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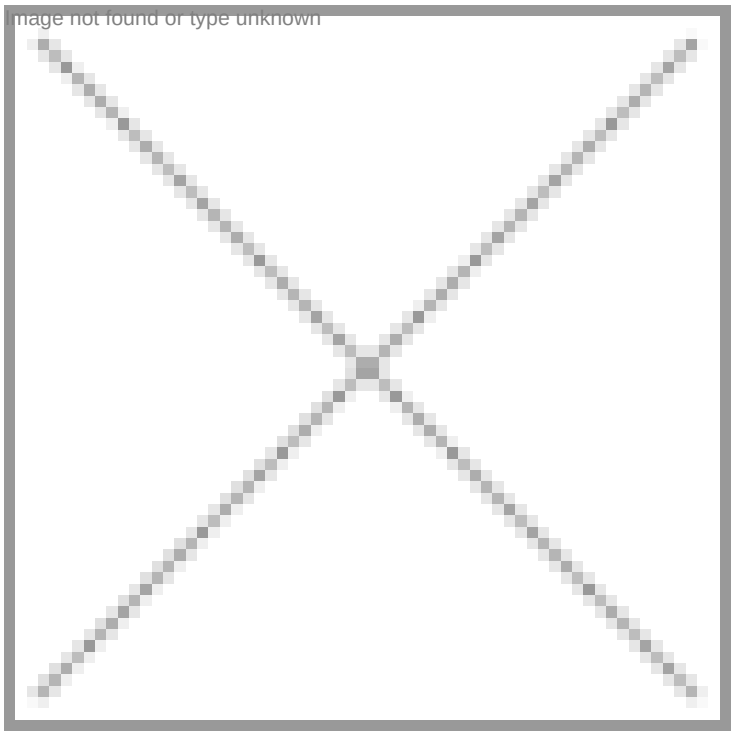

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For the first time an Australian company has successfully implanted adult stem cells in a patient for repair of a long bone fracture. Mesoblast Limited, an Australian biotechnology company focused on the development of novel treatments for orthopedic conditions, has implanted specialist adult stem cells in an orthopedic patient using its unique and proprietary technology. After the procedure, the patient was reported in a stable condition and was expected to be released from hospital shortly.

The director of Orthopaedics at The Royal Melbourne Hospital, Richard de Steiger, where the implant took place, said, "The patient had sustained a major fracture of his femur some nine months ago, which had not healed. For this type of non-healing defect, we would typically consider a bone graft using a large amount of bone taken from the patient's own hip. However, this often results in long-term complications including pain and possible infection. The use of adult stem cells could result in the healing of the defect without the complications of a bone graft taken from a separate incision."

Under the procedure, a needle is used to remove bone marrow from the pelvis and specific stem cells are extracted and multiplied for about six weeks. The cells are then surgically inserted into the patient to grow into blood vessels and tissue or into bone. "If successful, this procedure may significantly reduce or eliminate long-term patient complications, whilst decreasing hospital time and costs associated with the treatment of long bone fractures," de Steiger said.

The pilot trial at the Royal Melbourne Hospital is an independent assessment of the safety of Mesoblast's specialist adult

stem cell technology. This pilot trial will involve up to 10 patients suffering from non-union, long bone fractures. These fractures are usually a result of accidents and affect many thousands of people each year in Australia and as many as two million people in developed countries around the world.

IBN's hydrogel could lead to safer disease treatments

Scientists at the Institute of Bioengineering and Nanotechnology (IBN) in Singapore are on their way towards making a medical breakthrough in the area of targeted drug delivery and tissue engineering, by inventing an injectable hydrogel that can deliver drugs at specific locations or act as a scaffold in bone and cartilage repair. "My colleagues and I have been exploring the enzymatic polymerization of polyphenol compounds and evaluating their biological activities. We found that this enzymatic reaction is benign and suitable for manufacturing biomaterials that use biocomponents such as proteins and cells as these components do not lose their bioactivity nor cause tissue damage," said Dr Motoichi Kurisawa, who led this project. "From the findings, we developed an idea to apply the enzymatic reaction in an injectable hydrogel system, which excludes the need for toxic chemicals."

According to the researchers, IBN's hydrogel has numerous advantageous. Firstly, it can be formed easily within the body through injections at the desired site. The hydrogel will form directly at the site, due to two types of solution-a fluid drug-loaded biodegradable polymer and an enzyme, which acts as the gelation catalyst. From here drugs or cells contained within the hydrogel can be released at a controlled rate. This means that unlike conventional hydrogels, no surgery is required to implant the hydrogel. Furthermore, due to its biodegradability, surgery is also not required to remove the hydrogel as it decomposes safely within the body.

Secondly, composed from almost 90 percent water, the hydrogel is non-toxic. It is formed from hyaluronic acid-tyramine (HA-Tyr) conjugates with enzyme, which does not cause any tissue damage. The HA forms the main backbone polymer while the Tyr is the cross-link moiety. This chemically cross-linked hydrogel is superior as it is able to retain its stability for a longer time in the body and does not use any toxic chemical crosslinkers, which lead to inflammation and redundant reactions with bioactive agents in the body.

The potential for medical applications for this hydrogel are tremendous and already the research team is in discussion with both companies and hospitals for taking the research further downstream through possible collaborations.