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First patients receive lab-grown blood vessels from donor cells

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For the first time, blood vessels created in the lab from donor skin cells were successfully implanted in patients. Functioning blood vessels that aren't rejected by the immune system could be used to make durable shunts for kidney dialysis, and potentially to improve treatment for children with heart defects and adults needing coronary or other bypass graft surgery.

For the first time, human blood vessels grown in a laboratory from donor skin cells have been successfully implanted into patients, according to new research presented in the American Heart Association's Emerging Science Series webinar.

While more testing is needed, such "off-the-shelf" blood vessels could soon be used to improve the process and affordability of kidney dialysis.

"Our approach could allow hundreds of thousands of patients to be treated from one master cell line," said study lead author Todd N. McAllister, Ph.D., co-founder and chief executive officer of Cytograft Tissue Engineering Inc., of Novato, Calif.

The grafts also have the potential to be used in lower limb bypass to route blood around diseased arteries, to repair congenital heart defects in pediatric patients and to fix damaged arteries in soldiers, who might otherwise lose a limb, said McAllister.

The tissue-engineered blood vessels, produced from sheets of cultured

skin cells rolled around temporary support structures, were used to create access shunts between arteries and veins in the arm for kidney dialysis in three patients. These shunts, which connect an artery to a vein, provide access to the blood for dialysis. The engineered vessels were about a foot long with a diameter of 4.8 millimeters.

At follow-up exams up to eight months after implantation, none of the patients had developed an immune reaction to the implants, and the vessels withstood the high pressure and frequent needle punctures required for dialysis. Shunts created from patients' own vessels or synthetic materials are notoriously prone to failure.

Investigators previously showed that using vessels individually created from a patient's own skin cells reduced the rate of shunt complications 2.4-fold over a 3-year period. The availability of off-the-shelf vessels could avoid the expense and months-long process involved in creating custom vessels for each patient, making the technique feasible for widespread use.

Besides addressing a costly and vexing problem in kidney dialysis, off-the-shelf blood vessels might someday be used instead of harvesting patients' own vessels for bypass surgery. A larger, randomized trial of the grafts is under way for kidney dialysis, and human trials have been initiated to assess the safety and effectiveness of these grafts for lower-limb bypass.

The study will be presented in the American Heart Association's Emerging Science Series. The series is a free online webinar presentation of cutting-edge science. The Emerging Science Series provides a new venue for presenting the latest cardiovascular scientific breakthroughs several times a year, when the discoveries are ready to be presented rather than waiting for a regularly scheduled meeting. Each study is handled in a peer-reviewed process similar to late-breaking

clinical trials presented at AHA's annual Scientific Sessions.

The series will include the first presentation of data from clinical trials, basic science, key updates of previously presented trials and major bench-to-bedside breakthroughs. The webinar will be viewable from a computer or mobile phone and attendees can post questions electronically before or after the event. Presentations will be archived for on-demand viewing.

More information: For registration and information about the series visit: http://my.americanheart.org/professional/Sessions/AdditionalMeetings/EmergingScienceSeries/New-Emerging-Science-Series_UCM_424613_Article.jsp

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