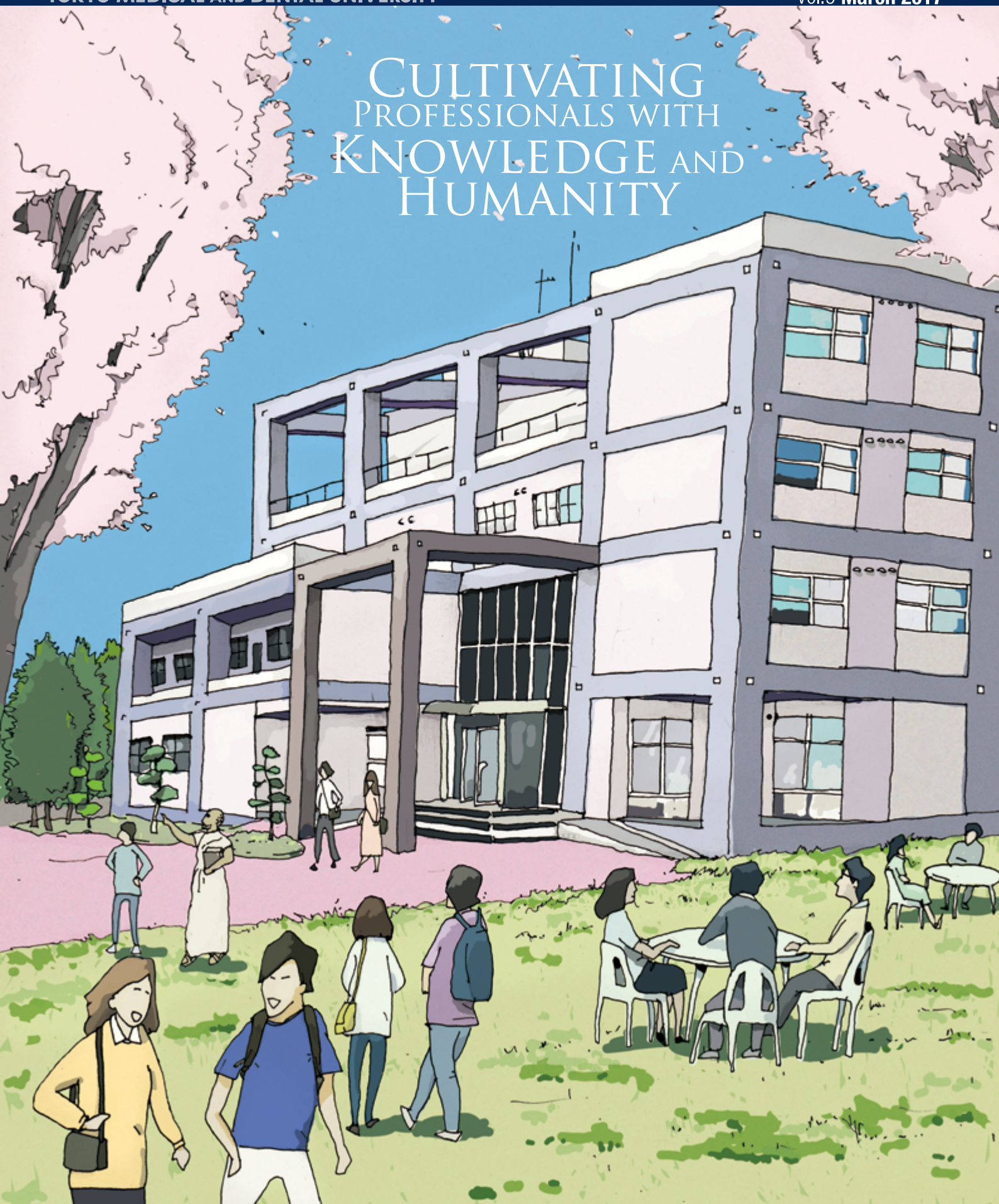
NATIONAL UNIVERSITY CORPORATION

TMDU ANNUAL NEWS

TOKYO MEDICAL AND DENTAL UNIVERSITY

Vol.9 March 2017

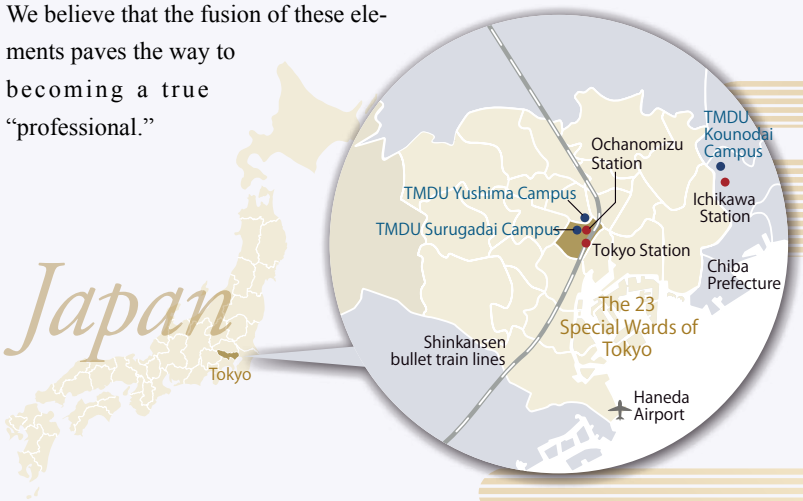
Cultivating Professionals with Knowledge and Humanity



Standing at the sacred birthplace of scholarship in Japan

Tokyo Medical and Dental University was established as a national medical and dental educational institution on October 12, 1928. Currently, TMDU is located in the Yushima / Shoheizaka area of Tokyo, which is considered sacred ground for scholarship and learning in Japan. As Japan's only comprehensive medical university and graduate school, TMDU has provided advanced medical treatment through a fusion of the medical and dental fields. It has worked to cultivate professionals with knowledge and humanity, thereby contributing to human health and the well-being of society. The "knowledge" referred to here includes learning, technology, and self-identity, while "humanity" means culture, sensitivity, and the ability to communicate openly and accept diversity.

We believe that the fusion of these elements paves the way to becoming a true "professional."



TOKYO - The past and present

This landscape shows a view of Ochanomizu, where TMDU is located today. The buildings on the right-hand side, Yushima Seido and Shoheizaka School, were the center of scholarship since the 17th century, the Edo Period in Japan. Mt. Fuji can be seen in the far distance.

1800s

View of the Eastern Capital, Edo-Ochanomizu (woodblock by Shotei Hokuju)

1928

The Tokyo National School of Dentistry, the predecessor of TMDU, was established at Hitotsubashi.

2017

Today, TMDU is still located in Ochanomizu/Yushima district where its predecessor, the Tokyo National School of Dentistry, had moved in 1930, two years after its founding. TMDU has since jointed the ranks of elite research universities in Japan.

Present-day Ochanomizu, showing the same view as in the above woodblock. Ochanomizu Station is at the left and the TMDU Main Campus is at the right, with the Kanda River flowing between them.

TMDU: Did you know...?

University Ranking by Subject

	Medicine	Dentistry
National Rank	4	1
World Rank	101-150	3

SOURCE: QS World University Ranking by Subject 2017

University Ranking by Number of Faculty / Students

Ranked #2 in Japan and #7 in the World

	Students	Faculty
Graduate	1,510	741
Undergraduate	1,489	

SOURCE: QS World University Ranking 2016

World' s Best Small Universities

Ranked #1 in Japan and #17 in the World

SOURCE: Times Higher Education World's Best Small Universities 2017

University Hospitals Promoting Our Research

	Beds	Outpatients Per Year
Medical Hospital	763	581,993
Dental Hospital	60	450,710*

* Ranked #1 among dental hospitals in Japan

International Students

	No. of International Students	No. of Countries
Graduate Schools	277*	42

* Ranked #1 in enrollment among medical graduate schools in Japan

How do you like life at TMDU?

To be at TMDU is a privilege. Not only is it an opportunity academically, as I have had the opportunity to learn from the best researchers and professors, but also an opportunity where I have felt socially integrated into the community. If I could choose again, I would not hesitate to choose TMDU.

Jorge Espigares
(Spain)

I felt everything is set up to get the most from our studies! We have access to cutting-edge technology and world-class facilities at TMDU. I have gained excellent opportunities to present my research at occasions like academic meetings, symposiums and international conferences. In addition, TMDU has become more global in every aspect. Life as an international student is pleasant, thanks to the staff, who are always there for us.

Manila Nisha Gowri
(India)

TMDU's community is superb—the medical presen-tations, lectures, patients cases, research papers and overall background of the professors. It makes me realize that I'm in the right place. Sometimes it's easy to lose oneself in all the projects, academic and extracurricular commitments. This engagement with the university makes you fall in love with TMDU.

Andres Mora, MD
(Ecuador)

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CONTENTS

Delegation Headed by President Yoshizawa Visits University of Nevada to Discuss International Exchange

President Yoshizawa and Dr. Thomas L. Schwenk, Dean of UNR School of Medicine

TMDU President Dr. Yasuyuki Yoshizawa and UNR President Dr. Marc Johnson

FROM MAY 11 to 12, 2015, a delegation consisting of Dr. Yasuyuki Yoshizawa, TMDU President; Dr. Hajime Karasuyama, Executive Director; Dr. Yoshinobu Eishi, Dean of the Faculty of Medicine; and Professor Kazuki Takada, visited the School of Medicine of the University of Nevada for discussions in preparation for an academic exchange agreement on student exchanges.

On the 11th, the delegation visited the University of Nevada, Reno (UNR), for talks with UNR President Dr. Marc Johnson and his administrative team. They also visited the basic research unit of UNR School of Medicine. The following day, they were at the University of Nevada, Las Vegas (UNLV), for a meeting with faculty of UNLV School of Medicine in the clinical field. They also called at the University Medical Center (UMC), which is the principal facility for clinical practice, for talks with the UNLV administrative team.

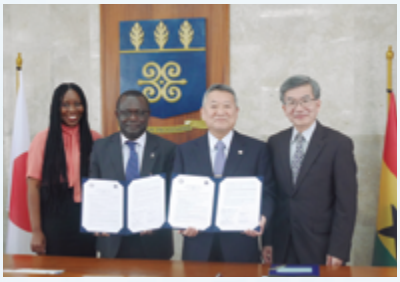
UNR Professor of Medicine Hidenobu Shigemitsu (2nd from right) and Executive Associate Dean Melissa Piasecki (third from right) at UNR

Faculty members of UNLV School of Medicine in the clinical field and the TMDU delegation Dr. Hidenobu Shigemitsu, professor of medicine and chief of pulmonary and critical care medicine at UNR, at extreme right

The discussions at UNR and UNLV were the brainchild of Dr. Eishi of TMDU and Dr. Hidenobu Shigemitsu, professor of medicine and head of pulmonary and critical care medicine at UNR. It was a valuable opportunity to strengthen the shared recognition of the significance of the contemplated partnership for international exchange, one that promises to be mutually beneficial in terms of the advancement of education and research.

Going forward, TMDU and UNR/UNLV will discuss further to determine whether a partnership agreement should be concluded and to make a concrete plan for international exchange going forward.

Inter-university Academic Exchange Agreement Concluded with University of Ghana



(From left) Mrs. Amoa Stella Awukubea, Director - Public Affairs Directorate; Professor Ebenezer Oduro Owusu, Vice-Chancellor of the University of Ghana; Dr. Yasuyuki Yoshizawa, TMDU President; and Dr. Hajime Karasuyama, Executive Director / Executive Vice President of University Innovation and Globalization at TMDU

BACK IN 2008 TMDU concluded an exchange agreement with Noguchi Memorial Institute for Medical Research (MMIMR) of the University of Ghana. Based on this agreement, TMDU and MMIMR are conducting collaborative research in the field of infectious and parasitic diseases. Active student exchanges are another aspect of the fruitful relationship between TMDU and MMIMR: fourth-year students from TMDU's Faculty of Medicine study at MMIMR based on TMDU's project semester system, and TMDU welcomes students from Ghana to its doctoral program.

Thereafter, TMDU and the University of Ghana began discussing the possibility of concluding an inter-university academic exchange agreement. Finally, on October 19, 2016, TMDU President Yasuyuki Yoshizawa and the University of Ghana Vice-Chancellor Ebenezer Oduro Owusu signed the agreement at a ceremony at the University of Ghana in Accra, which was attended by many of the people who will be involved in this promising collaborative endeavor.

Specific exchange programs are currently being prepared. TMDU and the University of Ghana intend to further develop the ongoing research on infectious and parasitic diseases that is currently underway and envisage launching a joint degree program. We will promote exchange so that TMDU becomes a bridge between Japan and Ghana in the academic field.

In addition to the signing of the agreement, the TMDU delegation met Dr. Kwadwo A. Koram, Director of MMIMR, and Professor P. F. Ayeh-Kumi, Provost of the College of Health Sciences, to discuss exchange activities going forward.

Meeting with Professor Ebenezer Oduro Owusu, Vice-Chancellor of the University of Ghana

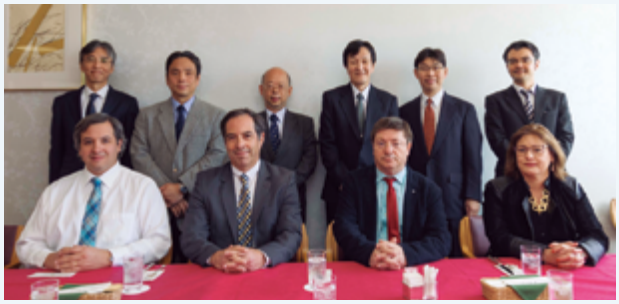
First year of the Joint Degree Program (JDP) with the University of Chile –The University of Chile and TMDU Joint Degree Doctoral Program in Medical Sciences with mention of a medical specialty

TMDU WAS APPROVED to establish a JDP with the University of Chile (UCh) on June 15, 2015. We began the program in April 2016 together with the first UCh student in a Coloproctological Surgery course. Since then we have conducted a monthly TV conference and tried to recruit more students.

Paying a courtesy call on President Yoshizawa

In October and December, we had some wonderful experiences with UCh doctors here in Japan. Drs. Gómez and Latorre visited our hospital, and we had fruitful discussions on the medical situation in Chile and feasible research areas for both TMDU-UCh students and institutions. Moreover, thanks to a visit by a delegation from UCh and Clinica Las Condes (Drs. O'Ryan, Poniachick, and Torres), we were able to advance program content and strengthen the relationship between our two schools. During this visit, TMDU and UCh conducted a joint workshop at TMDU for the first time. Many faculty members and students gathered and were able to deepen their knowledge. I sincerely appreciate the active participation of all of the participants and observers and their contributions toward making the workshop a great success. TMDU and UCh will continue to work together to strengthen our JDP.

Lecture by Dr. O'Ryan at Joint Workshop 2016 at TMDU



Lunch Meeting with TMDU and UCh Professors

Joint degree program in dentistry between Chulalongkorn University and TMDU

TOKYO MEDICAL AND Dental University (TMDU) started its first joint degree program in the field of dentistry with Chulalongkorn University (CU) in Thailand. The five-year International Program in Dentistry (Orthodontics) aims to educate and train dentists who will be orthodontic specialists possessing solid research expertise who can compete in the international arena. Three Thai students enrolled in the inaugural program in 2016.

During the first three years of this 5-year program, the students will focus on theoretical study concerning diagnosis and treatment of malocclusions by interceptive and corrective orthodontics. They will also examine multidisciplinary approaches to treatment, take dissertation-related seminars and design a research proposal under the supervision of both CU and TMDU advisors. They will start their research activities at TMDU toward the end of the first year, and will submit the research results for publication to international journals as part of the program. Finally, in order to enhance their expertise in orthodontics the students will have the opportunity to treat orthodontic patients at the CU clinic for at least 2.5 years. Their treatment methods and results will be evaluated as part of their clinical training.

Joint meeting between CU and TMDU in Bangkok

Thai students enrolled in the joint degree program with a TMDU supervisor, Prof. Moriyama

Achieving the Third

"Cultivating Professionals with Knowledge and Humanity, thereby Contributing to People's Well-being" is the vision we articulated to achieve the goals of TMDU's medium-term plan. To realize this vision as the embodiment of TMDU's guiding philosophy, I call on all members of the university community to do their utmost to achieve these goals, motivated by a sense of vocation and affection for their alma mater. Reform is one of the priority themes that we will be addressing.

Specifically, since the start of this year—the first year covered by the third medium-term plan goals—we have focused on four strategies to strengthen the university.

The first strategy is to infuse our research with the new concept of preemptive medicine, which will help position TMDU as a global training and research hub distinguished by the integrated use of medical information covering medicine, dentistry and health sciences. To this end, we plan to reorganize the graduate school to enhance TMDU's presence in training

Medium-Term Plan Goals

and research linked to bioinformatics and other medical information, including the integrated use of IoT, AI and robotics, across medicine, dentistry and health sciences.

The second strategy is to further TMDU's internationalization by developing an innovative, advanced model for our medical and dental curricula that will enable us to promote and disseminate a distinctive TMDU pedagogical style. In doing so, we aim to build on what we have already achieved at our sites overseas and on the innovations in medical and dental tertiary education, which we have consistently cultivated through the alliance between the Institute of Education and the Institute of Global Affairs.

It is my belief that TMDU is making a valuable contribution internationally through ongoing efforts to help educate health professionals using curricula and teaching methods adapted to conditions in other countries, and by helping to develop medical systems for the benefit of local communities around the world.

We already have joint degree programs with the University of Chile and with Chulalongkorn University in Thailand, and are now seeking to extend this model through the development of collaborative teaching and research systems with other overseas institutions such as the University of Ghana and Mahidol University in Thailand.

With our third strategy, we are capitalizing on the organic links between those parts of TMDU engaged in advanced medicine, dentistry and medical engineering, which constitute major strengths of TMDU. By creating centers of research in these areas so that the fruits of research can be rapidly applied in frontline medical care, we will be able to publish world-class research while developing practical applications based upon the underlying science.

We plan to establish the Institute of Research to eliminate internal divisions between those researching in different fields and to provide strategic support for those areas in which our research potential is especially notable. In doing so, we hope to generate groundbreaking innovations and accelerate their practical-application.

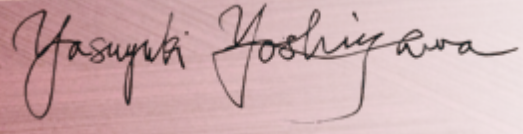
We will also reform our organization to develop closer links with industry and the government sector, and to strengthen our external funding capabilities.

Our fourth strategy centers on the establishment of the Institute of Information Technology. Through the collation, analysis and management of internal and external data, we aim to make our teaching and research internationally competitive by providing better employment conditions for educators who are not Japanese nationals, based on international teaching evaluation and salary norms. We also aim to utilize these data to strengthen our teaching and research capabilities based on the analysis of TMDU's strengths and weaknesses in different areas. At the same time we plan to reduce costs via more efficient use of internal resources as one aspect of reforms aimed at improving the management of TMDU and raising the quality of student welfare, education and our clinical medical sciences.

In addition to the four strategies outlined above, we plan to set up the Clinical Institute to augment the operation of the university's medical and dental hospitals based on enhanced cooperation between the two institutions. This approach will enable TMDU to better manage these two hospitals from the perspective of the entire university, resulting in higher-quality medical and dental teaching at the clinical level as well as a stronger financial footing for the university.

To ensure that our strategic plans inform future management of TMDU, we will establish a new governance model based on synergistic links between the Institute of Education, the Institute of Research and the Clinical Institute on the one hand, and the Institute of Global Affairs and the Institute of Information Technology on the other.

It is my earnest desire and expectation that all members of the university community will be united in promoting and implementing these reforms to forge a great future for TMDU.



Yasuyuki Yoshizawa, President

Winning the Nobel Prize Accelerates

Clinical Applications of Autophagy

"Elucidating a novel mechanism of autophagy for application to disease pathology"

Professor
Shigeomi Shimizu
Pathological Cell Biology
Pathophysiology
Medical Research Institute
Tokyo Medical and
Dental University

"Elucidating the mechanism and functions of autophagy"

Professor
Noboru Mizushima
Department of Biochemistry
and Molecular Biology
The University of Tokyo,
Graduate School of
Medicine

History of autophagy research

1955

Christian de Duve discovers lysosomes via the fractionation of rat liver cells. In 1956, he reports electron microscope evidence for lysosomes being cell organelles.

1963

de Duve coins the term "autophagy" to describe the mechanism of intracellular protein degradation.

Christian de Duve (1917-2013), who coined the term "autophagy"

1988

At the University of Tokyo, Yoshinori Ohsumi (now Honorary Professor, Tokyo Institute of Technology) is the first in the world to use an optical microscope to observe autophagy-related vesicles inside the vacuoles of starved yeast cells.

1993

Budding yeast mutants defective in autophagy gene(*atg* mutans) are isolated, leading to an explosion in autophagy research.

Autophagy is not simply a recycling process involving the degradation of proteins and other cellular components. Research is also progressing on various disease-related fronts. Expectations centering on potential clinical applications rose when Yoshinori Ohsumi, the Tokyo Institute of Technology Honorary Professor often called 'the father of autophagy,' was awarded the 2016 Nobel Prize in Physiology or Medicine. In this feature, Professor Noboru Mizushima of the University of Tokyo, who has contributed to development of interdisciplinary research into autophagy, joined TMDU researchers involved in autophagy research to discuss the current status of autophagy research and future prospects.

"Finding autophagy-based therapies for treating inflammatory bowel disease"

Professor
Mamoru Watanabe
Gastroenterology and Hepatology,
Systemic Organ Regulation,
Medical and Dental Sciences,
Tokyo Medical and Dental University Graduate School of Medical and Dental Sciences
Vice President of Research and Industry-University Alliance,
Tokyo Medical and Dental University

"Finding the role of autophagy in cancer by genomic analysis"

Professor
Johji Inazawa
Molecular Cytogenetics
Medical Genomics
Medical Research Institute
Tokyo Medical and Dental University

"Elucidating the role of autophagy in neurodegenerative disease"

Professor
Hitoshi Okazawa
Neuropathology
Pathophysiology
Medical Research Institute
Tokyo Medical and Dental University

1997

Ohsumi identifies the autophagy-related gene *ATG1*.

2004

At the National Institute for Basic Biology, Noboru Mizushima (now Professor, The University of Tokyo) creates transgenic mice to enable fluorescent labeling of autophagosomes.

2004

Mizushima creates ATG5 knockout mice lacking this specific autophagy gene.

2011

Mizushima creates ATG knockout mice lacking specific autophagy genes to enable mosaic analysis of autophagic function in all body organs.

2016

The Nobel Prize in Physiology or Medicine is awarded to Hon. Prof. Yoshinori Ohsumi.

Profs. Ohsumi and Mizushima at the Nobel Prize ceremony, Stockholm

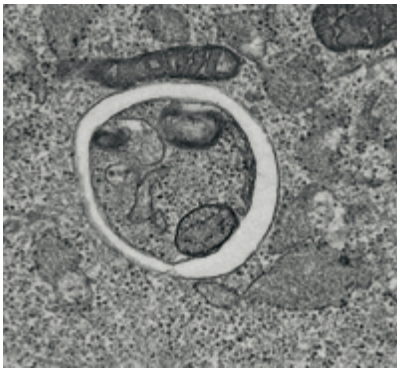
Autophagy Researchers Discuss Their Field

Progress and prospects in disease elucidation, drug discovery and therapy development

Current status of autophagy research

Shimizu: First, I would like to ask Prof. Mizushima how he felt when Prof. Ohsumi, with whom he conducted research into autophagy for many years, won the Nobel Prize.

Mizushima: I did not think that our work would be awarded such a prize because the work on autophagy has not yet reached the level of developing practical applications that benefit society. Winning a Nobel Prize is recognition of the basic science, and so is extremely gratifying for me as a researcher focused on the fundamentals. At the same time, I think it puts pressure on us to derive something useful from the field.



Mouse embryonic fibroblast cells in starvation (photo by Yuriko Sakamaki, TMDU)

Shimizu: Autophagy has certainly already had a substantial impact in medicine and biology. When I began research into cell death to find solutions to problems encountered with liver transplantation, I found autophagy was one of our main research topics. Can I ask what led everyone else here to engage in research into autophagy?

Okazawa: In my specialist field of neurodegenerative disease, we are looking for evidence of various cellular phenotypes, which are not necessarily related to autophagy. It is hard to observe changes inside the human brain, but we have been able to use dual-photon microscopes to see changes in neuronal autophagosomes inside the brains of living mice. Our hope is to be able to do something similar with human subjects.

Inazawa: For me, the link between autophagy and cancer was highlighted by a paper demonstrating the lower malignancy of mammary epithelial tumors in beclin-1 heterozygous knockout mice. Our research into the link between autophagy and tumorigenesis has shown that autophagy can promote cell survival in advanced cancer, making it something of a double-edged sword in this regard.

There are numerous clinical trials underway in the US of autophagy inhibitors in combination with existing anticancers drugs, and we are looking at autophagy research from this angle as well.

Watanabe: A human genome-wide association study (GWAS) published in 2007 identified genes that are critical to autophagy as potential causes of inflammatory bowel disease (IBD). This turned the attention of IBD researchers to autophagy as a new topic to study. One of these genes was ATG16L1, originally discovered by Prof. Mizushima. Naturally we were delighted that he teamed up with us here at TMDU. Unfortunately, since ATG16L1 mutations

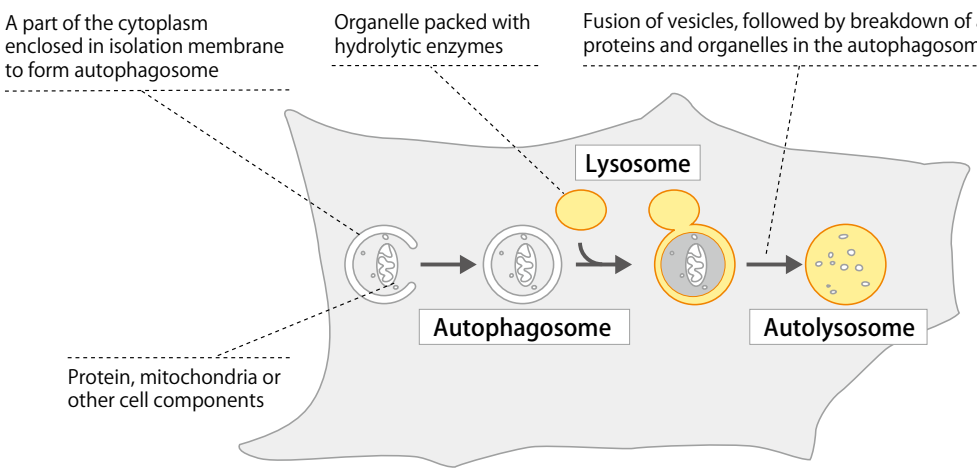
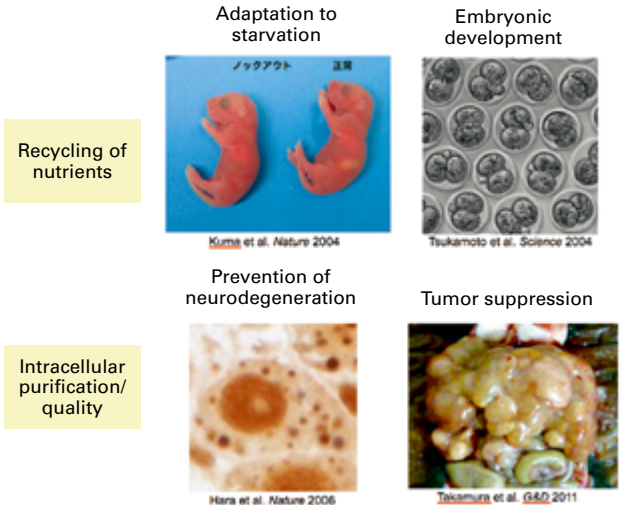


Illustration of autophagy
In autophagy, cellular materials are enclosed in an isolation membrane to form an "autophagosome." This fuses with a lysosome containing hydrolytic enzymes to form an "autolysosome," whose contents are then broken down by the enzymes. (Source: Prof. N. Mizushima)



Research findings (Prof. Mizushima)
Studies using ATG5 knockout mice showed the importance of autophagy in responding to starvation in the neonatal period or early embryonic stage (top row). Autophagy also plays a role in intracellular clearance and tumor suppression (bottom row).

are uncommon among Japanese, we have proposed using knockout mice, antibodies and other analytical tools to study this area with him.

Shimizu: It almost goes without saying why Prof. Mizushima began research on autophagy, but autophagy research has changed significantly in the years since he began working in the area with Prof. Ohsumi. As I am sure Prof. Watanabe will agree, Prof. Mizushima's creation of knockout mice strains has substantially helped to broaden the scope of subsequent research.

Mizushima: The number of research papers on autophagy increased markedly from around 2004, which was the year when we were able to observe autophagy and its functional inhibition in mice. The number of researchers in the area has since exploded, although it remains difficult to monitor autophagy in a quantitative manner. There remain many issues, but I believe they will be resolved.

Shimizu: Prof. Ohsumi remarked in an interview that a great deal of research remains to be done on yeast.

Mizushima: I agree. The Nobel Prize was awarded for Prof. Ohsumi's discoveries of autophagy mechanisms, rather than their elucidation. We have found the fundamental factors, but we still do not know how all of them work together in autophagy or understand the mechanism of some parts of the process such as autophagosome closure. I think we have now reached the stage where we understand the important issues that we need to resolve.

Shimizu: We have achieved results on several autophagy research projects at TMDU. How far has the basic science progressed in this area?

Inazawa: Looking at The Cancer Genome Atlas (TCGA) database of over 4,000 oncogene sequences, we can identify missense or functional loss mutations in about 15% of the autophagy-related genes. In addition, we know cancer cells can contain loss-of-function mutations in autophagy-related genes such as ATG5. Our team is focusing on the functional characterization of each of those mutations.

Okazawa: Accumulation of altered proteins in the brain is a key characteristic of neurodegenerative conditions, and therefore the mechanism for elimination of abnormal proteins is equally important as the mechanism of deposition. It is now widely recognized that autophagy is a crucial part of this puzzle. The problem is that its role is complex, as evidenced in part by the significant differences between disorders.

For example, in Parkinson's disease there is evidence of a causal link to genetic mutations in two directly autophagy-related mitochondrial proteins called Parkin and PINK1, and in Alzheimer's disease the data suggest autophagy may

Professor
Noboru Mizushima

Department of Biochemistry and Molecular Biology
The University of Tokyo, Graduate School of Medicine

【Major areas of research】

- **Elucidation of the mechanism of autophagy**
  Based on analysis of autophagosome formation factors and nutrition signaling induction factors, this work examined autophagy induced by starvation or fertilization in the neonatal or preimplantation periods and explained the physiological significance of constant, low-level autophagy.

- **Development of methods for monitoring autophagy**
  Involving the creation of animal models for detecting autophagy, including transgenic mice to enable the fluorescent labeling of autophagosomes and ATG5 knockout mice, this work developed standard methodologies for autophagy measurement and diagnostics.

- **Link between autophagy and disease**
  Mutations in the mutant autophagy-related gene WDR45 were identified as one of the causative factors in the neurodegenerative disease SENDA.

Professor
Shigeomi Shimizu

Pathological Cell Biology
Pathophysiology
Medical Research Institute
Tokyo Medical and Dental University

[Major areas of research]

•Novel mechanism of autophagy
Discovery of "alternative macroautohagy": analysis of DNA damage-treated ATG5 knockout cells revealed a new autophagy mechanism that did not rely on ATG5 or ATG7, genes previously thought essential for autophagic processes in mammals.

•Analysis of novel autophagy mechanism
Studies showed the new autophagy mechanism to be associated with a protein known as ULK1, and to operate in erythrocytes from which mitochondria have been removed. This work also showed that autophagy plays a role in protecting cell DNA from damage due to radiation or chemical exposure.

promote amyloid production. In addition, while we see intracellular aggregation of altered proteins in most degenerative conditions related to autophagy, proteins can accumulate both inside and outside cells in the case of Alzheimer's disease. This is not yet well understood.

Shimizu: What is happening in terms of clinical research?

Watanabe: Anti-TNF antibodies have proven highly effective in treating Crohn's disease, and have even been dubbed a 'miracle cure' for the condition. We have focused our research on the ubiquitin regulatory genes whose expression is turned on by TNF-alpha. Associate Prof. Oshima and his team have demonstrated the involvement of these genes in Crohn's disease, along with the role played by autophagy via ubiquitin. There is no doubt of the link between autophagy and IBD, but we still do not sufficiently understand its precise role.

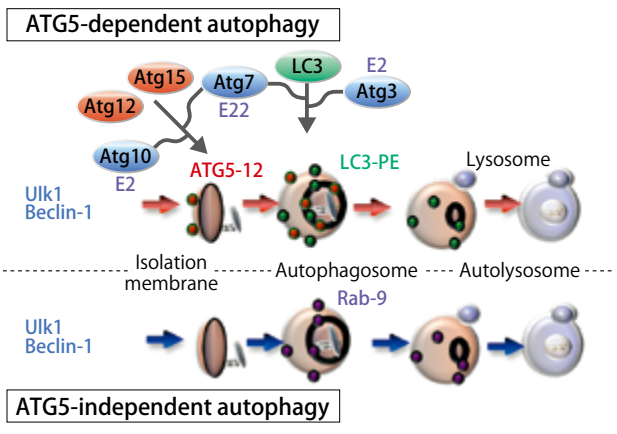
Autophagy and disease

Shimizu: We know that various diseases can arise as the functions of autophagy decrease. Conditions that have been clearly linked to autophagy genes include IBD and neurodegenerative disorders such as SENDA syndrome and Parkinson's disease. The regulation of autophagy genes is also believed to be a factor in polyglutamine diseases involving protein aggregation, suggesting possible treatments.

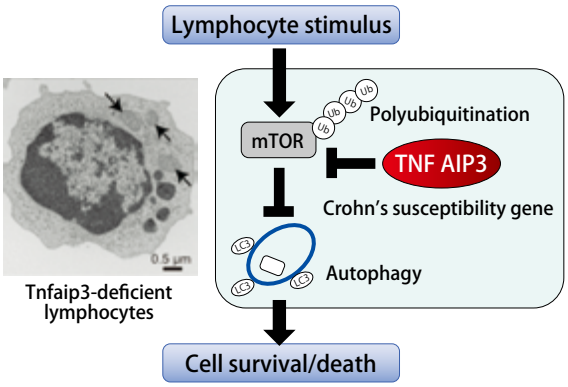
Watanabe: Environmental factors play a major role in Crohn's disease, and we think Paneth cells in the intestinal epithelium have a critical barrier function. Paneth cells tend to die in Crohn's patients. Students at our graduate school led by Associate Prof. Oshima have identified a possible new autophagy-related treatment approach based on blocking the signals that trigger the death of such cells. Westernized diets could also be an environmental factor, and we have found a new mechanism for induction of autophagy by fatty acids. Since the Paneth cells influence stem cell differentiation, we hope to build on these discoveries to find ways of restricting autophagy in the gut epithelium to restore the barrier function or else promote the functional recovery of stem cells.

Mizushima: While I think that autophagy is likely to be involved in these diseases, it does not mean that it is the cause. Autophagy genes in yeast are expressed almost entirely in autophagy alone, but in humans such genes are likely to have other functions besides autophagy.

Watanabe: You are correct. The enteritis that we study in mice will inevitably be different than that in humans. However, while it is hard to pinpoint the precise role of autophagy in disease, I think that demonstrating the existence



Research findings (Prof. Shimizu)
While traditional autophagy is ATG5-dependent, the new ATG5-independent mechanism known as alternative macroautophagy involves proteins such as ULK1, PI(3) kinases and Rab9.



Research findings (Prof. Watanabe)
Mitochondrial swelling and increased production of reactive oxygen species (ROS) are observed in Tnfaip3-deficient lymphocytes (photo). Signal pathway analysis demonstrated autophagy regulation by TNFAIP3 via polyubiquitination of the MTOR complex.

of autophagy-related mechanisms in clinical disorders could prove a valuable first step.

In this context, whether one adopts a fundamental or a clinical perspective can also affect things significantly. Naturally, we try to use both viewpoints in our research. Our policy is not to conduct any research unless it is useful to society.

Okazawa: Our objective is also to shed light on disease mechanism. This is slightly off topic, but in neurodegenerative disorders one of the problems is to identify at what stage the pathological trigger is activated. If this is before the stage of protein deposition, then we could not hope to prevent the pathological changes by activating autophagy pathways to eliminate aggregation.

Mizushima: But what about trying to activate autophagy mechanisms much earlier on? In the case of inheritable degenerative conditions, lowering the overall concentration of pathogenic proteins within the body might help to slow the progress of the disease.

Okazawa: That theory is most advanced in the case of Alzheimer's disease, where the idea would be to start treatment even in symptom-free patients as soon as a PET scan detected amyloid plaques.

Shimizu: Many researchers have now reported a link between Parkin and mitophagy (mitochondrial autophagy) in Parkinson's disease.

Mizushima: There is no doubt that Parkin is a causative factor, but there is not enough evidence to say it is indeed through autophagic insufficiency. Parkin is associated with mitochondrial degradation, but it also has many other functions, and we do not understand which types of functional loss lead to the development of Parkinson's disease.

Rather than such conditions, my view is that autophagy-based treatments could be more effective in diseases where autophagy is not compromised. If autophagy is not functioning properly, activating the system is unlikely to be effective, whereas promoting functionally active autophagy mechanisms could be useful in fighting disease.

Shimizu: In other words, we should view autophagy as a possible therapeutic target rather than as the cause of disease pathology?

Mizushima: Yes, I think that could more often be the case.

Shimizu: What about cancer? Various links to autophagy have been suggested in research to date.

Inazawa: That's right. However, we doubt that autophagy is playing a similar genetic role in cancer to the kinds of strongly tumorigenic 'driver' mutations associated with tyrosine kinases.

On the assumption that autophagy can either cause cancer or enhance tumor malignancy, we are studying the actual impact of autophagic pathway activation. Our view is that the therapeutic strategy of autophagy inhibitors in cancer could be the right clinical approach in a cellular context-dependent manner.

Mizushima: The difficulty in trying to utilize autophagy for therapeutic pur-

Professor
Mamoru Watanabe

Gastroenterology and Hepatology,
Systemic Organ Regulation,
Medical and Dental Sciences,
Tokyo Medical and Dental University Graduate School of Medical and Dental Sciences
Vice President of Research and Industry-University Alliance, Tokyo Medical and Dental University

[Major areas of research]

- **Showing a common genetic link between autophagy and IBD pathology**
  Besides demonstrating ubiquitin-mediated regulation of autophagy by TNFAIP3, a gene strongly associated with inflammatory bowel disorders such as Crohn's disease and ulcerative colitis, this work revealed new mechanisms for autophagic involvement in apoptotic signaling and fatty acid induction of autophagy. Research continues into ubiquitin-mediated regulation of autophagy.

- **Research using cultured human intestinal epithelial cells**
  Autophagy is being studied using epithelial cells cultured from patient biopsy specimens with the aim of finding autophagy-based therapies for treating IBD.

Professor
Johji Inazawa

Molecular Cytogenetics
Medical Genomics
Medical Research Institute
Tokyo Medical and Dental University

[Major areas of research]

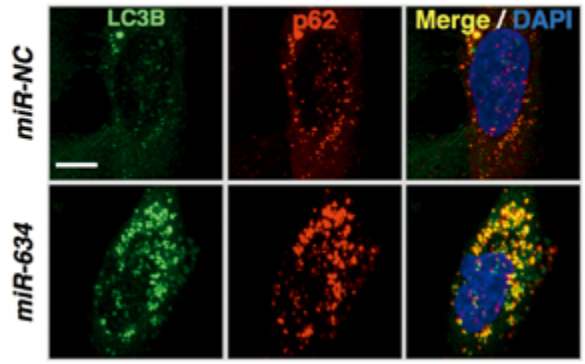
•Elucidation of the role of autophagy in cancer

This work aims to find new diagnostics and therapies for cancer by studying the links between autophagy and cancer stem cells, abnormal epithelial-mesenchymal transition (EMT) regulation in cancer, and tumor metastasis. It has demonstrated an autophagic connection in the pediatric cancer acute lymphoblastic leukemia (ALL), and has also shown a strong association between cancer pathology and inhibition of lysosomal degradation.

•Establishing new cancer diagnostics and treatments

The suppression of autophagy led to excessive ROS production inside cells. microRNA-634 was identified as a potential nucleic acid anticancer due to its ability to induce tumor cell death.

***MiR-634*-mediated autophagy inhibition is involved in enhancement of chemotherapy-induced cytotoxicity in ESCC cells**



Research findings (Prof. Inazawa)
Inhibition of autophagy via the expression of microRNA-634 results in the accumulation of large numbers of autophagosomes inside esophageal cancer cells (bottom row), as evidenced by staining of the autophagosome marker protein LC3B (green), the selective autophagy substrate molecule p62 (red), and a combination of the two (yellow).

poses is that it is not molecular in nature, but rather a functional process based on molecule aggregation. Drug discovery requires molecular targets to develop therapies, and autophagy simply does not fit the bill.

Proteasome inhibitors are another example of a type of cancer therapy—in this case, treatment of multiple myeloma—where the idea is to inhibit normal performance (of proteasomes) rather than taking advantage of abnormalities. There is a chance that autophagy could work in a similar way.

Challenges for clinical applications

Shimizu: Next, I would like to discuss autophagy-related drug development and clinical applications.

Inazawa: We are looking to use autophagic pathways for drug creation, partly due to the limitations of molecular target inhibitors and partly because we see a need for smart combination therapies with existing drugs to yield economically productive treatments. Our approach treats autophagic flux as the target.

Shimizu: In our laboratory, we have begun researching autophagy as an anticancer tool. We see it as one of the many possible therapeutic strategies that will be needed as personalized medicine advances.

Mizushima: One of the very convenient features of autophagy is that it functions regardless of the cellular contents being recycled. In the case of neurodegenerative disorders, it is thought that replacing the contents of cells to lower the concentration of toxic substances could delay the onset or progress of disease. There are many drugs available to treat cancer, but in contrast there are still virtually no effective therapies for treating neurodegenerative disorders. Autophagy could thus have a major therapeutic impact. The problem is that the time needed to show results implies extremely lengthy clinical trials, and it is not clear how this hurdle might be overcome.

Okazawa: Whilst the pathology of Alzheimer's can vary by patient and by the nature of symptoms, I think there is no doubt that autophagy could be effective in many cases. I would like to see us take advantage of it to help reactivate functionally impaired parts of autophagy flux, which should have clinical benefit. Yet the sheer length of the clinical trials that would be required is a major problem compared with, say, cancer. As Prof. Mizushima points out, the lack of precise biomarkers would also make it extremely difficult to detect significant differences in clinical outcomes in large-scale trials.

Shimizu: Looking ahead, the field of autophagy is expected to enter the clinical domain. Overseas, in some cases fundamental and clinical researchers

are collaborating.

Mizushima: Even if this collaboration relies on a virtual set-up, it is a significant development if it enables collaboration between fundamental and clinical researchers.

Watanabe: Prof. Mizushima is also providing our team with the tools we need for research, but the opportunities for joint research with Prof. Shimizu or Prof. Inazawa are few and far between. As Vice-President of Research at TMDU, it pains me that we have not created more collaborative links between these centers of research and clinical excellence. We must generate opportunities to forge closer links between fields because autophagy is a vital phenomenon that could play a valuable role in various areas from basic science to clinical development.

Okazawa: Integrating the basic science with the clinical side is also an absolutely important part of our research in the field of neuroscience. While I am delighted that we understand the mechanism of autophagy, as a medical school graduate my goal is to apply the science to help people.

Watanabe: We have developed the technology to cultivate human intestinal epithelial cells. We want to use this technology to study autophagic variation and apply our understanding of the autophagy phenomenon in fundamental research.

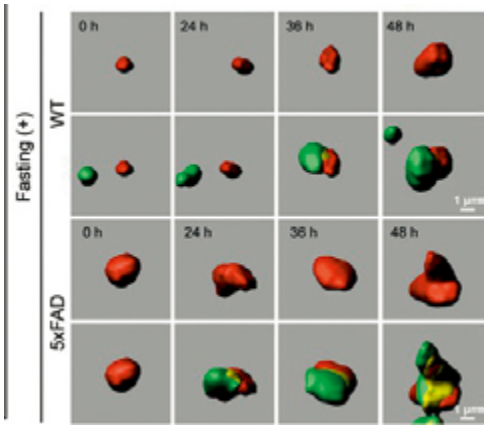
Shimizu: It would seem the primary issue is how to diagnose autophagy abnormalities.

Mizushima: With autophagy, it is not enough just to see the autophagosome, as we must also confirm that the contents of the autophagosome have been broken down. New detection methods have recently been developed to allow us to measure the autophagic degradation, and I believe this will make it easier to conduct autophagy research in mice. In humans, which are of far more interest, at present the only lead we have is to investigate abnormalities in autophagy due to related genetic mutations. We still have much to do to develop autophagic diagnostic and quantification tools.

Okazawa: PET scan technology enables us to observe a wide range of cellular events in neurons. Besides observing simple aggregates, we can also visualize the dynamics of various receptors. Observing the whole scheme of subcellular dynamics might not be easy yet, but I am confident the technology will develop further.

Inazawa: Autophagy diagnostics such as measurement of autophagy flux in cancer cells and/or tumor tissues will be an important part of developing cancer treatments based on the personalized or precision medicine approach. I am glad we had this opportunity for a discussion between researchers from different parts of TMDU.

Shimizu: Agreed. Let's try to help one another in advancing our autophagy research.



Research findings (Prof. Okazawa)
Neuronal cells from wild type (WT) or Alzheimer's model (5xFAD) fasting mice are injected either with TAMRA-beta-amyloid (top row) or TAMRA-beta-amyloid plus EGFP-Lc3 plasmid (bottom row) and then observed 24, 36 and 48 hours later to visualize the interaction over time between the endosomes (red) and autophagosomes (green).

Source: http://www.nature.com/articles/srep12115

Professor
Hitoshi Okazawa

Neuropathology
Pathophysiology
Medical Research Institute
Tokyo Medical and Dental University

【Major areas of research】

•Development of technology to observe in vivo autophagy in brain neurons
Using fluorescent-labeled proteins, a method was developed to use dual-photon microscopes to see changes in neuronal autophagosomes inside the brains of living mice. These studies demonstrated the existence of starvation-induced autophagy in brain cells.

•Role of autophagy in Alzheimer's disease
This work shows that starvation-induced autophagy can potentially aggravate Alzheimer's disease by promoting beta-amyloid deposition inside brain cells.

Growing TMDU Network in Latin American Countries; Academic, Educational and Clinical Collaborations

Latin American Collaborative Research Center,
Tokyo Medical and Dental University, Santiago, Chile

Masanobu Kitagawa
MD, PhD
Professor, Comprehensive Pathology, TMDU
Director of Satellite Office in Chile

Hiroyuki Uetake
MD, PhD
Professor, Specialized Surgeries, TMDU

Takuya Okada
MD, PhD
Junior Associate Professor, Gastrointestinal Surgery, TMDU

IN 1968, PROFESSOR Tadashige Murakami, former professor of surgery of TMDU, visited Chile to give a lecture on gastric cancer. This was the start of the long relationship between TMDU and Chile. In the 1970s, the Japan International Cooperation Agency (JICA) launched a project for the early detection of gastric cancers in order to reduce their high mortality rate. The Gastric Cancer Center in Santiago was founded in 1977 at the Hospital Paula Jaraquemada (now the Hospital Clinico San Borja Arriaran), and this center has long played a major role in the project. TMDU has dispatched numerous experts there to support the prevention of gastric cancer. The Gastric Cancer Center was later renamed the Chilean-Japanese Institute for Digestive Diseases, and it still contributes to maintaining the health of the Chilean people.

Colorectal Cancer Screening in Chile, Supported by TMDU

In Chile, the mortality from colorectal cancer has been increasing in the last two decades, and thus the need for colorectal cancer screening has grown rapidly. Approval was given in 2009 to start a screening project based on a proposal from Dr. Lopez of the Clinica Las Condes (CLC), one of the biggest and most advanced hospitals in Chile. Due to the long history between TMDU and Chile, our university was invited to supervise the project. In 2009, the Ministry of Health of Chile, CLC and TMDU signed a collaboration agreement concerning colorectal cancer screening (Fig. 1), and the Latin American Collaborative Research Center (LACRC) was established at CLC in 2010. Over the years, TMDU has continuously sent experts in pathology, endoscopy and research to LACRC. Since 2012, PRENEC (the Prevention Project for Neoplasia of Colon and Rectum) has been implemented in three major cities: Punta Arenas, Valparaiso and Santiago. In each place, the Japanese method using immunological fecal occult blood test and colonoscopy has been adopted for the detection of colorectal cancer.

The Chilean-Japanese Institute for Digestive Diseases at the Hospital San Borja Arriaran is the headquarters of PRENEC in Santiago. The institute also serves as a training center for endoscopy. Many Chilean doctors have taken a training course in endoscopy, acquiring the skills required for colorectal cancer screening with colonoscopy (Fig. 2). The institute's endoscopy unit has been redesigned for PRENEC, with extensive support from the Japanese Embassy in Chile.

Conclusion of an agreement for colorectal cancer screening between the Chilean Ministry of Health, CLC and TMDU

LACRC Members and University Activities

LACRC has been staffed by experts from the pathology, endoscopy and molecular biology of TMDU, and various doctors have been involved since the center's inception. As of 2015, LACRC has been operated by five TMDU doctors; Dr. Hiroshi Kawachi (pathologist; March 2012 to March 2015), Dr. Maki Kobayashi (molecular biologist; July 2012 to March 2015), Dr. Takuya Okada (endoscopist; April 2013 to March 2015), Dr. Masahiro Tsubaki (endoscopist; October 2014 to September 2015) and Dr. Tomoyuki Odagaki (endoscopist; November 2014 to present).

Public Releases of PRENEC Results in Medical Journals and Congresses

The colorectal cancer screening system at

1 Colonoscopy training for Chilean doctors by Dr. Tsubaki and Dr. Okada
2 Presentation by Dr. Odagaki at a congress of the American College of Surgeons in Lima, Peru
3 Presentation by Dr. Ito at a JICA/AGCI International Training Course

PRENEC has achieved exceptional results. From June 2012 to July 2014, a total of 10,575 asymptomatic individuals enrolled in PRENEC. Colorectal cancer was detected in one hundred and seven cases, amounting to 1.01% of all participants. The detection rate of the previous screening system in Chile was 0.2%. Most of the cancers detected using PRENEC were early intramucosal cancers without risk of metastasis, and these lesions were treated successfully by endoscopy.

These results have been reported in various medical journals and congresses, most notably in an article by Dr. Okada in the prestigious journal Cancer (DOI: 10.1002/cncr.29715). A paper by Dr. Ito regarding the standardized protocol of pathology in PRENEC was also accepted for publication in the Chilean medical journal Gastroenterologia Latinoamericana. Dr. Odagaki presented on PRENEC at international congresses in countries such as Lima, Peru and Quito, Ecuador (Fig. 3). More reports related to PRENEC results are in progress for future publication.

Spreading Network of TMDU-PRENEC in Latin-America

PRENEC and supportive activities by TMDU are now recognized as essential aspects of Chilean health care.. Increasing numbers of participants have steadily enrolled in PRENEC in three cities: Santiago, Valparaiso and Punta Arenas. As TMDU and local doctors have provided an incentive to the government of Chile, TMDU-PRENEC network is spreading. At present, three more cities—Osorno, Valdivia and Vallena—have concluded agreements to start PRENEC, and five more cities or facilities are scheduled to participate in the future: Coquimbo, Concepcion, Antofagasta, Iquique, and the Nacional Cancer Institute in Santiago.

TMDU has also tried to promote the same screening system in other Latin-American countries, in association with JICA and the International Cooperation Agency of Chile (AGCI). In August 2015, the First International Training Course for Colorectal Cancer Screening took place in Santiago. TMDU experts participated in the course as instructors and gave lectures to doctors from Ecuador and Colombia. In August 2016, the Second International Training Course was held in Santiago. Dr. Ito and Dr. Okada from TMDU and Dr. Odagaki from LACRC gave special lectures to twelve medical professionals from Bolivia and Paraguay (Fig. 4, 5).

Projects in Ecuador and Paraguay

TMDU came to an agreement regarding a cancer screening program with the government of Ecuador in 2012. At that time, a pilot project for colorectal cancer screening was being carried out at the National Hospital Pablo Arturo Suarez in Quito, with clinical and project management support from TMDU. LACRC sent doctors from Chile to Ecuador several times for discussions and to make suggestions concerning the cancer screening system. Academically speaking, the Ministry of Health of Ecuador holds annual medical congresses in Quito, and TMDU professors are regularly invited as presenters. Finally, in Paraguay TMDU agreed to a direct request from the President of Paraguay for support for the colorectal cancer screening project. Dr. Kawachi from TMDU attended a signing ceremony for the agreement held in Asuncion in June 2013.

Guidance concerning colonoscopy technique by Dr. Okada to doctors from Bolivia

Activities for strengthening relationships between TMDU and Thai universities

CU-TMDU Research and Education Collaboration Center, Thailand

Yoko Kawaguchi
DDS, PhD
Professor of Oral Health Promotion, TMDU
Director of Satellite Office in Thailand

1. Prof. Petchara Techakumpuch receives TMDU Honorary Degree

On February 11, 2016, Tokyo Medical Dental University (TMDU) awarded an Honorary Degree to Prof. Petchara Techakumpuch for her great contribution in implementing academic collaboration between TMDU and Chulalongkorn University (CU). Prof. Petchara was the dean of the dental school in CU when the first Memorandum of Understanding (MoU) was signed between the two dental schools in 1991. Since then many projects have been carried out between the two universities, In 2010, the CU-TMDU Research and Education Collaboration Center was established on the CU campus. This vigorous promotion of international exchange has stemmed from Prof. Petchara's wisdom and foresight.

The honorary degree ceremony was held at the main hall in the CU campus. Prof. Pirom Kamolratanakul (President of CU), Prof. Suttipong Wacharasindhu (Dean of CU Medical School), Assistant Prof. Suchit Poolthong (Dean of CU Dental School) and many distinguished delegates from CU and TMDU participated. TMDU alumni members from CU also attended the ceremony dressed in TMDU's academic black gowns.

Prof. Yujiro Tanaka (Executive Director and Executive Vice President of TMDU) praised Prof. Petchara's achievements and gave her the Certificate of Honorary Degree. Following that, she made a memorable speech about her appreciation for both the degree and the continuous support from TMDU. After the ceremony, everyone enjoyed a party where participants further strengthened their friendships.

Prof. Tanaka gave the Certificate of Honorary Degree to Prof. Petchara at the Honorary Degree Ceremony

After the ceremony, Prof. Pechara and TMDU delegates and TMDU alumni members took a commemorative photo

2. Discussion about medical collaboration with CU and Mahidol University

Prof. Yujiro Tanaka and Prof. Satoshi Miyake (Dept. of Clinical Oncology) visited CU Medical School and discussed the mutual student exchange program with Dr. Unnop Jaisamrarn (Assistant Dean for International Affairs) on February 11, 2016. This time CU asked TMDU to increase the number of CU students in the exchange program, as this program has been greatly beneficial for them.

On February 12, Prof. Tanaka and Prof. Miyake visited Mahidol University campus at Salaya and spoke with Prof. Sansanee Chaiyaroj (Vice President for Research and International Relations) about the new MoU. The new MoU concerns a new University Unit designed to implement more active exchange projects. They also visited the Faculty of Medicine at Siriraj Hospital of Mahidol University, and talked about future collaboration projects between the two universities.

3. Signing ceremony for Memorandum of Understanding

Prof. Keiji Moriyama (Dean of TMDU Dental School) and Assistant Prof. Suchit Poolthong (Dean of CU Dental School) signed a MoU between the two dental schools on February 11, 2016. This was a renewal of the agreement to promote mutual cooperation and exchange projects between the two dental schools.

There has been a long history (more than 25 years) of mutual collaboration between TMDU and CU since the first MoU was signed in 1991. TMDU has accepted many Thai students into the doctoral course and at present about 40 dental alumni who received PhDs at TMDU are working

1 Prof. Tanaka and Prof. Miyake visited Mahidol University and met Prof. Sansanee Chaiyaroj (Vice President for Research and International Relations)
2 Four TMDU students in the School of Health Care Sciences visited CU and participated in a training program
3 Students helped administer health check-up activities for residents in Saraburi Province

as academic scholars in the Faculty of Dentistry in CU. In recent years, various exchange programs for undergraduate and postgraduate students have been actively conducted, with the support of the Re-Inventing Japan Project.

In 2016, TMDU and CU implemented a new five-year international doctoral joint degree program in Dentistry (Orthodontics). Three Thai students enrolled in this program in August. The new academic affiliation agreement will contribute to strengthen dental networking between TMDU and CU.

4. Student exchange program in health care sciences

From August 20-29, 2016, five students in the School of Health Care Sciences (Ms. Wakana Sato, Ms. Chinami Onchi, Ms. Ayane Ono, Ms. Mutsumi Gotanda and Mr. Kosuke Shinoda) visited the Faculty of Allied Health Sciences in CU and participated in a training program. They observed the experiments in the medical laboratory of the hospital and joined the medical biology class where they studied along with CU undergraduate students.

Moreover, they had opportunities to participate in local community health center activities in Saraburi Province. Under the supervision of university teachers and community health staff, CU 4th year students conducted free health check-ups for the residents, including measurements of weight and height, blood tests, urine tests, nutrition counseling and physiotherapy. TMDU students assisted with these activities.

They found that knowledge and technological techniques in Thai medicine are not so different from Japan in the urban hospital laboratory. However, the situation in rural areas is quite different. Participation in these health checkup activities for local people was an interesting experience for the TMDU students, as they had not yet experienced clinical activities.

5. Research Day program in CU

Mr. Yuta Ikami and Mr. Shion Orikasa (5th year dental students) visited CU and participated in the Research Day program on January 27, 2016. This is a special program for dental students to present their research activities as part of a competition. Since 2013, TMDU has sent dental students to participate in this program every year. Mr. Ikami and Mr. Orikasa presented their research topics orally in front of an audience of more than 100. Mr. Orikasa won a prize in the Oral Biology session and received the oral competition award from Dean Suchit. Prof. Sachiko Iseki (Dept. of Molecular Craniofacial Embryology) and Dr. Keiichi Morita (Dept. of Maxillofacial Surgery) also participated in the CU Research Day and contributed as an evaluator of the oral session and chair of the poster session, respectively.

4 Signing Ceremony for Memorandum of Understanding between Dental Schools in TMDU and CU
5 Mr. Orikasa, a 5th year dental student, won a prize in the "Oral Biology" session in the Research Day program at CU

Research Partnership between TMDU and Noguchi Memorial Institute for Medical Research, University of Ghana: partnership strengthening and constructing an intra-African network Ghana-Tokyo Medical and Dental University Research Collaboration Center

Ghana-Tokyo Medical and Dental University Research Collaboration Center

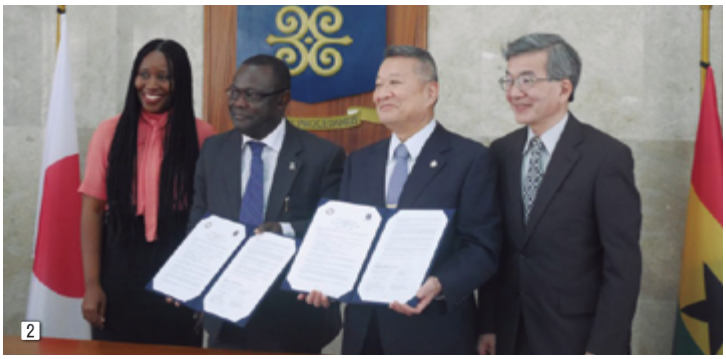
Nobuo Ohta
MD, PhD
Professor, Environmental Parasitology, TMDU
Director of Joint Project Office in Ghana

Project re-started in West Africa

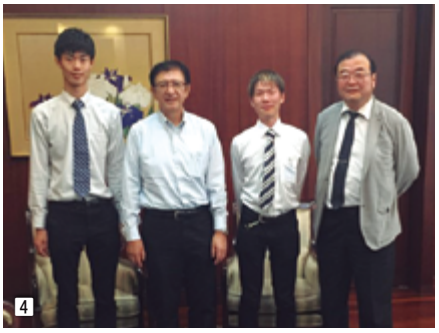
Our international research collaboration project between Japan and Ghana started in 2008 as part of the Program for Founding Research Centers for Emerging and Reemerging Infectious Diseases, sponsored by the Japanese Ministry of Education, Culture, Sports and Technology (MEXT), and became the Japan Initiative for Global Network on Infectious Diseases (J-GRID) program with a minor modification in the scheme. The J-GRTID project finished at the end of Japanese fiscal year 2014, but the program was restarted under the new scheme arranged by the Japan Agency for Medical Research and Development (AMED). Our counterpart in Ghana is the Noguchi Memorial Institute for Medical Research (NMIMR). Dr. Mitsuko Ohashi, Project Lecturer of TMDU was dispatched to Ghana as the Team leader in 2015. Two years have passed since the restart, and we are realizing research outcomes from this AMED/J-GRID joint project. The main focus of the AMED/J-GRID program is to promote innovative research collaboration with counterpart researchers, such as new drugs, new diagnostics, and/or vaccines. Under this scheme, AMED has also made a strong request for information sharing with the National Institute of Infectious Diseases. Under this basic concept, our AMED/J-GRID project has been implemented to collect genetic information concerning Dengue/Chikungunya viruses prevalent in Africa, and to analyze molecular profiles of causative agents of diarrheal diseases in Africa, both of which being important information for developing new medications and/or vaccines. Another theme is to develop new drugs from Ghanaian plant materials to combat protozoan diseases. To achieve research and development more efficiently, we invite Japanese experts from various domestic institutions such as the National Institute of Infectious Diseases (NIID), Nagasaki International University, and Fujita Health Science University to join us. In this sense, we have built an "all Japan collaboration team" for the AMED/J-GRID project in Ghana.

Intra-African network for joint research projects on health matters between Japan and Africa

2016 was somehow an epoch-making year because the Tokyo International Conference on African Development (TICAD VI) was held outside of Japan for the first time in Kenya. Improv-



1 Koram director
2 University of Ghana and TMDU exchange program signing ceremony



3 Joint research on mosquitoes at NMIMR
4 Courtesy visit to the Japanese Ambassador by TMDU medical students
5 After TICAD symposium at Nairobi, Kenya

ing the health situation is an important issue, as was stated in Sustainable Development Goals issued by WHO, and the Japanese Government also proposed commitment to improve the health situation in African countries along with strengthening other matters of economic and social development. After the joint declaration released in Kenya at the TICAD VI meeting, a joint symposium was planned to discuss more specifically about Japan-Africa research collaboration on health issues. In September 2016, TMDU joined a symposium held in Nairobi, Kenya where Nagasaki University (Kenya), Hokkaido University (Zambia), Jikei Medical University Burkina Faso), NIID (Ghana), National Mie Hospital (Ghana) were also present. Our TMDU-Ghana project reported the current situation and research outcomes, and raised a proposal to perform effective research collaboration, and emphasized the importance of sharing scientific information among Japan-Africa research projects. There are several difficulties to implementing joint research between Japan and African counterparts due to the geographic distances, insufficient infrastructure for experimental research, and research fields being too broad, to name a few. Together with opinions and suggestions from African researchers, it was concluded that a network system should be built to share information in order to overcome those difficulties.

Partnership with NMIMR and more

Since Ghana's independence in 1957, cooperation between Japan and Ghana has been performed in various aspects of social and scientific development. In the field of health sciences, NMIMR was established through the support of the Japanese Government in 1979. Since then, many cooperation projects between Japanese institutions and NMIMR have been implemented. As mentioned above, TMDU became a NMIMR partner in 2008. Since then, various cooperative activities have been performed not only in research, but also in education and human development. There is a program to dispatch undergraduate students to NMIMR for a few months to experience conducting research in developing countries like Ghana. It is a good occasion for our medical students to better understand the health problems faced by developing countries, and some of students come to consider it seriously as their future career. Two medical students were dispatched to Ghana in 2016. From NMIMR, TMDU accepted young and talented researchers as PhD students under the scholarship program of the Japanese Government. In the last 5 years, 8 PhD students from NMIMR were supported to join TMDU's Graduate School. Based on our small-scale exchange program, TMDU decided to expand more intensive exchange activities not only with NMIMR, but also with the University of Ghana. President Y. Yoshizawa, of TMDU, visited Ghana in October 2016, and talked with Vice-Chancellor E.O. Owusu, of University of Ghana. An MOU of University-level exchange was signed and a new exchange scheme was started between the two universities. After the signing ceremony, a special lecture by President Yoshizawa was carried out in the main campus of the University of Ghana. NMIMR belongs to the College of Health Sciences of the University of Ghana. College of Health Sciences is composed of seven schools, such as the School of Medicine and Dentistry, the School of Public Health, and the School of Nursing. Along with NMIMR, it is a big benefit to have partnerships with those schools. Through this partnership promotion of scientific and human exchanges with those schools is expected in the future. In this sense, our partnership between TMDU and NMIMR has become deeper and broader, covering various fields of medical sciences. It is highly expected that a more intensive collaboration in both education and research will be promoted.

Enriching our life experience by connecting people inside and outside of campus

As of May 2016, there are 277 international students studying at TMDU. As one of the Top Global Universities, it is our priority to enhance the quality not only of education for international students, but also of their experiences at TMDU and in Japan. Their presence on campus, and our active involvement with them, enriches the experiences of all students, faculty, and staff by bringing new, culturally diverse perspectives; ultimately, it permits us to grow into a globally engaged university.

Kazuhiro Yonemoto
Assistant Professor,
Institute of Global Affairs,
TMDU

THE INSTITUTE OF Global Affairs (IGA), a pivotal driving force for globalization of TMDU, organizes and hosts a variety of events and activities with the understanding that being global means being able to be "connected and collaborate" with others across social, cultural, and linguistic borders. Throughout the year, both inside and outside the campus, we are making concrete efforts from lunchtime presentation sessions to visits to neighborhood schools. Among them, this volume describes two events that we held in the past year; namely, the exchange events with Juntendo University and visits to elementary and junior high schools in our neighborhood.

Joint Events with Juntendo University

Since 2013, TMDU has had an agreement with Juntendo University, located just next door to our Yushima campus. This agreement is to collaborate and promote student exchange between the two universities, in particular for international students, by holding such programs as joint exchange events and offering Japanese language courses to each other. Every year, we have four events; two by TMDU and two by Juntendo University. Last year, TMDU organized the events for *setsubun* (celebration of the arrival of spring) in February and *tsukimi* (mid-autumn festival) in September. In these events, not only learning about *setsubun* and *tsukimi*, the participants also experienced making and eating *ehomaki* (roll sushi) and *dango* (rice dumpling), as well as visiting Kanda Myojin Shrine for their *setsubun* festival. Juntendo University held *ohanami* (cherry blossom viewing) in April and the International Student Exchange Conference in November. During *ohanami*, the participants enjoyed the Koishikawa Korakuen Gardens while talking and eating *sakuramochi* (pink-col-

Setsubun: Commemorative photograph

Setsubun: Making and eating sushi rolls

1 *Tsukimi*: Greetings by Prof. Karasuyama, Institute of Global Affairs Director, emcees in background
2 Trip to Karuizawa: Enjoying a BBQ together
3 Elementary School Visit: Indian students explaining greetings in their language

ored rice cake). At the Conference, they enjoyed eating, chatting, and singing together. In addition, as a special event, we went on a two-day study trip to Oga-ryo, our welfare facility in Chiba in 2015 while staying at Juntendo University's welfare facility in Karuizawa in 2016.

In the TMDU events, Japanese students from the Students' Society of International Activities (SSIA) participated and kindly explained about *setsubun* and *tsukimi* in English. Likewise, some international students actively took part in the events by serving as the bilingual master of ceremonies. These events were fun, yet at the same time a great opportunity for creating friendships not simply between TMDU and Juntendo University students, but also between international and Japanese students.

Visits to Neighborhood Schools

Every year, international students visit two elementary schools and one junior high school near our two campuses. The purpose of these visits is to deepen our friendship with the school children in the local communities as well as providing international experiences for them. Upon the visit, the international students took the initiative in planning and delivering various activities like games and chatted in small groups. Some international students showed games from their childhood and others taught the songs of their home country. The elementary and junior high school children were sometimes a bit shy about communicating, especially in English. However, the international students did a great job of getting everyone to communicate.

The school teachers' statement that the children looked and acted very different from their usual classes suggests that our visit could successfully offer them meaningful and engaging experiences. However, this is not only the case for the school children. This visit was also a very nice opportunity for international students in that they could learn what Japanese schools were like. Chatting while eating *kyushoku* (school lunch) together and seeing children cleaning their classroom made their visit more memorable. Through this visit, by better understanding Japanese children and schools, the international students seemed to feel closer to and more familiar with the neighborhood communities and the people. This can be proven by the international students' comments after the visit that they would like to visit the schools again. Although this visit is a significant part of our contribution to the community, this is definitely a mutually rewarding and beneficial activity for knowing and understanding each other.

Besides these activities, the IGA regularly organizes events and activities for the purpose of cultivating a global awareness and contributing to the understanding and value of diversity inside and outside the campus. It is our desire through enhancing and expanding communications, to achieve creating an inclusive environment for not only international students but also for everyone including our students, faculty, and staff. We are looking forward to seeing more people take part in our activities, learn more about each other, and consequently, enrich and expand their lives.

The school visits were partially funded by the Nakajima Foundation as well as by KAKENHI (16K21018) that has been awarded to the author.

Junior High School Visit: Chinese and Vietnamese students leading a small-group discussion

TMDU graduates are active at the forefront of their field in countries worldwide. Studying abroad helped them deepen their knowledge as healthcare professionals, benefiting both their field and patients in every corner of the globe.

Letters from TMDU Overseas Alumni

Letter 01

Veni, vidi, vici

Koji Sasaki
M.D., Hematology Oncology Fellow
The University of Texas MD Anderson Cancer Center


Koji Sasaki

IT IS MY pleasure and an honor to write a brief contribution to alumni members at Tokyo Medical and Dental University (TMDU). Time flies so fast. I graduated from the Division of Medicine at TMDU in 2006. I remember the day I wrote a comment to my future self in 10 years in a student yearbook saying "Work hard to be a good doctor!". After graduation, I spent 4 additional years on a residency and hematology fellowship at TMDU and its affiliated hospitals. These ten years at TMDU formed my identity to be a professional academician which remains unchanged and will stay with me throughout my life.

While on rotation at TMDU, a medical student might come to realize that cancer is the leading cause of death, and the majority of patients pass away from a clearly known diagnosis rather than from an undiagnosed rare disease. Even with the current best practice therapy, survival of patients with advanced-stage cancer is still challenging, though the molecular understanding of cancer biology has substantially progressed over a decade. Clearly, further breakthroughs are needed to improve symptom control, quality of life, as well as survival. Imagine one day a patient with cancer enjoying a "normal" life without fear of losing a part of him- or herself, and one day people not understanding the meaning of "chemo" in the presence of effective therapy without toxicity.

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center Making Cancer History®

MD Anderson Logo to symbolize institutional mission to end cancer


Class of 2016 - Hematology Oncology Fellowship, MD Anderson Cancer Center

Touched by the hearts and grief of patients and their families, I followed the natural bent of my passion, and pursued my early academic carrier in the United States. Academia has no borders, and opportunities are everywhere if you seek, knock, and challenge.

MD Anderson Cancer Center is ranked #1 for cancer care in the Best Hospitals survey published in the U.S. News & World Report, and has been the leading cancer institution for the past 75 years and a global leader in cancer research. The mission of MD Anderson Cancer Center is to eliminate cancer globally through outstanding programs that integrate patient care, research and prevention, and through education. To achieve this goal, the institution initiated the Cancer Moon Shots program to aim at drastic improvement in cancer survival within 10 years, and currently operates more than 1200 clinical trials at the single institution. MD Anderson also collaborates with institutions and individuals worldwide, sharing practices in treatment, education and prevention to impact cancer care across the globe.

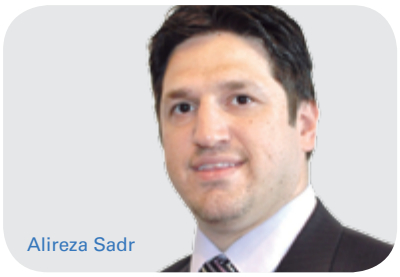
The Global Academic Program supports MD Anderson's Sister Institution Network, the largest global network of cancer centers working collaboratively to end cancer.

I was fortunate to join MD Anderson as a fellow after the completion of my 3-year medicine residency in New York. Starting residency and fellowship over could be a tough carrier decision. However, a well-trained physician at TMDU has guaranteed competency and ability through its excellent training. Without the undergraduate medical education, as well as the residency and fellowship training at TMDU, I believe I could not have passed through each competition process. I am proud of being a graduate of TMDU. Likely, I will proceed with my career as a faculty at MD Anderson this July, and am looking forward to contributing to the global cooperation between TMDU and MD Anderson to conquer cancer together. Someday, we will bring breaking news to patients and their families, and they will say "Veni, vidi, vici!!".

Letter 02

TMDU, My Home University

Alireza Sadr
D.D.S., Ph.D, Acting Associate Professor
University of Washington School of Dentistry



Alireza Sadr

IT HAS BEEN two years since I left TMDU and 14 years since I first walked onto the TMDU campus. Upon completing my D.D.S. at the National University of Iran, I started to practice general dentistry but soon developed a passion for dental science, as a way to go beyond the "drill-and-fill" daily routine. I visited Prof. Amir Ghasemi, one of my mentors who was a visiting researcher at TMDU. He introduced me to Prof. Junji Tagami in Cariology and Operative Dentistry, who was very welcoming. My first experience of Japan left me no choice but to pursue my goals at TMDU.

Curious to find out why replacement of failed restorations accounted for more than half of restorative dentistry procedures, I began my Ph.D. research by experimenting on clinical factors affecting the success of direct adhesives, a project that led to a dissertation and four peer-reviewed publications. Under Prof. Tagami's supervision, I mastered most of the common mechanical, microscopic and analytical test methodologies for dental materials and hard tissues, and attempted to develop my nanoindentation test approach.

In 2009, thanks to a rare chance to apply for a position at TMDU, I started working as a full-time faculty member at the Global COE for tooth and bone research. It was a privilege to oversee graduate students from Japan and elsewhere. I launched an optics study group with the graduate students and investigated optical coherence tomography (OCT), a new assessment tool for dental tissues and materials. Currently, only a few dental schools and institutes are active in dental OCT research, among which are leaders such as UCSF and TMDU. We organized the first international symposium on OCT in Tokyo and worked with industry to develop a clinical system.

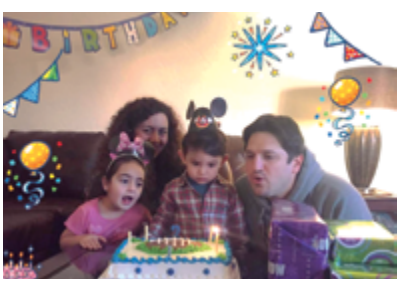
Next, while still a faculty member of the department, I joined a project to promote TMDU, attract outstanding students and develop interuniversity agreements. Despite my passion for TMDU and Japan, I decided to take another leap by accepting an offer at the University of Washington (UW) in Seattle. I am now using my TMDU knowledge and experience to teach dentistry, provide patient care and pursue research in my newly established laboratory, Biomimetics Biomaterials Biophotonics Biomechanics & Technology (B4T), at UW.

TMDU is my family's home and we miss it. My wife did her master's and Ph.D. at TMDU and worked there, and our daughter and son were born at the TMDU hospital. So I hope we can promote exchange between TMDU and UW.

Flag to answer the "Where are you from?" question. I was born in the UK, went to school in Iran, went to grad school and started my family and career in Japan, and now live and work in the US.

Cariology and Operative Dentistry Department Photo in 2014

Japanese cherry blossoms at the University of Washington, a chance for Hanami.



My son was born at TMDU two years ago, just before we left Japan.

International students from Asia, Africa, the Middle East, North America,Latin America and just about everywhere else in the world are studying at TMDU. What are they studying? What are their aspirations? International students currently at TMDU report on their life here.

Reports by TMDU Overseas Students

Report 01

Contributing to better global health by cultivating professionals with knowledge and humanity at TMDU: a world-class center of excellence in public health research

Mohammad Omar Mashal
3rd year student, Department of Global Health Entrepreneurship,Graduate School of Medical and Dental Sciences


Mohammad Omar Mashal

ON GRADUATING WITH an MD from Kabul Medical University in Afghanistan, my dream was to pursue quality graduate education so as to contribute to the health and wellbeing of the Afghan people. I therefore joined the Public Health Leadership graduate course at TMDU in 2013.

Prior to TMDU, I was a national coordinator of a polio eradication program with Afghanistan's Ministry of Public Health. This work made me realize the great impact quality public health professionals can have.

The attributes of Japan, and the diverse, multicultural ethos of TMDU, notably the professional mentorship within the Department of Global Health Entrepreneurship, which draws on decades of experience in international public health research, inspired me. This supportive environment, coupled with the department's more than 10 years of research practice in public health in Afghanistan, has empowered me to gain skills and understanding of public health from a global perspective.

At TMDU, I have had valuable opportunities to participate in public health and disease prevention courses and seminars, interacting with students and experts from different nations and learning from their experiences. The combination of studying on my own, interacting with international students and following a path illuminated by global experts has helped me enhance my skills while deepening my knowledge.

Evidence-based learning and practice are among my foremost goals as a graduate student. At TMDU I have been doing research relevant to the healthcare financing system in Afghanistan and am currently involved in another project in collaboration with the Ministry of Public Health on school-based non-communicable disease prevention and control in Kabul. I am proud to be an entrepreneur in this regard. Learning at TMDU transcends frontiers.

Japan is renowned for its excellent health indicators, including a universal health coverage system and the highest life expectancy. Evidence-based health research has been a big contributing


With Prof. Nakamura and colleagues at a welcome gathering, October 2014


Special lecture by Dr. Hai Rim Shin on Healthy City, July 2015

factor. Although Afghanistan has been making progress in health care in recent years, there is a need for further improvement in disease prevention and control as well as for a comprehensive evidence-based health system.

In addition to my research, together with my family I am enjoying living in Japan. I will have a wealth of wonderful memories.

On completing the PhD course, I am keen to work with the Ministry of Public Health in Afghanistan. Initially, my priority will be to help strengthen the health system and community-based prevention and control of communicable and non-communicable diseases. I will be seeking to upgrade my field experience and share it with coworkers in international public health. I hope my academic training plus the professional skills I am acquiring at TMDU will enable me to contribute to a well-functioning public health system in Afghanistan and ultimately to the improvement of human health around the world.

Amid the blossoms at Kamakura, April 2014

Report 02

TMDU, a wonderful educational journey

Minh Nguyet Dao Luong
3rd year student, Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences

Minh Nguyet Dao Luong

MY STAY IN Japan has turned out to be the most blissful experience in my professional and personal life. Since Japan is one of the world's most desirable destinations with its technology and deeply rooted culture, I had been eager to visit the country since my teens.

After graduating from the University of Medicine and Pharmacy (UMP) in Ho Chi Minh City, Vietnam, I wished to pursue graduate studies with the hope of becoming a lecturer at my faculty. While I was in an internship program in Canada, the dean at UMP informed me about the International Summer Program (ISP) in 2013 organized by TMDU. Japan is very attractive to me as a place to do research because of its prowess in dental materials made by Japanese manufacturers that are well known in Vietnam. This opportunity to study at TMDU promises to open up possibilities for me in my subsequent career. At ISP, lectures and lab tours at departments followed by cultural activities, such as visits to shrines and doing origami, gave me a very positive impression of TMDU. I passed the PhD Program Special Selection exam at the end of the program, which allowed me to receive a TMDU scholarship funded by Sony Corporation. I knew I had made the right choice when I became a student of the Cariology and Operative Dentistry Department.

My life as a researcher was busy but joyful thanks to the friendly and collaborative atmosphere throughout the department. I also had opportunities to present my work at conferences and expand my professional network.

While studying at TMDU, I have noticed differences in hospital practice between Japan and Vietnam. Besides the use of sophisticated medical technologies in examination, the payment method, handled by clerical staff or automated, is fast and convenient. Administrative departments at hospitals in Vietnam, which have to deal with many patients, could learn from the Japanese approach.

Besides school, I am seeing as much of Japan as possible. I relish the chance to experience the natural surroundings and culture of this fascinating country. I love the customer service, the food and the hot springs.

I am grateful for this life-changing experience at TMDU that has allowed me to meet and work with wonderful people and enrich my knowledge in ways that should enable me to contribute to dentistry in Vietnam in the future. The memory of when I first met Prof. Tagami and Dr. Alireza Sadr, who also supported me in my work, and the prospect of the day when I can experience the graduation ceremony have motivated me to do my best so that I may deserve this wonderful opportunity at TMDU.

Student Chapter meeting with Prof. Tagami (left) and Dr. Sadr (second from left).

Year-end party with Dr. Shimada (fourth from left) and his research group.

There are a wide variety of exchange programs for young people at different levels. TMDU students and young researchers improve their skills by participating in training programs abroad.

Reports of TMDU Students in the World

Report 01

Clinical clerkship at University of Glasgow and Harvard Medical School

Takayuki Kuroda
6th year student, School of Medicine
Clinical Training in UK and US

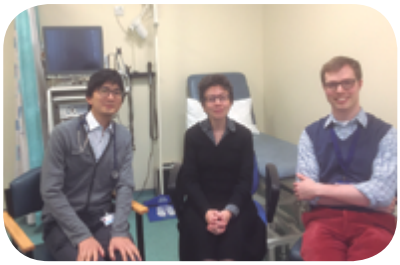
ONE OF THE biggest benefits of the clinical clerkships in the United Kingdom and United States was the relationships that I made with many people. I met many doctors, researchers and students in each country who have broadened my mind about the medical field and also about my life. I realized through this clerkship that true relationships can only be made by meeting people face to face.

In Glasgow, I participated in clinical training in the Hyper Acute Stroke Unit and Neurology Department at Queen Elizabeth University Hospital as an international medical student from the Japan Medical Education Foundation (JMEF). It was a wonderful experience for me to learn about evidence-based intensive multidisciplinary care for acute stroke patients as well as the comprehensive approach towards patients including neurological examination with the guidance of great neurologists, including Dr. Edward Newman.

With Prof. Walters and other students from JMEF

I also had an opportunity to learn about the differences in healthcare systems between Scotland and Japan through conversations with Prof. Yoshihiro Kokubo, Visiting Professor at the University of Glasgow, and Prof. Matthew Walters, the head of the School of Medicine at the University of Glasgow. In addition, Prof. Walters gave me a lot of guidance and support throughout the clerkship and told me about the educational strategies for increasing competent general practitioners from his viewpoint as head of the School of Medicine.

In Boston, I learned pediatric neurology at the Child Neurology Department, Boston Children's Hospital, and the Diagnostic Radiology Department at Beth Israel Deaconess Medical Center, both of which are Harvard Medical School (HMS)-affiliated hospitals.



With doctors in Glasgow

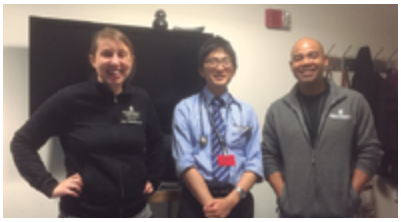
At the Child Neurology Department, learning about how to diagnose, classify and treat epilepsy was challenging for me but it was wonderfully memorable to work for children as a member of the epilepsy care team, which is the first pediatric epilepsy unit in the world. This was mostly thanks to Dr. Takeoka Masataka, who guided me very kindly every day as an attending in the team.

As part of my radiology training, I mainly observed how doctors read images. I especially had a great time in the Neuroradiology Department, where the doctors, including Dr. Yu-Ming Chang and Dr. Rafael Rojas, taught me a lot about important features of neurological images. Sharing good cases with other HMS or international students was also a precious learning opportunity for me.

Furthermore, I had many opportunities to talk with Japanese researchers in

Boston. By observing laboratories and knowing how they do their research, I realized how hard but attractive it was to work as a researcher in Boston in terms of high academic cooperativeness and competitiveness.

What I also really felt through this clerkship was the importance of the collaboration between many fields. Closely related to clinical practice are education, healthcare system and research all around the world, which have the potential to improve each other in order to ultimately maximize the patients' benefit. In terms of this collaboration, I was very lucky to be acquainted with many renowned doctors, educators and medical researchers with whom I would like to continue to have relationships in my future work.



With doctors at Boston Children's Hospital

Report 02

What I've learned at Imperial College London

Yoshiko Ishisaka
4th year student, School of Medicine
TMDU-Imperial Exchange Program

Yoshiko Ishisaka

MORE THAN A month has passed since I have returned from London. There were of course a lot of challenging things, but studying abroad was a very precious experience, and looking back at the memories make me miss the days there.

The study experience was beyond what I had expected, because I got the chance to get involved in clinical research, a dietary/clinical research, and clinical medicine. I was in the Endocrinology and Metabolism Department at the Hammersmith Campus of Imperial College. I was placed on a team that investigates how type 2 diabetes improves by bariatric surgery (obesity surgery), and my main research project focused on how glycemic control, insulin resistance, and gut hormone secretion change before and after patients undergo surgery.

Of course, research was tough for me at first. The workload was beyond my capacity in the beginning, and I struggled with balancing two projects and studying at the same time. However, once I got used to everything, I became able to do more on my own. Moreover, acting independently made me more interested in the research topic and allowed me to learn actively.

Clinical research was also a good opportunity to interact with patients who had the will and motivation to contribute to medicine. I met many patients throughout the research project, and they all told me how they suffered from their disease, taking many medications, dealing with complications caused by the disease, and going to the hospital a lot of times. In addition, they told me that they joined the clinical research not only because they wanted a possibly effective treatment themselves but also wanted to help other people suffering from diabetes. As a medical student, I had been unaware of the suffering felt by patients and the generous contributions of patients who have supported the research of medicine. Now after doing clinical research, I feel that I need to be a doctor who can respond to those patients' wishes and commitment.

I tried things other than research during my study abroad as well. I met many students with diverse backgrounds in the dorm where I stayed. It was always exciting to interact with them and learn about different cultures. Living in a dorm served as a good chance to live independently as well. Also, Imperial College provided us with a lot of extracurricular opportunities; I joined the gymnastics society and a volunteer group. Joining those groups made me feel refreshed from stress, and I was also able to interact with a lot of people from and outside Imperial College. Many of the students I met were motivated, and I was impressed how they engaged in studying, doing internship, and pursuing their hobbies at the same time, just like the phrase my friend at Imperial taught me: "Work hard, play harder."

The experience of studying abroad was unforgettable and made me grow in both academic and non-academic aspects. I hope I can connect what I have learned there to my future career, and I thank everyone who supported me throughout the period in London.

St.Mary s In front of St. Mary's Hospital with my friend who did research together

Hanging out with friends from the gymnastics society in the Imperial college student's union

Report 03

Learning Nursing in Seattle

Haruno Suzuki
4th year student, School of Health Care Sciences
Study program in U.S.

I HAD THE opportunity to apply and be accepted to an intensive nursing program at the University of Washington (UW) and Nikkei Manor (the elderly nursing home). We had several discussion sessions with actual Nurse Practitioners (NP) at UW Medical Center (UWMC), Seattle University, and Keiro Northwest Rehabilitation and Care Center. We also received nursing training for elderly residents at Nikkei Manor for two weeks.

Firstly, I had multiple opportunities to discuss about NP with administrative staff members at several hospitals and facilities. The NP is considered to be an advanced nurse practitioner mainly for primary care in the US. Compared to other states, the State of Washington grants the NP relative autonomy with regards to medical practice like diagnosing disease and opening their own clinic without physicians. In the discussions, NPs emphasized the importance that NP has a holistic perspective for patients as a nurse. In Japan, the NP license has yet to be approved as a national license; I think it's necessary to evaluate the possibilities and limitations of the NP and pursue an optimal solution for Japan.

NP discussioning session at Seattle University

At Nikkei Manor, we underwent nurse training to interview elderly residents and create a nursing plan for each resident based on our own assessment. I learned the importance of promoting 'well-being' and supporting daily life activities for residents. One of the main tasks of the nurses at this facility is managing the health conditions of residents. A nurse mentioned she devised ways of communication with the elderly residents to give positive feedback and enhance their strengths. The atmosphere was really comfortable for all people to work together. Besides, I was happy to find that during my training in the US my original interest in geriatric nursing was reaffirmed.

In the US, Japanese-Americans sometimes experienced exclusion and discrimination, such as being sent to wartime relocations camps like at Tule Lake, which had a big impact on elderly residents and their families. Their

With my host mother and dog

hardship was considerable, and after the war they had to work hard to earn their current status in American society. It was a significant experience for me to hear their wartime stories and the discrimination they experienced.

On the weekends, I enjoyed going outdoors with my host family. Seattle has a large number of places to enjoy outdoors and we can refresh to touch plentiful nature on holiday. In my opinion, people in Seattle place a priority on enjoying their lives and striving to create quality of life. It was good chance to rethink my view on work-life balance.

There are a lot of insights I gained in Seattle. Before this study, I honestly didn't expect that I could experience such great opportunities to meet a lot of people and learn deeply. I appreciated this opportunity and all the support I received to complete this program.

Nursing conference at Nikkei Manor

Report 04

Things I Gained in Thailand

Ayane Ono
3rd year student, School of Health Care Sciences
Study program in Thailand

ALONG WITH OTHER undergraduate students, I joined a two-week study program in Chulalongkorn University (CU) last summer. CU is located in central Bangkok and is known as the most traditional university in Thailand.

In the Faculty of Allied Health Sciences (AHS) of CU, I visited two laboratories. One was the Laboratory of Thai Medicinal Herbs and the other was the

With the head of AHS

Laboratory of Bioinformatics and Neuropsychiatric Disorders. Firstly, I did some research in the laboratory of Thai

herbs with my friend. We conducted MTT assay and neurite outgrowth to analyze how Thai herbs are effective against neuroprotection, both of which we had never done before. Therefore, it took us a lot of time to understand the protocols. However, thanks to help from graduate students, we managed to succeed in these experiments. On our last day there, we had a chance to explain our results to our professor. This was our first time to make a scientific presentation entirely in English. In this lab, we gained valuable experiences like research using Thai medicinal plants and the presentation. In my second laboratory, graduate students taught me how to use some protein databases and perform electrophoresis. After I came back to Japan, the knowledge helped me especially in my clinical chemistry class.

Prepared electrophoresis with a CU student

One weekend, I went to Saraburi, a rural province which is more than 100km away from Bangkok. In an open space there, 4th grade students in AHS ran medical examinations for the residents living in a small area of Saraburi in order to study community medicine. Medical technology students collected urine and blood samples and examined them manually. Observing this situation, I could feel the relationship between the Thai society and medical laboratory science, but on the other hand, by helping CU students examine samples, I realized that the number of people with diabetes was increasing in Thailand. Moreover, I found how medical conditions were different between Bangkok and rural areas. After the health check-up, I saw a Japanese occupational therapist talking in front of residents. I was surprised that he gave health guidance in Thai! At the sight of him, I also became interested in health promotion in Thailand.

Examind a urine sample in Saraburi

Originally, I applied for this study program because I wanted to study about medicine in a foreign university. However, through the experience in Saraburi and cultural exchanges with CU students, I could broaden my outlook on global health and Thai cultures as well. Now I want to visit Thailand again to study these fields. Fortunately, I could join another overseas program held in Finland in 2015.Through these overseas programs, I could learn medical weak and strong points in Finland and Thailand. In addition, I noticed that a lot of the skills and knowledge I'm studying in TMDU are used around the world. These programs encouraged me to study harder and think about my future career. I really appreciate everyone who supported me in these programs.

Report 05

Fruitful Days in Ann Arbor

Sumiko Yoshida
4th year student, School of Dentistry
Study program in U.S.

ANN ARBOR, A peaceful college town in the United States, was definitely a great place to spend the summer. During my research semester, I stayed there to conduct basic science research. I was really excited about my first stay in the US, and expected to undergo many challenges. Now, looking back, I am satisfied with my experiences. In order to turn my intentions into reality, I found that it was important to express them to the people around me. Here, I would like to share some of the experiences I had.

I had a chance to join Dr. Gabriel Nunez's laboratory in the Department of Pathology, at the University of Michigan (UM) Medical School, which currently focuses on models of intestinal, skin and lung inflammation driven by microbial pathogens, commensal bacteria and sterile organ injury. I worked on a project which aimed to investigate the effects of bile acids on commensal bacteria in vitro and on colitis-model mice. Thanks to my supervisor, I was able to experience and observe several research techniques, such as quantitative-PCR, CFUs counting, bile acid sampling, DNA sampling, microbiota analysis and so on.

The lab meetings I attended impressed me the most. I realized that strong critical thinking and language skills are vital for researchers to present their results effectively and to participate in active discussion of their research topics. I also learned that it is important to consider how to demonstrate data carefully. Data may give a different impression depending on how it is shown in relation to figures and charts and even depending on the way data is presented in general. Also, it was obvious that contributing to discussion and showing passion and skill for research was indispensable. Lab members asked questions and suggested their ideas frequently, and presenters dealt with these questions and were able to deepen

Huron River in Ann Arbor

their research.

In addition to laboratory training, I visited the UM Dental School and Dental Hospital. In the dental students' clinic, I observed a restoration for wedge-shaped defects with glass ionomer cements. In the clinic for graduate periodontics program, implant applications for implant overdenture and a flap operation were performed. Through observing these clinics, I learned that students place importance on teamwork and communication to improve health outcomes. In particular, students in different grades asked each other questions, and professors gave students feedback and discussed cases with them. As for communication with patients, dental care workers explained treatment in detail and asked patients for their questions and opinions. It was interesting for me to discuss the differences in dental clinical practice between the United States and Japan with Dr. Furgeson, who is Director of the Dental Hygiene Graduate Program and Clinical Assistant Professor at UM. From this discussion, I was convinced that those differences, especially in terms of communication, come from our culture and health care systems.

There were so many things to enjoy off campus. Living in a multi-cultural country enabled me to appreciate cultures and differences between people. I am very grateful to have met wonderful, caring and respectful friends there who gave me opportunities for cultural exchange. Thanks to my friends, I fully enjoyed celebrating summer time in the US, such as BBQ, an Independence Day party, and kayaking and tubing on the river. An educational event collaborating with artists in Detroit gave me my first encounter with hip-hop culture. Before going to Detroit, my assumption was that local people might have negative feelings towards Japan and I was a bit nervous. To my surprise, the people who joined the event gave me a warm welcome. They inspired me a lot through their work and I fully realized it was important to get rid of my prejudices, open my heart and respect other people. There was another event called 'Michigan Japan Week,' which was organized by the UM Center for Japanese Studies, and I was lucky to participate as a volunteer. At this event, local people enjoyed Japanese culture such as summer festival games, sushi and art. From volunteering, I found that many people are interested in and know a lot about Japan. This experience encouraged me to understand and clarify my culture, history, identity and morality.

Report 06

My Experience as a Dental Hygienist Student in Australia

Sayoko Yamashita
4th year student, School of Oral Health Care Sciences
Study program in Australia

THROUGH THREE WEEKS of study in Australia (from 2nd September to 26th September), I had had many wonderful experiences as a student becoming a dental hygienist. I took lectures at the University of Sydney, Newcastle University and the University of Melbourne and participated in clinical training. In the lectures, the most surprising thing was that the students enthusiastically asked questions and expressed their own opinions. Some lectures used laptops for interactive communication. What I admired most in the lecture was the interactive dialogue.

Good-bye dinner party in Melbourne

In Australia there are dentists, oral therapists, dental therapists, dental hygienists, dental nurses, and dental technicians. Oral therapists are a relatively new job. It is like a combination of pediatric dentistry and dental hygiene. Dental nurses have a role like dental assistants in Japan. The most impressive part of the overseas training was the interaction with students in the program for the bachelor's degree in oral health therapy at the University of Melbourne. In clinical training, I took practiced periodontal disease examinations while sometimes talking to the patient in English. Incredibly, I actually sucked saliva from a patient's mouth. Instruments like scaling were nearly identical to those found in Japan, but there was a difference between sterilization and disposable equipment for each patient. It was necessary for students to understand the patient's oral problem, to make a dental or dental hygiene diagnosis, and to report on how to intervene to their supervisor, and to formulate the intervention plan itself before treatment and dental preventive treatment are taken. I learned about the role of oral therapists in Australia and was asked questions about Japanese dental hygienists and what kind of programs or careers are available in Japan. My experience was exceptionally enlightening and caused me to reflect on Japanese dental care and dental hygienist work.

Study programs in Australia

I didn't sense any major differences between the two countries in lecture content and clinical training, but I felt there was a difference in the diversity

of registered students. For example, there were students who entered immediately after graduation from high school and those who already had another bachelor's degree. There were students with many backgrounds in Asian countries such as Vietnam, Pakistan, Singapore, Korea, and so on, but unfortunately this time I did not encounter any Japanese college students. I found that among those from other countries, not all could speak English fluently. Some patients were accompanied by an interpreter to a dental hospital and received treatment.

Clinical training at the University of Melbourne

I was very impressed with the acceptance of diversity in Australia. When I was with students they asked me without hesitation, "Are you a vegetarian? Can you eat anything?" In Japan, I think that we should make efforts to deepen people's relationships while respecting each other's religion and nationality.

I am grateful that I had such valuable opportunities. Through this overseas program, I came to realize that there are many fields in which dental hygienists can contribute. Of course I will continue to learn about dentistry and to study areas of interest such as public health and health promotion. In addition to communicating using English in everyday conversation, I can now express my ideas and opinions at the academic level of specialized fields. I look forward to challenging myself to build on these experiences in the future.

Report 07

Invaluable Experience in Sweden

Maya Toyoda
3rd year student, School of Oral Health Care Sciences
Study program in Sweden

I VISITED THE University of Gothenburg in Sweden and attended a training program in the Dental Technology Course for 3 weeks. During this stay, I had an opportunity to observe a dental clinic, dental laboratory, and a dental manufacture's factory.

During my stay in Sweden, I enjoyed school life. It was my first time staying abroad by myself. Moreover I couldn't speak English well. These things made me a little nervous, but the students and teachers there were so nice and helped me a lot. They interpreted their lectures into English for me, which helped me to understand. My classmates invited me lunch and "fika," which is a coffee break and Swedish custom for getting along with each other. It was an especially exciting experience to associate with foreign students who study in the same field. Thanks to them, I spent a wonderful time.

At my friend's house

With respect to dentistry, Sweden is one of the most advanced countries. Sweden is a pioneer in preventive dentistry and dental implants. Surprisingly, titanium dental implants were invented in the University of Gothenburg where I stayed. The training program I participated in had thirteen 3rd semester students. An instructor taught us how to fabricate heat-pressed all-ceramic restorations, which I had never used before. I think that this technique helps to fabricate prosthetic work effectively.

The dental clinic and dental laboratory are both located in the same building as the Dental Technology Course. At the dental clinic, dental implants are a very popular procedure while at the dental laboratory various prostheses are fabricated. The most surprising prosthesis I saw was a dog's fixed orthodontic appliance.

I also visited a dental implant factory. This company is one of the largest dental manufacturers supplying various dental products such as implants. A Japanese employee working at this factory

With professor in Gothenburg

guided me inside the company. According to her explanation, employees in the factory rotate their jobs in the middle of each day, to allow them to do various jobs so that they can feel refreshed, and they rarely extend their working time. I feel these characteristics are very Swedish. The nice working environment at this factory fascinated me.

I found many good points about both Sweden and Japan. During my stay, I was proud to hear that Japanese people who work in Sweden have a good reputation. I really feel that Swedes are so kind and friendly. It was a valuable experience for me. I am very grateful to all those who supported me to join this program and I deeply appreciate this overseas training opportunity.

Farewell party with my classmates

New Concept of Tissue Aging Based on New Hair Research

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MD, PhD,
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Medical Research Institute,
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Mystery of hair thinning by aging

MANY THEORIES HAVE been proposed to explain the aging of our bodies since the 19th century, yet aging is still a mysterious phenomenon. Hair thinning is one of the most prominent aging phenotypes in mammals. Hair is generated in a mini-organ called a hair follicle. Stem cells called hair follicle stem cells (HFSCs) divide to renew themselves to keep generating their progeny which grow hair. However, hair follicles gradually decrease in number after repetition of hair cycles, which thins a person's hair during aging. We have studied the common aging phenomenon for the last 10 years and finally succeeded in partially solving the mystery of aging by using stem cell tracing technologies.

Fate tracing of hair follicle stem cells

Hair follicles repeat their cyclic regeneration and regression forming a hair cycle through their cyclic activation and inactivation of HFSCs. A detailed analysis of HFSCs in aged mice and human scalp skin revealed that the stem cells decrease in number by aging in a scattered manner on the skin. As neither a significant increase of signs for cell death nor cellular senescence has been found in those stem cells during aging, we hypothesized that the fate of HFSCs may change during aging. We thus applied the fate tracing technique of genetic Cre-loxP recombination system onto the analysis of HFSCs in mice to analyze the dynamics and fate of aged stem cells.

HFSCs normally reside in a specific area called the hair follicle bulge and provide their progeny to the hair follicle bulb to grow hair. In aged mice, genetically tagged stem cells in the bulge unexpectedly migrate up toward the epidermis. It turns out that those aged stem cells actually change their fate to the differentiated epidermal keratinocytes to be shed off as dandruff from the skin surface. Those affected hair follicles are indeed miniaturized by loss of the stem cells and eventually disappear from the skin.

Stem cell-centric aging program

How is the fate of stem cells changed by aging? The answer to this question comes from patients of progeroid syndroms (genomic instability syndrome), who age much faster than usual, and their mouse models. Premature hair thinning in many of those patients occurs due to impaired DNA damage repair. Similarly, we found that HFSCs in aged mice accumulate genomic damage. We thus hypothesized that the fate change of stem cells may be driven by excessive DNA damage response in those stem cells during aging. Indeed, we found that XVII collagen (COL17A1), which we previously demonstrated to be expressed by HFSCs and essential for their maintenance, is degraded in HFSCs in response to DNA damage as well as by aging. Also the sustained maintenance of this collagen in stem cells in mice significantly delayed hair follicle aging and hair thinning during physiological aging. As far as we know, this is the first research to reveal the existence of such a tissue aging program despite the existence of many theories of aging. Importantly, the program is driven by stem cell aging. We believe that this study may open up a new venue for treatment of common hair thinning as well as for intractable alopecia caused by cancer therapy such as radiotherapy and chemotherapy.

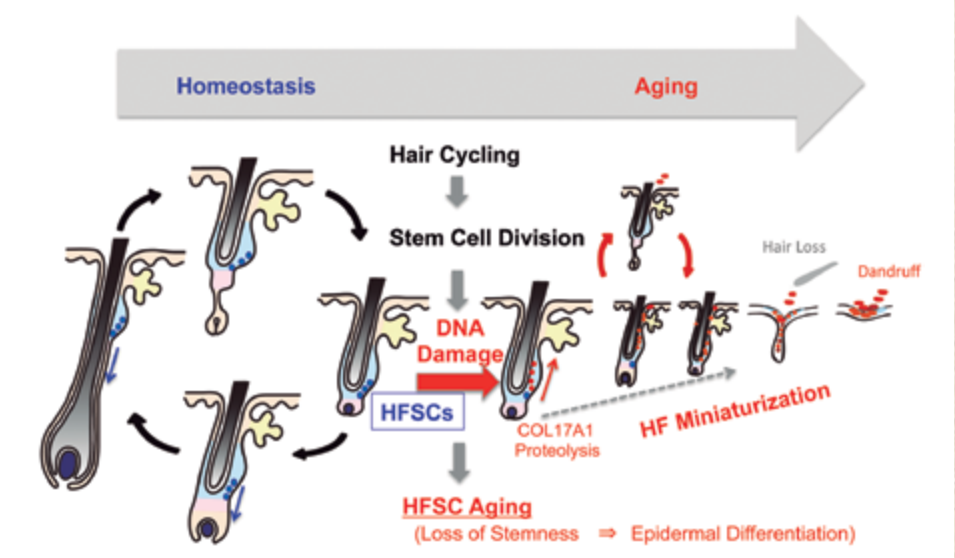

Fig.1: Mechanism of hair follicle aging and hair thinning (Matsumura H et al. Science, 351 (6273) :575, 2016)

Injected mix of bone-augmenting agents causes new bone growth in mouse jaws

RESEARCHERS CENTERED AT Tokyo Medical and Dental University (TMDU) deliver a protein/peptide combination using an injectable gel carrier to promote bone formation in mouse jawbones

The part of the jawbone containing tooth sockets is known as alveolar bone, and its loss over time or following dental disease may ultimately result in tooth loss. While dentures can be used as a tooth replacement, the mechanical stimuli under the dentures causes further bone loss. An alternative and more permanent solution is strongly hoped for. Recombinant human bone morphogenetic protein 2 (BMP-2) has been used to stimulate osteogenesis (bone formation) in humans, but high doses can cause inflammation and are recently reported to increase the risk of cancer. Therefore, agents such as peptide drugs for accelerating bone augmentation need to be developed, even in the presence of lower doses of BMP-2. Additionally, there are no known means of stimulating local bone augmentation without performing surgery.

The peptide OP3-4 has been shown to inhibit bone decay and stimulate the differentiation of cells (osteoblasts) that form bone. Now, an international team centered at Tokyo Medical and Dental University has injected a gelatin-based gel carrying OP3-4 and BMP-2 into mice jawbones to trigger local augmentation of bone around the injection site. The study was recently reported in the Journal of Dental Research.

Use of this injectable gelatin-based gel to carry the agents avoids the need for surgical implantation and resulted in no swelling or other such complications in the experimental mice. The researchers observed a region of increased bone mass around the BMP-2 + OP3-4 injection site that was larger than that seen in mice injected with BMP-2 alone, or with other controls. This mass also had a significantly higher bone mineral content and density (Fig. 1).

Microscopic examination confirmed the deposition of calcified tissue (mineralization) and the intensive bone formation in the BMP-2 + OP3-4-treated mice (Fig. 2).

"Mineralization of the outer region evidently took place before that of the inner region," lead author Tomoki Uehara (section of Pediatric dentistry in TMDU) says (Fig. 2). "We speculate that the size of the new bone is determined before calcification starts, and that OP3-4 plays an important role in making a regeneration site at the early stage of bone formation."

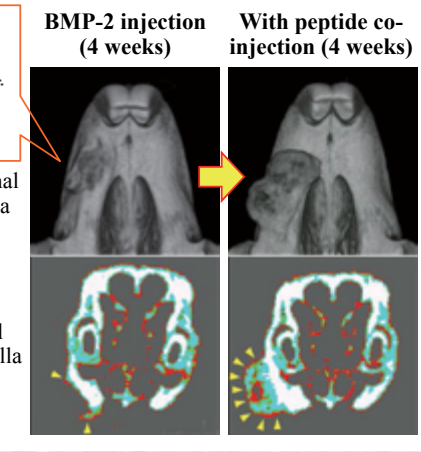

Fig.1: **Peptide co-injection thickens mouse bone.** Yellow arrowheads (lower panels) indicate newly formed bone.

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Corresponding author Kazuhiro Aoki adds: "OP3-4 further enhanced the number of bone-forming cells induced by BMP-2 treatment, and also increased the expression of genetic markers of bone formation."

The article "Delivery of RANKL-Binding Peptide OP3-4 Promotes BMP-2-Induced Maxillary Bone Regeneration" was published in the Journal of Dental Research (Uehara et al, J Dent Res, 95: 665-72, 2016)

Summary Text: A Tokyo Medical and Dental University (TMDU)-centered research team combined a protein that stimulates bone formation with a peptide that promotes osteoblast differentiation, and delivered them into mouse jawbones by injection within a gelatin carrier. The technique induced formation of new bone, suggesting its potential as a non-invasive means of replacing lost jawbone.

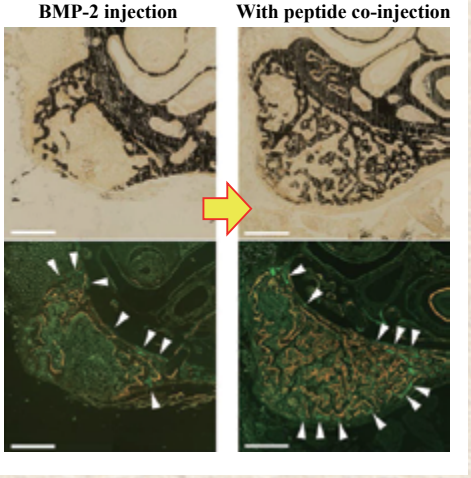

Fig.2: **Microscopic views of newly formed bone** Black area mainly shows newly formed bone (upper panels). Green lines (white arrowheads) and yellow area indicate bone formation activity on day 12 and 26 after injections, respectively. Bar represents 0.5 mm.

Role of Sox17 Protein in Embryo Implantation Key to Mouse Fertility

RESEARCH CENTERED AT Tokyo Medical and Dental University (TMDU) identifies a novel role for the Sox17 protein in uterine receptivity and mouse embryo implantation

Tokyo–Assisted reproductive technology is commonly used to treat human infertility, but the rate of successful pregnancies is still low. One reason for this is the failure of embryos to implant in the uterus. Embryonic implantation is a complex process that must occur within a short window of time when the lining of the uterus is receptive. Although signaling pathways and hormones from the ovary are known to be necessary for pregnancy to occur, the molecular mechanisms underlying this are unclear. An international team led by Tokyo Medical and Dental University (TMDU) has now revealed that expression of the protein Sox17 is required for uterine receptivity and embryo implantation in mice. The study was reported in Scientific Reports.

Implantation in the uterus occurs on the fifth day of embryo development in mice, and is essential for progression beyond the blastocyst stage. The maternal hormones progesterone and estrogen regulate uterine receptivity in both humans and mice, while the Sox17 protein is known to be expressed during implantation in the uterine lining, with possible roles in progesterone mediation and blastocyst attachment.

TMDU-led researchers confirmed this expression of Sox17 in mice, and also detected slightly lower levels of Sox17 expression in the oviduct and blood vessels. Female mice carrying a mutation in one copy of the Sox17 gene had lower fertility levels than control mice.

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"Sox17 heterozygosity had no adverse effect on ovulation, fertilization, or the morphology of the uterus," first author Yoshikazu Hirate says. "However, we observed defective implantation in these females, resulting from fewer implantation sites."

The team predicted that the reduced implantation occurred because of a shortage of Sox17 gene product, so-called haploinsufficiency, although some mutant females were unaffected and had normal litter sizes.

"This suggests that a protein similar to Sox17, such as the related Sox7 or Sox18, is compensating for its absence in these cases," corresponding author Masami Kanai-Azuma says. "However, Sox17 appears to be the key player among Sox-F proteins in embryonic implantation."

The article "Mouse Sox17 haploinsufficiency leads to female subfertility due to impaired implantation" was published in Scientific Reports at DOI: 10.1083/srep24171

Summary Text: Tokyo Medical and Dental University (TMDU) researchers discovered the importance of Sox17 protein expression in female mouse fertility. Mice with only one functional Sox17 gene had lower levels of embryonic implantation than controls, causing reduced fertility. This understanding of the role of Sox17 in implantation may help improve human infertility treatment.

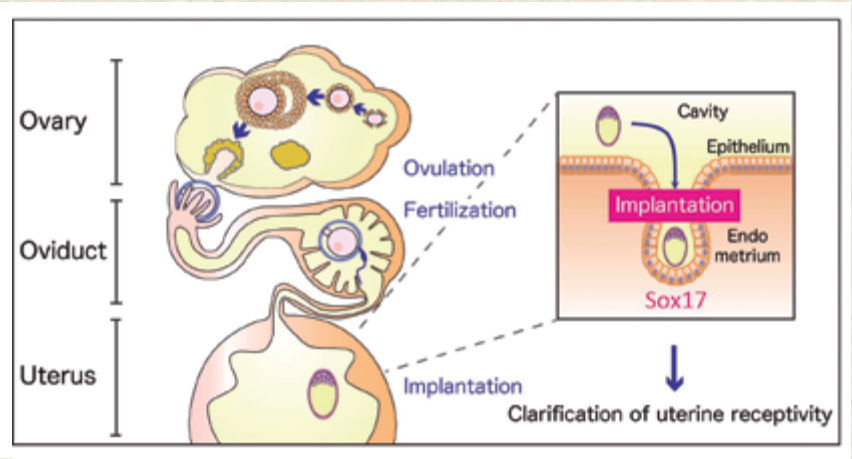


Fig.1: **Uterine Sox17 expression is necessary for embryo implantation.**

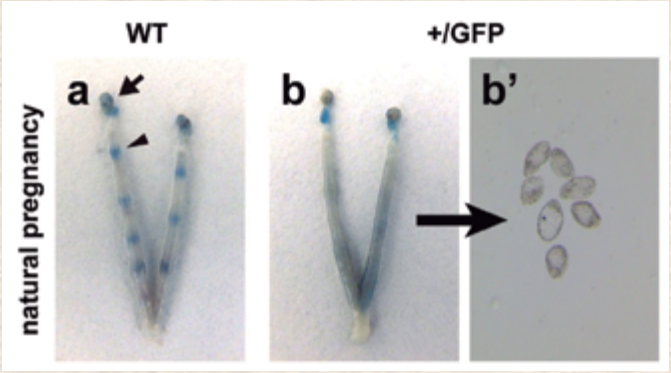


Fig2: **Blue dye staining showing implantation sites in WT and *Sox17*$^{+/GFP}$ uteri at 5 days after natural mating. Arrows and arrowheads show the ovaries and implantation sites, respectively. (b') Unimplanted normal blastocysts recovered from *Sox17*$^{+/GFP}$ uterus by flushing.**

Breakthrough for bone regeneration via double-cell-layered tissue engineering technique

TOKYO, JAPAN - VARIOUS technologies have been developed to introduce laboratory-grown bone-forming cells into bone defects to promote their repair. However, these have many limitations as the conditions of the cells and their surroundings do not accurately mimic those typically found in the body. This means they cannot optimally promote bone formation. A research team at Tokyo Medical and Dental University (TMDU) has now made a major advance in overcoming these difficulties by developing a technique for producing double-layered cell constructs that can be transplanted onto bone defects. The technique increases the speed of bone repair and the flexibility and durability of the constructs make them ideal for many surgical applications.

Cells with various functions can now be cultured in the laboratory and then introduced into the body to treat different medical conditions. However, as individual cells can spread away from the site of injury, they need to be held in place on a scaffold, which is then transplanted into the body. Substantial progress has already been made in this sort of tissue engineering. When the body repairs broken or damaged bones, it employs a complex system of molecular signals and cells, including osteoblasts that build up the calcium matrix on which bone is based. To speed up the repair of bone defects by artificial means or enable recovery from severe injuries, tissue engineering approaches thus need to mimic this complex system.

"After establishing our double-layered cell transfer technology, we used it to apply different combinations of cells related to bone formation to defects in mouse skulls," first author Keiko Akazawa says. "We found that osteoblasts together with stem cells from tooth-supporting ligament were particularly more effective at promoting bone repair than equivalent scaffolds containing only a single cell layer."

Kengo Iwasaki
DDS, PhD, Junior Associate Professor Department of Nanomedicine (DNP), Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University,TMDU

The double-layered cell constructs were also tested for their stability and flexibility. The cells remained attached despite folding the constructs or trimming them to fit the shape of a particular defect. Coauthor Kengo Iwasaki says: "The durability of these new constructs makes them particularly suitable for surgical applications. We have high expectations for their use in regenerative medicine for treating a range of defects using different cell layer combinations."

The article "Double-layered cell transfer technology for bone regeneration" was published in Scientific Reports at DOI: 10.1038/srep33286.

Summary Text: Tokyo Medical and Dental University (TMDU) researchers developed a technique for attaching two distinct layers of cells on top of each other on an amnion-based scaffold. When osteoblasts and mesenchymal stem cells were used to form the layers, the cell constructs more effectively promoted bone regeneration after implantation onto skull defects in mice, compared with their single-cell-layer equivalents. This new approach has a range of potential applications for tissue engineering in the field of regenerative medicine.

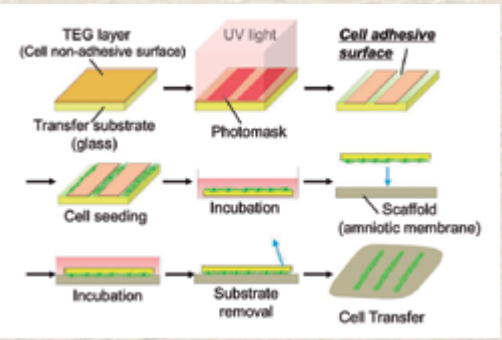


Fig.1: (A) We coated the surface of glass substrate with tetraethylene glycol (TEG, brown) and the layer was partially degraded by UV irradiation to prepare hydrophilic cell adhesive surface (green). Cells to be transferred were poured onto the substrate and incubated to allow the cells to adhere to the substrate surface. Transfer substrate with cells was then placed onto the scaffold (amnion) in the direction of cell surface down. Cells were further cultured and transfer substrate was carefully removed subsequently. Cells were transferred onto scaffold surface. (B) Cells of the first layer (green) were seeded on the transfer substrate and cultured. Then, the cells of the second layer (red) were seeded onto the cells of the first layer. After incubation, transfer substrate bearing two layers of cells was placed onto the amnion to make direct contact between cells and scaffold surface. Double cell layers were transferred onto the scaffold material after the removal of the transfer base.

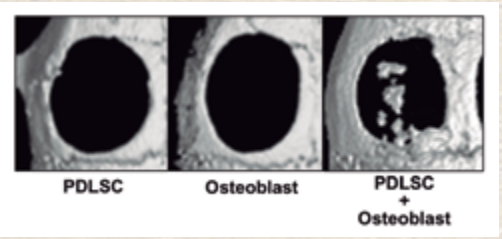


Fig.2: Micro CT images of bone defects 4 weeks after the transplantation of cell-transferred amnion. In the single cell transplantation (mesenchymal stem cells from periodontal ligament (PDLSC) or osteoblast), bone healing was limited while new bone-like tissue formation was observed in bone defects transplanted with double-layered cell-transferred amnion (PDLSC+Osteoblast).

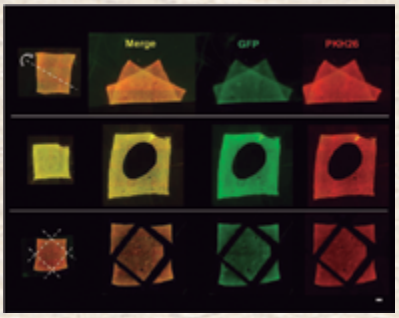
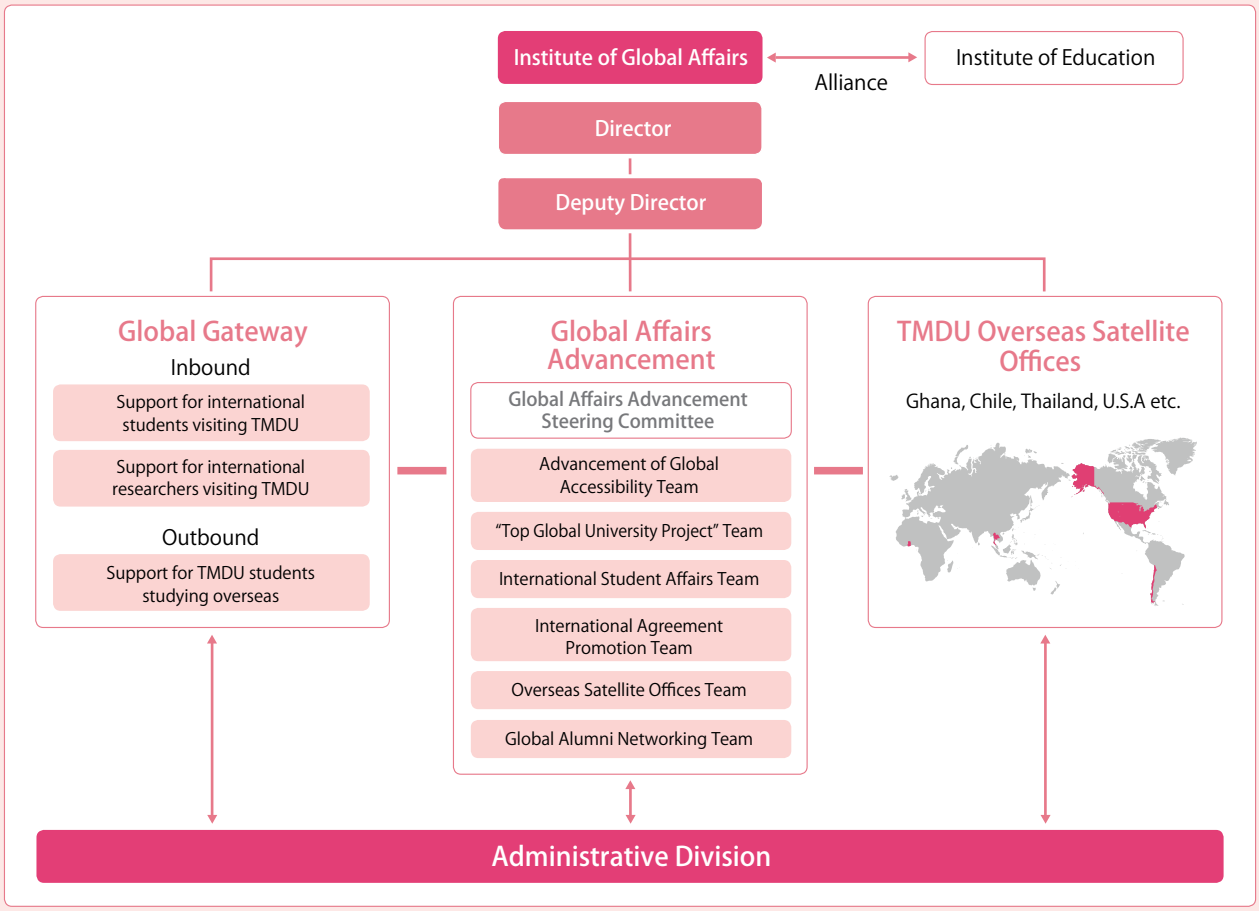


Fig.3: Fluorescence microscopic images of amnion holding double-layered cells after deformation (top), holing (middle) and trimming (bottom) of the membrane. Despite deformations and trimming of cell-transferred amnion, cells stably adhered onto the scaffold material. Green (GFP): First layer cells, Red (PKH26): Second layer cells. Bar = 1 mm

Institute of Global Affairs

By strengthening international aspects of TMDU and, in particular, by promoting university-wide globalization in the fields of education, research, and medical treatment, the Institute of Global Affairs aims to assist in achieving TMDU's goal as a world-leading integrated medical university to "cultivate professionals with knowledge and humanity."



Kakizome (first calligraphy of the year)

ON JANUARY 13, international students who are learning Japanese at the Institute of Global Affairs enjoyed *kakizome* (the first calligraphy of the year) under the kind instruction of Ms. Keiko Uyama (Adjunct Lecturer, Public Relations). Surprisingly enough, although this was the first time to try calligraphy for most of them, they were really good at writing with a brush—no doubt because of a previous talent or their skills as medical and dental experts. Their calligraphy work is posted outside the Japanese language classroom on the 8th floor of M&D Tower.

After experiencing *kakizome*, we enjoyed *kagami-biraki* with other international students. During this event, we typically eat *kagami-mochi* (rice cake) that is offered to a deity in order to wish for a peaceful year. The students also enjoyed *oshiruko* (sweet red-bean soup) to kick off the year 2017 together.

Some students enjoyed calligraphy so much that they said they would like to do it more often, not just at the beginning of the year. It is a good way not only to learn how to write Japanese neatly but also to remember how to write kanji.

Please drop by and see their work in M&D Tower. You will be surprised how good their calligraphy is.

In addition to enjoying home-made *oshiruko*, the students learned what *kagami-biraki* is and why we eat *oshiruko* on the day.

Cover of this issue

The Kounodai Campus houses the College of Liberal Arts and Sciences, where our undergraduate students start their university studies. This campus is located in Ichikawa City, Chiba Prefecture, and is about 40 minutes from Yushima Campus by train.

EDITORIAL SUMMARY

WE ARE PLEASED to send you Vol. 9 of TMDU Annual News, with highlights of TMDU's international activities and campus events for the 2016-2017 academic year. President Yasuyuki Yoshizawa discusses in **Message from the President** the goals and strategies of the third medium-term plan of TMDU in line with the University's mission of "Cultivating Professionals with Knowledge and Humanity, thereby Contributing to People's Well-being." The strategies involve (i) reorganization of the graduate school, (ii) further promotion of internationalization, (iii) tightening the links among TMDU's advanced medicine, dentistry, and medical engineering in part by establishing Institute of Research, and (iv) establishment of Institute of Information. Furthermore, President Yoshizawa discusses the plan to set up Clinical Institute, in addition to the preexisting and planned Institute of Education, Institute of Global Affairs, Institute of Research, and Institute of Information Technology.

In this issue is featured TMDU research on **clinical applications of autophagy**, which has received fresh impetus from the winning of the 2016 Nobel Prize by Dr. Yoshinori Ohsumi, the father of autophagy. You will enjoy a discussion on the current status of autophagy research and future prospects by Professor Noboru Mizushima of the University of Tokyo, who is an alumnus of TMDU and has contributed to development of interdisciplinary research into autophagy, and by TMDU professors carrying out autophagy research.

In **Campus News**, we highlight the delegation headed by President Yoshizawa visiting University of Nevada to discuss international exchange, and the conclusion of the inter-university academic exchange agreement with University of Ghana.

We also have reports from each of our three **International Collaboration Centers**, where TMDU faculty, staff, and students interact with international colleagues: Latin American Collaborative Research Center, reported by Professor Masanobu Kitagawa, Professor Hiroyuki Uetake and Junior Associate Professor Takuya Okada; Chulalongkorn University-TMDU Research and Collaboration Center in Thailand, reported by Professor Yoko Kawaguchi; and Ghana-TMDU Research Collaboration Center by Professor Nobuo Ohta. This issue also provides **Reports on Study Abroad Programs** from TMDU students and **Letters from Overseas Alumni** from graduates who tell us about their careers after graduation.

THE EDITORIAL OFFICE expresses many thanks to those who took special effort in preparing articles for this issue. If you have any suggestions or news to be included in the future issues of TMDU Annual News, please feel free to contact the Public Relations Division by e-mail (kouhou.adm@tmd.ac.jp).

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Open Windows Leading to the Global World
TMDU's activities are reported through the open windows to the world.
The window represents TMDU as the Global base for its speedy exchange of information.

TMDU

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