

November 24, 2008

## **Stem cells could save babies with heart defects, experts predict**

*MOHIT JOSHI*

Hamburg - Babies with congenital heart defects could benefit from stem cell technology to create healthy new cardiac valves, according to a team of German scientists.

The Munich-based researchers say they have grown cells from umbilical cord blood which have been used to build early versions of laboratory-grown heart valves. These have the potential to save babies currently facing a bleak prognosis owing to the near impossibility of repairing malfunctioning heart valves in newborns.

The "proto-valves," constructed around biodegradable scaffolds, are made in much the same way as their natural counterparts.

The German scientists believe that with improvements they could provide perfectly-matched replacement valves for infants born with heart defects.

Currently, surgeons implant replacement valves obtained from human or animal donors or made from artificial materials.

However, these substitutes cannot grow and change shape as a child develops. Two or more operations may be needed to replace outgrown valves.

Animal tissue may also stiffen over time and wear out quickly, and children with artificial valves must also be treated with blood thinners.

The new approach involves growing replacement valves from stem cells taken from a child's own umbilical cord blood. Stem cells are immature cells that can develop into different tissue types.

Dr Ralf Sodian, from the University Hospital of Munich in Germany, who led the research, said: "In our concept, if pre-natal testing shows a heart defect, you could collect blood from the umbilical cord at birth, harvest the stem cells, and fabricate a heart valve that is ready when the baby needs it."

The scientists described their work at the American Heart Association's Scientific Sessions meeting in New Orleans.

Stem cells taken from frozen-stored, cord blood were "seeded" into eight heart-valve scaffolds made from a bio-degradable material.

The cells grew into pores in the scaffolding to form a tissue layer. Not only did they survive, but they also produced key elements of the "extra cellular matrix" - the connective material outside the cells that is essential to tissue structure and function.

Compared with normal heart valves, the tissue-engineered valves contained 77.9 per cent as much collagen, 85 per cent as much glycosaminoglycan - an important carbohydrate - and 67 per cent as much of the connective tissue material elastin.

Tests showed the valves also had an array of proteins found in muscle cells, internal organs and blood vessel walls.

"These markers all indicate that human cardiovascular tissue was grown in the lab," said Dr Sodian.

The research raises the possibility of building laboratory-grown replacement heart valves from a child's own tissue. Once implanted in a child, the scaffold would disappear, leaving the valve in place.

Dr Sodian said many problems still had to be overcome, such as how to ensure the valves function properly after being implanted.

But he added: "Tissue engineering provides the prospect of an ideal heart valve substitute that lasts throughout the patient's lifetime and has the potential to grow with the recipient and to change shape as needed." (dpa)