ISOLATION OF MESENCHYMAL STEM CELLS FROM WHARTON'S JELLY

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Introduction: Mesenchymal stem cells (MSCs) derived from Wharton's jelly of the umbilical cord are increasingly recognized for their potential in regenerative medicine. These cells offer significant advantages, including high proliferative capacity, multipotent differentiation, and immunomodulatory properties. Due to their accessibility and low risk of immunological rejection, they are considered a valuable resource for various therapeutic applications.
Methods: The collection of umbilical cords is performed under sterile conditions, followed by the isolation of MSCs using two primary techniques. The first, the direct explantation method, involves sectioning the umbilical cord into small fragments, removing the blood vessels, and placing them in culture plates with a medium (DMEM/F-12) supplemented with fetal bovine serum (FBS). The fragments are incubated at 37°C in a 5% CO_2 atmosphere for 7-14 days, allowing the cells to migrate from the tissue and adhere to the culture surface. The second technique, enzymatic digestion, involves incubating Wharton's jelly fragments with collagenase type I and/or trypsin for 30-60 minutes at 37°C with gentle agitation. After digestion, fetal bovine serum is added to stop the enzymatic process, and the cell suspension is centrifuged. The cells are then resuspended in DMEM/F-12 medium with FBS and growth factors and cultured under standard conditions. **Results:** The MSCs obtained from Wharton's jelly exhibit high proliferative potential and the ability to differentiate into osteoblasts, chondrocytes, and adipocytes. These cells also display immunomodulatory properties, making them suitable candidates for applications in autoimmune disease treatment, tissue regeneration, and advanced cell therapy. **Conclusion:** Wharton's jelly-derived MSCs present a promising alternative for regenerative medicine, offering a favorable safety profile and versatile therapeutic applications. The optimization of isolation and characterization protocols is crucial for their successful integration into clinical protocols, advancing the field of regenerative therapies.