

Factors Affecting the Mechanical Behavior of Bone

by

Subrata Saha, Ph.D.

Research Professor & Director of Musculoskeletal Research
Department of Orthopaedic Surgery & Rehabilitation Medicine

Research Professor, Dept. Neurosurgery

Research Professor, Dept. Physiology & Pharmacology

SUNY Downstate Medical Center

450 Clarkson Ave., Box 30

Brooklyn, New York 11203

Office: 718-613-8652 / Fax: 718-270-3983

E-mail: subrata.saha@downstate.edu

ABSTRACT

The load carrying capacity of our skeletal system depends on the mechanical properties of bone which, in turn, is related to its density, mineral content and microstructure. Mechanical variables such as strain rate also affect the mechanical properties of bone. For many years, we have tested the mechanical properties of whole bones and bone tissue as a material. We have also investigated the relationships between the mechanical properties and the microstructural features (e.g., osteons, porosity and trabecular morphology) and bone mineral density. We have also developed mathematical models of the stress generated fluid flow in bone and the structural behavior of cancellous bone tissue. Results of these studies based on our work on cortical and cancellous bone tissue as well as whole bones (e.g., long bone and vertebra) will be presented.