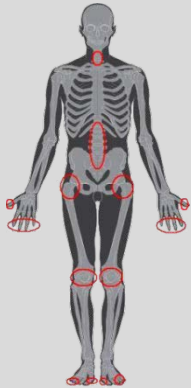


Research Priorities for the Unified Orthopaedic Research Agenda

The mission of the Unified Orthopaedic Research Agenda is to advance science and research in orthopaedic care through a unified research strategy. Continued and additional funding of these research priorities is necessary to improve function and mobility and reduce the socioeconomic burden of musculoskeletal disorders.

Musculoskeletal diseases are the most common health condition in the United States.



Musculoskeletal disorders and diseases are the leading cause of disability in the United States and account for more than half of all chronic conditions in people over 50 years of age in developed countries. The economic impact of these conditions is staggering. For the years 2004-2006 the sum of the direct expenditures in health care costs and the indirect expenditures in lost wages has been estimated to be \$950 billion annually, or 7.4% of the national gross domestic product. The aging boomer generation (persons born between 1946 and 1964), accounts for an increasingly greater proportion of total musculoskeletal disease treatment cost and lost wages, a trend that will continue for the next several decades. One in two adults reported a chronic musculoskeletal condition in 2008, nearly twice the rate of reported chronic circulatory (heart) or respiratory conditions. Orthopaedic surgery is a medical specialty that preserves and restores the structure and function of bones, joints, muscles, and other associated structures by medical, surgical, and physical methods.

Priorities Relevant to All Orthopaedic Research

- Patient safety and healthcare quality
- Creating value through orthopaedic care
- Eliminating disparities in access to and the outcomes of musculoskeletal care

Orthopaedic Conditions with the Greatest Burden of Disease

- Arthritis and cartilage injuries
- Spinal disorders, neck and back pain
- Muscle, tendon, ligament, and nerve injuries
- Osteoporosis and bone fragility, especially fractures in the elderly and those caused by cancer
- Major limb trauma/high-energy extremity injuries
- Childhood musculoskeletal conditions

Priorities for Strengthening Orthopaedic Research

- Train and increase diversity of the next generation of orthopaedic clinician investigators and basic scientists
- Support for interdisciplinary teams of orthopaedic scientists
- Support for scientific infrastructure

Patient Safety and Healthcare Quality

Orthopaedic surgeons support minimizing - with a goal of eliminating- all types of preventable surgical harms.

Creating Value Through Orthopaedic Care

In healthcare terms, value is defined as achieving the greatest improvement in health for every dollar that is spent. Specific research will address the most common and most debilitating orthopaedic ailments to society: Arthritis and Cartilage Injuries; Spinal Disorders, Neck and Back Pain; Muscle, Tendon, Ligament, and Nerve Injuries; Osteoporosis and Bone Fragility, especially fractures in the elderly and those caused by cancer; Major Limb Trauma/High-Energy Extremity Injuries; and Childhood Musculoskeletal Conditions. By studying how orthopaedic treatment can provide relief for these conditions, orthopaedic research will lead to improved overall health, and thereby, create greater value to society by contributing to a stronger work force, an increase in productivity, and an enhanced quality of life.

Arthritis and Cartilage Injuries

- Arthritis is the most common cause of adult disability and is among the leading conditions causing work limitations
 - Genetic, mechanical and biologic factors that cause arthritis need to be identified
 - Diagnostic tools that detect, predict, and track arthritis progression need to be developed
- By 2030, the number of persons with doctor-diagnosed arthritis is projected to increase by 40% over current levels to nearly 67 million, or 25% of the adult population
 - Strategies to prevent or delay arthritis and therapies to stop the development of arthritis following joint injury need to be developed and implemented

Spinal Disorders, Neck and Back Pain

- Lumbar / low back pain and cervical / neck pain are among the most common physical conditions requiring medical care and affecting an individual's ability to work and manage the daily activities of life
 - Diagnosis of spinal disorders, including the ability to localize the source of pain, evaluate motion segment instability, and evaluate the role of muscles and connective tissues on back pain, need to be improved
- Annually, 12-15% of the U.S. population (~44.4 million patients) will visit their physician with a complaint of back pain
 - The etiology of spinal pain and the role of medical, complementary, and surgical treatment needs to be studied

Muscle, Tendon, Ligament, and Nerve Injury

- Soft tissue injuries and conditions account for 2 million hospitalizations, 9 million bed days, 6.5 million outpatient visits, 18 million emergency room visits, 64 million physician's office visits, and over \$28 billion in costs annually
 - Biological or biomedical engineering approaches to restore muscle function and mobility must be studied
- Soft tissues, including ligaments, tendons, muscles and nerves, are vulnerable to damage from occupational accidents, sports and recreational injury, repeated overuse, and even normal everyday activities in susceptible individuals
 - Biological replacements for muscle, nerve, ligament, tendon, meniscus, and cartilage must be developed
- 9.5 million sports injuries per year in the U.S. involve soft tissues
 - Pathomechanics of soft tissue injury, focusing on prevention and the development of more effective protective strategies for particular sports and jobs where risks of physical impairment exist, must be studied

Osteoporosis and Bone Fragility, especially fractures in the elderly and those caused by cancer

- Nearly 57 million Americans suffer from osteoporosis, a disease characterized by low bone mass and deterioration of bone structure that causes bone fragility and increases the risk of fracture
 - Public education campaigns must be implemented to provide practical help for the maintenance of bone mass throughout the lifespan
- By 2020, over half of Americans over 50 are expected to have low bone mass or osteoporosis
 - Techniques to improve bone quality and strength must be advanced
- Primary and metastatic bone cancer is a major source of morbidity and mortality for patients
 - Improved pathologic fracture/prospective fracture care for cancer patients must be provided

Major Limb Trauma / High-Energy Extremity Injuries

- 60-67% of injuries that occur annually involve the musculoskeletal system
 - Biologic treatments to accelerate the normal fracture healing process, including the use of growth factors and cell therapies, need to be developed
- Fractures represent 25% of self-reported musculoskeletal injuries; over 16.2 million fractures are treated annually
 - Improve techniques for the diagnosis and treatment of fractures that do not heal as expected (nonunions), including the use of growth factors and cell therapies
- Nearly 2 million people live with limb loss in the United States (all causes)
 - Guidelines for the care of amputees, including surgical techniques, pain control, rehabilitation and artificial limb development, must be established
 - Rehabilitation methods to enhance return to work and regular activities after major limb trauma must be refined

Childhood Musculoskeletal Conditions

- Approximately half of U.S. children will sustain a fracture
 - High quality research studies need to be conducted regarding the surgical and nonsurgical management of pediatric trauma, including the development of injury prevention programs
- Childhood obesity can have consequential effects on the bones and joints
 - Effects on the musculoskeletal system such as fracture risk, osteoarthritis, and bone density, need to be further studied
- Disorders of the growing skeleton can result in deformity, leg length abnormalities, or arthritis
 - Developmental biology of the musculoskeletal system in the child with an emphasis on bone and joint development needs to be examined, and orthopaedic devices appropriate for children and adolescents need to be designed
- Scoliosis, an abnormal curvature of the spine, can be treated with observation, bracing, or surgery
 - Causes and mechanisms of scoliosis need to be identified and optimal treatment methods must be defined

Burden of Disease data obtained from The Burden of Musculoskeletal Diseases in the United States, © 2011. www.boneandjointburden.org

**For more information, contact the
American Academy of Orthopaedic Surgeons**
www.aaos.org/research / researchinfo@aaos.org

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Contributing Societies: American Orthopaedic Society for Sports Medicine (AOSSM); American Shoulder and Elbow Surgeons (ASES); Cervical Spine Research Society (CSRS); The Hip Society; Musculoskeletal Tumor Society (MSTS); North American Spine Society (NASS); Orthopaedic Research Society (ORS); Pediatric Orthopaedic Society of North America (POSNA); and Scoliosis Research Society (SRS).