EVALUATION OF THE EFFECTIVENESS OF CRYOPRESERVATION AND RECOVERY PROCESSES IN LONG-TERM STORAGE OF PC12 CELLS

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Establishing effective cryogenic banks to ensure the continuity of scientific research and preserve the genetic stability of valuable cell lines is currently a primary objective in biotechnology. Due to the high sensitivity of PC12 cells to environmental stressors, maintaining cellular membrane integrity during freezing and recovery processes remains a significant methodological challenge. Optimizing long-term storage (cryopreservation) systems in liquid nitrogen not only minimizes resource consumption but also ensures the availability of cells with consistent phenotypic characteristics at any research stage. This, in turn, provides a robust bioresource foundation for the preclinical testing of neurotropic pharmaceuticals within the country.

In the subsequent phase of this study, parameters for the long-term storage (biobanking) of PC12 cells were investigated without compromising their genetic or functional integrity. The freezing process is a critical stage in ensuring cellular viability. For cryopreservation, cells were transferred into a specialized freezing medium (RPMI-1640, high-concentration serum, and 10% DMSO). The freezing process was conducted using a controlled step-by-step cooling method to prevent intracellular ice crystal formation, with final storage in liquid nitrogen (-196°C).

During the recovery (thawing) phase, a rapid rewarming technique was employed in a 37°C water bath. Immediately following thawing, cells were seeded onto Poly-D-Lysine-coated substrates.

The results demonstrated that 92–95% of the cells recovered through this method fully retained their viability and neuronal differentiation potential. This

enables the establishment of a reliable PC12 cell reserve bank within our laboratory.

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