Using Clay to Grow Bone

Brigham and Women's Hospital

Researchers use synthetic silicate to stimulate stem cells into bone cells

In new research published online May 13, 2013 in Advanced Materials, researchers from Brigham and Women's Hospital (BWH) are the first to report that synthetic silicate nanoplatelets (also known as layered clay) can induce stem cells to become bone cells without the need of additional bone-inducing factors. Synthetic silicates are made up of simple or complex salts of silicic acids, and have been used extensively for various commercial and industrial applications, such as food additives, glass and ceramic filler materials, and anti-caking agents.

Silicate nanoplatelets cause stem cells to become bone cells, as determined by the formation of bone matrix (in red). Image courtesy of Khademhosseini lab.

"With an aging population in the US, injuries and degenerative conditions are subsequently on the rise," said Ali Khademhosseini, PhD, BWH Division of Biomedical Engineering, senior study author. "As a result, there is an increased demand for therapies that can repair damaged tissues. In particular, there is a great need for new materials that can direct stem cell differentiation and facilitate functional tissue formation. Silicate nanoplatelets have the potential to address this need in medicine and biotechnology."

"Based on the strong preliminary studies, we believe that these highly bioactive nanoplatelets may be utilized to develop devices such as injectable tissue repair matrixes, bioactive fillers, or therapeutic agents for stimulating specific cellular responses in bone-related tissue engineering," said Akhilesh Gaharwar, PhD, BWH Division of Biomedical Engineering, first study author. "Future mechanistic studies will be performed to better understand underlying pathways that govern favorable responses, leading to a better understanding of how materials strategies can be leveraged to further improve construct performance and ultimately shorten patient recovery time."

For more information, visit Brigham and Women's Hospital [1].

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[1] http://www.brighamandwomens.org