FACT SHEET

Osteoarthritis

NATIONAL INSTITUTES OF HEALTH

Osteoarthritis, the most common form of arthritis, affects approximately 27 million Americans. A degenerative disease, it is caused by a breakdown of cartilage (the tissue that covers the ends of bones where they form a joint). Healthy cartilage allows bones to glide over one another, and it absorbs energy from the shock of physical movement. In osteoarthritis, the surface layer of cartilage breaks down and wears away. This results in bones under the cartilage rubbing together, causing pain, swelling, and stiffness. Bone spurs develop, permanently changing the joint's shape.

Yesterday

Osteoarthritis was viewed as an inevitable consequence of aging or injury, about which little could be done.

- Patients were told to rest their joints by avoiding exercise.
- For pain relief, patients took aspirin or, beginning in the mid-1970s, nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen.
- Early artificial knees were constructed like hinges, and did not permit knees to rotate or bend naturally. As a result, many implants loosened shortly after surgery.
- Patients between 60 and 75 years of age were the best candidates for total knee replacement surgery, as they were not expected to require a second implant.
- Although hip replacement surgeries were more successful than knee replacement surgeries, they were reserved only for the most seriously disabled patients. In 1982, approximately 75,000 total hip replacements were being performed annually in the United States.

Today

Although osteoarthritis is common in Americans 65 years of age or older, osteoarthritis is known to be caused by more than age-associated "wear-and-tear" on the joints.

- Researchers now know that injuries to a joint—whether through sports, accidents, or even daily living—can lead to joint degeneration. Some former professional football and soccer players, for example, require knee and hip replacements in their early forties and fifties. Researchers are beginning to appreciate that structural differences of the knee joint and thigh muscles, differences in the ways male and female athletes move, and other sex differences explain why women are more susceptible to anterior cruciate ligament injuries than men. They are also developing strategies to identify young female athletes who could benefit from interventions to prevent these injuries.
- Certain genetic mutations also predispose individuals to develop osteoarthritis. As NIH-funded researchers continue work in this area, the discovery of genetic variants that protect against or increase a person's risk of developing osteoarthritis may suggest targets for the development of disease modifying agents.
- An NIH-funded study demonstrated that smokers who have osteoarthritis have more severe joint pain and a greater degree of cartilage degradation than nonsmokers with osteoarthritis.
- Although people who are overweight are at an increased risk of developing osteoarthritis, the longstanding NIH-supported Framingham Study recently demonstrated that overweight people who walked or jogged regularly were no more or less likely to have osteoarthritic joint damage than their overweight, sedentary peers.
- Instead of rest, moderate exercise is suggested for patients as part of their therapy. NIH-funded clinical trials showed that exercise reduces joint pain and stiffness, and increases flexibility, muscle strength, cardiac fitness, and endurance. It also helps with weight reduction and contributes to an improved sense of well-being.
- Development of longer-lasting materials and design of artificial joints that more closely mimic the natural movement of the knee are making total knee replacements more popular and better suited for younger, more active patients who have osteoarthritis. In 2006, approximately 542,000 total knee replacement surgeries were performed in the United States.

- Despite the notable benefits of total knee replacement surgery, black and Asian patients are less likely than their white counterparts to elect to have the procedure. NIH-funded investigators have shown that disparities among racial groups persist even when comparing Medicare enrollees who have osteoarthritis and live in the same or similar neighborhoods. The finding that race is more important than factors attributable to socioeconomic status is a first step toward developing strategies to improve access to knee replacement surgeries, and to help all patients make informed decisions about osteoarthritis treatment.
- Surgical advances have made hip replacements safer for older patients, many of whom have other conditions that previously would have made them ineligible for the procedure. Of the approximately 254,000 hip replacement surgeries performed in the United States in 2000, almost half were in patients over 75 years of age.
- In the mid-1990s, NIH-funded investigators concluded that, over the life expectancy of an artificial hip, medical costs associated with a hip replacement were considerably less than the costs incurred had a patient opted for non-surgical treatment. In 2009, NIH-funded researchers drew a similar conclusion for total knee replacement procedures.
- If a person needs two knee replacement surgeries because of severe arthritis in each leg, replacing both joints at the same time is no more risky than spacing the procedures so the patient can recover between the first and second operations.
- The development of less-invasive surgical approaches and preoperative regimens has led to decreased hospital stays and recovery time. For example, NIH researchers demonstrated that osteoarthritis patients who participated in an exercise program before receiving an artificial knee or hip were more likely to return home instead of going to an inpatient rehabilitation facility immediately after leaving the hospital, a finding that is likely to have profound cost-savings if widely adopted.

Tomorrow

By 2030, an estimated 20 percent of Americans—about 70 million people—will have passed their 65th birthday and will be at increased risk for osteoarthritis. Over the next 2 decades, however, advances from NIH-funded research may enable many of these individuals to be spared the pain and disability that osteoarthritis causes today.

- Biomedical researchers and physicists are continuing to develop new materials for hip and knee replacements, so patients in the future can avoid the wear and tear on implants that lead to additional surgeries.
- Investigators are developing strategies that clinicians can use to monitor a person's recovery after an injury. Patients can reinjure themselves if they stress an injured joint before it has fully healed but, at present, physicians cannot accurately determine when patients can safely resume activities.
- One barrier to the development of drugs that block joint degradation is the lack of objective, measurable standards for disease progression by which new drugs can be evaluated. To overcome this problem, the NIH—with input from the U.S. Food and Drug Administration—has partnered with private sponsors to create the Osteoarthritis Initiative (http://www.niams.nih.gov/Funding/Funded_Research/Osteoarthritis_Initiative/default.asp), featuring a publicly available research resource that investigators can use to identify and evaluate osteoarthritis biomarkers. In this case, a biomarker would be a physical sign or biological substance that could be used in clinical studies to monitor changes in joint health.
- NIH-supported researchers are testing approaches for engineering healthy pieces of cartilage that would replace damaged tissue following injury before joint damage occurs. Because the replacement tissue would be grown from cells taken directly from the patient, the new cartilage could be transplanted back into the patient without any risk of rejection.
- With NIH support, investigators are exploring tissue banking and cartilage storage technologies so that more people can benefit from cartilage transplants.

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