

RIVO MULTITRADE OPTICAL SYSTEMS

Cold grafting fluid



Overview

Below are detailed step-by-step instructions for the proper handling and preparation of your frozen allograft.

Key Takeaways

Cold grafting fluids are specialized preservation solutions used to maintain donor organ viability during hypothermic storage, reducing ischemia-reperfusion injury and metabolic stress. Purpose and Function

Cold grafting fluids are designed to preserve organs at low temperatures (typically 0–4°C) by slowing metabolic activity, stabilizing cell membranes, and preventing edema and oxidative damage during transport from donor to recipient . These solutions mitigate the effects of cold ischemia, which can otherwise lead to mitochondrial dysfunction, ATP depletion, and accumulation of harmful metabolites like succinate, predisposing grafts to reperfusion injury .

Common Types of Cold Preservation Solutions

Several solutions are widely used in clinical practice:

- University of Wisconsin (UW) Solution: Contains hydroxyethyl starch, glutathione, allopurinol, and impermeants like lactobionate and raffinose to maintain osmolarity, reduce oxidative stress, and prevent cellular swelling .
- Histidine-Tryptophan-Ketoglutarate (HTK): A low-viscosity solution that stabilizes membranes and supports metabolism, suitable for single-dose, high-volume perfusion

- Celsior: Designed for multi-organ preservation with antioxidants and osmotic agents to protect endothelial and cellular structures .
- IGL-1/IGL-2: Polyethylene glycol (PEG)-based extracellular colloid solutions that enhance cytoprotection, activate AMPK and nitric oxide pathways, and maintain microvascular integrity .

Mechanisms of Protection

Cold grafting fluids work through multiple mechanisms:

- Metabolic suppression: Hypothermia reduces energy demand and slows ATP consumption.
- Oncotic support: Colloids like PEG or hydroxyethyl starch prevent interstitial edema.
- Antioxidant activity: Components such as glutathione and allopurinol reduce reactive oxygen species.
- Endothelial and mitochondrial protection: PEG-based solutions preserve glycocalyx integrity and mitochondrial function, which is critical for vulnerable grafts like fatty livers .

Application Methods

- Static Cold Storage (SCS): Organs are flushed with the preservation solution and stored in cold conditions. This is simple, cost-effective, and widely used .
- Dynamic Perfusion: Hypothermic or normothermic machine perfusion circulates the solution through the organ, allowing oxygen delivery, metabolic support, and therapeutic interventions. Solutions used in SCS are often adapted for perfusion, though some, like IGL-1, are not intended for continuous perfusion .

Emerging Trends

Research is focusing on unified perfusion solutions that combine endothelial, mitochondrial, and redox protection, aiming to improve outcomes for marginal or extended criteria donor organs and expand the donor pool . PEG-based solutions combined with hypothermic oxygenated perfusion (HOPE) represent a promising approach for high-risk grafts. In summary, cold grafting fluids are essential for maintaining organ viability during transplantation, with ongoing innovations targeting enhanced cytoprotection, reduced ischemia-reperfusion injury, and improved post-transplant outcomes.

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