

Mild hypothermia in deceased organ donors improves organ function in kidney transplant

July 29 2015

Mild hypothermia in deceased organ donors significantly reduces delayed graft function in kidney transplant recipients when compared to normal body temperature, according to UC San Francisco researchers and collaborators, a finding that could lead to an increase in the availability of kidneys for transplant.

Their study appears in the July 30 issue of the *New England Journal of Medicine*.

By passively cooling deceased organ [donor](#) body temperature by approximately two degrees from normal body temperature, researchers saw an overall nearly 40 percent increase in the successful function of donated kidneys after surgery. In particular, kidneys especially at risk of poor post-surgical functional were protected.

"This is a free intervention that can be done at any hospital in the world, and tens of thousands of patients worldwide can benefit from it," said lead author Claus Niemann, MD, professor of anesthesia and surgery at UCSF.

"It could have a major impact on global health, especially in resource-limited countries, and provide significant cost savings in the United States through less dialysis, shorter hospital stays and potentially less need for expensive interventions," Niemann continued. "In addition, it may allow us to consider organs we may otherwise reject, especially at the extremes of age, which would result in more patients benefiting from

kidney transplantation. This is of critical importance given we have a complete mismatch of transplant need and organ supply in the United States."

Therapeutic hypothermia (targeted temperature management) is an established intervention for certain types of cardiac arrest, stroke and asphyxia patients and is used to protect neurological function, but its impact on renal protection in the transplantation setting has been unknown, according to the researchers. Current organ donor management protocols stipulate normal body temperature be maintained in donors, frequently requiring active warming.

However, delayed organ function after kidney transplantation is reported in up to 40 percent of recipients and associated with increased cost and diminished long-term organ function.

To test the potential benefit and safety of targeted hypothermia in donors on delayed organ function rates in the recipients of their kidneys, Niemann and his research team conducted a randomized controlled trial in two large organ donation service areas from March 2012 to October 2013.

The organ donors were assigned after neurologic determination of death to either of two targeted temperatures - 34-35°C (hypothermia) or 36.5-37.5°C (normal body temperature). Temperature protocols were initiated immediately after authorization for donation, and the study ended when organ donors left the intensive care unit for organ recovery in the operating room.

There were 370 organ donors enrolled - 180 in the hypothermia group and 190 in the normal body temperature group. A total of 572 patients received kidney transplants, 285 from donors in the hypothermia group and 287 from donors in the normal body temperature group. Delayed

graft function developed in 79 (28 percent) of the hypothermia group and 112 (39 percent) of the normal body temperature group.

The researchers found that targeted temperature control in donors demonstrated a statistically and clinically significant protective effect on recipient renal graft outcome. In fact, the trial was terminated early based on the recommendation of an independent data and safety monitoring board because an interim analysis demonstrated efficacy of the intervention with 49 percent of the enrollment target.

At final trial analysis, the relative odds of delayed organ function were reduced by 38 percent when compared to targeted temperature management at normal body temperature. Kidneys from not ideal donors (extended criteria donors) and other high-risk subgroups particularly benefited from hypothermia.

Extended criteria donors and marginal donors are older donors or donors who may have health issues that previously would have excluded their acceptance.

"From these findings, potentially more organs could be available for transplantation since we can push the limits with these 'marginal donors'," Niemann said. "This is critical because the number of available deceased organ donors has been stagnant, but the demand has dramatically increased. In the United States alone, about 101,000 patients wait for kidney transplantation."

The only alternative to [kidney transplantation](#) from deceased donors is living donation.

Currently one of the largest transplant centers for deceased and living kidney transplants nationally, UCSF also has performed more kidney transplants overall than any other center in the country with more than

10,000 since 1964. With a three-year survival rate of 94.39 percent for all adult kidney recipients - above the 92.62 percent national average - UCSF has more patients on the [kidney transplant](#) waiting list than any other U.S. transplant center.

As of July 22, 2015, 101,144 patients are currently waiting for kidney transplants, according to the U.S. Department of Health and Human Services. In California, the waitlist is currently at 18,606. The number of patients waiting for a [kidney](#) at UCSF is 5,217, or 5.2 percent of the U.S. waitlist and 28 percent of the California waitlist.

Provided by University of California, San Francisco

Citation: Mild hypothermia in deceased organ donors improves organ function in kidney transplant (2015, July 29) retrieved 3 May 2024 from <https://medicalxpress.com/news/2015-07-mild-hypothermia-deceased-donors-function.html>

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