

Umbilical cord blood may help build heart valves



By Michael Kahn
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LONDON (Reuters) – Doctors may one day be able to use stem cells taken from umbilical cord blood to build new heart valves for children born with heart defects, German scientists said on Monday.

These valves could grow as a child develops, doing away with any need for repeated operations to replace outgrown artificial valves or valves made from animal or human donor tissue, said Ralf Sodian of University Hospital Munich, who led the study.

"The problem is if you have to do surgery on a child you have a relatively small heart valve and the child grows out of it, which means you have to do the surgery many times," Sodian said in a telephone interview.

"The basic idea is to implant something living, functional from your own cells which will integrate into the surrounding tissue with the potential to grow."

Stem cells are the body's master cells and there are several kinds. Stem cells from the bone marrow or cord blood are partly differentiated, or transformed, and can be used to restore the immune systems of patients undergoing cancer treatment, for example.

Tissue engineering of heart valves is still in its infancy, with different research teams looking at whether it is possible to use stem cells, bone marrow or amniotic fluid.

When infants have faulty heart valves that cannot be surgically repaired, they rely on replacement from animal tissue, donated human organs or artificial materials.

In what is called a concept study, Sodian and colleagues showed it was possible to collect blood from the umbilical cord at birth, harvest the stem cells and then make a heart valve that is ready when the baby needs it.

"We showed it is possible to do this with human cells," said Sodian, whose research was presented at the American Heart Association Meeting in New Orleans.

To do this, the researchers first extracted and then froze the cord blood to preserve the cells. After 12 weeks, they seeded the cells onto eight biodegradable heart valve scaffolds and grew them in the laboratory.

Examination using electron microscopes showed the cells had grown into the pores of the scaffolding and formed a tissue layer. Further tests indicated the cells were heart tissue.

While the technique shows promise, Sodian cautioned that researchers need to work out several issues before they can think about attempting it in people.

"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," he added in a statement.

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