Evaluation of Grant Instruments Controlled Rate Freeze-Thaw Device for Cryopreservation and Thawing of hiPSCs

Medical–Biological Research & Technologies

Application Note:

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Introduction:

The CRFT device by Grant Instruments was evaluated to determine its effectiveness in cryopreserving and thawing human-induced pluripotent stem cells (hiPSCs). The study, conducted by Cell and Gene Therapy Catapult, focused on comparing the CRFT's controlled freeze-thaw capabilities against traditional passive devices, namely the Corning CoolCell for freezing and a water bath for thawing.

Objectives:

1. Assess the ability of the CRFT to control freeze rates for hiPSC cryopreservation.
2. Determine the viability and recovery rates post-thaw with CRFT compared to standard methods.

Methods:

- **Freezing:** hiPSCs were cryopreserved in Cryostor CS10 using either the CRFT or CoolCell, and stored at -150°C.
- **Thawing:** Thawing was performed either in a water bath or using the CRFT's controlled thawing function. Post-thaw assessments included viability, recovery, morphology, and proliferation over two passages.
- **Data Collection:** Temperature data was logged in real-time, analyzing the freezing and thawing profiles across multiple vials.

Key Findings:

1. **Temperature Control & Consistency:** The CRFT maintained precise temperature profiles during both freezing and thawing, reducing variation compared to passive systems. Data showed a consistent thawing rate that reduced risks associated with operator dependency and contamination.
2. **Viability & Recovery:** Post-thaw viability exceeded 80% for all groups, meeting the acceptance criteria. Recovery rates were statistically comparable across methods, validating CRFT's effectiveness.
3. **Cell Morphology and Growth:** Cells displayed normal hiPSC morphology and proliferation, meeting expected confluency and yield, suggesting that CRFT does not negatively impact cell integrity.
4. **Advantages Over Traditional Methods:** The CRFT's controlled thawing capability offered an alternative to the rapid and operator-dependent water bath thawing, promising reduced variability and improved consistency in GMP environments.

Conclusion:

The Grant CRFT device offers a reliable alternative to conventional cryopreservation and thawing methods, with advantages in consistency, reduced operator dependency, and controlled environment suitability. This study recommends the CRFT for applications requiring precise cryopreservation of hiPSCs and other sensitive cell lines.

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