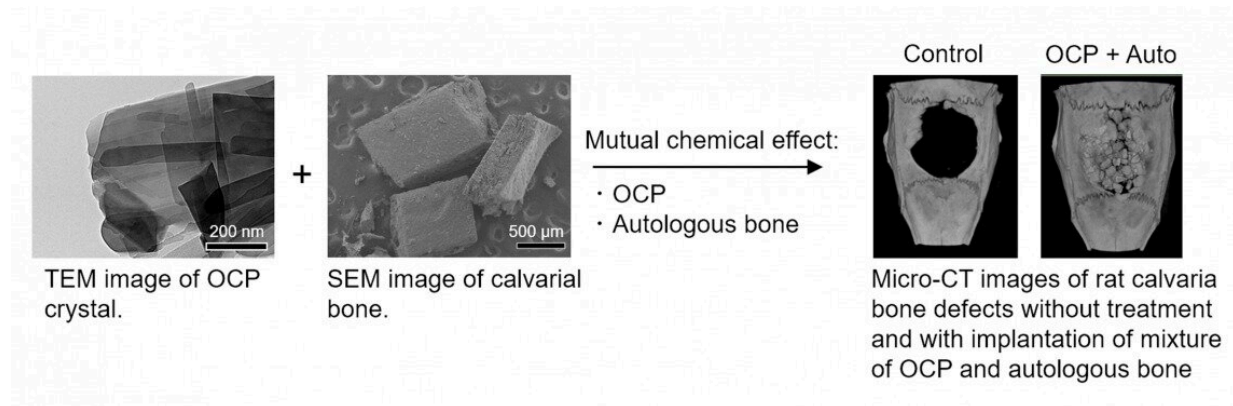


New filling for bone defects encourages tissue regeneration

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Mixing a synthetic substitute with natural bone material stimulated cellular activities and repair in experiments with rats. Credit: Tohoku University Graduate School of Dentistry

A combination of a synthetic material with natural bone fills bone defects and encourages tissue regeneration, with potential for use during surgical procedures. The research was carried out at the Tohoku University Graduate School of Dentistry in Japan, and the results were published in the journal *Science and Technology of Advanced Materials*.

"Surgeons often use a patient's own [bone](#) when they operate to fill and repair defects, but it can be hard to get enough amount of bone," says Tohoku University biomaterials researcher Osamu Suzuki. "Reliable

synthetic bone substitutes could make a big difference and this material seems to be one of the most promising."

The synthetic bone substitute material is called octacalcium phosphate (OCP). Previous studies have shown that OCP can promote bone formation and replace it with new bone over time. In the new study, Suzuki and his colleagues investigated the ability of OCP mixed with autologous bone to repair bone defects.

Working in rats, the researchers used OCP alone, bone from the animals, or a mixture of the two to fill a critical sized defect that cannot repair spontaneously in the skull. Bone formation of the natural material was higher than OCP alone. However, the researchers found that cells related to bone regeneration were accumulated by OCP mixed into natural (autologous) bone material for longer periods, suggesting it could replace some of the natural bone currently used in many clinical applications.

Histological analysis of new [bone formation](#) in the rats, and in a parallel set of cell culture experiments, showed that a chemical interaction between the OCP and mineral crystals in the bone activated the regenerative properties of the mixture.

Suzuki says the findings suggest that OCP could be used to reduce the amount of autologous bone needed for bone repair.

A [composite material](#) developed by the author's group that blends OCP with collagen has recently been approved as a bone filling material together with dental implant. Now, the researchers want to explore how the structure and property of the biomaterial influences its function and bone regeneration. They plan to develop further composite materials with natural or [synthetic polymers](#) and analyze the atomic structure of the resulting materials.

More information: Hisashi Ozaki et al, Mutual chemical effect of autograft and octacalcium phosphate implantation on enhancing intramembranous bone regeneration, *Science and Technology of Advanced Materials* (2021). [DOI: 10.1080/14686996.2021.1916378](https://doi.org/10.1080/14686996.2021.1916378)

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