

Ajit M.W. Chaudhari, Ph.D.

Over the past several decades, great advances have been made in the study of human movement biomechanics. We understand much more about the basic biomechanics of disease processes in musculoskeletal tissues and our research has assisted in the development of new devices and surgical techniques to improve treatment. Yet in many ways musculoskeletal medicine is still far behind many other medical disciplines in the development of evidence-based medicine. The impediments slowing the adoption of evidence-based practices have been multi-factorial, just like the disease and injury processes we are trying to treat and prevent. Three of the most important factors slowing the pace of translational advance in musculoskeletal medicine are the lack of quantitative outcome measures, the lack of emphasis on prevention of injury and disease, and too much focus on examining individual joints rather than examining the body as a complete interconnected system. I believe that by prioritizing research and development in these areas, we can make transformational changes in the way that we provide musculoskeletal care that will improve the lives of billions of people around the globe.

Quantitative Outcome Measures To Advance Evidence-Based Medicine: In musculoskeletal medicine, the adoption of evidence-based practices has historically been impeded by a lack of quantitative, objective, and user-friendly diagnostic tools. In fields such as cardiology, oncology, internal medicine, and obstetrics, practical diagnostic tools have been developed for early identification and differential diagnosis of diseases, as well as for prediction of potential complications or long-term sequelae of chosen treatment courses. This deficiency is due in part to the inherent differences between functional activities and the activities that can be performed as part of a physical examination in a clinical exam room. Under the current state of the art, quantitative analysis of functional activities are primarily performed in a specialized laboratory. However, due to time, space, and financial considerations this solution does not lend itself well to clinical care or research studies of large populations. Moreover, replication of more dynamic activities remains limited within the constraints of a laboratory environment. Development and application of methods that permit quick, inexpensive, and accurate measurement of human motion in natural and clinical environments will enable future large-scale randomized studies to identify risk factors and assist in personalized treatment planning for common musculoskeletal injuries and diseases.

Increased Emphasis on Prevention: Well functioning preventive programs should always be a focus in our healthcare system. Our current healthcare approach to most musculoskeletal problems is aimed at treatment, emphasizing surgery, pharmaceuticals, and rehabilitation. While we cannot ignore those who are suffering from disease, these treatments are extremely costly in both human and economic terms when compared to prevention measures. By bringing together specialists in such disciplines as kinesiology, orthopedic surgery, bioengineering, public health, internal medicine, and rehabilitation we can best leverage our individual strengths to generate new insights into the root causes of injuries and diseases and the means to prevent them. We aim to change the focus of musculoskeletal medicine from a reactive approach to a proactive personalized approach aimed at preventing injury occurrence and progression.

Interplay Of Whole Body In Musculoskeletal Problems: In the past, biomechanics studies have typically focused on understanding the motion and loading of a particular joint of interest, or at best the joint of interest plus adjacent joints. However, the activities of daily living that most influence quality of life require the coordination of the body as a whole to locomote, exercise, work, and play. Along with a broadened emphasis on using transdisciplinary teams to understand the interplay between neurology, physiology, biology, and biomechanics, we must also emphasize building transdisciplinary teams that understand the different components of the musculoskeletal system as well to understand the interplay between the upper extremity, lower extremity, head, and torso. It is only by studying the body from top to bottom as well as from the inside out that we can provide the evidence-based comprehensive care to prevent and treat musculoskeletal problems efficiently and effectively.