

## Supplement 1 Commercially available freezing media features and formulations

Commercial Name	Brand	Features
ABM freezing media	Applied Biological Materials Inc.	Suitable for HSC, MSC and iPSC. Animal protein-free
ACS-3020 ATCC 30-2600 (serum-free)	ATCC	Contains 10% DMSO. Recovery, morphology and differentiation of hESCs and hiPSCs are confirmed after cryopreservation and thawing. Serum-free formulation available
CryoMACS® DMSO 10	Miltenyi	Contains DMSO
CryoStor	Stem Cell Technologies	Serum-free, animal component-free, DMSO-free. Designed to improve post-thaw cell viability and function, and to reduce the level of cryopreservation-induced delayed-onset cell death.
CryoStor CS2/CS5/CS10	Stem Cell Technologies	Serum-free, animal component-free, and defined cryopreservation medium containing 2, 5 or 10% DMSO. Recommended for hMSC, hESC and hiPSC. It is manufactured with USP grade components.
BloodStor 55-5	Stem Cell Technologies	cGMP freeze media products used to cryopreserve stem cells and other cells isolated from umbilical cord blood, peripheral blood, bone marrow. It contains 55% DMSO USP, 5% Dextran-40 USP, and WFI quality water.
HypoThermosol Preservation media	FRS Stem Cell Technologies	Optimized for hypothermic preservation (2-8°C). Improved and extended preservation of iPSC, HSC, MSCs from different species. This media is serum and animal component-free as well.
STEM-CELLBANKER	ZENOAQ	Optimized formulation for stem cells and iPS cells. Free of serum and animal derived component, and contains only USP, EP or JP graded ingredients. Direct freezing at -80°C, no programmable freezer required. 20 and 100 mL bottle option possible.
NutriFreez D10	Sartorius/Biological Industries	The first fully defined, optimized freezing solution designed and validated for the hESCs, iPSCs, hMSCs and different cell types. Maintains animal component-free conditions. Also there is phenol red free option with 10, 20, 50, 100 and 500 mL bottle.
Cell Freezing Medium	Sigma Aldrich/Merck	C6039 and C6164 contain MEM supplemented with FBS and contain 10% glycerol or DMSO. C6295 is a serum-free solution. It contains 8.7% DMSO in MEM supplemented with methylcellulose.
TC-Protector Cell Freezing Medium	Biorad	Ready-to-use optimized serum-free cryo-preservation medium which allows for the direct freezing of an expansive range of mammalian cell lines at -80°C.
PRIME-XV Stem FreezIS DMSO-Free	Fujifilm/ IrvineScientific	DMSO and animal component free chemically defined solution for human MSCs and HSPPCs.
StemXVivo® Serum-Free MSC Freezing Media	R&D Systems	Serum-free media containing 10% dimethylsulfoxide (DMSO) designed specifically for the cryopreservation of mesenchymal stem cells. All of the components have been selected and optimized for MSC serum-free cryopreservation. This product does not contain antibiotics.
HyCryo-STEM cryopreservation media	Cytiva Life Science	Serum-free product for stem cell lines. Designed for use with neural progenitor or stem cells, ESCs and iPSCs. This chemically defined formulation contains DMSO and protein components to protect cells during the cryopreservation process.
Cell Freezing medium	BPS Bioscience	Contains DMSO.