Sticks and stones break bones, but new study may prevent it

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The best way to prevent a fracture is to stop bones from reaching the point where they are prone to breaking, but understanding the process of how bones form and mature has been challenging. Now researchers at the University of Houston department of health and human performance have created a process that grows real human bone in tissue culture, which can be used to investigate how bones form and grow.

"We have manufactured a structure that has no synthetic components," said Mark Clarke, associate professor and principal investigator. "It's all made by the two cell types bones start with inside the body. What you end up with is a piece of material that is identical to newly-formed, human, trabecular bone, including its mineral components, its histology and its growth factor content."

Being in a microgravity environment causes astronauts' bodies to lose more bone mineral than they can replace, which makes them vulnerable to fractures and breaks. Even when they return to Earth, the bone loss continues as their bodies slowly begin the process of replacing the bone mineral content.

The NASA-funded study, which included Clarke's collaborators at NASA-Johnson Space Center, Dr. Neal Pellis and Dr. Alamelu Sundaresan, used human osteoblasts and osteoclasts, the two major cell types involved in the formation of and breaking down of bone. The 3-dimensional bone constructs allowed for ideal conditions to investigate how bone forms and, more importantly, how bone is lost in

environments such as space flight and conditions present in post-menopausal women and spinal cord patients.

Clarke has worked with NASA on other bone loss studies. He served as a principal investigator in a NASA study of micro-fabricated skin patches that collect sweat for analysis of biomarkers of bone loss, like calcium.

His research on bone formation also is proving to be market-ready, as a newly formed start-up company, OsteoSphere Inc., examines ways the breakthrough research can be used in a clinical setting for applications such as spinal fusions, facial reconstructions following bomb blasts or the re-growing of an individual bone outside of the patient,.

"UH has now licensed the technology to OsteoSphere Inc. which is looking at ways to commercialize the technology in a clinical setting, including culturing an individual's own bone for subsequent transplantation back into the patient, developing other products for use in orthopedic reconstruction or using the technology as a screening tool for development of pharmaceuticals for combating bone loss or stimulating bone regeneration," Clarke said.

Source: University of Houston (news : web)