

FOR IMMEDIATE RELEASE

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Fetal stem cell grafts spells hope for unborn babies with brittle-bone disease

A team of experts from the National University Hospital (NUH) was part of an international collaboration comprising researchers from Sweden, Singapore and Taiwan to treat two babies with Osteogenesis imperfecta (OI) or brittle-bone disease, by injecting bone-forming stem cells through the womb. The longitudinal results of the treatment were published on Monday, 16 December, 2013 in *Stem Cells Translational Medicine*.

The babies were treated with mesenchymal stem cells, connective tissue cells that can form and improve bone tissue. The stem cells were extracted from the livers of donors and although they were completely unmatched genetically, there was no rejection and the transplanted cells were accepted as self.

In consultation with the Karolinska Institutet (KI), Sweden, the team at NUH carried out the stem cell transplant on a baby girl from Taiwan. The first injection was administered while she was still in her mother's womb, in 2008.

The girl subsequently followed a normal, fracture-free growth until the age of one, when it levelled off. She was then given a fresh stem cell treatment in 2010 and her growth resumed. The girl eventually started to walk and has since not suffered any new fractures. Today, she is four years old.

The Singapore team that conducted the research and administered the stem cell treatment over a span of five years was led by Associate Professor Mahesh Choolani (Senior Consultant, Department of Obstetrics and Gynaecology), the local primary investigator and co-led by Associate Professor Jerry Chan, Director, KK Research Centre, and Consultant, Department of Reproductive Medicine, KK Women's and Children's Hospital, who was then part of the NUH team.

"OI is a congenital bone disease that causes stunted growth and repeated, painful fracturing. Ultrasound scans can reveal fractures already in the fetus and now, results of this study show that the progress of the disease can potentially be stalled if we inject stem-cells that promote bone development," says A/Prof Choolani.

"We are extremely heartened by the results of this transplant and are proud to have been part of this effort to develop a potential new treatment method for OI," he adds.

This clinical breakthrough, a first for NUH and in Asia, follows KI's introduction of the same treatment that was given to a female fetus from Sweden in 2005. After the girl's birth, it was reported she suffered a large number of fractures and developed scoliosis up to the age of eight, by which time the researchers decided to give her a fresh stem cell graft from the same donor. For the next two years, the girl suffered no new fractures and improved her growth rate. Today, she takes dance lessons and participates more in PE at school.

"We believe that the stem cells have helped to relieve the disease since none of the children broke bones for a period following the grafts, and both increased their growth rate," says study leader Dr Cecilia Götherström, researcher at Karolinska Institutet's Department of Clinical Sciences, Intervention and Technology.

"Today, the children are doing much better than if the transplantations had not been given. OI is a very rare disease and currently lacks effective treatment, and a combined international effort is needed to examine whether stem cell grafts can alleviate the disease," says Dr Cecilia Götherström.

OI affects one in 20,000 children globally and often leads to severe and widespread bone damage, including numerous fractures. The most severe forms of OI can result in death at birth or during infancy. OI is among the estimated 6% of fetal abnormalities diagnosed at the NUH's Fetal Care Centre every year.

Note to editors:

***Publication title:** 'Pre and postnatal transplantation of fetal mesenchymal stem cells in osteogenesis imperfecta: a two-center experience', Cecilia Götherström, Magnus Westgren, S W Steven Shaw, Eva Åström, Arijit Biswas, Peter H Byers, Citra N Z Mattar, Gail E Graham, Jahan Taslimi, Uwe Ewald, Nicholas M Fisk, Allen E J Yeoh, Ju-Li Lin, Po-Jen Cheng, Mahesh Choolani, Katarina Le Blanc and Jerry K Y Chan, *Stem Cells Translational Medicine*, advance online publication 16 December 2013 .

*The **Karolinska Institutet** is one of the world's leading medical universities. It accounts for over 40 per cent of the medical academic research conducted in Sweden and offers the country's broadest range of education in medicine and health sciences. Since 1901 the Nobel Assembly at Karolinska Institutet has selected the Nobel laureates in Physiology or Medicine.

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About the National University Hospital

The NUH is a tertiary hospital and major referral centre for a comprehensive range of medical, surgical and dental specialties including Cardiology, Gastroenterology and Hepatology, Obstetrics and Gynaecology, Oncology, Ophthalmology, Paediatrics, Orthopaedic Surgery and Hand and Reconstructive Microsurgery. The Hospital also provides organ transplant programmes for adults (in kidney, liver and pancreas) and is the only public hospital in Singapore to offer a paediatric kidney and liver transplant programme.

Staffed by a team of healthcare professionals who rank among the best in the field, the NUH offers quality patient care by embracing innovations and advances in medical treatment.

In 2004, the NUH became the first Singapore hospital to receive the Joint Commission International (JCI) accreditation, an international stamp for excellent clinical practices in patient care and safety. Today, patient safety and good clinical outcomes remain the focus of the hospital as it continues to play a key role in the training of doctors, nurses and allied health professionals, and in translational research which paves the way for new cures and treatment, offering patients hope and a new lease of life.

A member of the National University Health System, it is the principal teaching hospital of the NUS Yong Loo Lin School of Medicine and the NUS Faculty of Dentistry.

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