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Reviving Organs, Redefining Death? The Ethical Controversy Over Normothermic Regional Perfusion and the Way Around It

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As medicine makes technological advances, it raises ethical questions. One of the most pressing questions in organ transplantation today is about a technique called Normothermic Regional Perfusion (NRP), a method that improves transplant outcomes but challenges long-standing principles about the sanctity of human life in deceased organ donation.

NRP is used in Donation after Circulatory Determination of Death protocols (DCDD).[1] In standard DCDD, after a patient's heart stops, five minutes go by, and death is declared, surgeons rapidly open the body, cool the desired organs, and remove them for transplant. Unfortunately, organs procured in this way tend to suffer damage because they are deprived of oxygen during the dying process. To remedy this problem, transplant surgeons have devised a new technique (NRP) that restores warm, oxygen-rich blood flow to certain organs in the chest or abdomen using a sophisticated bypass machine. Sometimes, depending on the technique, they get the heart beating on its own again.[2] They are careful, however, to block the flow of blood to the brain using clamps and cuts on the vessels to the brain. NRP has been shown to improve organ quality and increase the number of usable organs for transplant, but it also means restarting circulation in the body, and perhaps the heart, of someone who had just been declared dead—on the basis that circulation had permanently ceased.[3]

NRP raises many ethical questions, but a fundamental one is: Does NRP violate the dead donor rule? The rule holds that transplant professionals ought not be involved in the donor's death and should only take organs from those who have been validly declared dead. The rule is important because it upholds two values: (1) There is to be no conflict of interest among those responsible for caring for the donor and caring for the recipient, and (2) no one's organs are worth more than the life of the one who has them.[4] At the very least, a valid declaration of death made on the basis of the total stoppage of circulation requires that stoppage to be permanent.

Supporters of NRP seek to comply with this framework. They argue that they are not really restarting circulation or reversing the cessation of "circulatory and respiratory" functions in the donor, which, according to legal standards, is to be "irreversible."[5] They believe that they are doing something new: regionally perfusing organs for transplant to help the donor effectively donate. The American Society of Transplant Surgeons, which supports NRP, argues that it should be described to the public in more clinical, less emotionally charged language, using terms

Adam Omelianchuk, "Reviving Organs, Redefining Death? The Ethical Controversy Over Normothermic Regional Perfusion and the Way Around It," *Dignitas* 32, no. 1–2 (2025): 3–5.

like "in situ tissue perfusion" rather than "circulation" to distinguish their activities from resuscitation measures.[6] They further argue that by blocking flow to the brain, they maintain a permanent absence of flow to the brain, an absence that was already caused by the donor's natural death.[7] For supporters, it is circulation to the brain that ultimately matters—the life of the person depends on the life of the brain.[8]

Critics argue that "circulation" is restarted and that the meaning of "circulatory and respiratory functions" cannot be interpreted to mean only those that apply to the brain.[9] Therefore, in their view, NRP undermines the permanence standard. Even if circulation is restarted only in the body but not in the brain, we cannot know for sure no blood is reaching the brain. The fact that transplanters need to study this issue and develop reliable occlusion measures betrays an unsettling fact: They don't know if the donor is really dead when they restart circulation in the donor.[10] The American College of Physicians calls NRP "a protocol more accurately described as organ retrieval after cardiopulmonary arrest and the induction of brain death" and warns that it may erode public trust.[11] After reviewing the arguments for and against NRP, The Organ Procurement and Transplantation Network found that NRP raises "serious ethical concerns" and "consideration for how the technology can be implemented ethically is critical to its widespread adoption and acceptance by the public."[12]

Recognizing that NRP pushes past the boundaries of conventional standards for determining death, some supporters of NRP believe the definition of death should change. In an op-ed for the *New York Times*, some transplant surgeons called for society to "broaden" the definition in order to "have more organs available for transplantation."[13] They recommend that "irreversibly comatose patients on life support" should be counted as among the dead so that the debate over NRP will become, in their words, "moot."

Underlying this radical proposal is the view that what really matters in human life is being able to have relatively complex mental states. To have a devastating but not life-ending disorder of consciousness, then, is to become a candidate for organ donation. It also denigrates the value of one's life if one is neither able to develop nor maintain conscious experience—that what one is really good for in such a condition is to supply organs for others. It is understandable, however, why the surgeons prefer this weaker standard. They would like to maximize organs for transplant and avoid the conflict of interest they have when they accept responsibility for ensuring no amount of blood will reach the donor's brain when they restart circulation in the donor's body for the sake of benefiting potential organ recipients. The ethical debates over NRP are at bottom about respect for life and escaping liability for being charged with failing to respect it, even if the quality of that life is greatly diminished.

Hence, ethical controversy besets NRP, and many hospitals do not allow it. My own view is that it ought not be practiced.[14] That said, I believe supporters of NRP are correct to pursue organ reconditioning methods that will help donors effectively donate and for the lives of recipients to be saved from organ failure. Fortunately, there are other methods available to achieve these noble goals. An alternative technique, Normothermic Machine Perfusion (NMP), avoids these ethical pitfalls by preserving organs outside the body.[15] Though more expensive and technically demanding, NMP is gaining support as a more ethically straightforward option that produces good outcomes for livers and hearts.[16] Similar technologies like Hypothermic Machine Perfusion (HMP) have also achieved good outcomes for kidney recipients.[17] Supporters of NRP have even developed alternative methods for reconditioning hearts that are both ingenious and consistent with accepted ethical standards.[18]

These developments are precisely what my co-authors and I hoped for when we called for "ethical parsimony" in DCDD procurement: "If goals can reasonably be achieved by an option that is simple and uncontroversial, then, as a matter of prudence, one should choose it over other options that require complex or convoluted justifications and generate strong disagreement."[19] This way of reasoning is not without precedent. The contentious debate over whether to create new stem cell lines from embryos was resolved by the innovation of induced pluripotent stem cells from which comparable research goals could be achieved.

At stake is more than clinical utility—it's the integrity of the organ donation process and the trust of the public. Ethical parsimony should guide our choices: When two methods yield similar outcomes, the one with fewer ethical complications should be preferred. Instead of trying to achieve a new consensus on how to define death or change legal and consent frameworks, transplant programs should prioritize alternatives like NMP, HMP and other methods that re-perfuse organs outside the body over NRP.

Notes

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