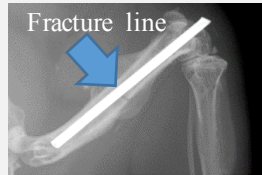


## FRACTURE HEALING



X-ray

*Healing of long bone fracture in a small animal model*

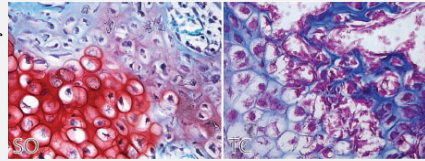
- Fracture healing is a complex process that can be affected by many factors, including complexity of the injury, age of the patient, and health/lifestyle.

- Translational models and clinical investigations are used to study the fracture healing process.

- Innovations exploring how age, fixation, vascularity, inflammation, and growth factors have allowed researchers to better understand how fracture calluses form and heal.

## MESENCHYMAL STEM CELLS (MSCs)

*Histology of differentiating MSCs*

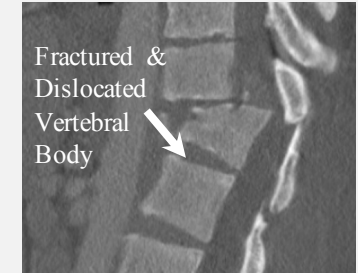


- Mesenchymal stem cells (MSCs) are integral to normal tissue repair and regeneration.
- NIH funding has led to the creation of exciting new stem cell therapies for treatment of orthopaedic disorders, including for use in cartilage regeneration, improved fracture healing outcomes, and cell-seeded scaffolds for grafts and tissue interfaces.
- Clinicians are eager to continue their quest for new treatments that are founded on the discoveries of members of the ORS.

## LOWER BACK PAIN

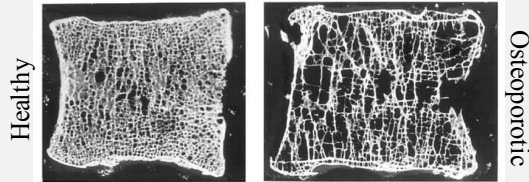
- Lower back and neck pain is a debilitating and prevalent condition and is an economic burden estimated at \$100-200 billion each year.

- Advancements have been made in imaging, instrumentation, and pain control for spine-related disorders.



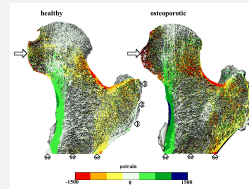
- Ongoing research by ORS scientists is aimed at using stem cells to replace degenerating discs, and by exploring the biology of disc tissues, defining new molecular targets for therapeutic agents that will prevent inflammation and slow tissue degeneration.

## OSTEOPOROSIS & ANTI-RESORPTIVE THERAPIES



- Osteoporosis leads to increased fracture risk because of bone resorption (i.e., loss) and/or improper bone remodeling.
- 1 in 3 women, and 1 in 7 men, are likely to suffer an osteoporotic fracture in their lifetime.
- Anti-resorptive therapies for osteoporosis, such as bisphosphonates and monoclonal antibodies, have been shown to cut fracture risk in patients by as much as 50%.
- ORS Members are engaged in cutting-edge research to study bone biology and approaches to prevent or treat excessive bone loss.

## ADVANCED IMAGING



*Computational modeling of the hip*

- Advances in imaging have transformed the field of orthopaedics, clinically and in research, by enabling 3D visualization of the body's musculoskeletal structures and their physiological function.
- Members of the ORS use quantitative imaging data to study musculoskeletal physiology and diseases, a process integral to development of new treatments and diagnostic technologies.
- Additional investment in imaging technology is needed to further improve treatments and help maintain independence of our aging population.

## JOINT REPLACEMENT THERAPY

*Total knee replacement*



- Total hip and knee replacement surgery is one of the most successful surgical procedures, providing patients with relief from pain and restoration of mobility.
- Over 700,000 knee and nearly 300,000 total hip replacements are performed each year, making it one of the most common hospital operations
- The success of joint surgery procedures has been the result of critical new discoveries made by members of the ORS working in fields that include bone biology, biomechanics, infection control, and material research.

**Musculoskeletal disorders and diseases are the leading cause of disability in the United States**

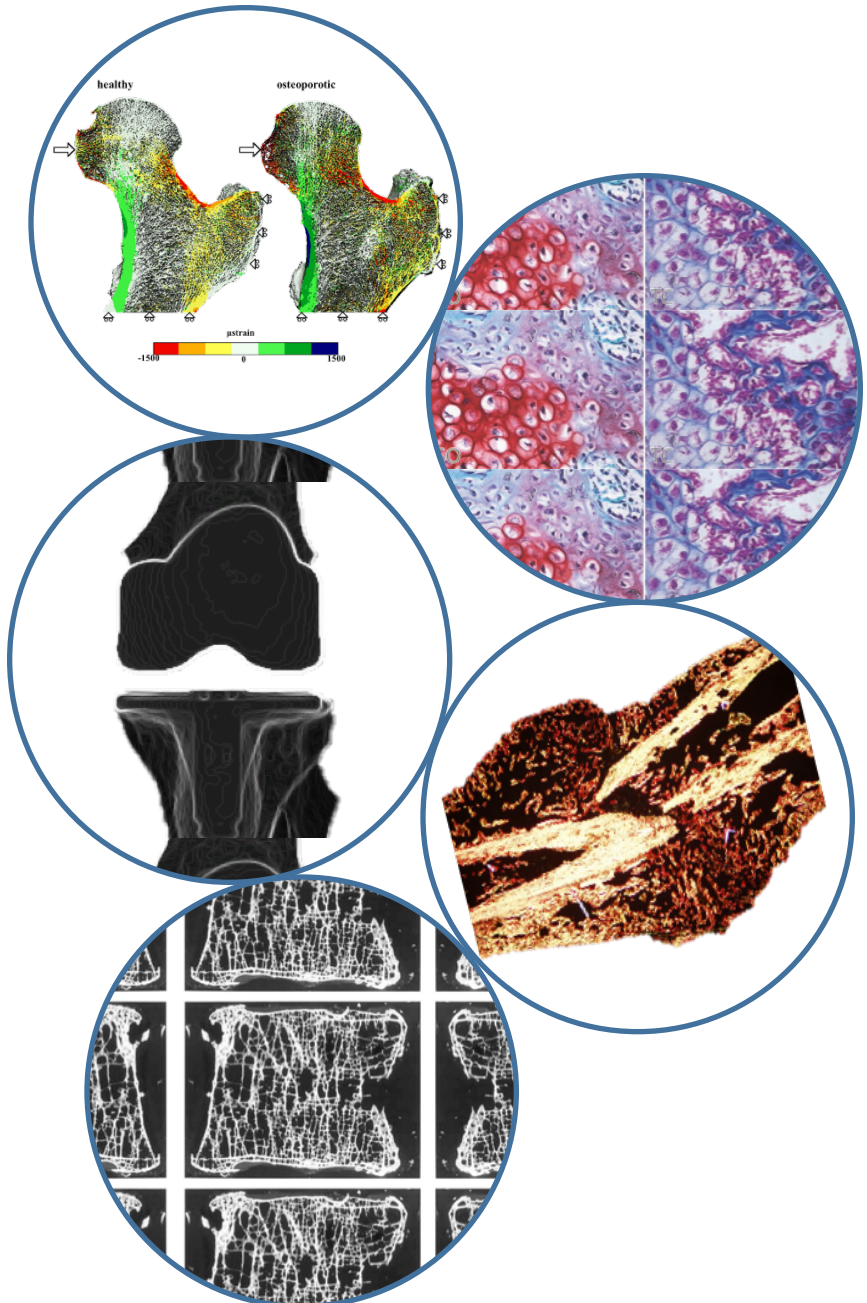
- The economic impact of musculoskeletal disorders is staggering: health care costs and lost wages were estimated to total \$849 billion dollars, or 7.7% of the national gross domestic product in 2004.

**The Orthopaedic Research Society is our nation's leading organization dedicated to solving complex challenges of patient treatment through research**

- The ORS promotes, supports, develops, and encourages research in surgery and musculoskeletal disease disciplines. Our vision is to transform the future of orthopaedic research through unique global multidisciplinary collaborations, focusing on the increasingly complex challenges of musculoskeletal disease and treatment.

**Federal support for musculoskeletal research has resulted in revolutionary advances in health care and sustained economic productivity for Americans**

- Grants from the National Institutes of Health (NIH), National Science Foundation (NSF), Department of Defense (DOD), National Institute of Standards and Technology (NIST), and other organizations have led to the development of stem cell therapies, management of osteoporosis, improvements in fracture treatment, total joint replacement, and advanced imaging technologies, to name a few.



Established in 1954, the Orthopaedic Research Society is home to over 2,900 basic scientists, engineers, and clinicians representing all fields of musculoskeletal research.

For more information on the Orthopaedic Research Society, visit [www.ors.org](http://www.ors.org)