Musculoskeletal diseases are extremely common and have important consequences to the individual and society.

WHO has reported the figures for burden due to musculoskeletal disease and shown that not only are they significant in terms of absolute disability-adjusted-life years (DALYs), but that this burden is seen (and is growing) in both the developed and developing world.
## Burden of Musculoskeletal Diseases

Estimated burden of musculoskeletal diseases by gender and developed or developing regions, 2001

<table>
<thead>
<tr>
<th>Number of DALYS (thousands)</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Developing regions—both genders</th>
<th>Developed regions—both genders</th>
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<tr>
<td>Rheumatoid arthritis</td>
<td>4,757</td>
<td>1,353</td>
<td>3,404</td>
<td>3,238</td>
<td>1,520</td>
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<tr>
<td>Osteoarthritis</td>
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<td>6,621</td>
<td>9,750</td>
<td>11,049</td>
<td>5,323</td>
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<tr>
<td>Other musculoskeletal diseases</td>
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<td>5,033</td>
<td>3,638</td>
<td>6,789</td>
<td>1,880</td>
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<tr>
<td>All musculoskeletal diseases</td>
<td>29,798</td>
<td>13,007</td>
<td>16,792</td>
<td>21,076</td>
<td>8,723</td>
</tr>
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</table>
Who Has Osteoarthritis?

- Osteoarthritis is one of the most frequent causes of physical disability among adults.
- More than 20 million people in the US have the disease.
- More than half of the population age 65 or older show x-ray evidence of osteoarthritis in at least one joint.
- By 2030, 20 percent of Americans--about 70 million people--will have passed their 65th birthday and will be at risk for osteoarthritis.
- Some younger people get osteoarthritis from joint injuries.
- Both men and women have the disease. Before age 45, more men than women have osteoarthritis, whereas after age 45, it is more common in women.
How Does Osteoarthritis Affect People?

- Osteoarthritis affects each person differently.
- In some people, it progresses quickly; in others, the symptoms are more insidious.
- Scientists do not know yet what causes the disease, but they suspect a combination of factors, including being overweight, the aging process, joint injury, and stresses on the joints from certain jobs and sports activities.
What Areas Does Osteoarthritis Affect?

Osteoarthritis most often occurs at the ends of the fingers, thumbs, neck, lower back, knees, and hips.
Osteoarthritis hurts people in more than their joints:

their finances and lifestyles also are affected

- **Financial effects include**
  - The cost of treatment
  - Wages lost because of disability.

- **Lifestyle effects include**
  - Depression
  - Anxiety
  - Feelings of helplessness
  - Limitations on daily activities
  - Job limitations
  - Trouble participating in everyday personal and family joys and responsibilities
People with osteoarthritis *can* lead active and productive lives. They succeed by using osteoarthritis treatment strategies, such as the following:

- Pain relief medications
- Rest and exercise
- Patient education and support programs
- Learning self-care and having a "good-health attitude."
Most joints—the place where two moving bones come together—are designed to allow smooth movement between the bones and to absorb shock from movements like walking or repetitive movements. The joint is made up of:

- **Cartilage**: a hard but slippery coating on the end of each bone. Cartilage breaks down and wears away in osteoarthritis.

- **Joint capsule**: a tough membrane sac that holds all the bones and other joint parts together.

- **Synovium**: a thin membrane inside the joint capsule.

- **Synovial fluid**: a fluid that lubricates the joint and keeps the cartilage smooth and healthy.

- **Ligaments, tendons, and muscles**: tissues that keep the bones stable and allow the joint to bend and move.
In a healthy joint, the ends of bones are encased in smooth cartilage. Together, they are protected by a joint capsule lined with a synovial membrane that produces synovial fluid. The capsule and fluid protect the cartilage, muscles, and connective tissues.
With osteoarthritis, the cartilage becomes worn away. Spurs grow out from the edge of the bone, and synovial fluid increases. Altogether, the joint feels stiff and sore.
How Do You Know if You Have Osteoarthritis?

- Usually, osteoarthritis comes on slowly
- Early in the disease, joints may ache after physical work or exercise
- Osteoarthritis can occur in any joint
- Most often it occurs at the hands, knees, hips, or spine.
How Do You Know if You Have Osteoarthritis?

- **Hands:**
  - Osteoarthritis of the fingers has some hereditary characteristics.
  - More common in women especially after menopause.
  - In osteoarthritis, small, bony knobs appear on the end joints of the fingers (Heberden's nodes) and on middle joints of fingers (Bouchard's nodes).
  - Fingers can become enlarged and they may ache or be stiff and numb.
  - The base of the thumb joint also is commonly affected by osteoarthritis.
  - Osteoarthritis of the hands can be helped by medications, splints, or heat treatment.
How Do You Know if You Have Osteoarthritis?

- **Knees:**
  - Because knees are the body's primary weight-bearing joints, they are among the joints most commonly affected by osteoarthritis.
  - They may be stiff, swollen, and painful, making it hard to walk, climb, and get in and out of chairs.
  - If not treated, osteoarthritis in the knees can lead to disability.
  - Medications, weight loss, exercise, and walking aids can reduce pain and disability.
  - In severe cases, knee replacement surgery may be helpful.
How Do You Know if You Have Osteoarthritis?

- **Hips:**
  - Hip osteoarthritis can cause pain, stiffness, and severe disability.
  - Pain can be noted in groin, inner thigh, buttocks, or knees.
  - Walking aids, such as canes or walkers, can reduce stress on the hip.
  - Hip osteoarthritis may limit moving and bending. It can make daily activities such as dressing and foot care a challenge.
  - Walking aids, medication, and exercise can help relieve pain and improve motion.
  - Hip replacement may be advisable if the pain is severe and not relieved by other methods
How Do You Know if You Have Osteoarthritis?

- **Spine:**
  - Stiffness and pain in the neck or in the lower back can result from osteoarthritis of the spine.
  - Weakness or numbness of the arms or legs also can result.
  - Some people feel better when they sleep on a firm mattress or sit using back support pillows. Others find it helps to use heat treatments or to follow an exercise program that strengthens the back and abdominal muscles.
  - In severe cases, surgery may reduce pain and help restore function.
The Warning Signs of Osteoarthritis

- Steady or intermittent **pain** in a joint
- **Stiffness** in a joint after getting out of bed or sitting for a long time
- **Swelling** or **tenderness** in one or more joints
- **Crunching feeling** or the sound of bone rubbing on bone
- **Hot, red, or tender?** Probably not osteoarthritis. Check for other causes, such as rheumatoid arthritis.
- **Pain?** Not always. In fact, only a third of people whose x-rays show evidence of osteoarthritis report pain or other symptoms.
Cartilage: The Key to Healthy Joints

- Cartilage is 65 to 80% water. Three other components make up the rest of cartilage tissue:
  - **Collagen**: a fibrous protein, building block of skin, tendon, bone, and other connective tissues.
  - **Proteoglycans**: a combination of proteins and sugars. Strands of proteoglycans and collagen weave together and form a mesh-like tissue. This allows cartilage to flex and absorb physical shock.
  - **Chondrocytes**: cells that are found all through the cartilage. They mainly help cartilage stay healthy and grow. Sometimes, however, they release substances called enzymes that destroy collagen and other proteins.
How is Osteoarthritis Diagnosed?

- No single test can diagnose osteoarthritis. Usually a combination of the following methods are used to diagnose the disease and rule out other conditions:

  - **Clinical history:**
    - Symptoms—pain, stiffness and joint function
    - Function—how the condition affects the patient's work and daily life.

  - **Physical examination:**
    - patient's general health
    - neurology exam and muscle strength.
    - joint exam
    - judging ability to walk, bend, and carry out activities of daily living.
How is Osteoarthritis Diagnosed?

- **X rays:**
  - Taken to see how much joint damage has been done.
  - X-rays of affected joint can show cartilage loss, bone damage, and bone spurs.
  - Often a big difference between the severity of osteoarthritis as shown by the x-ray and the degree of pain and disability felt by the patient is noted.
  - X-rays may not show early osteoarthritis damage, before much cartilage loss has taken place.

- **Other tests:**
  - Blood tests are ordered to rule out other causes of symptoms.
  - Another common test is joint aspiration, which involves drawing fluid from the joint for examination.
How is Osteoarthritis Diagnosed?

- Usually not difficult to tell if a patient has osteoarthritis. It is more difficult to tell if the disease is causing the patient's symptoms.

- Osteoarthritis is so common--especially in older people--that symptoms seemingly caused by the disease actually may be due to other medical conditions.

- Attempts are made to determine what is causing the symptoms by ruling out other disorders and identifying conditions that may make the symptoms worse.

- Severity of symptoms in osteoarthritis is influenced greatly by the patient's attitude, anxiety, depression, and daily activity level.
How is Osteoarthritis Treated?

- Most successful treatment programs involve a combination of treatments tailored to the patient's needs, lifestyle, and health.

- Osteoarthritis treatment has four general goals:
  - Improve joint care through rest and exercise.
  - Maintain an acceptable body weight.
  - Control pain with medicine and other measures.
  - Achieve a healthy lifestyle.
Treatment Approaches to Osteoarthritis

- Exercise
- Weight control
- Rest and joint care
- Pain relief techniques
- Medicines
- Alternative therapies
- Surgery
Treatment Approaches to Osteoarthritis

- Osteoarthritis treatment plans often include ways to manage pain and improve function.
- Such plans can involve exercise, rest and joint care, pain relief, weight control, medicines, surgery, and nontraditional treatment approaches.
Treatment Approaches to Osteoarthritis

- **Exercise:**
  - Research shows that exercise is helpful for osteoarthritis.
  - Exercise can improve mood, decrease pain, increase flexibility, improve blood flow, maintain weight, and promote general physical fitness.
  - Exercise is inexpensive and, if done correctly, has few negative side effects.
  - Amount and form of exercise will depend on which joints are involved, how stable the joints are, and whether a joint replacement has already been done.
On the Move: Fighting Osteoarthritis
With Exercise

- Exercises are be used to keep patient strong and limber, extend range of movement, and reduce weight.
- Some different types of exercise include the following:

  **Strength exercises:** These can be performed with exercise bands, inexpensive devices that add resistance.

  **Aerobic activities:** These keep lungs and circulation systems in shape.

  **Range of motion activities:** These keep joints limber.

  **Agility exercises:** These can help maintain daily living skills.

  **Neck and back strength exercises:** These can help keep spine strong and limber.
On the Move: Fighting Osteoarthritis
With Exercise

- Important for patient to ask for guidelines on exercising when a joint is sore or if swelling is present.
- Pain-relieving drugs, such as analgesics or anti-inflammatories, may make exercising easier.
- Use of ice after exercise may be helpful.
Treatment Approaches to Osteoarthritis

- **Rest and joint care:**
  - Treatment plans include regularly scheduled rest.
  - Patients must learn to recognize the body's signals, and know when to stop or slow down, which prevents pain caused by overexertion.
  - Some patients find that relaxation techniques, stress reduction, and biofeedback help.
  - Canes/splints can protect joints and relieve pressure on them.
  - Splints/braces provide extra support for weakened joints. They keep joint in proper position during sleep or activity.
  - Splints should be used only for limited periods because joints and muscles need to be exercised to prevent stiffness and weakness.
Treatment Approaches to Osteoarthritis

- **Non-drug pain relief:**
  - People with osteoarthritis may find non-drug ways to relieve pain.
  - Warm towels, hot packs, or a warm bath or shower to apply moist heat to the joint can relieve pain and stiffness.
  - Cold packs (a bag of ice or frozen vegetables wrapped in a towel) can relieve pain or numb the sore area.
  - Water therapy in a heated pool or whirlpool also may relieve pain and stiffness.
  - For osteoarthritis in the knee, patients may wear insoles or cushioned shoes to redistribute weight and reduce joint stress.
Treatment Approaches to Osteoarthritis

- **Weight control:**
  - Osteoarthritis patients who are overweight or obese need to lose weight.
  - Weight loss can reduce stress on weight-bearing joints and limit further injury.
  - A dietitian can help patients develop healthy eating habits. A healthy diet and regular exercise help reduce weight.
Treatment Approaches to Osteoarthritis

**Medicines:**
- Medications are prescribed to eliminate or reduce pain and to improve functioning.
- A number of factors are used choosing medicines for patients with osteoarthritis.
- Two important factors are the intensity of the pain and the potential side effects of the medicine.
- Patients must use medicines carefully and tell their doctors about any changes that occur.
Treatment Approaches to Osteoarthritis

- **Acetaminophen:**
  - Pain reliever that does not reduce swelling.
  - Does not irritate the stomach and is less likely than nonsteroidal anti-inflammatory drugs (NSAIDs) to cause long-term side effects.
  - Research has shown that acetaminophen relieves pain as effectively as NSAIDs for many patients with osteoarthritis.
  - **Warning:** People with liver disease, people who drink alcohol heavily, and those taking blood-thinning medicines or NSAIDs should use acetaminophen with caution.
Treatment Approaches to Osteoarthritis

**NSAIDs (nonsteroidal anti-inflammatory drugs):**
- Many NSAIDs are used to treat osteoarthritis.
- OTC (aspirin, Advil, Motrin IB, Aleve, ketoprofen) or prescription.
- All fight inflammation and relieve pain.
- Each is a different chemical with slightly different effect on the body.
- **Side effects:**
  - stomach irritation
  - affect kidney function.
- Many other drugs cannot be taken when a patient is being treated with NSAIDs because of way that they alter the way the body uses or eliminates these other drugs.
- Occasional serious gastrointestinal problems, including ulcers, bleeding, and perforation of the stomach or intestine.
- People over age 65 and those with any history of ulcers or gastrointestinal bleeding should use NSAIDs with caution.
Treatment Approaches to Osteoarthritis

**COX-2 inhibitors:**

- Several new NSAIDs from a class of drugs known as COX-2 inhibitors are now being used to treat osteoarthritis.
- These medicines reduce inflammation similarly to traditional NSAIDs, but they cause fewer gastrointestinal side effects.
- However, these medications occasionally are associated with harmful reactions ranging from mild to severe.
Treatment Approaches to Osteoarthritis

- **Other medications:**
  - *Topical pain-relieving creams, rubs, and sprays* (for example, capsaicin cream)
  - *Mild narcotic painkillers*, which--although very effective--may be addictive and are not commonly used.
  - *Corticosteroids*, powerful anti-inflammatory hormones made naturally in the body or manmade for use as medicine.
    - May be injected into the affected joints to temporarily relieve pain.
    - Short-term measure, generally not recommended for more than two or three treatments per year.
    - Oral corticosteroids should not be used.
  - *Hyaluronic acid*, a medicine for joint injection, used to treat osteoarthritis of the knee. This substance is a normal component of the joint, involved in joint lubrication and nutrition.
Treatment Approaches to Osteoarthritis

- Because of side effects, patients need to learn about the medicines they take. Even nonprescription drugs should be checked.

- Patients at high risk for side effects from NSAIDs:
  - history of peptic ulcers or digestive tract bleeding
  - people taking oral corticosteroids or anticoagulants (blood thinners)
  - smokers
  - people who consume alcohol.

- Some patients may be able to help reduce side effects by taking some medicines with food.

- Others should avoid stomach irritants such as alcohol, tobacco, and caffeine.

- Some patients try to protect their stomachs by taking other medicines that coat the stomach or block stomach acids.
Treatment Approaches to Osteoarthritis

- **Surgery:**
  - Can help relieve the pain and disability of osteoarthritis.
  - Surgery may be performed to:
    - Remove loose pieces of bone and cartilage from the joint if they are causing mechanical symptoms of buckling or locking
    - Reposition bones
    - Replace joints
**Treatment Approaches to Osteoarthritis**

- **Surgeons may replace affected joints with prostheses.**
  - metal alloys, high-density plastic, and ceramic material
  - joined to bone surfaces by special cements.
  - last 10 to 15 years or longer.
  - About 10 percent of artificial joints may need revision.
  - Surgeons choose the design and components of prostheses according to their patient's weight, sex, age, activity level, and other medical conditions.

- **Decision to use surgery depends on level of disability, intensity of pain, interference with the patient's lifestyle, patient's age, and occupation.**

- **Currently, more than 80% of osteoarthritis surgery cases involve replacing the hip or knee joint.** After surgery and rehabilitation, patient usually feels less pain/swelling, and can move easier.
Treatment Approaches to Osteoarthritis

Nontraditional Approaches:

- **Acupuncture**: Preliminary research shows that acupuncture may be a useful component in a treatment plan.

- **Folk remedies**:
  - copper bracelets, drinking herbal teas, and taking mud baths.
  - not harmful, some can be expensive.
  - can cause delays in seeking medical treatment.
  - to date, no scientific research shows these approaches to be helpful in treating osteoarthritis.

- **Nutritional supplements**: Nutrients such as glucosamine and chondroitin sulfate have been reported to improve the symptoms of people with osteoarthritis, as have certain vitamins. Additional studies are being carried out to further evaluate these claims.
Health Professionals Who Treat Osteoarthritis

- Primary care physicians
- Rheumatologists
- Orthopaedists.
- Physical therapists.
- Occupational therapists
- Dietitians
- Nurse educators.
- Psychiatrists (rehabilitation specialists)
- Licensed acupuncture therapists
- Psychologists
- Social workers
Self-Management Programs Do Help

People with osteoarthritis find that self-management programs help them:

- Understand the disease
- Reduce pain while remaining active
- Cope physically, emotionally, and mentally
- Have greater control over the disease
- Build confidence in their ability to live an active, independent life.
Three kinds of programs help people learn about osteoarthritis, learn self-care, and improve their good-health attitude. These programs include:

- Patient education programs
- Arthritis self-management programs
- Arthritis support groups

These programs teach people about osteoarthritis, its treatments, exercise and relaxation, patient and health care provider communication, and problem solving. Research has shown that these programs have long-lasting benefits.
Exercise

- Regular physical activity plays a key role in self-care and wellness.
- Two types of exercise are important in osteoarthritis management:
  - *Therapeutic exercises*, which keep joints working as well as possible.
  - *Aerobic conditioning exercises*, which improve strength and fitness, and control weight.
- Patients should be realistic when they start exercising. They should learn how to exercise correctly, because exercising incorrectly can cause problems.
- Most people with osteoarthritis exercise best when their pain is least severe. Start with an adequate warmup and begin exercising slowly. Resting frequently ensures a good workout. It also reduces the risk of injury.
- A physical therapist can evaluate how a patient's muscles are working. This information helps the therapist develop a safe, personalized exercise program to increase strength and flexibility.
Many people enjoy sports or other activities in their exercise program. Good activities include swimming and aquatic exercise, walking, running, biking, cross-country skiing, and using exercise machines and exercise videotapes.

People with osteoarthritis should check with their doctor or physical therapist before starting an exercise program. Health care providers will suggest what exercises are best, how to warm up safely, and when to avoid exercising a joint affected by arthritis.

Pain medications and applying ice after exercising may make exercising easier.
Exercises for Osteoarthritis

People with osteoarthritis should do different kinds of exercise for different benefits to the body.
Making the most of good health requires careful attention to the body, mind, and spirit.

People with osteoarthritis must plan and develop daily routines that maximize their quality of life and minimize disability.

They need to evaluate these routines periodically to make sure they are working well.

Good health also requires a positive attitude. People must decide to make the most of things when faced with the challenges of osteoarthritis. This attitude--a good-health mindset--doesn't just happen. It takes work, every day.
Enjoy a "Good-Health Attitude"

- Focus on abilities instead of disabilities.
- Focus on strengths instead of weaknesses.
- Break down activities into small manageable tasks.
- Incorporate fitness and nutrition into daily routines.
- Develop methods to minimize and manage stress.
- Balance rest with activity.
- Develop a support system of family, friends, and health professionals.
Current Research

- A leading role in osteoarthritis research is played by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
- Established Specialized Centers of Research devoted to osteoarthritis
- These centers conduct basic, laboratory, and clinical research aimed at understanding the causes, treatment options, and prevention of arthritis and musculoskeletal diseases.
- Center researchers also study epidemiology, health services, and professional, patient, and public education.
- NIAMS also supports multidisciplinary clinical research centers that expand clinical studies for diseases like osteoarthritis.
Current Research

- For years, scientists thought that osteoarthritis was a disease of "wear and tear" that occurred in joints as people got older.
- In the last decade, however, research has shown that there is more to the disorder than aging alone.
- The production, maintenance, and breakdown of cartilage, as well as bone changes in osteoarthritis, are now seen as a series or cascade of events.
- Many researchers are trying to discover where in that cascade of events things go wrong.
- By understanding what goes wrong, they hope to find new ways to prevent or treat osteoarthritis.
Current Research

- **Animal Models:**
  - Animals help researchers understand how diseases work and why they occur.
  - Animal models help researchers learn many things about osteoarthritis, such as what happens to cartilage, how treatment strategies might work, and what might prevent the disease.
  - Animal models also help scientists study osteoarthritis in very early stages before it causes detectable joint damage.
Current Research

**Diagnostic Tools:**
- Scientists want to find ways to detect osteoarthritis at earlier stages so that it can be treated earlier.
- Seeking specific abnormalities in the blood, joint fluid, or urine.
- Using new technologies to analyze the differences between cartilage from different joints. For example, many people have osteoarthritis in the knees or hips, but few have it in the ankles. Can ankle cartilage be different?

- **Addressing these issues may help in understanding of the disease.**
Current Research

**Genetics Studies:**

- Researchers suspect that inheritance plays a role in 25-30% of osteoarthritis cases.
- Genetics may play a role in 40-65% of hand and knee osteoarthritis cases.
- Suspected that inheritance might play a role in other types of osteoarthritis, as well.
- Scientists have identified a gene defect affecting collagen, an important part of cartilage, in patients with an inherited kind of osteoarthritis that starts at an early age. The mutation weakens collagen protein, which may break or tear more easily under stress.
- Scientists are looking for other gene mutations in osteoarthritis. Recently, researchers found that the daughters of women who have knee osteoarthritis have a significant increase in cartilage breakdown, thus making them more susceptible to disease. In the future, a test to determine who carries the genetic defect (or defects) could help people reduce their risk for osteoarthritis with lifestyle adjustments.
Current Research

- **Tissue Engineering:**
  - This technology involves removing cells from a healthy part of the body and placing them in an area of diseased or damaged tissue in order to improve certain body functions.
  - Currently, it is used to treat small traumatic injuries or defects in cartilage, and, if successful, could eventually help treat osteoarthritis.
  - Three types of tissue engineering are under study:
    - cartilage cell replacement
    - stem cell transplantation
    - gene therapy.
Current Research

- **Cartilage cell replacement:**
  - In this procedure, cartilage cells are removed from the patient's own joint and then cells are cloned or new cells are grown using tissue culture and other laboratory techniques.
  - Newly grown cells are injected into the patient's joint.
  - Patients with cartilage cell replacement have fewer symptoms of osteoarthritis.
  - Actual cartilage repair is limited.
Stem cell transplantation:

- Stem cells are primitive cells that can transform into other kinds of cells, such as muscle or bone cells.
- They usually are taken from bone marrow.
- In the future, researchers hope to insert stem cells into cartilage, where the cells will make new cartilage.
- If successful, this process could be used to repair damaged cartilage and avoid the need for surgical joint replacements with metal or plastics.
**Current Research**

- **Gene therapy:**
  - Scientists are working to genetically engineer cells that would inhibit the body chemicals, called enzymes, that may help break down cartilage and cause joint damage.
  - In gene therapy, cells are removed from the body, genetically changed, and then injected back into the affected joint. They live in the joint and protect it from damaging enzymes.
Effective treatment for osteoarthritis takes more than medicine or surgery.

Getting help from a variety of care professionals often can improve patient treatment and self-care.

Research shows that adding patient education and social support is a low-cost, effective way to decrease pain and reduce the amount of medicine used.
Comprehensive Treatment Strategies

Exercise plays a key part in comprehensive treatment. Researchers are studying exercise in greater detail and finding out just how to use it in treating or preventing osteoarthritis. For example, several scientists have studied knee osteoarthritis and exercise. Their results included the following:

- Strengthening the thigh muscle (quadriceps) can relieve symptoms of knee osteoarthritis and prevent more damage.
- Walking can result in better functioning, and the more you walk, the farther you will be able to walk.
- People with knee osteoarthritis who were active in an exercise program feel less pain. They also function better.
Comprehensive Treatment Strategies

- Research has shown that losing extra weight can help people who already have osteoarthritis.
- Overweight or obese people who do not have osteoarthritis may reduce their risk of developing the disease by losing weight.
Comprehensive Treatment Strategies

**Using NSAIDs:**

- Many people who have osteoarthritis have persistent pain despite taking simple pain relievers such as acetaminophen.
- Some of these patients take NSAIDs instead.
- Health care providers are concerned about long-term NSAID use because it can lead to an upset stomach, heartburn, nausea, and more dangerous side effects, such as ulcers, hypertension and myocardial infarctions.
Comprehensive Treatment Strategies

Drugs to Prevent Joint Damage:

- No treatment actually prevents osteoarthritis or reverses or blocks the disease process once it begins. Present treatments just relieve the symptoms.
- Researchers are looking for drugs that would prevent, slow down, or reverse joint damage.
  - One experimental antibiotic drug, doxycycline, may stop certain enzymes from damaging cartilage. The drug has shown some promise in clinical studies, but more studies are needed.
  - Researchers also are studying growth factors and other natural chemical messengers. These potential medicines may be able to stimulate cartilage growth or repair.
Comprehensive Treatment Strategies

- **Acupuncture:**
  - During an acupuncture treatment, a licensed acupuncture therapist inserts very fine needles into the skin at various points on the body.
  - Scientists think the needles stimulate the release of natural, pain-relieving chemicals produced by the brain or the nervous system.
  - Researchers are studying acupuncture treatment of patients who have knee osteoarthritis. Early findings suggest that traditional Chinese acupuncture is effective for some patients as an additional therapy for osteoarthritis, reducing pain and improving function.
Nutritional Supplements:

- Nutritional supplements are often reported as helpful in treating osteoarthritis.
- Such reports should be viewed with caution, however, since very few studies have carefully evaluated the role of nutritional supplements in osteoarthritis.
Comprehensive Treatment Strategies

- **Glucosamine and chondroitin sulfate:**
  - Both of these nutrients are found in small quantities in food and are components of normal cartilage.
  - Scientific studies on these two nutritional supplements have not yet shown that they affect the disease.
  - They may relieve symptoms and reduce joint damage in some patients, however.
  - Patients using this therapy should do so only under the supervision of their doctor, as part of an overall treatment program with exercise, relaxation, and pain relief.
Comprehensive Treatment Strategies

- **Vitamins D, C, E, and beta carotene:**
  - The progression of osteoarthritis may be slower in people who take higher levels of vitamin D, C, E, or beta carotene.
  - More studies are needed to confirm these reports.
*Hyaluronic Acid:*

- Injecting this substance into the knee joint provides long-term pain relief for some people with osteoarthritis.
- Hyaluronic acid is a natural component of cartilage and joint fluid. It lubricates and absorbs shock in the joint.
- The Food and Drug Administration (FDA) approved this therapy for patients with osteoarthritis of the knee who do not get relief from exercise, physical therapy, or simple analgesics.
- Researchers are presently studying the benefits of using hyaluronic acid to treat osteoarthritis.
Comprehensive Treatment Strategies

*Estrogen:*

- In studies of older women, scientists found a lower risk of osteoarthritis in women who had used oral estrogens for hormone replacement therapy.
- The researchers suspect having low levels of estrogen could increase the risk of developing osteoarthritis.
- Additional studies are needed to answer this question.
Hope for the Future

- Research is opening up new avenues of treatment for people with osteoarthritis.
- A balanced, comprehensive approach is still the key to staying active and healthy with the disease.
- People with osteoarthritis should combine exercise, relaxation education, social support, and medicines in their treatment strategies.
- Meanwhile, as scientists unravel the complexities of the disease, new treatments and prevention methods should appear. They will improve the quality of life for people with osteoarthritis and their families.