

# CYTOTHERAPY

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## CRYOPRESERVED MESENCHYMAL STROMAL CELL TREATMENT IS SAFE AND FEASIBLE FOR SEVERE DILATED ISCHEMIC CARDIOMYOPATHY

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**Background Aims:** Bone marrow (BM) mesenchymal stromal cells (MSC) represent a novel therapy for severe heart failure with extensive myocardial scarring, especially when performed concurrently with conventional revascularization. However, stem cells are difficult to transport in culture media without risk of contamination, infection and reduced viability. We tested the feasibility and safety of off-site MSC culture and expansion with freeze-controlled cryopreservation and subsequent rapid thawing of cells immediately prior to implantation to treat severe dilated ischemic cardiomyopathy.

**Methods:** We recruited three consecutive patients with end-stage ischemic heart failure with evidence of full-thickness myocardial scarring. MSC was isolated from 20 mL BM aspiration, expanded and cryopreserved using 10% dimethyl sulfoxide (DMSO). Cells were transported in a cryoshipper. Patients underwent concurrent coronary artery bypass graft (CABG) with intramyocardial MSC injection.

**Results:** The cell viability after thawing exceeded 90% for all samples. The supernatant was free from bacterial and fungal growth. All patients underwent the procedure safely. There were no arrhythmias noted. There was significant improvement in cardiac function and volume, resolution of scarring and increased wall thickness for all patients on cardiac magnetic resonance imaging at 6 months compared with baseline. The magnitude of improvement was more than was expected with CABG alone. Patients remained well at 1 year.

**Conclusions:** Rate-controlled freezing with 10% DMSO is a safe, feasible and practical method of cryopreserving MSC for cell storage and transportation without risk of contamination or cell death. Direct MSC injection may be beneficial as an adjunct to cardiac revascularization.