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Extracorporeal Machine Perfusion May Be a Way to Increase Transplant Donor Reserves

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Organ transplantation is the preferred therapy for those with end-stage organ failure, but a scarcity of organs limits the number of people who might benefit. According to the Health Resources and Services Administration, 100,000 people are waiting for an organ, and a person is added to the transplant waiting list every ten minutes. Approximately 17 people die daily while waiting for an organ, and each donor has the potential to save 8 lives and impact 75 more, so what can be done to increase the availability of organs?

A variety of cultural and psychosocial factors may influence one's decision whether to donate. However, even with the recent rise in donor organs, there are not enough viable organs for everyone on the waiting list. Organs must meet a myriad of criteria in order to be considered eligible for transplantation, and even then, they can be preserved in a hypothermic state for only short periods of time. For example, kidneys must be transplanted within 36 hours after removal, and hearts and lungs must be transplanted within 6 hours or less. This short time frame contributes to the growing number of organs that are eventually discarded. If we increase the number of available donation-eligible organs, we might be closer to meeting our current demands.

Typically, the donor organ undergoes static cold storage (SCS) shortly after it is gifted in an attempt to maintain viability for donation. However, complications from SCS include the risk of organ ischemia and early graft dysfunction, which may make the organ non-viable or subject to chronic complications post-transplantation. One solution is to use Extracorporeal machine

oxygenation systems (ECMO). ECMO systems have shown promise in optimizing transplant viability. Such systems utilize recently-gifted organs and supply them with blood and nutrients in order to simulate normal physiologic perfusion while avoiding the complications of SCS.

The TransMedics Organ Care System (OCS) is one of the first FDA-approved solutions proposed to mitigate this shortage. The fully portable system is designed to mimic human physiology. After the organ is gifted, the system maintains the donor organs at normothermia by perfusing it with warm, oxygen and nutrient rich blood outside of the body. This not only decreases complications such as ischemia but also provides the opportunity for providers to continually assess viability with the potential for therapeutic interventions. This platform works with a variety of organs, such as lungs, liver, and heart. Clinical trials have shown record-high transplantation rates at 87%, 81%, and 98% (compared to 21%, 24%, and 30% in SCS), respectively. Notably, the success of TransMedics OCS heart Clinical Trial has even opened the possibility of donation after circulatory death (DCD) heart transplants, a feat that was previously deemed impossible, given the high risk of damage during transport and troubles with ensuring adequate oxygenation of the organ.

"We are uniquely positioned to unlock transplant growth using OCS technology to increase donor yield, train clinical expertise to maximize clinical outcomes, and minimize the logistical burden on transplant centers in order to increase transplant numbers," says TransMedics President and CEO Dr. Waleed Hassanein. With widespread use of the innovative "organs in a box" throughout ICU and critical care settings, extracorporeal machine perfusion devices such as the OCS will breathe new life into deceased donor organs.

The authors have no conflicts to report