IMSUT Hospital

Department of Cell Processing and Transfusion

セルプロセッシング・輸血部

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Our department was established in 1990 to manage transfusion medicine and cell processing for hematopoietic stem cell transplantation. In addition to transfusion related works, our department has been supporting the cell processing for translational studies preformed in IMSUT-Cell Resource Center (IMSUT-CRC), established in 1997. Our recent projects include the Research Cord Blood Bank (RCBB); the National BioResource Project (NBRP) supported by the Ministry of Education, Culture, Sports, Science and Technology; and umbilical cord derived mesenchymal stromal cells (UC-MSC). We have been studying the immunological effects of UC-MSC administration for treatment-resistant severe acute graft-versus host disease, acute cerebral injury, and radiation injury.

1. Transfusion medicine and related tests

Abe Y, Ogami K, Iwasawa N, Yokoyama K, Nagamura-Inoue T

Our department controls and supports transfusion medicine through blood typing, irregular antibody testing, and cross-matching tests on blood transfusion products.

2. Cell Processing and quality tests for Hematopoietic stem cell transplantation (HSCT) and clinical trials.

Takahashi A, Ogami K, Yokoyama K, Miharu Y, Nagamura-Inoue T

We perform quality tests including viability and CD34 + cell number in the frozen-thawed cord blood, bone marrow, and peripheral blood stem cells for hematopoietic transplantation.

3. Exploring the therapeutic application of UC-MSCs for severe acute graft-versus-host disease (aGVHD) and non-infectious pulmonary complications (NIPC) after hematopoietic stem cell transplantation

Nagamura-Inoue T, Huang X, Takahashi A, Hori A, Miharu Y, Mori Y, Sudo K

We investigated the immunosuppressive mechanisms of UC-MSCs on inflammatory cells. A phase I dose-escalation trial, IMSUT-CORD for steroid-resist ant aGVHD using allogeneic umbilical cord-derived mesenchymal stromal cells (IMSUT-CORD) has been safely completed (Int J Hematol. 2022 Nov; 116(5):754-769.). From 2022 to 2023, phase II clinical trial of NIPC treated with UC-MSCs have been complemented. To assess the mechanisms of UC-MSCs action on GVHD and NIPC, we created xenogeneic GVHD model mice with idiopathic pneumonia syndrome (IPS). And we found that the UC-MSCs injec-

tions attenuated the symptoms of GVHD with IPS, resulting in the prolongation of survival. In vitro assay, we co-cultured UC- MSCs with human peripheral blood mononuclear cells (PBMCs) or allogeneic mixed lymphocyte reaction (MLR), and found that macrophage phenotype was shifted from M0 toward anti-inflammatory CD206 + M2 phenotype. UC-MSCs could suppress the proliferation of CD3 + T cells and those

4. Study of therapeutic application of UC-MSCs to neurological injuries in newborn/infant

Zhang T, Sei K, Mori Y, Mukai T, K Sudo, Nagamura-Inoue T

To assess the efficacy of UC-MSCs on cerebral palsy, we created investigated the efficiency of UC-MSCs for Periventricular leukoencephalopathy (PVL) rat model treated with UC-MSCs. We also created acute encephalitis (AE) model mice to mimic the infant viral encephalitis. We found the improvements in neuron degeneration and behavior abnormalities in AE by intravenous injection of UC-MSCs.

5. Research and Development of UC-MSCs (IMSUT-CORD) treatment for new application of UC-MSCs to acute radiation injury, ARDS, cleft palate, hemorrhagic arthropathy, and acceleration of engraftment of HSC

Sudo K, Hu D, Takahashi A, Mori Y, Yoshino T, Nagamura-Inoue T

In collaboration with companies, we have been exploring the use of UC-MSCs (IMSUT-CORD) for new applications, such as treating acute radiation injury, cleft palate, and hemorrhagic arthropathy, as well as accelerating engraftment of hematopoietic stem cells, using mouse models. In the radiation brain injury study, we found the reactive oxygen species (ROS) accumulation in the irradiated neuron, which were attenuated by the UC-MSCs coculture in vitro.

6. The Research Cord Blood Cell Resource / National BioResource Project (NBRP)

Yamaura N, Takahashi A, Yoshino T, Nagaya N, Nagamura-Inoue T

The Research Cord Blood bank / resource was established in 2004 with support of the Ministry of Education, Culture, Sports, Science and Technology to promote the development of regenerative medicine, immunological cell therapy, infectious disease researches, gene modified cell therapies, and drug discovery. Since July 2012, the project has been incorporated into the National BioResource Project (NBRP). The research umbilical cord blood (CB) bank provides processed and cryopreserved CB units (nucleated cells, mononuclear cells, and CD34 + cells) to researchers worldwide via the RIKEN Bioresource Center. The website is at http://www.nbrp.jp/.

7. Institute of Medical Science, University of Tokyo, Cell Resource Center (IMSUT-CRC)

Takahashi A, Hori A, Miharu Y, Yamaura N, Mori Y, Nagamura-Inoue T

IMSUT-CRC was established in 1997 to promote cell therapy in translational research. Originally called the Room for Clinical Cellular Technology (RCCT), the organization changed its name to IMSUT-CRC. The following projects have been implemented:

1) CB cell processing for banking in the manner of the Tokyo Cord Blood Bank (1997–2008), 2) Research cord blood bank (2004–present),3) Dendritic cell therapies (1998–2001), 4) Regenerative therapy of alveolar bone derived from bone marrow mesenchymal cells (2005–2011), 5) Gene therapy for renal cancer (1998), 6) CB and UC-MSC banking (IMSUT-CORD; 2012–present), 7) aAVC-WT1 cell therapy (2017–present), 8) Dendritic cell (DC) therapy using DCs pulsed with neoantigen (2020–2024), 9) Bio3D Conduit Made with UC-MSCs for Neuron Damage.Visit our website: http: //www.ims.u-tokyo.ac.jp/ dcpt/english/

Publications

1) Trang Thi Binh Pham, Kenshi Sei, Yuki Yamamoto, Takeo Mukai, Hiroyuki Akai, Tokiko Nagamura-Inoue, Umbilical cord-derived mesenchymal stromal cells attenuate radiation-induced neuron damage in vitro. Stem Cell Research & Therapy, 2026 in press.
2) Yamazaki R, Yakushijin K, Yoshihara S, Ikeda K, Ishida A, Kajiwara M, Kikuta A, Takagi N, Nagamura-Inoue T, Namba N, Haraguchi K, Fujimori Y, Fujiwara SI, Yamada-Fujiwara M, Okuyama Y, Tanosaki R, Ueda Y.Evaluation of peripheral blood stem cell collection in the Japan Marrow Donor Program (JMDP)., Transfusion. 2025 Dec; 65(12): 2345-2353.
3) Fujita K, Ikeguchi R, Aoyama T, Noguchi T, Yoshimoto K, Sakamoto D, Iwai T, Miyamoto T, Miyazaki Y, Akieda S, Nagamura-Inoue T, Nagamura F, Nakayama K, Matsuda S Efficacy and safety of Bio 3D conduits composed of human umbilical cord-derived mesenchymal stromal cells: A proof-of-concept study in a canine ulnar nerve defect model. Cell Transplant. 2025 Jan-Dec; 34:

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