IMSUT Hospital

IMSUT CORD
臍帯血・臍帯バンク

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Recently, umbilical cord blood (CB) has received attention as the optimum allogeneic source for immunotherapies. The umbilical cord tissue (UC) also has been rapidly utilized as an abundant source of mesenchymal stromal cells (MSCs), which migrate toward inflamed or damaged tissue to reduce inflammation and support tissue repair. Both CB and UC can be provided as "off-the-shelf" cell products for immunotherapies and regenerative medicine. IMSUT CORD is the CB and UC-derived cell bank established in the Institute of Medical Science, University of Tokyo (IMSUT) hospital in 2016. The aim of IMSUT CORD is to collect, process / culture, cryopreserve, stock, and release CB- and UC-derived cells—including mesenchymal stromal cells (MSCs)—for clinical and research use. We have released CB and UC-derived MSCs to researchers under material transfer agreements to expedite translational studies. We have supplied UC-MSC products for clinical trials for severe acute graft-versus-host disease (GVHD; 2018– 2020), COVID-19-related ARDS (2020–2022), cerebral palsy (PVL; 2021–), and non-infectious pulmonary disease after allogeneic hematopoietic stem cell transplantation NIPS; 2022–). Main processing facility has been moved from IMSUT cell resource center to new IMSUT-HLC cell processing facility since 2021.

1. Establishing a stable perinatal appendage–derived cell supply system as the source of allogeneic somatic stem cells for research and clinical use

Nagamura-Inoue T, Takahashi A, Hori A, Miharu Y, Yamamoto Y, Iwasawa N, Nagaya N, Ogami K, Okamura K, Mukai T, Nagamura F

The umbilical cord (UC) is a rich source of mesenchymal stromal cells (MSCs). UC-derived MSCs (UC-MSCs) possess many advantages: (1) ease of collection, storage, and transport; (2) abundant sources with high proliferation capacity; (3) multipotency to differentiate into various tissue cells, including osteoblasts, chondroblasts, adipocytes, and neurons; (4) low immunogenicity with significant immunosuppressive ability; (5) tissue repair potency; (6) ability to migrate toward the site of inflammation or injury, thereby reducing inflammation and repairing damaged tissues, and (7) no donor age–dependent variations (youngest cells!). We established a cord/cord-blood bank at the IMSUT hospital (IMSUT CORD) to collect cord blood (CB) and UC tissue after informed consent from the mothers in collaboration with the obstetricians. After receiving them, we freeze UC, and to manufacture master cells and product cells for research and clinical use. For clinical use, we introduced a serum-free process throughout the manufacture.

To maintain quality control, we introduced the ISO 9001:2015 quality management standards in IMSUT CORD from 2018. We have transferred the manufacturing and testing technologies to the client companies, where they apply our techniques and standards in their clinical trials. The IMSUT CORD

mission is to establish a supply system for UC-MSCs as a source of allogeneic somatic stem cells in research and clinical use. We supply UC-MSCs for research use in developing cell therapies. In addition, we have supplied clinical-grade UC-MSC products (namely IMSUT-CORD) for clinical treatment trials for severe acute graft-versus-host disease (GVHD; 2018–2020), COVID-19–related ARDS (2020–), cerebral palsy (PVL; 2021–), and non-infectious pulmonary disease after allogeneic hematopoietic stem cell transplantation NIPS; 2022-), after approval by the review board (PMDA). We are currently preparing for a clinical trial for treating peripheral nerve injury using allograft bio3D conduit made with UC-MSC products with Kyoto University (AMED project 2022-). Since 2021, our main manufacturing location has been moved from the IMSUT-Cell Resource Center (IMSUT-CRC) to a new facility, the IMSUT-HLC Cell Processing Facility (IMSUT-HLC CPF),

Publications

1) Meshitsuka S, Ninomiya R, Nagamura-Inoue T, Okada T, Futami M, Tojo A. CRISPR/Cas9 and AAV mediated insertion of β2 microglobulin-HLA-G fusion gene protects mesenchymal stromal cells from allogeneic rejection and potentiates the use for off-the-shelf cell therapy. Regen Ther. 2022 Oct 14;21:442-452. eCollection 2022 Dec.
2) Nagamura-Inoue T, Kato S, Najima Y, Isobe M, Doki N, Yamamoto H, Uchida N, Takahashi A, Hori A, Nojima M, Ohashi K, Nagamura F, Tojo A., Immunological influence of serum-free manufactured umbilical cord-derived mesenchymal stromal cells for steroid-resistant acute graft-versus-host disease. Int J Hematol. 2022 Nov;116(5):754-769. Epub 2022 Jul 30.
3) Nagamura-Inoue T, You can be a unique female physician scientist with originality to find the raison d'être in diverse career options in medicine, Rinsho Ketsueki. 2022;63(8):934-936.

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