

Human Mesenchymal Stem Cells (HMSC) Specification Sheet

Adult (HMSC-Ad)

Wharton's Jelly (HMSC-WJ)

Lifeline's Human Mesenchymal Stem Cells provide an ideal culture model for the study of stem cell biology. HMSC-WJ and HMSC-Ad can each be expanded in an undifferentiated state for future differentiation to multiple lineages. Lifeline's HMSC may be differentiated down the typical mesenchymal lineages, such as adipogenic, chondrogenic, and osteogenic lineages.

Lifeline's HMSC are cryopreserved as secondary cells to ensure optimal phenotype and the highest viability and plating efficiency. Our HMSC are quality tested via flow cytometry to ensure proper expression of multiple markers of mesenchymal stem cells. There is a consensus in the published literature that mesenchymal stem cells do not express hematopoietic surface proteins such as CD45, CD34, and CD14, and that they do express STRO-1, SH-2 (CD105, endoglin), and SH3/SH4 (CD73). However, quantification of positive vs. negative expression is not universally standardized. Lifeline® has set stringent parameters for quantification of marker expression. Lifeline's HMSC are uniformly positive[§] for integrin CD29; matrix receptors CD44 and CD105; and stromal cell-associated markers CD73, CD90, and CD166. Lifeline's HMSC are uniformly negative[#] for hematopoietic lineage markers CD14, CD31, CD34, and CD45.

CELL FEATURES:

- HMSC-Ad are isolated from adult lipoaspirate and are cryopreserved as secondary cells.
- HMSC-WJ are isolated from the Wharton's Jelly of human umbilical cord and are cryopreserved as secondary cells.
- HMSC are extensively tested for quality and optimal performance.
- Lifeline guarantees performance and quality.

Quality Testing for Guaranteed Consistency and Reproducible Results

Lifeline Cell Technology manufactures products using the highest quality raw materials and incorporates extensive quality control in every production run. Exacting standards and production procedures ensure consistent performance.

HUMAN MESENCHYMAL STEM CELLS ARE TESTED FOR:

• Cell Count	HMSC-Ad – 1 x 10 ⁶ cryopreserved cells per vial HMSC-WJ – 500,000 cryopreserved cells per vial
• Morphology	Normal morphology for 3 passages
• Cell Viability	Minimum 70% viability when thawed from cryopreservation
• Sterility Testing	Negative for mycoplasma Negative for bacterial and fungal growth
• Virus Testing	Negative for HIV-1, HIV-2, HBV, and HCV by PCR
• Specific Staining	Positive [§] for CD29, CD44, CD73, CD90, CD105, CD166 Negative [#] for CD14, CD31, CD34, CD45

**Lifeline Technical Note: There are different and often contradictory terminologies used by cell culture companies to define the passage number of cells. Lifeline's designation of 'primary cells' are cells that have been isolated from tissue, plated onto culture vessels, expanded, harvested and cryopreserved. The term 'secondary' indicates that the cells have been isolated, plated and expanded in culture vessels twice before being harvested for cryopreservation.*

§Lifeline defines positive expression as when greater than 95% of the cell population expresses that cell marker.

#Lifeline defines negative expression as when less than 2% of the cell population expresses that cell marker.

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The Lifeline® Guarantee

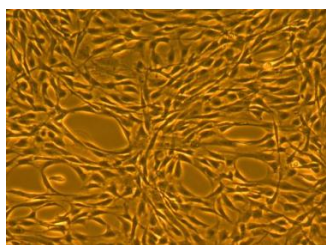
Lifeline's rigorous quality control ensures sterility and performance to standardized testing criteria. All donated tissues have been obtained under proper informed consent and adheres to the Declaration of Helsinki, The Human Tissue Act (UK), CFR Title 21, and HIPAA Regulations relative to obtaining and handling human tissue for Research Use. If Lifeline's products do not meet our posted performance and quality standards, we will replace them at no charge or provide a full refund. Upon request, Lifeline will provide lot specific QC test results, material safety data sheets, and certificates of analysis. See complete guarantee/warranty statement at lifelinecelltech.com or contact your Lifeline representative for more information.

Safety Statement

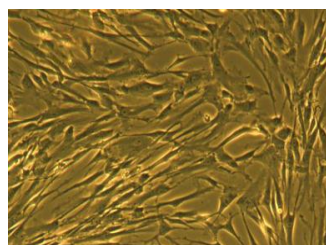
This product is For Research Use Only. This product is not approved for human or veterinary use, or for use in *in vitro* diagnostic or clinical procedures.

Lifeline recommends storing cryopreserved vials in liquid nitrogen vapor phase NOT liquid phase. Handle cryopreserved vials with caution. Always wear eye protection and gloves when working with cell cultures. Aseptically vent any nitrogen from cryopreserved vials in a biosafety cabinet prior to thawing the vials in a water bath. If vials must be stored in liquid phase, the vials should be transferred to vapor phase storage or -80°C for up to 24 hours prior to being thawed.

PRODUCT INFORMATION:	CATALOG NUMBER:
HMSC-Ad, Human Mesenchymal Stem Cells, Adult, Secondary – 1 x 10 ⁶ cells/vial	FC-0034
HMSC-WJ, Human Mesenchymal Stem Cells, Wharton's Jelly, Secondary – 500,000 cells/vial	FC-0020
StemLife™ MSC Complete Medium (StemLife MSC Basal Medium, StemLife MSC LifeFactors® Kit)	LL-0034
AdipoLife™ Adipogenesis Complete Kit	LL-0050
ChondroLife™ Complete Chondrogenesis Medium	LM-0022
OsteoLife™ Complete Osteogenesis Medium	LM-0023
Alcian Blue Staining Kit	LL-0051
Oil Red O Staining Kit	LL-0052
2% Alizarin Red Stain	CM-0058
TrypKit™ Subculture Reagent Kit	LL-0013
KryoLife™ Cryopreservation Solution	LM-0015



HMSC-Ad, passage 4, 4 days after inoculation with ~4,500 cells/cm² (100X)



HMSC-WJ, passage 3, 5 days after inoculation with 5,000 cells/cm² (100X)

Call Lifeline Technical Service and Sales at 877.845.7787
or visit lifelinecelltech.com for more information

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