



Shinya Tanaka, M.D., Ph.D.

Hokkaido University
Professor
Department of Cancer Pathology, Faculty of Medicine
WPI-ICReDD
GI-CoRE Global Station for Soft Matter

Education 1984-1990 Hokkaido University School of Medicine, Sapporo, Japan
1990-1994 Hokkaido University Graduate School of Medicine, Sapporo, Japan

Research Experiences

1990-1991 Research on JC virus, at Hokkaido Univ. (Prof. Kazuo Nagashima)
1991-1992 Research on oncogene and signal transduction, at NIH, Tokyo. (Dr. Michiyuki Matsuda)
1994-1997 Postdoctoral Fellow at The Rockefeller University. New York, USA. (Prof. Hidesaburo Hanafusa)
1998-2002 Senior Researcher at Hokkaido Univ. Research on signal transduction for cancer development.
2003-2007 Associate Professor at Hokkaido Univ. Research on pathogenesis of human cancers.
2008-Present Professor at Hokkaido Univ. Research on translational pathology.
Focusing on brain tumor, synovial sarcoma, and other therapy-resistant cancers.
2016-Present Researcher of GI-CoRE Soft Matter Global Station. Hydrogel-based cancer cell biology.
2018-Present PI of WPI-ICReDD.

Awards

2002 Incitement Award of the Japanese Cancer Association
2003 Incitement Award of the Japanese Society of Pathology

Projects

We will use polymer hydrogels as biomaterials to investigate cellular and biological reactions for applications in advanced medical care. The functioning of the human body relies on many complex biological reactions such as the chemical modification of DNA and proteins. A disturbance or imbalance of these reaction systems often induces various human diseases including cancers, autoimmune disorders, and metabolic diseases leading to human death. In order to uncover mechanisms of human diseases, we will use AFIR and biocompatible materials. Following the development of mathematical models and biocompatible materials to control the cellular events, new diagnostic tools and treatment strategies as regenerative medicine will be established for various human diseases with mechanical genomics by the end of the funding period. Our ultimate goal is to predict and prevent human diseases through ICReDD.

Member of Department of Cancer Pathology

Staff Masumi Tsuda, Associate professor
Yusuke Ishida, Assistant professor
Hirokazu Sugino, Assistant professor
Satoshi Tanikawa, Assistant professor

Jun Suzuka, Assistant professor
Lei Wang, Assistant professor
Umma Habiba, Assistant professor

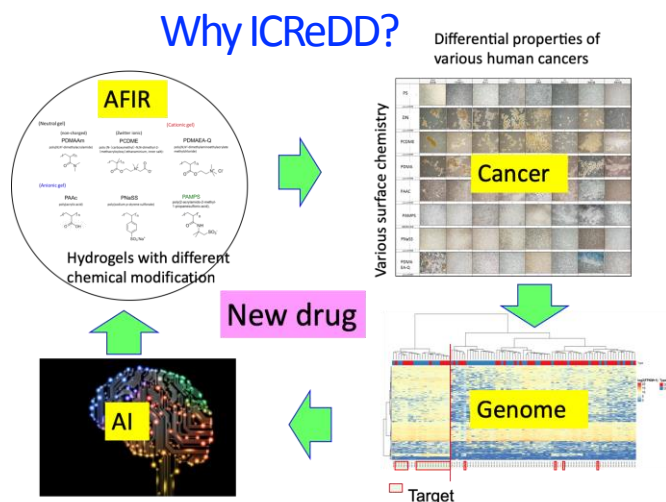


Fig. Establishment of new research field as MATERIAL GENOMICS. Hydrogel-based rapid regulation of human cell behavior through epigenomic alteration which can be analyzed by AI.

Publications

1. Hydrogel research

1. Kiyama, R., Nonoyama, T., Wada, S., Semba, S., Kitamura, N., Nakajima, T., Kurokawa, T., Yasuda, K., Tanaka, S., and Gong, J. P. Micro patterning of hydroxyapatite by soft lithography on hydrogels for selective osteoconduction. **Acta Biomater** 2018.
2. Goto, K., Kimura, T., Kitamura, N., Semba, S., Ohmiya, Y., Aburatani, S., Matsukura, S., Tsuda, M., Kurokawa, T., Gong, J. P., Tanaka, S., and Yasuda, K. Synthetic PAMPS gel activates BMP/Smad signaling pathway in ATDC5 Cells, which plays a significant role in the gel-induced chondrogenic differentiation. **J Biomed Mater Res A**, 734-746, 2015.

2. Brain tumor research

1. Mahabir, R., Tanino, M., Elmansuri, A., Wang, L., Kimura, T., Itoh, T., Ohba, Y., Nishihara, H., Shirato, H., Tsuda, M., and Tanaka, S. Sustained elevation of Snail promotes glial-mesenchymal transition after irradiation in malignant glioma. **Neuro Oncol** 16, 671-685, 2014.
2. Kohsaka, S., Hinohara, K., Wang, L., Nishimura, T., Urushido, M., Yachi, K., Tsuda, M., Tanino, M., Kimura, T., Nishihara, H., Gotoh, N., and Tanaka, S. Epiregulin enhances tumorigenicity by activating the ERK/MAPK pathway in glioblastoma. **Neuro Oncol**, 960-970, 2014.
3. Kanno, H., Nishihara, H., Wang, L., Yuzawa, S., Kobayashi, H., Tsuda, M., Kimura, T., Tanino, M., Terasaka, S., and Tanaka, S. Expression of CD163 prevents apoptosis through the production of granulocyte colony-stimulating factor in meningioma. **Neuro Oncol** 15, 853-864, 2013.

3. Cancer signal transduction research

1. Yachi, K., Tsuda, M., Kohsaka, S., Wang, L., Oda, Y., Tanikawa, S., Ohba, Y., and Tanaka, S. miR-23a promotes invasion of glioblastoma via HOXD10-regulated glial-mesenchymal transition. **Signal Transduction and Targeted Therapy** 3, 33, 2018.
2. Matsumoto, R., Tsuda, M., Yoshida, K., Tanino, M., Kimura, T., Nishihara, H., Abe, T., Shinohara, N., Nonomura, K., and Tanaka, S. Aldo-keto reductase 1C1 induced by interleukin-1beta mediates the invasive potential and drug resistance of metastatic bladder cancer cells. **Sci Rep** 6, 34625, 2016.
3. Kimura, T., Wang, L., Tabu, K., Tsuda, M., Tanino, M., Maekawa, A., Nishihara, H., Hiraga, H., Taga, T., Oda, Y., and Tanaka, S. Identification and analysis of CXCR4-positive synovial sarcoma-initiating cells. **Oncogene** 35, 3932-3943, 2016.
4. Kohsaka, S., Wang, L., Yachi, K., Mahabir, R., Narita, T., Itoh, T., Tanino, M., Kimura, T., Nishihara, H., and Tanaka, S. STAT3 inhibition overcomes temozolomide resistance in glioblastoma by downregulating MGMT expression. **Mol Cancer Ther** 11, 1289-1299, 2012.
5. Kobashigawa, Y., Sakai, M., Naito, M., Yokochi, M., Kumeta, H., Makino, Y., Ogura, K., Tanaka, S., and Inagaki, F. Structural basis for the transforming activity of human cancer-related signaling adaptor protein Crk. **Nat Struct Mol Biol** 14, 503-510, 2007.
6. Tsuda, M., Makino, Y., Iwahara, T., Nishihara, H., Sawa, H., Nagashima, K., Hanafusa, H., and Tanaka, S. Crk associates with ERM proteins and promotes cell motility toward hyaluronic acid. **J Biol Chem** 279, 46843-46850, 2004.
7. Nagai, M., Tanaka, S., Tsuda, M., Endo, S., Kato, H., Sonobe, H., Minami, A., Hiraga, H., Nishihara, H., Sawa, H., and Nagashima, K. Analysis of transforming activity of human synovial sarcoma-associated chimeric protein SYT-SSX1 bound to chromatin remodeling factor hBRM/hSNF2 alpha. **Proc Natl Acad Sci U S A** 98, 3843-3848, 2001.
8. Tanaka, S., Ouchi, T., and Hanafusa, H. Downstream of Crk adaptor signaling pathway: activation of Jun kinase by v-Crk through the guanine nucleotide exchange protein C3G. **Proc Natl Acad Sci U S A** 94, 2356-2361, 1997.
9. Tanaka, S., Morishita, T., Hashimoto, Y., Hattori, S., Nakamura, S., Shibuya, M., Matuoka, K., Takenawa, T., Kurata, T., Nagashima, K., and et al. C3G, a guanine nucleotide-releasing protein expressed ubiquitously, binds to the Src homology 3 domains of CRK and GRB2/ASH proteins. **Proc Natl Acad Sci U S A** 91, 3443-3447, 1994.

4. Surgical pathology

1. Omori, Y., Ono, Y., Tanino, M., Karasaki, H., Yamaguchi, H., Furukawa, T., Enomoto, K., Ueda, J., Sumi, A., Katayama, J., Muraki, M., Taniue, K., Takahashi, K., Ambo, Y., Shinohara, T., Nishihara, H., Sasajima, J., Maguchi, H., Mizukami, Y., Okumura, T., and Tanaka, S. Pathways of Progression From Intraductal Papillary Mucinous Neoplasm to Pancreatic Ductal Adenocarcinoma Based on Molecular Features. **Gastroenterology** 2018.
2. Yuzawa, S., Nishihara, H., Yamaguchi, S., Mohri, H., Wang, L., Kimura, T., Tsuda, M., Tanino, M., Kobayashi, H., Terasaka, S., Houkin, K., Sato, N., and Tanaka, S. Clinical impact of targeted amplicon sequencing for meningioma as a practical clinical-sequencing system. **Mod Pathol** 29, 708-716, 2016.
3. Yuzawa, S., Nishihara, H., Wang, L., Tsuda, M., Kimura, T., Tanino, M., and Tanaka, S. Analysis of NAB2-STAT6 Gene Fusion in 17 Cases of Meningeal Solitary Fibrous Tumor/Hemangiopericytoma: Review of the Literature. **Am J Surg Pathol** 2016.
4. Sasai, K., Nodagashira, M., Nishihara, H., Aoyanagi, E., Wang, L., Katoh, M., Murata, J., Ozaki, Y., Ito, T., Fujimoto, S., Kaneko, S., Nagashima, K., and Tanaka, S. Careful exclusion of non-neoplastic brain components is required for an appropriate evaluation of O6-methylguanine-DNA methyltransferase status in glioma: relationship between immunohistochemistry and methylation analysis. **Am J Surg Pathol** 32, 1220-1227, 2008.

5. Collaborative study with other groups

1. Yabe, I., Yaguchi, H., Kato, Y., Miki, Y., Takahashi, H., Tanikawa, S., Shirai, S., Takahashi, I., Kimura, M., Hama, Y., Matsushima, M., Fujioka, S., Kano, T., Watanabe, M., Nakagawa, S., Kunieda, Y., Ikeda, Y., Hasegawa, M., Nishihara, H., Ohtsuka, T., Tanaka, S., Tsuboi, Y., Hatakeyama, S., Wakabayashi, K., and Sasaki, H. Mutations in bassoon in individuals with familial and sporadic progressive supranuclear palsy-like syndrome. **Sci Rep** 8, 819, 2018.
2. Hirose, T., Nobusawa, S., Sugiyama, K., Amatya, V. J., Fujimoto, N., Sasaki, A., Mikami, Y., Kakita, A., Tanaka, S., and Yokoo, H. Astroblastoma: A Distinct Tumor Entity Characterized by Alterations of the X Chromosome and MN1 Rearrangement. **Brain Pathol** 2017.
3. Li, S., Zhang, P., Freibaum, B. D., Kim, N. C., Kolaitis, R. M., Mollie, A., Kanagaraj, A. P., Yabe, I., Tanino, M., Tanaka, S., Sasaki, H., Ross, E. D., Taylor, J. P., and Kim, H. J. Genetic interaction of hnRNPA2B1 and DNAJB6 in a Drosophila model of multisystem proteinopathy. **Hum Mol Genet** 25, 936-950, 2016.
4. Kawano, S., Grassian, A. R., Tsuda, M., Knutson, S. K., Warholic, N. M., Kuznetsov, G., Xu, S., Xiao, Y., Pollock, R. M., Smith, J. S., Kuntz, K. K., Ribich, S., Minoshima, Y., Matsui, J., Copeland, R. A., Tanaka, S., and Keilhack, H. Preclinical Evidence of Anti-Tumor Activity Induced by EZH2 Inhibition in Human Models of Synovial Sarcoma. **PLoS One** 11, e0158888, 2016.
5. Michels, S., Trautmann, M., Sievers, E., Kindler, D., Huss, S., Renner, M., Friedrichs, N., Kirfel, J., Steiner, S., Endl, E., Wurst, P., Heukamp, L., Penzel, R., Larsson, O., Kawai, A., Tanaka, S., Sonobe, H., Schirmacher, P., Mechttersheimer, G., Wardelmann, E., Buttner, R., and Hartmann, W. SRC signaling is crucial in the growth of synovial sarcoma cells. **Cancer Res** 73, 2518-2528, 2013.
6. Shime, H., Matsumoto, M., Oshimi, H., Tanaka, S., Nakane, A., Iwakura, Y., Tahara, H., Inoue, N., and Seya, T. Toll-like receptor 3 signaling converts tumor-supporting myeloid cells to tumoricidal effectors. **Proc Natl Acad Sci U S A** 109, 2066-2071, 2012.
7. Satoh, T., Arii, J., Suenaga, T., Wang, J., Kogure, A., Uehori, J., Arase, N., Shiratori, I., Tanaka, S., Kawaguchi, Y., Spear, P. G., Lanier, L. L., and Arase, H. PILRalpha is a herpes simplex virus-1 entry coreceptor that associates with glycoprotein B. **Cell** 132, 935-944, 2008.
8. Ohnishi, N., Yuasa, H., Tanaka, S., Sawa, H., Miura, M., Matsui, A., Higashi, H., Musashi, M., Iwabuchi, K., Suzuki, M., Yamada, G., Azuma, T., and Hatakeyama, M. Transgenic expression of Helicobacter pylori CagA induces gastrointestinal and hematopoietic neoplasms in mouse. **Proc Natl Acad Sci U S A** 105, 1003-1008, 2008.