Gene therapy as a new option for bone defects

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(Medical Xpress)—Gene therapy involving modified stem cells obtained from fatty tissue and bone marrow could represent a new option for the treatment of severe orthopaedic injuries to the extremities. This treatment has been developed by Martina Hauser-Schinhan from the University Department of Orthopaedics at the MedUni Vienna during a research fellowship at the Center for Advanced Orthopedic Studies at the Harvard Medical School. The treatment could in future prevent threatened amputations or massive shortenings of bones.

The new method involves altering the body's own stem cells, obtained from fat or bone marrow, with BMP-2 genes which are known to promote bone healing. The autologous stem cells that are genetically modified with ad.BMP-2 are embedded in a fibrin gel which is applied between the two broken parts of the bone. The stem cells continuously produce BMP-2, like a power plant. The stem cells and the BMP-2 cause the bones to heal. "Until now, in cases of severe injury that we would be able to treat with this method, amputations or bone shortening surgery were often necessary," says Hauser-Schinhan.

The new treatment option has been used in in vivo trials and clinical studies are set to follow. The results so far invite the conclusion that healing occurs within a few weeks. Says Hauser-Schinhan: "Even with normal bone fractures, it takes six weeks." Its use even after the removal of bony tumours, which involves taking away large portions of bone, appears to be possible according to the MedUni researcher.

Hauser-Schinhan carried out research at Harvard between April 2011 and April 2012. The local Center for Orthopedics, led by Christopher Evans, who has collaborated closely for many years with the Head of Department in Vienna Reinhard Windhager, is renowned for its work on gene therapy and its use in the healing of bone defects.

Provided by Medical University of Vienna