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DEVELOPMENT OF DEFINED CULTURE CONDITIONS FOR HUMAN WHARTON'S JELLY STEM CELLS

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Development of Defined Culture Conditions for Human Wharton's Jelly Stem Cells

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ABSTRACT

Mesenchymal stem cells (MSCs) are multi-potent and capable of differentiating into various cell lineages. While MSCs have commonly been isolated from bone marrow for treatment of numerous diseases, alternative sources including adipose tissue and Wharton's Jelly (WJ), an extra-embryonic umbilical cord tissue rich from hyaluronic acid (HA), are under study for establishment of safer, less invasive procedures. Typically, WJ-MSCs are cultured in undefined media containing fetal bovine serum, of which use has been associated with different complications, including transmission of infectious agents and induction of immunologic reactions. To facilitate clinical applications, this project aims to develop chemically defined and safe culture conditions for human WJ-MSCs. The hypothesis is that undifferentiated growth of WJ-MSCs will be supported by an HA-based extracellular matrix and fortified DMEM/F12 supplemented with macromolecules, antioxidants, and growth factors. This hypothesis will be tested by comparing the growth kinetics and plasticity of WJ-MSCs cultured under conventional undefined and defined conditions. WJ-MSCs will be isolated via either the "enzymatic digestion" or "tissue explant" methods from human umbilical cords. They will then be phenotyped by evaluating the expression of relevant markers using a MSC phenotyping kit and placed into one of six different culture media groups for experimental testing.

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