



**GREEN WAY:** A new “green roof” adjacent to the Birthing Pavilion promises to mitigate temperature fluctuations, reduce runoff, cost less to maintain, and extend the life of the roof up to 200%—not to mention the fact that it provides an appealing patio for patients.

THEN & NOW

A reminder of the pace of change, and of timeless truths, from the Summer 1964 issue of the *Dartmouth Medical School Quarterly*:

“Medicine is unique among the learned professions that deal with . . . individuals . . . in the degree to which content, method and application are all dependent on science,” wrote Dr. Gilbert Mudge, then the dean of DMS. “To be sure, science unadorned is not a sufficient basis but, excluding witchcraft or its various modern counterparts, medicine without science is certainly not much of a profession.”



56

Faculty in the basic science departments in 1964

290

Faculty in the basic science departments in 2010

\$115.6 million

Research income in FY09

**Determining death, when minutes matter**

Death, so the maxim goes, is one of life’s certainties. But in this era of high-tech medical interventions, determining the precise moment of death isn’t always cut-and-dried. That determination is vitally important, however, when the deceased could be an organ donor.

**Organs:** Medical experts all around the world are now taking a closer look at the length of time doctors should wait to determine death before organs are removed for transplantation. One of those experts is Dr. James Bernat, a Dartmouth neurologist and a national authority on medical ethics.

Most vital organ transplants come from donors after they’ve experienced brain death. “The brain-dead donor is the ideal organ donor because circulation continues,” Bernat explains. “So the organs are perfused by the beating heart up to the very moment that they’re procured.”

Over the last two decades, however, “donation after circulatory death” (DCD) has become increasingly common.

In such cases, organs are removed from deceased donors some period of time after their hearts stop beating and their blood stops circulating. DCD, Bernat says, “has become a very common phenomenon that now represents 20 to 25 percent of all deceased organ donation.”

In the U.S. and Canada, DCD protocols allow for organ transplantation in “controlled”

situations, in which circulatory death occurs after the donor has been removed from life support. In controlled situations, doctors know exactly what interventions and medications the donor received before death—but even so, uncertainties remain.

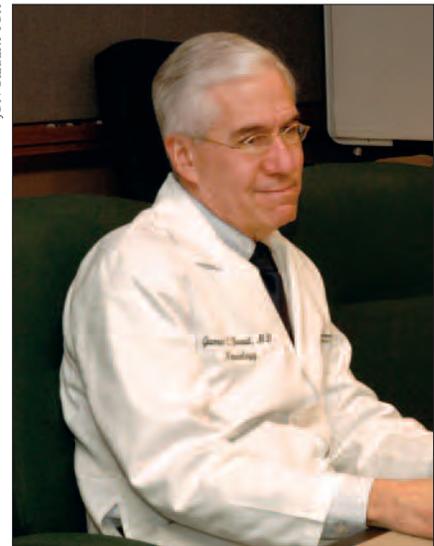
The most pressing question is how long doctors should wait after the heart has stopped before removing organs. In some situations, auto-resuscitation—the spontaneous return of a heartbeat—can occur after a person’s heart has stopped beating. So a surgeon must wait long enough to ensure that the patient has died, but not so long that the organs begin to decay.

**Heart:** According to Bernat, some hospitals wait just 65 seconds after the heart stops beating before organs are removed. Others wait 5 minutes or more. “Individual hospitals that start programs in DCD develop their own protocols,” he explains. “The whole thing is kind of ad hoc, and it cries out for some kind of national standards.”

In an attempt to establish standards, Bernat convened a group of experts from across the U.S. and Canada in late 2008 at the request of the Health Resources Services Administration, a division of the Department of Health and Human Services. Their recommendations were published in *Critical Care Medicine* a few months ago.

Bernat and his colleagues urge that the cessation of circu-

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Bernat is leading the national effort.

lation, not just heartbeat, be used to determine death for DCD. After circulation stops, a waiting period of 2 to 5 minutes before removing organs is a prudent choice given current data, the group stated. That recommendation applies specifically to controlled situations.

Many European countries allow for DCD in uncontrolled situations. In those cases, the deceased donor has suffered cardiac arrest, often outside a hospital, and can’t be revived. The U.S. may consider uncontrolled DCD protocols in the future, Bernat says. His group hopes to meet again to discuss death determination in those instances.

**Standards:** Bernat decries the fact “that doctors practicing in one state are using different standards of death determination than in another state. There’s really a pressing need,” Bernat concludes, “for some type of standardization.”

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