

preservation

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At the time of heart procurement from brainstem dead (donation after brainstem death [DBD]) donors, the heart must be arrested and explanted prior to transportation. There follows a period of ischaemia until the heart is reperfused in the recipient. Allograft ischaemic time is a strong risk factor for post-transplant mortality, especially when it exceeds 3–4 hours, so every effort must be made to keep this time period as short as possible. At retrieval cardioplegic solutions that inhibit the Na^+/K^+ ATPase cell membrane pump or lead to cellular depolarisation and diastolic cardiac arrest are infused into the aortic root to rapidly arrest and uniformly cool the heart. Continuous heart perfusion is an alternative but more expensive and complex method of preservation. This is typified by the widely used Transmedics Organ Care System (Figure 92.3). Rather than being stored in an arrested and hypothermic state, the heart is kept warm and beating. It can be managed with inotropes and monitored through lactate assays, permitting longer transport times. Trials have shown that 30-day post-transplant survival is similar to standard preservation. There is some evidence to suggest that machine perfusion reduces mortality in higher risk donors and recipients and opens the potential for organ modification and improvement. Other systems that utilise cold oxygenated continuous perfusion of a still heart are under investigation. To expand the current donor pool hearts may be retrieved from patients suffering circulatory arrest (donation after circulatory death [DCD]) after the withdrawal of life-sustaining care and proclamation of death (Figure 92.3). The heart is then rapidly retrieved and reperfused in an organ care system before transport and transplantation. Clinical results appear equivalent to conventional donation and this has been a major advance.

More than 80% of potential lung grafts are declined because of concerns over donor history, chest trauma, pneumonia or aspiration. Ideally lung donors should demonstrate standard criteria but in reality only 20% of donors actually meet these values. Those outside of the standard criteria are called extended criteria donors. Experience has shown that these organs can be safely transplanted without detrimental effects on survival or longer term outcome. When oxygenation of donor lungs falls below the standard criterion of 300 mmHg aggressive donor management with alveolar recruitment, ventilatory optimisation, bronchoscopy and diuretics can lead to improvements. Additionally the opiate abuse epidemic in the USA has led to a significant rise in the number of organ donors but with a concomitant increase in hepatitis C infection. Antiviral therapies, however, may enable widespread use of such donors in hepatitis C-negative recipients.

Summary box 92.5 - Standard criteria lung donors

Outcomes are adversely affected by a donor smoking history of an increasing number of pack-years. Recipients of donor lungs from smokers have a higher 3-year mortality and prolonged hospital stay after adjusting for age and oxygenation but this is not a consistent finding and there remains an overall survival benefit to using lungs from heavy smoking donors to reduce waiting-list mortality. Lungs from older donors (>55 years) can be safely used to 70 years old and short-term outcomes of older

donors are - similar in well-selected cases. A history of cancer in the donor does not automatically preclude lung donation. Those with a history of skin cancer , as well as certain low-grade central nervous system tumours, can be used with minimal risk.

Investigations Clear chest radiograph Negative Gram stain of bronchial secretions or purulent secretions Arterial oxygen tension >300 mmHg (inspired oxygen fraction of 100% and positive end-expiratory pressure 5 cmH₂O) 2 History Age <55 years Smoking <20 pack-years No chest trauma No aspiration No pneumonia

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