



APP ABSTRACT- APP 2026-002

Isolation and In-Vitro Expansion of Human Umbilical Cord–Derived Mesenchymal Stem Cells for Regenerative and Therapeutic Applications. “

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Abstract

Introduction

Human umbilical cord blood and tissue are valuable sources of stem cells with significant potential in regenerative medicine and cellular therapy. Among them, mesenchymal stem cells (MSCs) derived from the umbilical cord are widely studied due to their self-renewal capacity, multipotent differentiation ability, and low immunogenicity. Natural bioactive compounds such as mangiferin have gained attention for their potential to enhance stem cell viability and therapeutic properties. The present study focuses on the isolation and in-vitro culture of human umbilical cord–derived mesenchymal stem cells as a foundational step for further experimental evaluation involving mangiferin and other therapeutic approaches.

Methods

Human umbilical cord samples were collected under sterile conditions and processed in the laboratory. The Wharton’s jelly region of the umbilical cord was dissected and subjected to enzymatic and/or explant culture techniques for the isolation of mesenchymal stem cells. The isolated cells were cultured in appropriate growth medium supplemented with fetal bovine serum and antibiotics, and incubated under controlled conditions. Cell morphology, adherence properties, and proliferation were monitored using microscopic observation. Subsequent passages were carried out to maintain and expand the MSC population for experimental studies.

Results

The isolation process yielded spindle-shaped fibroblast-like cells characteristic of mesenchymal stem cells. The cultured cells demonstrated strong plastic adherence and proliferative capacity during successive passages. Morphological observation confirmed the successful establishment of a stable MSC culture from umbilical cord tissue, providing a suitable in-vitro model for further biological and pharmacological investigations.

Conclusion

Human umbilical cord tissue serves as an effective and non-invasive source of mesenchymal stem cells. The successful isolation and culture of these cells establish a reliable platform for downstream applications such as drug testing, regenerative medicine studies, and evaluation of natural bioactive compounds like mangiferin. These findings support the potential of umbilical cord–derived MSCs as an important cellular resource for biomedical research and therapeutic development.