SPINAL-OSTEOPOROSIS/OSTEOPENIA AND BIOMECHANICAL METHODS OF TREATMENT

Osteoporosis is a major public health threat for an estimated 44 million Americans. Much of the research that is currently underway involving spinal osteoporosis and the biomechanical treatments associated with it is focused on pedicle screw fixation. Although there is much good that comes from the research related to screw fixation, there are also many problems associated with it. One of the largest problems and sources of error in screw fixation is the bone used to test the devices on. Another problem with current research is the actual variation in severity of osteoporosis of the patients involved. The goal of this study was to develop an in vitro osteoporosis model that could be used to investigate various clinical treatments of the spine. The hypothesis being tested was that acetic acid could be used to manipulate bone densities in the test specimens. To accomplish this, 18 cancellous bone cores were treated with acetic acid for 0, 2, and 4 days. Following the treatment, the bone density of the cores was verified by a DXA scan, as seen in Figures 1 and 2.

Bone densities of the 0, 2, and 4-day specimens were further investigated by backscatter images as seen in Figure 3.

By means of the acetic acid treatment, the goals of decreased mineral content and decreased mechanical properties were achieved. This created an osteoporotic-like model that could be used for further testing to produce more reliable and consistent results. This model provides an opportunity for future testing with regards to continuing model development and new implant studies in osteoporosis research.