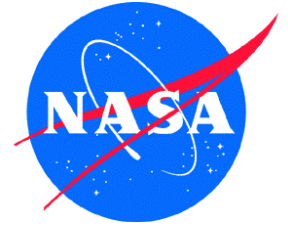


NASA INFORMATION

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Bone Loss

It has often been said that the best defense against osteoporosis and low bone mass is exercise and a balanced diet rich in calcium and Vitamin D. While osteoporosis is preventable for most people, an estimated 44 million adults who are 50 or older are considered at risk for the disease.

But thanks to NASA know-how, millions of Americans are coping with the disease better these days. While in space astronauts' bones become weak because they're not working against the Earth's gravity.

Weightlessness leads to the release of calcium, leaving the bones more brittle and weak. Risks include acceleration of age-related osteoporosis; fracture and impaired fracture healing; injury to soft connective tissue and joint cartilage; intervertebral disc rupture; and kidney stone formation.

It is unknown whether these changes continue at full strength or whether they can be totally reversed. Here at the Johnson Space Center, countermeasure research and technology efforts focus on diagnostic tools to monitor and measure critical parameters, including the cellular and molecular mechanisms of bone loss.

Because of the threat of bone loss in space, a Mechanical Response Tissue Analyzer was developed to measure bone mineral content, stiffness, bone strength and density. Fluorescent microscopy techniques have been developed to assess bone cell cultures and combat bone loss.

A new bone replacement material closely matching natural human bone is being developed to decrease implant replacement operations, hospitalization and stress for patients. Scientists are looking for bone replacement products that dissolve into the body as natural bone cells grow into the implant.

Prevention and rehabilitation involves pharmacological, exercise and nutritional regimens, artificial gravity options, and crew screening and selection criteria to identify at-risk individuals.