis* also involves painful swelling of the joints but it is usually associated with the smaller, non weight bearing joints of the body. Also, it is not usually associated with old age onset, but instead, it primarily begins in the young adult from ages 30 to 50 from unknown causes. It can also develop in young child. This form of rheumatoid arthritis is referred to as Still's disease or juvenile rheumatoid arthritis. Unlike osteoarthritis, rheumatoid arthritis is associated with more profound physical deformities and crippling.

*Gout* is quite different from osteoarthritis and rheumatoid arthritis. Gout is a disease or disorder that occurs when the body cannot excrete the uric acid it produces because the body is overproducing it or the kidneys have a diminished ability to filter it out and excrete it. When uric acid builds up in the body the joints, as well as soft tissues, become affected by it. The buildup of uric acid in gout causes very painful attacks of arthritis and it is accompanied with a high concentration of uric acid in the bloodstream and the formation of uric acid crystals in the affected joints.

## **OSTEOPOROSIS**

Osteoporosis is a "generalized, progressive diminution of bone density (bone mass per unit volume), causing skeletal weakness, although the ratio of mineral to organic elements is unchanged." (Merck, 2005)

There are three types of osteoporosis:

- Primary osteoporosis Type 1
- Primary osteoporosis Type 2
- Secondary osteoporosis

*Type 1 primary osteoporosis* is six times more prevalent in women than in men. This type typically appears between the ages of 51 and 75 years of age. It is associated with distal radius fractures (Colles' fractures) and vertebral crush fractures.

*Type 2 primary osteoporosis* is twice as common in women than men and its onset is generally after 60 years of age. This type is a part of the normal aging process in that it results from decreasing numbers and activity levels of osteoblasts, rather than an increase of osteoclast activity. It is associated with femoral neck fractures, fractures of the pelvis, humerus, vertebrae and tibia. Some people, particularly women, can have type 1 primary osteoporosis and type 2 primary osteoporosis simultaneously.

*Secondary osteoporosis* can be caused by a number of diseases, medications, and other conditions, such as prolonged space flight weightlessness. It accounts for about 5% of all osteoporosis cases. (Langford & Thompson, 2000; Merck & Co., 2005)

## **ETIOLOGY AND PREVALENCE**

The cause of primary osteoporosis is not known. The possible causes of secondary osteoporosis and osteoarthritis are:

- An endocrine disorder (diabetes mellitus, hypogonadism, hyperthyroidism, hyperparathyroidism, hypogonadism, hyperprolactinemia, and an excess of glucocorticoids)
- Some medications (dilantin, heparin, glucocorticosteroids, barbiturates and ethanol)
- Some diseases (rheumatoid arthritis, renal or liver disease, malabsorption syndrome, malabsorption syndromes, sarcoidosis malignancies, chronic obstructive pulmonary disease, and sarcoidosis)
- Long periods of immobility and weightlessness (calcium leaves the bones)

Women are affected with osteoporosis more than men. About 50% of postmenopausal women have osteoporosis. Of these women, 33% will have an osteoporotic fracture during their lifetime. (Langford & Thompson, 2000; Merck & Co., 2005)

Some of the risk factors associated with primary osteoporosis include:

- A sedentary lifestyle
- Prolonged periods of immobility
- Menopause (surgical or natural)
- Late menarche
- Early menopause
- A loss of ovarian function
- Gender (women are at greater risk than men)
- Race (the white and Asian race are at greatest risk)
- A family history of osteoporosis
- Malnutrition
- Lack of calcium
- Lack of sufficient vitamin D
- High dietary sugar and/or red meat
- Anorexia
- Intense exercisers, particularly when the person is also underweight
- Cigarette smoking
- Coffee and alcohol use and abuse (Langford & Thompson, 2000; Merck & Co., 2005)

## **PATHOPHYSIOLOGY**

The resorption of bone exceeds the rate of bone formation when osteoporosis occurs. The bone mass declines, cortical thickness diminishes and the size and number of trabeculae decline. (Merck & Co., 2005)

## **SIGNS AND SYMPTOMS**

Individuals are typically asymptomatic early in the disease. The first symptom is usually a dull, aching, constant pain in the bones, particularly the back and chest. The pain may radiate down the leg, and muscle spasms may be present. Later in the disease, the back pain may become chronic, unrelenting, dull and aching. As the spinal column mass diminishes, dorsal kyphosis and cervical lordosis

(dowager's hump) increase, which can lead to one or more compression fractures of the spine and a reduction in height. The most common affected vertebrae are those at the T-8 level and below. Other fractures may also occur with minimal or no trauma, particularly the hip and the wrist in an attempt to break a fall.

Other *early signs* and symptoms are:

- aching joint pain that can get worse with exercise or as the day and its normal activities progress and
- stiffness after a period of immobility

Some of the *middle stage* signs and symptoms include lessening joint motion as well as joint:

- crepitus,
- tenderness,
- grating,
- flexion contractures, and
- enlargement.

The *late* signs and symptoms are:

- an increase in the duration and extent of pain,
- joint tenderness upon palpation,
- pain with passive range of motion, and
- joint deformity and subluxation. (Langford & Thompson, 2000; Merck & Co., 2005)

## **THE COMPLICATIONS OF OSTEOPOROSIS**

The complications of osteoporosis include:

- deformities,
- immobility,
- spinal damage,
- fractures (Langford & Thompson, 2000; Merck & Co., 2005)

## **DIAGNOSIS**

Osteoporosis is diagnosed with a clinical assessment, the presence of bone and/or joint pain, laboratory findings, x-ray, photon absorptiometry and CT scans.

### *Laboratory findings*

- normal PTH levels or low levels with type I patients and high with type II patients when calcium absorption is low or when hypercalciuria is present
- urinary excretion of pyridinium peptide, hydroxyproline-containing peptides (signs of increased bone destruction)
- uptake of technetium-99m methylene diphosphonate

### *X-Ray*

- decreased radiodensity as the result of trabecular loss
- decreased bone density is visible when more than 30% of the bone is lost

### *Photon absorptiometry and CT scans*

- decreased bone density (Langford & Thompson, 2000; Merck & Co., 2005)

## **PREVENTION**

Some of the things that can be done to prevent osteoporosis and osteoarthritis include:

- regular exercise,
- sufficient intake of calcium and vitamin D (women should take or consume a prophylactic daily 1000 mg of calcium and 1500 mg per day after osteoporosis is diagnosed,
- take or consume 400 international units (IU) of vitamin D and
- bone density tests every 1 to 3 years after age 49 for early detection, especially for women. (Langford & Thompson, 2000; Merck & Co., 2005)

## **TREATMENT**

### *Exercise*

A regular exercise routine, as approved by the physician, as well as the following is recommended to strengthen the muscles, maintain joint mobility, and to decrease the rate of calcium loss.

- weight bearing exercises

- hyperextension exercises
- resistance exercises
- range of motion (active, passive and/or active assistive), as indicated by the patient's condition,
- isometric exercises, and
- general conditioning exercises. (Langford & Thompson, 2000; Merck & Co., 2005)

### *Physical Therapy Interventions*

These treatment interventions aim to prevent deformity, increase joint mobility, decrease pain, restore lost function, in some cases, and to maximize the patient's ability to perform their activities of daily living. Some patients can also benefit from assistive devices, such as a grasper. Most of these interventions can be independently done in the home without the services of a physical therapist.

- heat and massage for muscle spasms
- ambulation assistance with a walker or cane
- transcutaneous electrical nerve stimulation (TENS) (Langford & Thompson, 2000; Merck & Co., 2005)

### *Nutrition*

A regular, nutritious diet that is high in protein is recommended. Women should take or consume 1500 mg of calcium a day and men should take or consume 1,000 to 3,500 mg of calcium a day if they are not absorbing calcium in a normal manner.

Vitamin D should be taken concurrent with calcium. The dosage can range from 400 or 800 IU per day and up to 50,000 IU once or twice a week, as based on the patient's 25 hydroxy vitamin D and 1,25 dihydroxy vitamin D level. Serum and urinary calcium levels should be monitored when high doses are given since hypercalcemia, hypercalciuria, and renal failure can occur. (Langford & Thompson, 2000; Merck & Co., 2005)

### *Hormone Replacement Therapy*

Estrogen supplements can be considered for postmenopausal women without a uterus and estrogen-progesterone combinations can be considered for postmenopausal women with an intact uterus. Testosterone replacement therapy is an option for older men at risk for primary osteoporosis type 2.

Raloxifene, an estrogen-like drug, can also be considered. (Merck & Co., 2005)

### *Salicylates and nonsteroidal anti-inflammatory medications NSAIDs).*

These medications serve as both anti-inflammatory agents and analgesics. Examples are aspirin, ibuprofen, diclofenac, fenoprofen, flurbiprofen, indomethacin, ketoprofen, meclofenamate, nabumetone, naproxen, oxaprofen, piroxicam, sulindac and tolmetin.

Some of the side effects and adverse drug reactions to the NSAIDs are GI irritation, cardiovascular complications, blood dyscrasias, nephrotoxicity (oliguria, azotemia, hematuria and dysuria), abdominal pain, cholestatic hepatitis, anorexia, dizziness and drowsiness. Antacids, H<sub>2</sub> blockers and sucralfate can be given between meals for mild GI side effects of aspirin. 100 to 200 µg bid to qid of misoprostol or a proton pump inhibitor can be used with aspirin and other NSAIDs to reduce the risk of GI bleeding among high risk patients.

The NSAIDS are contraindicated among patients with asthma, severe liver and/or renal disease, and hypersensitivity. They can be used with caution among the elderly and children, during lactation and pregnancy and for patients with GI, cardiac and/or bleeding disorders.

The patient's blood, renal and hepatic function must be monitored when NSAIDS are used. Baseline hearing and eye exams are also recommended so that changes can be identified. Toxicity may be signaled with tinnitus and/or blurred vision. Current concerns about COX-2 inhibitors and NSAIDS are described below. (Skidmore-Roth, 2004)

### *Bisphosphonates*

Bisphosphonates inhibit bone resorption. Fosamax (alendronate ) is a bisphosphonate that is used for osteoarthritis among postmenopausal women as well as for those with Paget's disease. The dosage for postmenopausal women is 10 mg every day orally. This medication must be taken with a full glass of water on an empty stomach. Additionally, the patient should be instructed to remain upright for at least 30 minutes after taking dose in order to prevent esophageal irritation.

Some of the side effects associated with bisphosphonate medications include:

- anemia,
- hypomagnesemia
- hypophosphatemia
- hypokalemia
- anorexia
- nausea and vomiting
- abdominal pain
- headache
- constipation
- bone pain
- esophageal ulceration
- hypertension and fluid overload

It is contraindicated with hypocalcemia and hypersensitivity. It can be used with caution among children and those that are lactating or pregnant. Cautious use is also recommended if the patient has ulcers, gastritis and/or esophageal disease. Electrolytes and renal function must be assessed throughout the course of therapy. (Merck, 2005; Skidmore-Roth, 2004)

#### *Selective estrogen receptor modulator (Evista)*

Evista decreases the resorption of bone and decreases bone turnover. The dosage is 60 mg a day. Some of the side effects include nausea, vomiting, anorexia, diarrhea, hot flashes, depression, migraine headaches, insomnia, vaginitis, weight gain, peripheral edema, leg cramps, sinusitis, pharyngitis, laryngitis, and others.

It is contraindicated during pregnancy and lactation as well as for those with a hypersensitivity to it. Cautious use is necessary if the patient is affected with hepatic disease and/or venous thrombosis. It is recommended that daily weights, blood pressure and hepatic function tests be monitored throughout the course of therapy. (Skidmore-Roth, 2004)

#### *Salmon calcitonin*

Salmon calcitonin can be an alternative when estrogen therapy is contraindicated or refused. It is available in 2 forms, that is, nasally and parenterally. The nasal dosage is one spray (200 U) per day in alternating nostrils. The parenteral dose is 100 IU subcutaneously daily or every other day. Both forms should be taken concurrently with calcium and vitamin D supplementation. (Merck, 2005)

### *Sodium fluoride*

Sodium fluoride, with a dosage of 50 mg per day, concurrent with 1g or more of calcium appears to increase bone mass, but because it decreases bone density and makes bones more fragile, it is not a drug of choice. (Merck, 2005)

### *Androgen*

Short term therapy, of less than 3 months, is sometimes considered when the patient is plagued with uncontrollable fractures. Because androgenic anabolic steroids (stanozolol and nandrolone) have the risk of hepatotoxicity and can lower the concentrations of lipoproteins, their use is limited despite the fact that they do increase bone density in women. Men also take androgens for replacement treatment when there is an androgen deficiency. (Merck, 2005)

## **RECENT NEWS ABOUT COX-2 INHIBITORS AND NSAIDS**

In 2005, research indicated that some popularly used and intensely marketed COX-2 inhibitors, used for arthritis, increased the risk of cardiovascular events. On April 7, 2004 the U.S. Food and Drug Administration (FDA) asked Pfizer Inc. to voluntarily take Bextra off the market and to place strong warnings on Celebrex as a result of this research. This advice news lead to the withdrawal of Bextra (valdecoxib) from the market and to the strong warning that Celebrex (celecoxib), too, is associated with cardiovascular complications. Vioxx (rofecoxib) had been previously taken off the market by Merck because of its cardiovascular disease risk as well.

The FDA has also asked the numerous manufacturers of over the counter NSAIDs, other than aspirin and acetaminophen, to include additional information about the potential for gastrointestinal and cardiovascular side effects and risks.

At the current time it appears that the cardiovascular side effects are dose dependent, therefore, decisions about whether or not to take

available NSAIDs and Celebrex should be up to the patient and their physician. Additionally, if the decision is to use or continue to use one of these medication, the dosage should be the lowest possible to achieve the desired effect. (Arthritis Foundation, 2005)

## **OSTEOARTHRITIS RESOURCES AND ORGANIZATIONS**

### *Arthritis Foundation*

#### Contact Information:

Phone Number- (404) 872-7100  
Address- Arthritis Foundation  
P.O. Box 7669  
Atlanta, GA 30357-0669

Web Page: <http://www.arthritis.org>

#### Mission and Services:

"The Arthritis Foundation efforts center on the three-fold mission of the organization: research, prevention and quality of life. The Arthritis Foundation currently provides nearly \$20 million in grants to nearly 300 researchers to help find a cure, prevention or better treatment for arthritis. The Arthritis Foundation's sponsorship of research for more than 50 years has resulted in major treatment advances for most arthritis diseases.

The Arthritis Foundation also provides a large number of community-based services nationwide to make life with arthritis easier, including:

- Self-help courses
- Water and land-based exercise classes
- Support groups
- Home study groups
- Instructional videotapes
- Public forums
- A wide variety of free educational brochures and booklets
- The national, bimonthly consumer magazine *Arthritis Today*
- Continuing education courses and publications for health professionals

Arthritis Foundation volunteers serve as advocates to local and national governments on behalf of the nearly 70 million Americans with arthritis and chronic joint symptoms. Their successes include the

federal establishment of a national institute for arthritis among the National Institutes of Health, increased federal funding for arthritis research and state funding for arthritis medications. An Arthritis Foundation telephone and e-mail information service answers questions from more than 140,000 people per year." (Arthritis Foundation, 2004)

Care has been taken to confirm the accuracy of the information presented in this course and to describe generally accepted practices and drug information. However, the author and publisher are not responsible for errors or omissions or for any consequences from application of the information and make no warranty, express or implied, with respect to the contents of the publication.

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