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# Magnetic fields enhance bone remodeling

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Since the creation of 3-D-printed (3DP) porous titanium scaffolds in 2016, the scientific community has been exploring ways to improve their ability to stimulate osteogenesis, or bone remodeling. A recent study published in *The FASEB Journal* revealed the osteogenic potential of Static Magnetic Field (SMF) treatment for human bone-derived mesenchymal stem cells (hBMSCs) using 3DP scaffolds in vitro and in vivo.

"The reconstruction of large bone defects resulting from trauma, tumors, and infections remains a significant challenge for orthopedic surgeons," stated Hai Wang, Ph.D., a researcher within the Department of Orthopaedic Surgery, Peking Union Medical College Hospital, Peking Union Medical College and Chinese Academy of Medical Sciences. "When it comes to enhancing new bone formation, SMF presents a more feasible alternative to both bone grafts and pulsed electromagnetic fields."

A group of researchers used both hBMSCs and animal models to conduct the experiment. After seeding hBMSCs onto the surfaces of 3DP scaffolds, they divided the cells into four groups, designating the first as the control. They then exposed the remaining groups to magnetic field strengths of 50, 100, and 150 milliTesla (mT), respectively, and observed these cell cultures for 14 days. In this time, bone formation potential was significantly stronger among the SMF-treated cells than the control cells. Furthermore, the groups exposed to moderate levels of SMF (100 and 150 mT) demonstrated better osteogenic markers than the group exposed to 50 mT.

For the animal experiment, researchers used a rat model with a bone defect. After separating the rats into two groups, with the first as the control, the researchers exposed the second group to a moderate level (100 mT) of SMF. After 12 weeks, the researchers observed more new bone formation in the SMF-exposed rats than the control group.

"The long-known impact of magnetic fields in bone remodeling now receives this elegant advance, providing deep insights that may translate to major clinical advances," said Thoru Pederson, Ph.D., Editor-in-Chief of *The FASEB Journal*.

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