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 including concentrated red blood cells, platelets, and frozen plasma. The blood type of some patients with hematopoietic disorders and post–stem cell transplantation is undetectable.

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

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

For autologous peripheral blood stem cell transplantation (PBSCT), we perform apheresis for patients with myeloma and malignant lymphoma after mobilization by granulocyte colony-stimulating factor with or without the CXCR-4 inhibitor, Plerixafor. We test CD34-positive cells in the graft of PBSC, bone marrow, and cord blood as the quality tests for hematopoietic transplantations. We process the cells for clinical trials including collection (apheresis), cryopreservation, and thawing with or without washing upon the requests.

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, Takahashi A, Hori A, Miharu Y, Mori Y, Nagamura F, Yokoyama 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) have been safely completed (Int J Hematol. 2022 Nov; 116(5):754-769.). From 2022 to 2023, clinical trial of NIPC treated with UC-MSCs have been implemented. We continued to prepare the next clinical trials by obtaining the pre-clinical POC for aGVHD and NIPC in vitro and in vivo.

4. Study of therapeutic application of UC-MSCs to acute brain injury and importance of microglia

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

Based on the efficacy of proof of concept using UC-MSCs for cerebral palsy by Mukai T et al, a clinical trial (Phase I/II) for cerebral palsy treated with UC-MSCs was implemented from 2021 to 2023, and completed safely. Furthermore, we investigated the efficiency of UC-MSCs for the treatment of acute encephalitis (AE) mimicking the viral encephalitis. We found the improvement of the neuron degeneration and part of 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, and hemorrhagic arthropathy

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

We have been exploring UC-MSCs (IMSUT-CORD) treatment for new application of UC-MSCs to acute radiation injury, cleft palate, and hemorrhagic arthropathy using mice models in collaboration with companies.

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

Shibuya Y, Sakai R, Miharu Y, Takahashi A, Nagaya N, Nagamura-Inoue T

The Research Cord Blood bank / resource was established in 2004 and supported by the Ministry of Education, Culture, Sports, Science and Technology for the development of regenerative medicine, immunological cell therapy, infection research, modified gene cell therapy, and drug discovery. Since July 2012, this 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, Miharu Y, Hori A, Mori Y, Nagamura-Inoue T

To promote cell therapy in translational research, IMSUT-CRC was established in 1997 (originally called the Room for Clinical Cellular Technology, or RCCT). To date, 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–), 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) CBand UC-MSC banking (IMSUT-CORD; 2012–), 6) aAVC-WT1 cell therapy (2017–), and (7) dendritic cell (DC) therapy using DCs pulsed with neoantigen (2020–).

Visit our website: http: //www.ims.u-tokyo.ac.jp/dcpt/english/

Publications

1. Jimbo K, Yamagishi M, Suzuki Y, Suzuki K, Mizukami M, Yokoyama K, Sato A, Nagamura-Inoue T, Nannya Y, Uchimaru K., Progression of adult T-cell leukemia/lymphoma from smoldering to acute type due to branched subclonal evolution., EJ Haem. 2023 Aug 24;4(4):1188-1190.
2. Tsuji S, Mukai T, Tsuchiya H, Iwatani C, Nakamura A, Nagamura-Inoue T, Murakami T., Impact of administering umbilical cord-derived mesenchymal stem cells to cynomolgus monkeys with endometriosis, Reprod Med Biol. 2023 Sep 8;22(1): e12540.
3. Ishida H, Shimada H, Tanizawa A, Shimazu Y, Tachibana T, Doki N, Ara T,Matsuo Y, Nara M, Toubai T, Ino K, Nakamae H, Kato K, Kato K, Sato A, Hino M, Matsumoto K, Atsuta Y, Yasui M, Nagamura-Inoue T. Allogeneic stem cell transplantation for children and adolescents/young adults with de novo blastic phase chronic myeloid leukemia in the tyrosine kinase inhibitor era. Am J Hematol. 2023 Aug;98(8):E200-E203.
4. Jo T, Yoshihara S, Okuyama Y, Fujii K, Henzan T, Kahata K, Yamazaki R, TakedaW, Umezawa Y, Fukushima K, Ashida T, Yamada-Fujiwara M, Hanajiri R, Yonetani N, Tada Y, Shimura Y, Nishikii H, Shiba N, Mimura N, Ando J, Sato T, Na-

kashima Y,Ikemoto J, Iwaki K, Fujiwara SI, Ri M, Nagamura-Inoue T, Tanosaki R, Arai Y. Risk factors for CAR-T cell manufacturing failure among DLBCL patients: A nationwide survey in Japan. Br J Haematol. 2023 Jul;202(2):256-266.
5. Tsuji M, Mukai T, Sato Y, Azuma Y, Yamamoto S, Cayetanot F, Bodineau L, OnodaA, Nagamura-Inoue T, Coq JO. Umbilical cord-derived mesenchymal stromal cell therapy to prevent the development of neurodevelopmental disorders related to low birth weight. Sci Rep. 2023 Mar 7;13(1):3841.