

NATIONAL UNIVERSITY CORPORATION

TMDU

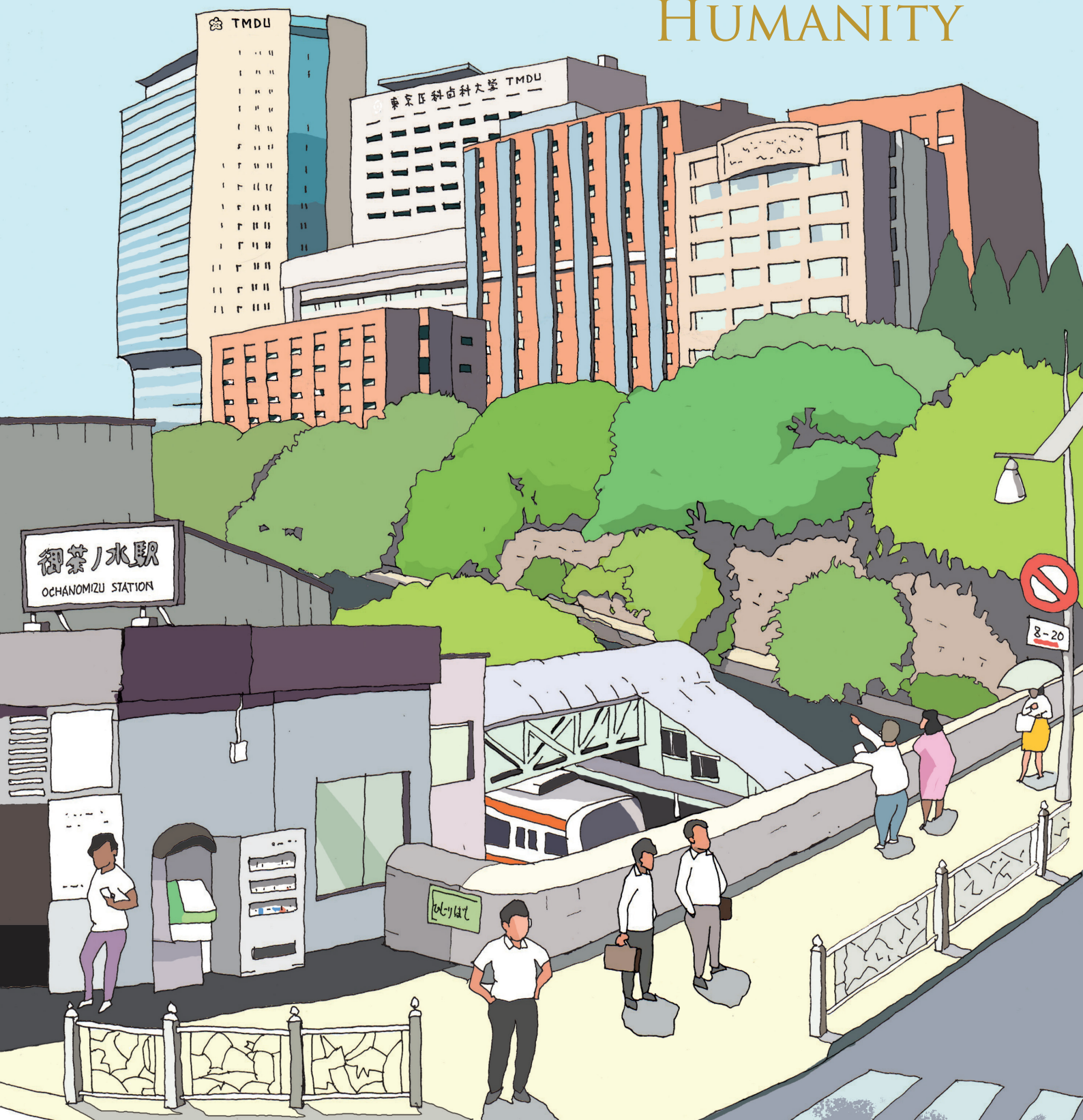
ANNUAL NEWS



TOKYO MEDICAL AND DENTAL UNIVERSITY

Vol.12 March 2020

CULTIVATING PROFESSIONALS WITH KNOWLEDGE AND HUMANITY

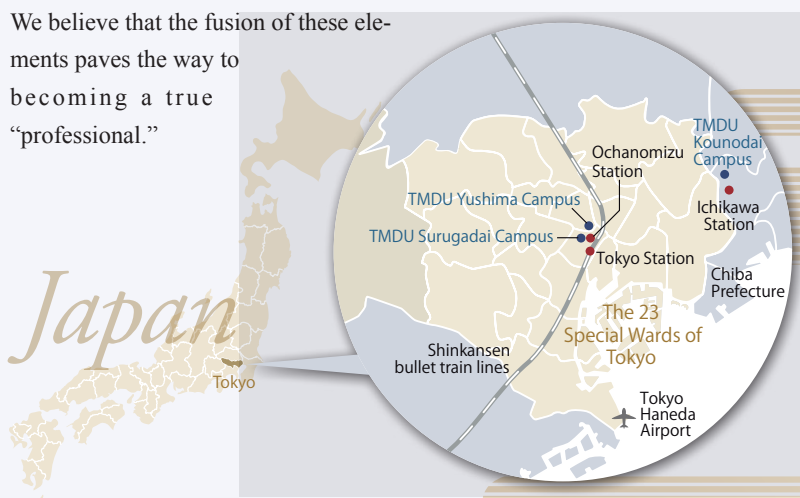


History and Location of TMDU

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 during 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.

2020

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 become known as one of the most excellent research universities in Japan.



This monument at TMDU's Ochanomizu Gate commemorates the Birthplace of Modern Education. It honors Japan's modern education system, which was developed in this neighborhood after the Meiji Restoration, and marks TMDU's emergence at this site in 1930 as the world's first comprehensive medical-dental graduate school.

How do you like life at TMDU?

TMDU: Did you know...?

THE World University Rankings
by Subject 2020 (Clinical, Pre-clinical & Health)

Ranked **#3** in Japan and **#74** in the World

SOURCE: THE World University Ranking by Subject 2020

University Ranking by Subject

	Medicine	Dentistry
National Rank	4	1
World Rank	101-150	6

SOURCE: QS World University Ranking by Subject 2020

University Hospitals Promoting Our Research

	Beds	Outpatients Per Year
Medical Hospital	753	549,118
Dental Hospital	60	355,052

International Students

	No. of International Students	No. of Countries
Graduate Schools	372*	34

* About **21%** of graduate school students are
International Students

My life as a PhD student has been busy but joyful, thanks to the friendly and collaborative atmosphere throughout the department. Aside from research, I have learned about personal interaction, teamwork, patience, and respect for others. Life outside the laboratory only becomes better with every passing day. I am grateful for this life-changing experience at TMDU, which has allowed me to meet and work with wonderful people.

Leila Nasiry Khanlar
(Iran)



Nothing is more attractive than studying at TMDU, where diversity is respected and you can communicate freely with people from all over the world. Although being away from one's home town and parents can be difficult, I found friendly support that helped me spend my first days on campus smoothly. TMDU provides us many challenging opportunities to immediately apply our newly learned skills and knowledge. I look forward to seeing how it also cultivates our independence and creative thinking.

Alapati Aimaitejiang
(Xinjiang Uyghur Autonomous Region, China)

TMDU is an outstanding environment for training and nurturing researchers for the future. I chose TMDU because of its high standards and qualifications, which are recognized around the world. My whole experience at this university has transformed me into a more confident and determined person. I will be eternally grateful to my dear mentors, who gave me tremendous hope and enthusiasm for pursuing cancer research.

Undrakh Ganbaatar
(Mongolia)



I always thought that traveling gives you perspective and makes you grow as a person. That is especially true of my time at TMDU. Studying here continues to be a truly remarkable life experience. TMDU not only provides high-level education and equips students with up-to-date research skills, it also offers a global environment where you can learn about different cultures from all over the world. I believe this kind of experience prepares you for the highly connected world that we live in today.

Saleh Sherif Adel Abdelfattah
(Egypt)



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TMDU | **ANNUAL NEWS**

Tokyo Medical and Dental University

Vol.12, March 2020

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8th TMDU International Summer Program (ISP2019)

TMDU's 8th INTERNATIONAL Summer Program (ISP 2019) was held from July 8th to 13th, 2019. This year's program was planned and prepared by the ISP2019 Work Group under the leadership of Chairperson Professor Hidenobu Shigemitsu. The topic of ISP2019 was "Medical Innovation Beyond 2020." The purpose of the program is to promote international exchange and strengthen relationships with overseas affiliated universities in the United States, Thailand, and Taiwan. Twenty-three participants and three faculty members were invited from overseas affiliated universities, and various events were held during ISP2019.

Work group members held an orientation which included an introduction of TMDU and ISP2019 and an exciting icebreaker activity that required the participants to introduce one another. Then the participants followed Professor Yasuhiro Otomo to the heliport at TMDU Medical Hospital, where they could have a full view of the location, scale and function of TMDU Yushima Campus and the Medical Hospital.

A welcome party was held. After a commemorative photo was taken, President Yasuyuki Yoshizawa officially welcomed the participants, and Professor Akinori Kimura made a toast.

Prominent researchers and scholars were invited to give lectures at ISP2019. After the lectures, participants were invited to join a Clinical Rotation or a Lab Visit in clinical departments or laboratories at TMDU.

Professor Kazuki Takada held a workshop in which participants, including participants from TMDU, were invited to give a presentation to introduce their universities. Afterwards, participants were divided into six groups and took part in a group discussion on a common topic.

During the closing ceremony, Professor Hidenobu Shigemitsu shared a few closing remarks and Professor Tetsuya Taga presented a ISP2019 certificate to each participant and a Group Discussion Award to each group. Afterwards a commemorative photo was taken and a Farewell Party held. President Yoshizawa made closing remarks and Professor Ikuko Morio made a toast. Program participants spent the rest of the farewell party eating, talking, laughing, and, sadly, saying their goodbyes after a week of bonding over new professional experiences at TMDU.



ISP2019 Commemorative Photograph



Lecture Course



Group Discussion



Farewell Party Commemorative Photograph



Participants introducing each other (Orientation)



Clinical Rotation

TMDU to Open a Joint Degree Doctoral Program in Cooperation with Mahidol University

THE GRADURATE SCHOOL of Medical and Dental Sciences at TMDU will be launching a Joint Degree Program, named the “Joint Degree Doctoral Program in Medical Sciences between Tokyo Medical and Dental University and Mahidol University (MU),” in April 2020 with Mahidol University, which has its origin in the establishment of Siriraj Hospital in 1888, and is one of the most prestigious public universities in Thailand.

This program is a four-year doctoral program. It aims to develop medical personnel:

- Who are highly specialized surgeons with expertise in the field of cancer treatment;
- Who have the research skills to respond promptly to the diversification of medical needs;
- Who can be leaders in medical and healthcare science both in Japan and the ASEAN region.

The most distinctive feature of this program is the practical education surgeons can receive due to the advanced research skills and knowledge available at TMDU to train cancer treatment specialists, and the abundant clinical research results based on the large number of cases at MU. Surgeons who have completed this program are expected to work internationally to resolve common issues found throughout Japan and the ASEAN region. Recruiting will begin at both universities from this fall, and the first students will be enrolled in April 2020.

On August 7, a signing ceremony for the Academic Cooperation Agreement was held at the Faculty of Medicine Siriraj Hospital, MU. In attendance were Prof. Banchong Mahaisavariya, Acting President (MU); Asst. Prof. Somchai Trakarn-



A signing ceremony for the Academic Cooperation Agreement between TMDU and Mahidol University

rung, Deputy Dean for Faculty of Graduate Studies (MU); Prof. Dr. Prasit Watanapa, Dean, Faculty of Medicine Siriraj Hospital (MU); and President Yasuyuki Yoshizawa (TMDU).

On Aug 8, President Yoshizawa gave a keynote speech titled “Japan-Thailand Education and Research Cooperation” at Princess Chulabhorn International Oncology Conference. Surgeons from all over Thailand engaged in active exchange at this conference. Following the lectures, the Opening Ceremony was held and international speakers, including President Yoshizawa, received a commemorative gift from Princess Chulabhorn.

During his stay in Bangkok, President Yoshizawa awarded TMDU alumnus Dr. Thiravud Khuhaprema, Hospital Director of Wattanosoth Cancer Hospital at Bangkok Hospital, and Prof. Dr. Prasit Watanapa, Dean, Faculty of Medicine Siriraj Hospital, the title of TMDU Visiting Professor. Dr. Issareeya Ekprachayakoon also received the title of TMDU Visiting Assistant Professor.

Master of Public Health in Global Health (MPH) Course

TMDU LAUNCHED THE Master of Public Health in Global Health (MPH) course to develop global leaders who can “think globally and act globally” and thereby find concrete solutions to pressing public health issues around the world

We invite renowned professors from Harvard T.H. Chan School of Public Health (HSPH) and Johns Hopkins Bloomberg School of Public Health (JHSPH), two of the world’s top schools of public health, to collaborate with us in offering MPH course students a world-class public health education in Tokyo. In 2019, we invited the following three professors to join us: Professor Ichiro Kawachi (HSPH) Professor Brian Schwartz (JHSPH), and Professor Pamela Surkan (JHSPH).

The MPH Course welcomes individuals with a bachelor’s or

higher degree who wish to go into public health academia and/or become a public health officer at international organizations such as WHO or UNICEF.



Lecture by the visiting professor from JHSPH.

Interview with TMDU President Yasuyuki Yoshizawa

Review of Six-year Tenure as TMDU President

Since assuming office as TMDU president, Dr. Yasuyuki Yoshizawa has devoted himself to organizational and mindset reform. Reviewing his six-year tenure, he discusses TMDU's transformation and prospects for the future.

What did you most want to achieve when you took office as TMDU president?

Yoshizawa: Two mottos—"If you know yourself, you cannot be wicked," and "Do your best to be a positive thinker," which I mentioned in my policy statement upon taking office as president in 2014, have inspired me to do my utmost over the past six years.

The first task I undertook as TMDU president was reforming the mindset of faculty and staff. For this purpose, I emphasized cultivation of a sense of affiliation with and an "alma-mater-like" affection for TMDU. I wanted all faculty and staff to share the same vision and work together to ensure that TMDU evolved in ways that contributed to the realization of that vision. It has been gratifying to recognize significant, albeit gradual, change in the mindset of faculty and staff over the past six years.

In parallel with mindset reform, I promoted reorganization within the university, an issue whose importance I was aware of before taking office as president. Whereas the Faculty of Medicine and the Faculty of Dentistry had previously operated separately without coordination, I revised personnel assignment and started by establishing

a structure that ensures that the entire university operates in accordance with a consistent administrative policy.

Soon after taking the helm, you established organizations directly reporting to the president, didn't you?

Yoshizawa: As TMDU is a small university, I thought it would be preferable to put in place an organizational structure enabling implementation of a university-wide policy unconstrained by the distinctions of faculties and hospital departments. Therefore, I first established the Policy Planning Office (currently President's Strategic Policy Section) that directly reports to the president and then the President's Advisory Board. I also introduced the institutional research (IR) system for integrated management of university information and data analysis in order to review and organize educational and research organizations.

Despite the expression of some reservations about the top-down approach at the outset, I remained true to my motto "If you know yourself, you cannot be wicked," and implemented initiatives for the benefit of TMDU and society at large.

You conducted an overall review of education, including reforms of liberal arts education and entrance exams.

Yoshizawa: Among various organizational reforms, I first tackled educational reform. In 2015, during my second year as president, I established the Institute of Education and pursued reform of liberal arts education, reform of entrance exams, and reorganization of the graduate schools. The aim was to achieve TMDU's educational policy of fostering independent, creative, pioneering, and internationally minded leaders who have a broad range of knowledge, deep humanity, and a strong sense of ethics.

For liberal arts education, we established a working group, including educational specialists from outside TMDU, to pursue reform. Proposals included introduction of student-led classes, small-group education, and teaching of liberal arts and sciences in English. These proposals have been implemented since 2017.

Regarding reform of entrance exams, we introduced a new track involving special selection for admission based on recommendation, in addition to general entrance examinations. The purpose was to increase opportunities to study at TMDU for students from areas outside Tokyo and those who have lived overseas. We were concerned by the fact that most of the students TM-



Yasuyuki Yoshizawa

President
TMDU

DU accepted in recent years came from high schools in the Tokyo Metropolitan area.

In a collaborative endeavor, TMDU and the Tokyo University of Foreign Studies developed a selection method for evaluating applicants' multifaceted and comprehensive capabilities, including preparation of exam questions integrating arts and sciences and joint dispatch of interviewers.

What did reorganization of the graduate schools entail?

Yoshizawa: In our reorganization of graduate schools, we were quick to put a focus on information-related programs, such as those concerning IoT, data science, and AI. Launched in fiscal

2017 under a five-year plan, the Doctoral program for Data-Related Innovation Expert is fostering consummate professionals equally at home in the worlds of data science and medicine, and moreover has led to the establishment of the Consortium for Data Sciences in Medical Care and Drug Discovery.

In 2018, TMDU established the new Graduate School of Medical and Dental Sciences. The Track of Biomedical Laboratory Sciences of the Graduate School of Health Care Sciences was transferred to this graduate school. New programs include a master's program on Health Sciences and Biomedical Engineering (Medical Sciences Pro-

gram for Preemptive Medicine, Master of Public Health in Global Health (MPH) Course, etc.) and the Integrative Biomedical Sciences Programs for Preemptive Medicine (Clinical Statistics and Bioinformatics Graduate Program, Medical Devices and the Internet of Things (IoT) Graduate Program, Biomedical Sciences and Chemical Biology Graduate Program). It took several years from the initial conception to the implementation of this reorganization of the graduate schools, but we eventually accomplished it.

The Institute of Research is spearheading TMDU's efforts to enhance its research capabilities.

Yoshizawa: Reform of research orga-

nizations started with expansion of the academic field-based system. Although TMDU originally introduced this system to strengthen the university's overall research and educational capabilities, it became apparent that there was an urgent need to remedy the insufficient integration of medicine and dentistry. For example, there were separate biochemistry departments for medicine and dentistry.

Therefore, focusing on closely related basic research fields, we established 15 new academic fields in the Graduate School of Medical and Dental Sciences in April 2016. For example, the pathology field comprises pathology-related departments both in medicine and dentistry, such as human pathology, comprehensive pathology, surgical pathology, oral pathology, diagnostic oral pathology, and molecular pathology. Subsequently, we established 13 academic fields in clinical research. We currently have 31 academic fields for basic and clinical research.

Expansion of the academic field-based system has led to promotion of TMDU's priority research fields and to the establishment of the Division of Advanced Multidisciplinary Research. Subsequently, TMDU established the Organ and Tissue Neogenesis Consortium and the Medical Innovation Con-

sortium, and we will shortly be launching the Intractable Disease Research Consortium. Involving cooperation between researchers in Japan and around the world, as well as with companies, these consortia are bases for cutting-edge international research spanning from the fundamental research to practical applications.

In 2017, we established the Institute of Research to spearhead research activities throughout TMDU and industry-academia-government collaboration from a broad perspective. By promoting integration of research facilities, which were previously scattered within TMDU, and networking with other universities to share facilities, we have established a framework and mechanisms for enhancing TMDU's research capabilities.

Fostering young researchers and inviting excellent researchers are keys to success.

Yoshizawa: The launch of the Presidential Young Investigators Award and the establishment of the Young Innovative Medical Scientist Unit are among the initiatives we have undertaken to strengthen research capabilities with a view to the next generation.

Meanwhile, TMDU has invited specialists in various fields, including distinguished athlete and sports scien-

tist Professor Koji Murofushi, regenerative medicine authority Professor Takanori Takebe, and cryo-electron microscope developer Distinguished Professor Yoshinori Fujiyoshi. We were able to pursue this human resources strategy thanks to the cross-appointment system introduced in 2014 and the HR Committee established in 2017.

Facilitating industry-academia collaboration at the organizational level through the Institute of Open Innovation and other mechanisms

Yoshizawa: The Institute of Research not only promotes basic research but also emphasizes industry-academia collaboration, enabling it to swiftly implement TMDU's research outcomes in society.

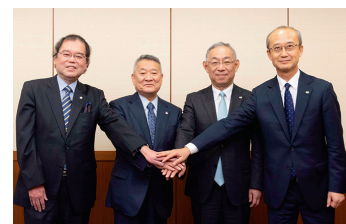
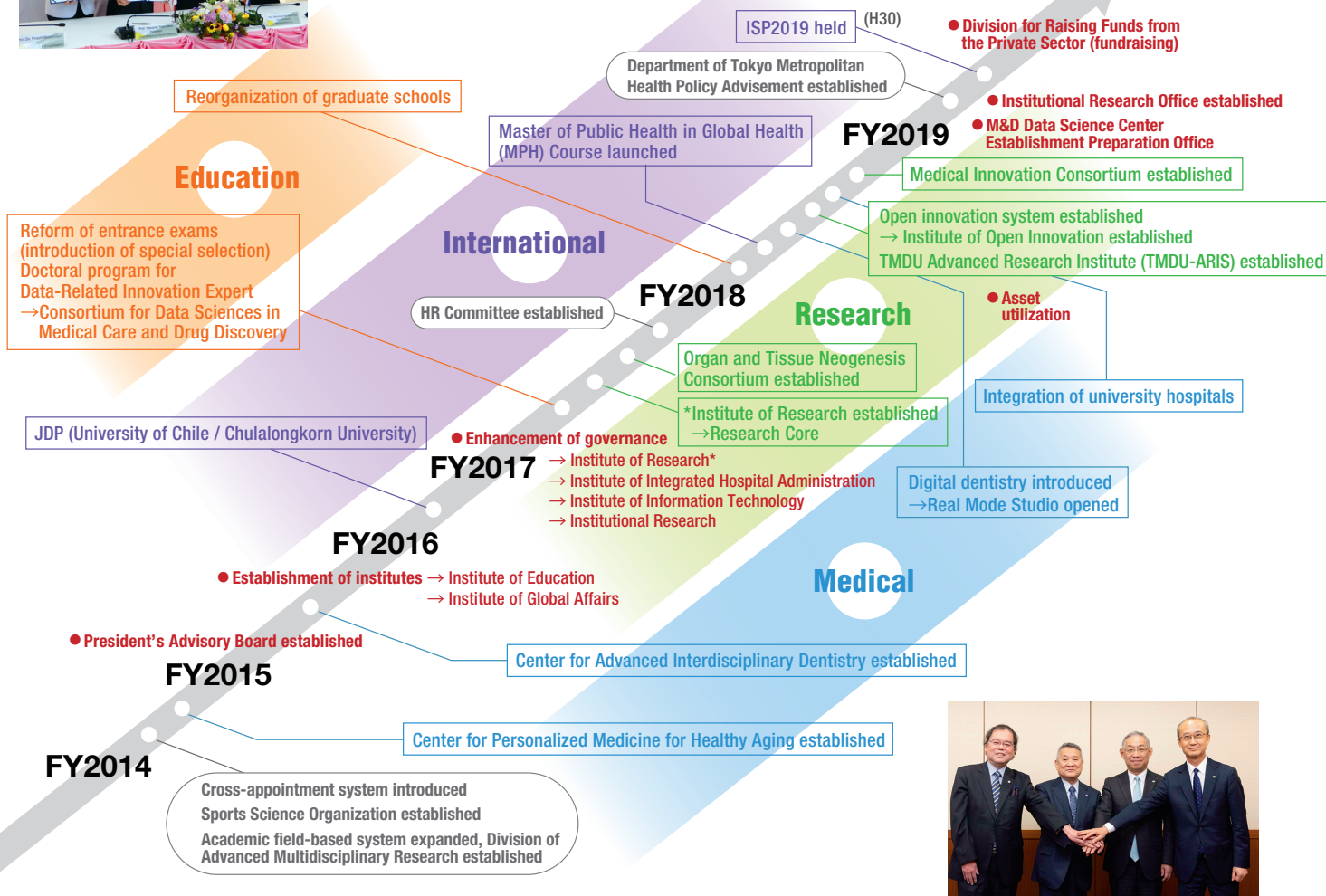
The Research Core, consisting of the Administration Division and seven Research Support Units, was established in 2017 within the Institute of Research to accelerate practical application of research outcomes.

However, what TMDU is promoting goes way beyond the joint research between individual researchers and company departments typical of conventional industry-academia collaboration. It is vital to have a framework facilitating collaboration between universities and companies at the organizational level based on comprehensive collaboration agreements covering basic research, research on practical applications, and social implementation including patents.

Considering that national universities are now independent corporations, I think such collaboration is at the heart of our mission. Intellectual property created through industry-academia collaboration should be put to good use in society, and profit thus gained should be invested to strengthen basic research. National universities need to establish this virtuous cycle.

This was the basis for the comprehensive collaboration agreements TMDU concluded with Sony, Nikon, and





Yamaha. In 2018 we established TMDU Open Innovation System to further promote industry-academia collaboration and concluded industry-academia collaboration agreements with Hitachi, Mitsui & Co. and other leading Japanese companies. Against the backdrop of these highly regarded achievements, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) selected TMDU for its program supporting creation of a framework conducive to open innovation. Following TMDU's selection, we established the Institute of Open Innovation.

Reflecting our widely recognized achievements so far, TMDU was also selected for the Japanese government's program supporting national universities' initiatives to strengthen the environment for innovation.

Reform of hospital administration is underway with a view to integrating university hospitals*. How is that progressing?

Yoshizawa: As I had been serving as the executive director responsible for hospital administration for six years before taking office as TMDU president, hospital administration reform was one of my priorities.

First of all, I thought full-scale collaboration should be established between the Medical Hospital and the Dental Hospital. Preoperative conferences and case discussions among oral surgery, otorhinolaryngology, head and neck surgery, and plastic and reconstructive surgery, as well as collaboration of the two hospitals pathology departments, were launched while I was the executive director responsible for hospital administration.

Since becoming president, I have endeavored to set up university-wide hospital administration systems step by step, including establishment of the Center for Personalized Medicine for Healthy Aging, which I long had in mind, and the Center for Advanced Interdisciplinary Dentistry and the Real Mode Studio to promote digital dentistry.

The Institute of Integrated Hospital Administration was established in 2017 and the Medical Hospital and the Dental Hospital were placed under this integrated organizational structure as university hospitals in 2018. Although the names of the hospitals remain unchanged, we made large strides toward integration of the university hospitals.

The space between the Medical Hospital and the Dental Hospital, will be

the site for a new building that will house operating rooms and emergency rooms available for use by both medical and dental departments.

Mindful of the tremendous possibilities inherent in AI, TMDU has plans afoot for the coming era in which AI will prevail.

Yoshizawa: In parallel with hospital administration reform, I have promoted initiatives related to AI, robotics, and data science, which are responsive to needs associated with medical information. The Center for Personalized Medicine for Healthy Aging established in 2014 is the base for preventive medicine utilizing genetic information gathered by the Bioresource Research Center. The increasing importance of medical big data leads sets the scene for realization of preemptive medicine.

The Institute of Information Technology established in 2017 played a key role in developing the information infrastructure system of the university that led to the launch of the Doctoral program for Data-Related Innovation Expert, which I mentioned in connection with educational reform, and the M&D Data Science Center that will start operation in April 2020. We intend to establish a Faculty of Medical Data Science in the future, and these initiatives are aligned with that prospect.

TMDU's high ranking among the world's universities is raising its profile globally.

Yoshizawa: TMDU's high ranking among the world's universities is in large measure attributable to the reforms we have promoted concerning education, research, and hospital administration. In the THE World University Rankings 2020 by subject, TMDU was ranked 74th in the world and 3rd in Japan for clinical, pre-clinical & health. In QS World University Rankings 2019 by subject announced in February 2019 by Quacquarelli Symonds, a British rating agency, TMDU was ranked 1st for dentistry in Japan and

10th for dentistry in the world, and 3rd for medicine in Japan and 51st -100th for medicine in the world.

For TMDU to be ranked so high in the world is indeed gratifying. It enhances recognition of TMDU worldwide and has a positive impact, making it much easier for us to engage in international cooperation.

TMDU has long promoted international collaboration and cooperation with institutions in Southeast Asia, Chile, and Ghana. Going forward, however, it is indispensable to cooperate with institutions in the U.S. and Europe in order to secure a firm position as a world-class comprehensive medical university. We think the relationship with the U.S. is particularly important. During my tenure as president, TMDU has concluded partnership agreements with eight universities in the U.S. However, we are still in negotiations about establishing a TMDU presence within an American university. I regret this project was not fully accomplished during my tenure.

TMDU established the Institute of Global Affairs in order to ensure that international cooperation throughout the university is executed in accordance with the TMDU policy. In signing agreements as TMDU president, I assumed final responsibility.

In response to the strengthening of cooperation with American universities, TMDU's International Summer Program (ISP) in 2019 broke new ground in that we invited students and faculty from partner universities in the U.S. to participate. ISP is an opportunity for participants to recognize TMDU's quality and it is expected to lead to further cooperation.

What are your expectations of TMDU going forward?

Yoshizawa: Reviewing my six-year tenure, I think I have achieved almost everything I intended to do or laid the foundation for further progress. However, I feel progress in AI, data science,



and robotics, such as the intelligent hospital concept, has been somewhat slower than expected. The alliance among TMDU, Tokyo University of Foreign Studies, Tokyo Institute of Technology, and Hitotsubashi University has yet to fulfill its potential. Given that national universities need to be more independently managed to survive, it is all the more urgent for these four universities to promote this alliance and create new research fields where collaboration can flourish.

Regarding organizational reform, to which I accorded the top priority, I am gratified the university made so much progress during my administration, establishing new institutes for education, research, integrated hospital administration, information technology, and global affairs. We managed to accomplish such far-reaching organizational reform because of the reform of the mindset of faculty and staff based on a sense of affiliation with and affection for TMDU.

It is my earnest desire and expectation that Dr. Yujiro Tanaka, my successor as president, will successfully complete the innovative projects already in progress at the university and, in addition, embrace new challenges and exciting opportunities. I am confident that he will do his utmost to guide TMDU and provide leadership for society going forward.



Message from New President Yujiro Tanaka

Join forces to realize comprehensive healthcare for the Earth and humankind

UNDER THE LEADERSHIP of President Yoshizawa, TMDU filed an application to become a designated national university corporation with the aim of realizing comprehensive healthcare for people through out the world.

I wish to achieve this goal by joining forces with you from April 2020. For this purpose, I would like to transform TMDU into an organization characterized by autonomy and cooperation wherein all faculty and staff are able and eager to seize the initiative while working together to accomplish shared objectives.

Although it will not be easy to establish such an organization and cultivate the necessary culture, I am eager to take up the challenge.

Accordingly, I will focus on 1) delegation of authority and responsibility and 2) elimination of barriers. In this regard, not only structural reform but also mindset reform is important. Within the framework set by TMDU's basic policy, you are

urged to demonstrate your sense of ownership while respecting one another. Whether your role is in education, research, clinical practice, or administration, let's join forces to realize new comprehensive healthcare.

A notable example of organizational reform is integration of the Medical Hospital and the Dental Hospital*. In addition, we will promote cooperation among departments and sections and exchanges with universities and other institutions in Japan, especially adjacent universities, hospitals, and clinics, and around the world.

In order to facilitate the full involvement of all the faculty and staff in these reforms, I intend to promote diverse workstyles so that people can continue working, and to support their career development.

Whatever your job description, academic background, gender, or age, I urge you to participate fully in TMDU's initiatives so that we can offer new comprehensive healthcare to society.



*The details regarding the integration of university hospitals are still under consideration. We will inform you in the near future.



Feature

M&D Data Science Center Opens

Fostering “super medical scientists” equally at home in medicine and data science

The M&D Data Science Center, TMDU’s new base for fostering data scientists in the medical field, will open in April 2020. Center director Dr. Satoru Miyano discusses how the ongoing integration of medicine and data science is opening up exciting new prospects for healthcare services.

Data science for navigating TMDU’s big data

There is a great need for consummate professionals capable of unlocking the tremendous potential of preemptive medicine in Society 5.0 by utilizing massive and complicated medical big data. TMDU is establishing the M&D Data Science Center to foster such people.

Dr. Satoru Miyano will serve as the director of the M&D Data Science Center. Having served as director of the Human Genome Center of The Institute of Medical Science at The University of Tokyo, Professor Miyano is an authority on the application of supercomputing to genome analysis.

The center will consist of three

fields—M&D Data Science Platform, M&D Data Science Implementation, and M&D Data Science Outcome—and seven departments. The 29 faculty and staff, of whom 10 are being newly recruited, include researchers in fields with an important bearing on medical data science, namely, information science, statistical science, computational science, and ethical, legal and social issues (ELSI).

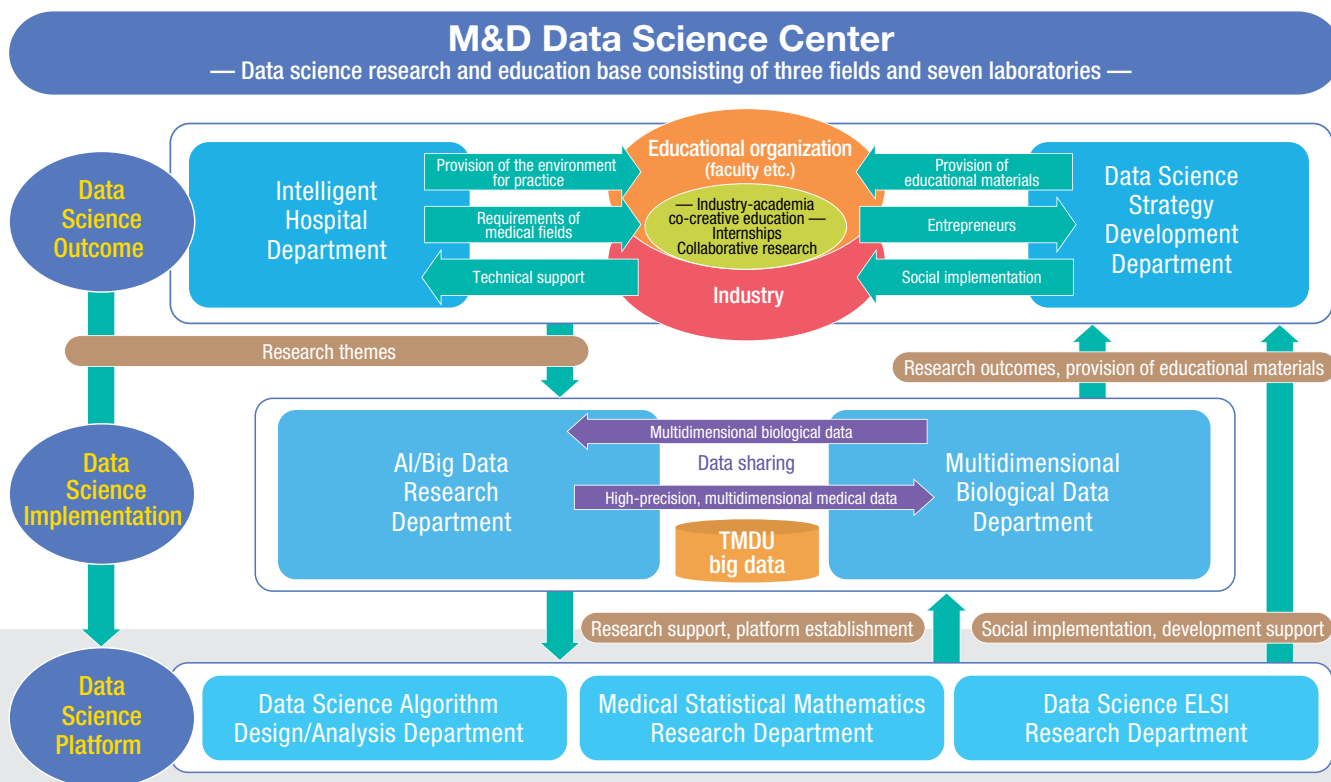
Dr. Miyano explains why TMDU is establishing this base for data science. “TMDU is a top-tier educational institution of global reputation focusing on medicine and dentistry. The university hospitals and the Bioresource Research Center already have a huge quantity of clinical data and biological samples. Mindful that expertise in data science is

indispensable for navigating medical big data, we intend to foster ‘super medical scientists’ who are consummate professionals equally at home in the worlds of medicine and data science. As a center of excellence, we envisage collaborating with third parties as a pacesetter in medical data science in Japan.”

Immensity and diversity of medical big data

The new center is TMDU’s response to the two defining characteristics of medical big data, namely, immensity and diversity. In terms of its conception and operation, the center will be at the forefront of the global medical big data trend.

“Compared with big data in other



Satoru Miyano

Director, M&D Data Science Center

Master of Science, Department of Mathematics, Kyushu University, 1979. Doctor of Science, Kyushu University, 1984. Having served as Professor of the Human Genome Center, Institute of Medical Science, The University of Tokyo, he became a Designated Professor of TMDU in 2019. Director of the M&D Data Science Center from April 2020. Specializing in computational biology, bioinformatics and cancer genomics

industrial and commercial sectors, the sheer scale, diversity and complexity of medical big data are particularly challenging. Electronic medical records, lifestyle information, real-time lifelogs, and various other factors are interrelated. Moreover, such data are personal information to be treated with due care, necessitating the establishment of an appropriate management system and the provision of training for the people who handle the data. Analysis of such massive quantities of data is beyond the capacity of humans unaided by big data analytics.”

It is becoming indispensable to foster data scientists whose ability to perform AI-based analysis is complemented by a sure grasp of medicine.

Fostering leaders for next-generation medicine

TMDU has been pursuing initiatives to foster consummate professionals in the burgeoning field of medical data science step by step, including establishment of the Medical Sciences Program for Preemptive Medicine and the Integrative Biomedical Sciences Programs for Preemptive Medicine within the graduate school as well as the launch of a Doctoral program for Data-Related Innovation Expert and the Consortium for Data Sciences in Medical Care and Drug Discovery.

As the next step, TMDU intends to establish an educational environment in which students have opportuni-

ties to begin acquiring expertise in the fundamentals of data science as soon as they begin their medical studies.

“As soon as they join the university, when their thinking is flexible and they are eager to encounter new ideas, we want students to get on track to become ‘super medical scientists,’ rather than waiting until they are in graduate school. Researchers at the M&D Data Science Center will prepare the ground by identifying the practical issues and applying their specialties to resolve them.”

By pursuing an integrated interdisciplinary approach attuned to the needs of Society 5.0, TMDU aims to position the M&D Data Science Center as a trailblazer in research encompassing the medical and dental sciences, medicine, and education. In this regard, Dr. Miyano views development of next-generation human resources as a crucially important task for the new center.

“The M&D Data Science Center will play the principal role in cultivating professionals capable of fulfilling leadership roles in the future of medicine.”



Feature Medical Innovation Consortium

Pioneering the future of medicine through joint efforts of the medical and dental fields

Amid the rapid progress of precision cancer medicine, genome editing and other technologies based on molecular biology, how best to translate these cutting-edge technologies into practical applications has emerged as an issue. TMDU has established the Medical Innovation Consortium whose mission is to develop genomic medicine and AI systems, utilizing a biobank and big data for that purpose, and achieve their implementation in society. Leveraging its strengths in both clinical applications and basic research, TMDU has launched initiatives to realize medical innovation through joint efforts of the medical and dental fields.

Reinforce TMDU's strengths and collaborate with industry and institutions in Japan and overseas

Completion of the human genome sequencing in 2003 triggered accelerated technological innovation in the molecular biology field. Technological innovation is transforming the nature of medicine.

With the aim of realizing “future medicine,” TMDU established the Medical Innovation Consortium in the Division of Advanced Multidisciplinary Research of the Institute of Research in December 2018. This is the second consortium embodying the Life Course Consortium Concept, following the Organ and Tissue Neogenesis Consortium established in 2017. The M&D Data Science Center, which will open in April 2020, will support these initiatives.

Dr. Toshihiro Tanaka, Director of the

Consortium, explains its structure: “While taking advantage of TMDU’s strengths as a comprehensive medical university, we envisage the consortium serving as a base for industry-academia-government collaboration. As well as promoting cooperation and exchanges with overseas universities and researchers, including the inviting of world-leading researchers to TMDU, we will emphasize the cultivation of fruitful relationships with external parties, such as alliances with industry and with governmental organizations and agencies.”

Consisting of three key organizations and 14 units dedicated to medical innovation

The Medical Innovation Consortium consists of three key organizations: the Basic and Exploratory Science Division and the Applied and Clinical Science Division, with the Information Integra-

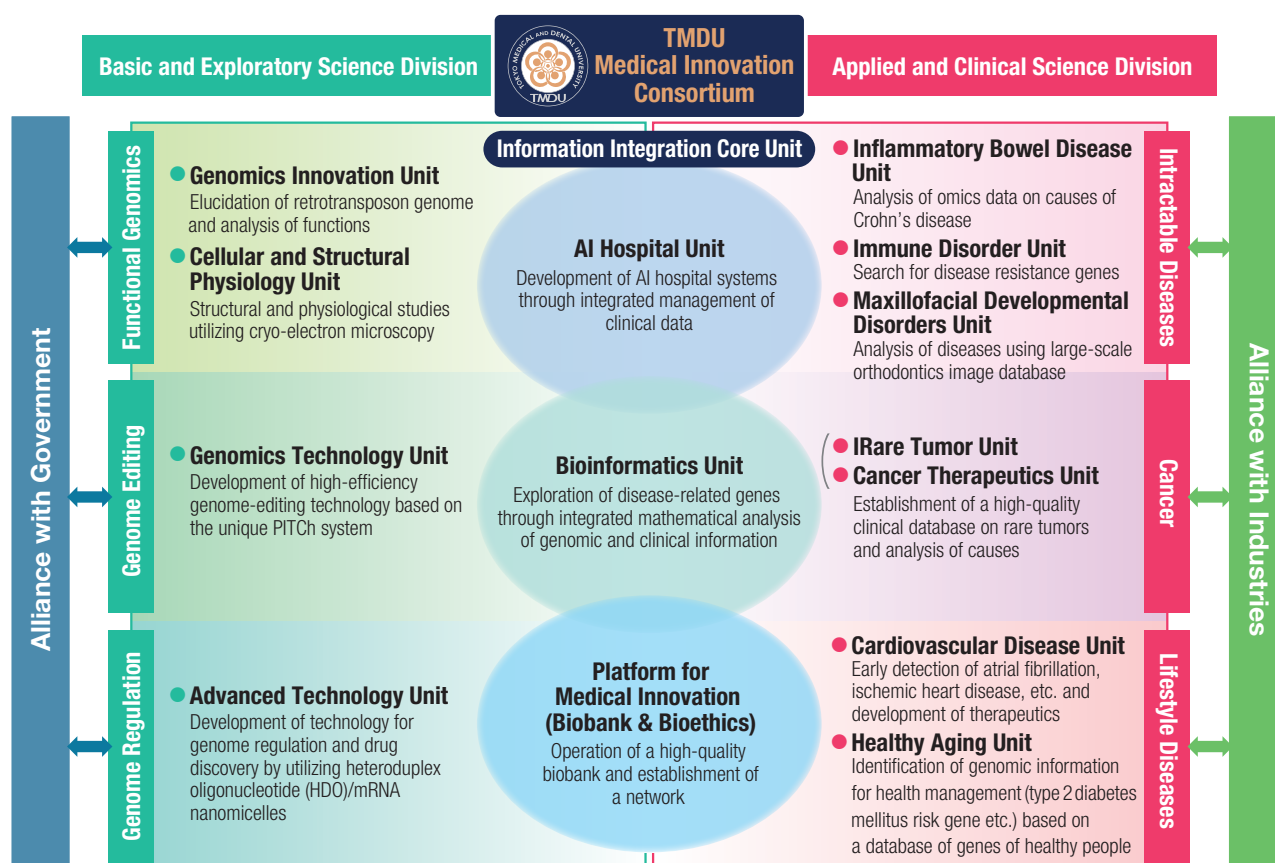


Dr. Toshihiro Tanaka
Director, Medical Innovation Consortium

tion Core Unit linking these two divisions.

The Basic and Exploratory Science Division searches for undiscovered genome functions and develops new knowledge and technology in such fields as cell-structure physiology research using cryo-electron microscopy, genome editing, and oligonucleotide and mRNA therapeutics.

In the promising field of oligonucleotide therapeutics that has been attracting keen interest in recent years, this division’s Advanced Technology Unit is studying heteroduplex oligonucleotide (HDO) technology, which is highly effective for regulation of gene expression and expected to reduce side effects. TMDU intends to apply its research outcomes in the treatment of



intractable diseases and preemptive medicine targeting changes associated with aging.

The Applied and Clinical Science Division develops therapeutics for refractory diseases, cancer and lifestyle-related diseases. For specified target diseases, the division aims to achieve clinical applications by integrating basic research with big data through the utilization of data analytics to exploit the available big data.

The Immune Disorder Unit, one of the seven units of the Applied and Clinical Science Division, aims to clarify the causes and conditions of immune diseases, such as articular rheumatism, immunodeficiency, and allergic diseases by analyzing big data and establishing disease models. It also envisages realization of personalized genomic medicine.

The Information Integration Core Unit links the Basic and Exploratory Science Division and the Applied and Clinical Science Division. Consisting of the AI Hospital Unit, the Bioinformatics Unit,

and the Platform for Medical Innovation (Biobank & Bioethics), the Information Integration Core Unit supports the two divisions' research units

through provision of big data analytics, processing of high-quality biological samples and clinical information, and support concerning bioethical issues.

Kick-off symposium to publicize the consortium's initiatives

ON DECEMBER 9, 2019, TMDU held a kick-off symposium titled "Pioneering the Future of Medicine" to mark the launch of the Medical Innovation Consortium. In addition to presentations introducing the consortium and units' research themes, keynote speaker Designated Professor Yusuke Nakamura focused on how AI will change medicine and discussed personalized medicine and the AI hospital concept, which are aspects of future medicine.

The symposium, held at the Akio Suzuki Memorial Hall in the M&D Tower, attracted a large audience that included many people from outside TMDU, indicating the high interest in this initiative.

"The overarching theme of the Medical Innovation Consortium is development of 'future medicine.' Our mission is to harness TMDU's long-cultivated sophisticated technological capabilities and facilitate their application for the benefit of society. We intend to advance toward our goal by capitalizing on the respective strengths of the consortium partners, drawn from within and outside TMDU, through enhanced collaboration," says Consortium Director Toshihiro Tanaka.

"Future medicine" will start realizing its promise in step with the advances achieved by the Medical Innovation Consortium.

Expanding 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

Tomoyuki Odagaki
MD, Assistant Professor,
Latin American Collaborative
Research Center in Chile,
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 a 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 has long since 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 still contributes to maintaining the health of the Chilean people.

Colorectal Cancer Screening in Chile, Supported by TMDU

In Chile, mortality from colorectal cancer has been increasing over 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. Francisco Lopez of Clinica Las Condes (CLC), one of the largest and most advanced hospitals in Chile. Due to the long history between TMDU and Chile, TMDU was invited to supervise the project. In 2009, the Ministry of Health

of Chile, CLC and TMDU signed a collaborative agreement concerning colorectal cancer screening, 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. Established in 2012, PRENEC (Prevention Project for Neoplasia of Colon and Rectum) uses Japanese medical methods to conduct immunological fecal occult blood tests and colonoscopies.

The Chilean-Japanese Institute for Digestive Diseases at the Hospital San Borja Arriaran is the main facility for PRENEC in Santiago. The institute also serves as a training center for endoscopy. Many Chilean doctors have received training in endoscopy, acquiring the skills necessary for cancer screening. The institute's endoscopy unit has been redesigned for PRENEC, with extensive support from the Japanese Embassy in Chile.

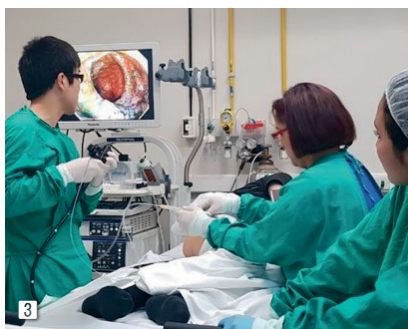
In December 2017, former TMDU Takashi Ohyama received the Order of Bernardo O'Higgins from the Government of Chile in appreciation of TMDU's contributions in Chile.

LACRC Members and University Activities

LACRC is staffed by experts from the pathology, endoscopy and molecular biology divisions of TMDU. As of 2020, nine TMDU doctors have provided leadership to LACRC: Dr. Takashi Ito (April 2010 to March 2012) and Dr. Hiroshi Kawachi (March 2012 to March 2015) as pathologists; Dr. Hiroyuki Uetake (July and August 2010), Dr. Tetsuro Nishikage (January 2011 to January 2012), Dr. Koji Tanaka (January 2012 to April 2013), Dr. Takuya Okada (April 2013 to March 2015), Dr. Masahiro Tsubaki (October 2014 to September 2015) and Dr. Tomoyuki Odagaki (November 2014 to present) as endoscopists; and Dr. Maki Kobayashi as a molecular biologist (July 2012 to March 2015). In November 2017, August 2018 and March 2019, Dr. Masamichi Yasuno visited Chile to supervise colorectal surgery conducted by local surgeons (Fig. 1).

1 Dr. Yasuno with Chilean surgeons at PRENEC center in Osorno





② Colonoscopy training with colon model
③ Dr. Odagaki performing an endoscopic procedure
④ Meeting with directors from all PRENEC centers

LACRC is currently overseen at TMDU by Prof. Tetsuya Taga (Executive Senior Vice President), Prof. Masanobu Kitagawa (Dean of the Faculty of Medicine, Department of Comprehensive Pathology), Prof. Uetake (Department of Specialized Surgeries) and other staff members.

In Chile, Dr. Odagaki is the current chief of LACRC, and he is engaged in PRENEC as an instructor of colonoscopy to Chilean doctors (Fig. 2). His cutting-edge techniques, including endoscopic resection for superficial cancer, have been in great demand. Many patients are referred to him not only from Santiago, but also from other parts of Chile (Fig. 3). Dr. Odagaki is also a supervisor in the stomach cancer screening project conducted by the Chilean Endoscopic Society.

TMDU operates the Project Semester Program, appointing medical students to institutions overseas. In 2019, two medical students from TMDU were sent to laboratories at the University of Chile, where they conducted advanced research in collaboration with local doctors.

Public Release of PRENEC Results in Medical Journals

The colorectal cancer screening system of PRENEC has achieved excellent results, detecting many cancer cases. Expert knowledge and technique from TMDU have significantly improved the completion rate of the screening procedures and the detection rate of colorectal cancer. Furthermore, most of the cancers detected by PRENEC were early intramucosal cancers without risk of metastasis, which were treated successfully by endoscopy. These results have been reported in various medical journals by past doctors. More reports related to PRENEC results are in progress for future publication.

In August 2019, Dr. Okada published “Colorectal cancer risk factors in asymptomatic Chilean population a survey of international collaboration between Japan and Chile” in the European Jour-

nal of Cancer Prevention. These results suggest that intensive screening of high-risk populations can help improve the detection of colorectal cancer, while higher consumption of cereals or fibers can be effective in preventing its onset.

Expanding TMDU-PRENEC Network in Latin America

PRENEC and supporting activities by TMDU are now recognized as essential aspects of Chilean healthcare. Increasing numbers of participants have enrolled in PRENEC in seven major cities: Santiago, Valparaiso, Punta Arenas, Coquimbo, Osorno, Valdivia and Concepcion (Fig. 4). While the TMDU-PRENEC network is still expanding throughout the country, additional cities and facilities have concluded agreements to join PRENEC in the near future (Fig. 5).

TMDU has also promoted 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 2016 and 2017, the same training course was held in Santiago for medical professionals from Bolivia, Paraguay and Peru. In Paraguay, the PRENEC pilot study has finished and preparation for PRENEC's full-scale launch is underway.



⑤ Promoting the PRENEC project with a giant colon model

Activities for Strengthening Relationships between TMDU and Thai Universities

CU-TMDU Research and Education Collaboration Center, **Thailand**

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

1. Student Exchange Programs between TMDU and Thai Universities

As of May 1, 2019, 40 Thai students are studying in Tokyo Medical and Dental University (TMDU) regular courses. Of the 40 students, two are in the undergraduate course of Faculty of Medicine and 38 belong to the postgraduate course in the Graduate School of Medical and Dental Sciences.

Just half of these students are supported by Japanese government while the others are supported by the Thai government or private expense. After graduation from TMDU, most of the students go back to their country where they promote the health of Thai people through contributions in the research, education and healthcare field.

In addition, TMDU and Thai universities conducted various student exchange programs from January to December in 2019. A total of 42 Thai students came to TMDU (inbound) and 35 TMDU students visited Thailand (outbound) for short-term exchange programs or research projects. Table 1 shows the number of students from each affiliation.

Table 1 Number of students at each affiliation of TMDU in 2019

TMDU	Regular students from Thailand	Short-term exchange students	
		Inbound	Outbound
Faculty of Medicine	2	10	18
Faculty of Dentistry	0	8	9
Graduate School of Medical and Dental Sciences	38	8	7
Institute of Biomaterials and Bioengineering	0	16	1
Total	40	42	35

1 Signing ceremony of JD program with MU



2. Medical collaboration with Mahidol University

Over the past few years, TMDU and its long-time partner Faculty of Medicine Siriraj Hospital, Mahidol University (MU), have held a series of discussions on launching a new joint degree doctoral program in Medical Sciences. As a result of tireless efforts by both universities, the Joint Degree Doctoral Program in Medical Sciences between TMDU and MU was successfully approved in both Japan and Thailand, by MEXT (Ministry of Education, Culture, Sports, Science and Technology, Japan) in June, and also by the MU Council in July 2019.

On August 7th, TMDU President Yasuyuki Yoshizawa visited MU and concluded the academic cooperation agreement with Acting President Prof. Banchong Mahaisavariya, Prof. Patcharee Lertrit, Dean of Faculty of Graduate Studies, and Prof. Dr. Prasit Watanapa, Dean of Faculty of Medicine Siriraj Hospital.

Both Japan and Thailand have similar medical issues stemming from their super-aging societies and the globalization of medical care, and so both universities expect this program to contribute significantly to solving such issues in the future. Further, this four-year doctoral program is expected to be a part of our ongoing effort “To train medical professionals with a rich international perspective” and strengthen our international competitiveness while at the same time contributing to the nurture of medical professionals throughout the world.

This doctoral program is designed to foster advanced medical personnel involved in the treatment of diseases in a super-aging society, especially multidisciplinary treatment such as cancer treatment. The most distinctive feature of the program is the practical education surgeons can receive due to the advanced research skills and knowledge to train cancer treatment specialists



available at TMDU, and the abundant clinical research results based on the large number of cases at MU.

Surgeons who have completed this program are expected to work internationally to resolve common issues found throughout Japan and the ASEAN region. Recruiting will begin at both universities from the fall in 2019, and the first students will be enrolled in April 2020.

3. Dental collaboration with Chulalongkorn University

During the four-year implementation of the JD program, the success achieved by TMDU and Chulalongkorn University (CU) has exceeded expectations. This is the first successful case of a JD program in Dentistry in Japan, and provides an excellent role model for other institutions.

Students of the inaugural class, matriculated in 2016, are approaching the final stage of dissertation. Therefore, the methods of guidance on publication and dissertation defense will be a major focus in the coming year.

For the recruitment of future PhD candidates, TMDU and CU hosted booths to introduce the program at the IADR-APR conference held on November 28-30, 2019 in Brisbane, Australia, where one of the JDP students had a poster presentation.

4. Thai Ministry of Public Health team visited TMDU

On August 27-28, 2019, 15 Thai dental public health officers visited TMDU, including Dr. Somkuan Hanpatchaiyakul, Senior Advisor to the Health Technical Office, Ministry of Public Health, Thailand. The purpose of their visit was to learn about elderly dental care and dental hygienists' roles in Japan.

The visitors listened to lectures on the education system and the roles of dental hygienists at School of Oral Health Care Sciences and partici-



pated in the training program in the dental hospital and skills laboratory room at TMDU. They also visited the Tokyo Metropolitan Institute of Gerontology to observe health activities for the community elderly. Moreover, they participated and presented in the International Seminar "Public Health Dentistry between Japan and Thailand," which was held at TMDU.

This was an invaluable opportunity to exchange knowledge, techniques and strategy of management of the elderly's health care for both Japan and Thai dentists. We believe their visit will contribute to implement a national policy on elderly dental care programs in Thailand.

5. Research Day program

On February 13, 2019, three TMDU postgraduate students visited CU and participated in the Research Day program and presented their research topics orally in front of a packed audience. This is a special program for dental students to present their research activities as part of a competition. Since 2013, TMDU has sent students to participate in this program. Ms. Akane Wada and Mr. Takahiko Yamada won the first and third prize and received an award from Dr. Suchit Poolthong (Dean, Faculty of dentistry CU). Assoc. Prof. Shigenori Nagai (Dept. of Molecular Immunology) also participated in the CU Research Day and contributed as a special lecturer, evaluator of the oral session and chair of the poster session.

6. Appointment of visiting scholars in Thailand

TMDU appointed the following four Thai doctors and dentists as visiting scholars in 2019.

Dr. Thiravud Khuaprema: Visiting Professor

Dr. Prasit Watanapa: Visiting Professor

Dr. Atiphan Pimkhaokham: Visiting Associate Professor

Dr. Issareeya Ekprachayakoon: Visiting Assistant Professor



- ② Dental students in JD program and advisers from TMDU and CU
- ③ Visiting members of Thai Dental Public Health
- ④ TMDU participants in CU Research Day

- ⑤ Visiting Professor Thiravud Khuaprema (left) and President Yoshizawa (right)



Research Partnership between TMDU and Noguchi Memorial Institute for Medical Research, University of Ghana

Ghana-Tokyo Medical and Dental University Research Collaboration Center

Shiroh Iwanaga
PhD

Professor, Environmental
Parasitology, TMDU
Leader of TMDU-AMED/JGRID
Project in Ghana

Overview of the TMDU-AMED/J-GRID Project

The Japanese Initiative for Global Research Network on Infectious Diseases (J-GRID) program has been carried out between TMDU and the Noguchi Memorial Institute for Medical Research (NMIMR) since 2008. The first and second terms of the J-GRID program, which were supported by the Japanese Ministry of Education, Culture, Sports and Technology (MEXT), were completed at the end of Japanese FY2014. The third term of the project started in FY2015 under the support of the Japan Agency for Medical Research and Development (AMED). Dr. Takaya Hayashi, project lecturer at TMDU, joined the project from FY2017 and started to work with research fellows in NMIMR. Dr. Yen Hai Doan, project lecturer at TMDU, also joined the project from FY2019.

Currently, ten Japanese and twelve Ghanaian researchers participate in the project, cooperating on multiple research projects. The main focus of the AMED/J-GRID project is to promote innovative research collaboration with researcher counterparts for collecting information about pathogens in endemic areas, evaluating vaccine efficacy, and identifying the drug resistance of

pathogens. Under this concept, the TMDU AMED/J-GRID project conducts the following three research projects: (1) the surveillance and isolation of dengue viruses prevalent in Ghana; (2) the genetic analysis of rotavirus, which is the causative agent of acute diarrhea; and (3) the identification of carbapenem-resistant bacteria. To conduct research more efficiently, TMDU invited Kitasato University Professor Kazuhiko Katayama, who is an expert in rota virus research to build an “all-Japan collaboration team.”

In 2019, we successfully determined the genome sequence of the dengue type 2 virus from Ghanaian patients. In addition, we collected the *Aedes* mosquitoes, which are the vector of dengue virus, and have succeeded in maintaining mosquito colonies in Japan. The artificial feeding experiments using those mosquito colonies and dengue virus isolated from South-East Asia showed that African *Aedes* mosquitoes exhibited resistance against virus infection compared to Asian *Aedes* mosquitos. This result suggested that that strain or subspecies of mosquito vector probably plays an important role in outbreak of dengue fever in West Africa. Our genetic analysis of the rota virus showed that the vaccine strain disappeared from the field sites after the introduction of the vaccine, but reemerged in 2018. Global surveillance in 2019 showed that similar reemergence of vaccine strains were found in other geographic areas, such as India and Indonesia. The reemergence of vaccine strains of the rota virus after the introduction of the vaccine is a global trend of rotavirus genotypes. The carbapenem-resistant bacteria was first found in Ghana in 2017, and then in FY 2018 the NDM-1 gene was identified as the drug resistant gene. In FY2019, we continued to survey novel drug resistance from specimens obtained from two field sites. A new research building named Noguchi Advanced Research Laboratories began operation. This building has several P3 laboratories and new equipment for infec-

1 Noguchi Memorial Institute for Medical Research (NMIMR)





tious disease research. In FY2019, researchers and laboratory staffs moved to this new facility.

Important Collaboration between TMDU and NMIMR, University of Ghana, in the Development of Human Resources

Collaboration between TMDU and NMIMR plays an important role in the development of human resources in Japan and Ghana. TMDU runs an educational program for medical students who want to gain experience at medical institutions overseas. Under this program, undergraduate students stay to carry out their research projects for a few months at NMIMR. For example, three students visited NMIMR in 2019. The visiting students worked with young Ghanaian scientists in the laboratory and field. One student belonged to the Department of Virology and the other two belonged to the Department of Parasitology. They conducted their own research at NMIMR. TMDU accepts young, talented researchers as Ph.D. students under the scholarship program supported by MEXT. In 2019, three Ph.D. students from NMIMR entered the doctoral course at TMDU. They joined the Parasitology Department of Medicine at TMDU and started a “new research life.” They are expected to bridge TMDU and NMIMR moving forward, contributing to collaboration between the two institutions.

TMDU received the donation from T.E.N. Ghana MV25

T.E.N. Ghana MV25 (MV25) was established based on investment by MODEC Inc., Mitsui & Co., Ltd., Mitsui O.S.K. Lines, Ltd., and Marubeni Corporation. MV25 carries out a charter business for FPSO and has produced crude oil and natural gas since 2016. MV25 provided a monetary donation of US\$250,000 to the TMDU



AMED/J-GRID Project. This donation not only contributed to the effective progress of the research project, but also to bridging research between Japan and Ghana. This donation will strengthen the relationship between our two countries and contribute to advances in medical research in Ghana.

40th Anniversary Symposium of NMIMR

NMIMR was established in 1979, and now in 2019 it is celebrating its 40th anniversary, on which behalf an international symposium was held on 28th-29th of November. In addition to many scientists, Professor Kwabena Frimpong Boateng, the Minister of Environment, Science, Technology and Innovation; Professor Ebenezer Oduto Owusu, the vice-chancellor of University of Ghana; and Mr. Tsutomu Himeno, Japanese ambassador to the Republic of Ghana, were invited as guests.

In the symposium, Prof. George E. Armah, Dr. Anthony Ablordey, Dr. Samuel Dadzi who are TMDU AMED/J-GRID members, presented recent research results about diarrhea caused by rota virus infection, pathogenic bacteria, and mosquito vector for dengue virus transmission. On behalf of TMDU, Dr. Hayashi and Dr. Doan offered their support for this anniversary symposium.



② Group photograph of 40th Anniversary Symposium of NMIMR

③ Professor Kwabena Frimpong Boateng (Minister of Environment, Science, Technology and Innovation, Republic of Ghana, Left), Professor Ebenezer Oduro Owusu (Vice-chancellor of University of Ghana, Left-Center), Mr. Tsutomu Himeno (Japanese Ambassador of Ghana, Right-Center), Professor Abraham Kwabena Anang (Director of NMIMR).

④ TMDU staff members in 40th Anniversary Symposium.

Activity Report of 2019

The Institute of Global Affairs (IGA) was established in 2016, and will be in its fifth year in 2020. The number of international students is 372, which represents a significant increase since 2016. As a top global university, it is our priority to enhance not only the quality of education for international students, but also the quality of their overall experience at TMDU and in Japan.

The institute held the International Summer Program, which was attended by 23 students from our partner universities in the USA, Thailand, and Taiwan. In addition, we also held a joint symposium with our three partner universities in Taiwan, with whom we have developed student exchange initiatives over many years. Further, we hosted a signing ceremony for the upcoming launch of the Joint Degree Program between TMDU and Mahidol University in April 2020. It has been a year of exceptional efforts to promote international exchange and strengthen relationships between TMDU and its partner universities.

Tetsuya Taga

Professor, Executive Senior Vice
President of Global Affairs
Director, Institute of Global Affairs,
TMDU

David Cannell

Associate Professor,
Institute of Global Affairs,
TMDU

Kazuhiro Yonemoto

Assistant Professor,
Institute of Global Affairs,
TMDU

Joint Symposium with Three Taiwan Universities

TMDU has held four joint symposiums with Taipei Medical University on research topics since 2013 as a means to deepen the universities' mutual communication. To further develop academic exchange with other partner universities in Taiwan, two additional universities National Taiwan University and National Defense Medical Center were invited to participate in this joint symposium, which now comprises four universities. The first commemorative joint symposium was held this year on Saturday October 5th at Taipei Medical University.

The theme of this year's joint symposium was "Medical Innovation", and research from each university was presented.

Along with the symposium, a signing ceremony was held for the Inter-University Agreement on Academic Exchange between TMDU and Taipei Medical University. The Chairman Wen-chang CHANG and President Chien-Huang LIN of Taipei Medical University signed the agreement with President Yoshizawa of TMDU.



1

① Signing ceremony for Inter-University Agreement on Academic Exchange between TMDU and Taipei Medical University.

② Joint Symposium with Three Taiwan Universities



2

Dean Pisano, Jacobs School of Engineering, University of California San Diego, visited TMDU

Professor Albert P. Pisano, Dean of Jacobs School of Engineering, University of California San Diego (UCSD), visited TMDU on August 8, 2019. UCSD is one of our overseas affiliated universities, which made it a meaningful opportunity to have discussions concerning increasing collaboration between UCSD and TMDU in the near future, such as in the fields of biomedical engineering and data science.



③ Participants in joint meetings with Dean Pisano, UCSD

Visit to TMDU by University of Ghana Vice President Owusu

On December 10th 2019, Vice President Owusu and several professors from University of Ghana visited TMDU and exchanged views with TMDU



④ Participants in joint meetings with University of Ghana

officials on future international exchange between the two universities and paid a visit to TMDU School of Dentistry. Discussion between the two parties centered on ways to further promote international exchange, with particular focus on TMDU admittance of international students from Ghana. Going forward, TMDU is committed to active, ongoing research collaboration and student exchange with University of Ghana.

Reinforcing international students' disaster preparedness

Many immense natural disasters occurred in various parts of Japan in 2018 and in 2019. In light of the need to learn about natural disasters in Japan, the university provided information during international student orientation on how to prepare for natural disasters. In addition, the Japanese language course incorporated a visit to the Life Safety Learning Center in Ikebukuro, a facility where visitors can learn about and practice how to handle emergency situations, such as fires and earthquakes. At the same time, students conducted fieldwork inside and outside the campus to become familiar with the signs, equipment, and facilities related to natural disasters and share the findings by creating evacuation maps and giving presentations. These activities helped students to visualize natural disaster scenarios, enabling them to situate such events in their surrounding environments, and further deepened their understanding of disaster preparedness information generally. One student noted after the activities: "Now, I know the location of the closest disaster prevention facility and evacuation site to my place and school as well as the routes there." The lived experiences obtained through these activities are expected to encourage learners to explore their surroundings and lead to more appropriate actions in case of natural disasters.

Advancing TMDU's Global Accessibility

AGAT is the Advancement of Global Accessibility Team charged by the Global Affairs Advancement Steering Committee to help globalize the university. AGAT's vision is to assist in creating an environment that is global in reach and has a rich international quality that attracts diverse, motivated individuals to the university community by broadly increasing the accessibility of university resources and facilities to all international



students, foreign faculty, staff, patients and visitors across university campuses and programs.

TMDU has overseas satellite offices at partner institutions in several countries, namely, Thailand, Chile, and Ghana. These offices are critical to TMDU's global footprint, facilitating global outreach and international exchange with strategic institutions overseas. Important collaborative developments taking place at these partner institutions overseas are communicated through newsletters intended to publicize such research and clinical breakthroughs among the TMDU and partner communities. The newsletters are translated and edited by AGAT and published through the Institute of Global Affairs (IGA) in multiple languages, including Japanese, English, Thai, and Spanish.

Organizational changes occur in TMDU academic departments and administrative units as the university continually evolves and adapts over time. As a result, new official names are proposed by departments and units throughout the university and submitted to a thorough vetting process that includes AGAT. AGAT is charged with reviewing all official English names in the university to ensure that new names and titles not only comport with accepted standards of English usage but also have professional currency around the world.

AGAT has launched an initiative to create a bilingual zone across the campus in which international students, foreign faculty and staff, hospital patients, and university visitors are able to easily access facilities and resources on campus.

One focus so far is the effort to bilingualize university documents in the medical and dental hospitals and university documents frequently used by international students, foreign faculty and staff. Another is to identify high-priority documents and forms for International students who often face a language barrier when they are asked to read or fill out forms available only in Japanese. Elsewhere, AGAT team members are integrally involved in the TMDU tutor system, which is designed to assist international students in their first year at the university.



- ⑤ Students learned how to use a fire extinguisher
- ⑥ Students checked facilities along the evacuation route during the fieldwork
- ⑦ Students created an evacuation map and shared the information

TMDU graduates are active at the forefront of their fields in countries worldwide.

Studying abroad helped them deepen their knowledge as healthcare professionals, benefiting both their field and patients around the globe.

Letters from TMDU Overseas Alumni

Letter 01

From TMDU to Becoming a Public Health Leader A journey dedicated to improving health of the most vulnerable population



Shafiqullah Hemat

Director, Department of Health Promotion,
Ministry of Public Health, Afghanistan



PURSUING A Ph.D program in a competitive and diverse academic environment was amongst my top career priorities. Tokyo Medical and Dental University (TMDU) provided that opportunity to me when I was enrolled in the Ph.D. program in the Health Promotion Department (Division of International Health Development) in 2005. I was excited to become part of a society where hard work, punctuality, respect and kindness were the norm. The diverse student body coming from different cultural backgrounds made the learning environment more enriching, letting me observe and analyze global challenges from various perspectives. As a result, I have grown to become a global citizen who enjoys and appreciates diversity, mutual respect and an inclusive society.

The academic journey at TMDU was full of surprises and fond memories. As a stranger, during the first few days, I had a hard time getting accustomed to my new life in the high-tech and crowded city of Tokyo. But I was lucky to have very supportive professors and peers who

encouraged me throughout this enriching journey. A very special memory that I will always cherish was when my research paper was accepted within 26 days by a prestigious academic journal, something that would normally have taken months. Another memory that I have kept is when Professor Keiko Nakamura, my supervisor, presented me with flowers upon the successful defense of my Ph.D. thesis.

After successful completion of my Ph.D. program, I returned to my home country of Afghanistan, aiming to transfer the knowledge and research skills to improve the deteriorated health system in our country. I joined the Ministry of Public Health of Afghanistan as the Director of Health Promotion where I have continuously strived to ensure that the Afghan people live healthier and more fulfilling lives. Since joining this office, I have been an integral part of many new developments in our health sector. In these years, I have had tremendous achievements such as:

- Establishing a well functioning and



Dr. Hemat Director of Health Promotion,
Ministry of Public Health

results-oriented national health promotion team;

- Forming a community mobilization network of more than 150 people;
- Creating a toll free (166) health call center;
- Developing a national school health curriculum for grades 4 to 12;
- Initiating a water, sanitation and hygiene program in health care facilities;
- Initiating and implementing community mobilization programs through which hundreds of communities are certified as healthy communities for several lifesaving indicators;
- Developing a Mother and Child Health Handbook (MCH) which resulted in increasing health knowledge and utilization of health services at the communities ; and
- Developing several policy documents.

Annually I raise and manage a budget of around two million USD for health promotion interventions throughout Afghanistan. As a researcher, I have conducted various published and unpublished researches and presented abstracts

at various international conferences across the globe. Additionally, I am serving as a member of the National Institutional Review Board (IRB) at Afghanistan's Ministry of Public Health. In addition to my position at the Ministry of

Public Health, I am working with the Ministry of Higher Education in the capacity of an associate professor at Nangarhar Medical Faculty, a prestigious university in the country.

I would advise TMDU students to feel

proud of the opportunity to study at such a well-known university. It helps them to grow personally and professionally and stress the virtue of compassion which would allow them to contribute to their country's health systems strengthening.

Letter 02

How TMDU shaped my academic career



Patricia Nobrega Rodrigues Pereira
Clinical Associate Professor, Associate Dean for Academic Affairs & Program Director of Operative and Esthetic Dentistry, University of Florida



Patricia Pereira

AS A DENTAL student in Brazil in 1991, I became intrigued by the research articles on dentin bonding authored by Dr. Fusayama's team at TMDU. This curiosity led me to attend major dental meetings and inquire about dentin bonding and why it was not a common practice in western countries. Lacking good explanations, I decided to pursue advanced education at TMDU. I was awarded a Monbusho Scholarship, and two months after graduation in February 1993, I moved to Japan. I lived in Osaka for 6 months to study Japanese language and culture at Osaka University of Foreign Studies, and then moved to Tokyo to study at TMDU. Dr. Tagami had recently been appointed Professor and Chair of the Department of Conservative Dentistry 1, currently the Department of Cariology and Operative Dentistry.

At TMDU, I joined the Ph.D. program and was honored to be mentored by brilliant world-renowned professors of the department. I knew that the future of my career would depend on my academic achievements and experiences at TMDU. I tried my best to become a well-rounded academician, doing patient care, helping

in preclinical courses, and collaborating in various research projects. I made many lifelong friends, with whom I still remain in close contact. I defended my Ph.D. thesis and was honored to receive the IADR Toshio Nakao Fellowship in 1998. I then married and applied to the Japan Society for Promotion of Science (JSPS) for a two-year postdoctoral fellowship, and was able to continue my research collaboration at TMDU.

After 7 years studying in Japan, it was time to find a job. I was hired by the University of North Carolina at Chapel Hill as an assistant professor and remained on the faculty for six years. At UNC-Chapel Hill, I was able to contribute with clinical and preclinical teaching and patient care while also conducting research as a principal investigator for several industry and government grants. I also hosted several international postgraduate fellows in my research laboratory, sharing and multiplying the knowledge acquired at TMDU. During my time in North Carolina, my two children were born within a 3-year period. Suddenly, despite being successful professionally, I longed for my extended family in our daily lives. My husband and I decided to move back to

Brazil to raise our children close to our extended family and have them develop family roots in Brazil. While living in Brazil, I joined the faculty of the University of Brasilia, opened a private practice and a CE institute that has trained over 1500 dentists in esthetic dentistry, while also becoming a certified prosthodontist.

We spent nine busy and happy years in Brazil, but my boys grew and wanted to pursue college education in the United States. It was a tough decision but it was time to move back to the United States. In 2015, my husband and I joined the University of Florida College of Dentistry (UFCD) as clinical associate professors. Since joining UFCD, I have been involved in predoctoral and postdoctoral teaching. I developed and started a 3-year master's and certificate program in operative and esthetic dentistry, with the first class graduating in June 2020. Most recently, I also became the Associate Dean for Academic Affairs. With this role, my duties became primarily administrative, but I remain an educator and clinical practitioner. Before making this decision, I reflected and understood that, like my colleagues in Japan, this is a natural path to take as we mature in academia. I attribute the path of my academic career to my mentors, training, and life experiences at TMDU and in Japan. Hard work, ethics, teamwork, honesty, and emotional intelligence, regardless of the order, are the ingredients for a successful academic pathway.



Department faculty and advanced education students

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

Fruitful Experience at TMDU



Rueda Saleh Alojaimy
2nd year graduate student
Department of Global Health Entrepreneurship
(from Saudi Arabia)



IN VIEW OF the challenges that lay ahead, starting with the Japanese language and ending with a different culture, it was not an easy decision for me to choose Japan as a country in which to study. I was eventually drawn into this Japanese adventure. It has been a journey of change because the struggles I experienced took me out of my comfort zone. I thought many times of giving up studying abroad and doing something else, but one day I came across an inspiring quote, “There are hidden blessings in every struggle.” This insight calmed me for a while. I have recently been discovering these hidden blessings, one after another, as I

look back on my experience.

My story began in 2016 when I received a Saudi scholarship to study in Japan. As a scholarship student, I had to study Japanese for at least one to two years as a requirement of my scholarship. While studying Japanese, I sought to identify the universities ranked highest internationally that addressed my field of interest. TMDU came out at the top of the list and I decided to try to enter this excellent university. In early 2018, the TMDU chapter of my life started. I passed the entrance exam and was accepted by Prof. Nakamura’s lab in the Global Health Entrepreneurship Department.

As a master’s student at TMDU I have had valuable opportunities to study various subjects and new topics that have enabled me to enrich my knowledge of international health and related global issues. Moreover, I have been able to explore Japanese campus life from my perspective as an international student. Prof. Nakamura offered me the precious opportunity to participate in the clinical rounds of the Infection Pre-



Rueda’s picture in the poster presentation at Kochi conference 2019

vention and Control Department at TMDU Hospital. This clinical experience allowed me to distinguish the differences between Saudi and Japanese hospital environments and enabled me to deepen my understanding of the role of the Infection Prevention and Control Department while helping me with my research thesis. TMDU also helped me overcome my anxiety about speaking in public by giving me a chance to make a poster presentation at the 2019 conference of the Japanese Society of Public Health.

At TMDU, where one encounters people from diverse backgrounds whose beliefs differ markedly, I am learning how to manage these differences with others and get everyone on the same page. I am also learning how to broaden my future career path instead of narrowing it by restricting myself to work in hospitals. TMDU opened new doors and invaluable opportunities for me to participate in the activities of Saudi organizations in Tokyo as a student. I



Infection control team members in the clinical round at TMDU hospital

entered TMDU with a simple dream, but day by day my goal expands, becoming clearer and more significant.

TMDU was the key to changing my mentality and personality in positive ways. As TMDU became my second home, so the members of my lab be-

came my second family. Many thanks to my second home and my second family! I am deeply grateful to TMDU and Prof. Nakamura for making this journey so fruitful in such a short period of time. In my professional and personal life, I will reflect on all the les-

sons I have learned. May all my fellow students whose chapters at TMDU are approaching a conclusion experience joy and accomplish much. And may those students who are about to commence their chapters at TMDU get off to a good start.

Report 02

Memoir of TMDU: A Step Worth Taking



Jason Hou

3rd year graduate student
Department of Oral Implantology and Regenerative
Dental Medicine(from Canada)



I SAT AT my desk with research articles scattered before me. Highlighter markings and handwritten notes covered each page, hinting at my hard work and commitment. Those articles weren't mine, but it made a nice headrest. I laid relaxed as I began losing myself in reverie.

"Yes. I'd love to come along!" A graduation party was being hosted that evening for the seniors. It was the perfect opportunity for me to become familiar with my colleagues on my first day in the Department of Oral Implantology and Regenerative Dental Medicine. We gathered at a rental near Akihabara. It was a long room with three tables aligned and the kitchen at the entrance. A unique but familiar aroma caught my attention as I entered. Baked dough with a pleasant smell of cheese, hints of tomato followed by sweetness. It was Teriyaki Chicken Pizza! I happily grabbed a few slices and enjoyed the meal on the side since I couldn't participate much. Communicating was a disaster since my Japanese language

skills were so poor. Drinking with my low alcohol tolerance would be disastrous so I had to perfectly calculate my intake. As time passed, empty cans of beer littered the room and language became universal. From a sober person's perspective, we would appear as fools speaking gibberish, but to us everything made perfect sense. That night ended better than I had expected. I got back home knowing two things: 1) I wouldn't regret coming to Tokyo and 2) I messed up my calculation.

A few months later, I attended a Japanese course offered to international students. I joined without hesitation with a goal in mind: I had to get to JLPT N6! Imamura sensei, our Japanese teacher, was extremely interactive and had a great sense of humor that made learning the language enjoyable. Insights into Japanese traditions, culture and tourist sights made learning more practical for both working and touring.

"冬休みはどうしますか" asked sensei. One by one, students answered in Japanese their plans for the upcoming winter vacation. Winter Illuminations, stunning and bright LED illuminations that light up every part of Tokyo was my planned destination. It was a spectacular view that exceeded my expectations. Never before had I seen such a beautiful and well-organized public display of lights. It was an experience that made me think of Tokyo as the top winter



A selfie with TMDU at Yushima Gate.
Say Cheese!

paradise.

Looking around my surroundings, I realized my life here was all thanks to my best friend who had introduced me to TMDU. Japan, a country of innovation with its focus on science and technology, was the ideal place for me to utilize advanced technology as an aspiring student of the therapeutic benefits of nanoparticles in implantology. My research on nanoparticle-coated implants to prevent the complication of peri-implantitis was made possible by my supervisors. I want to express my heartfelt gratitude to Prof. Kasugai and Prof. Tamura.

Every moment spent working together was a step toward success, and knowing that I had their support to the very end encouraged me to reach higher.

Finally, studying a doctoral program at TMDU influenced my personal growth. Strengthening my skills in decision-making and problem-solving, which I believe are the foundations for becoming an outstanding practitioner, facilitated my professional advancement as a dentist. Furthermore, TMDU has widened my knowledge in the field of dentistry and implantology, which I believe will potentially open unforeseen subsequent opportunities. TMDU, the place that cultivates professionals with knowledge and humanity, was the springboard that I will never forget.



House party: the end of a Japanese course
and the beginning of a new semester



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

The Most Valuable Six Months of My Life



Tetsuji Furukawa
4th year student, School of Medicine
Project Semester in the U.K.



DURING PROJECT SEMESTER, I was given the opportunity to do research in Imperial College London (ICL). I chose the laboratory in the Department of Surgery and Cancer at St. Mary's Hospital. This hospital is famous for Alexander Fleming who discovered the world's first antibiotic substance penicillin, and the professor of my laboratory, George Hanna, is a well-known authority on upper gastroenterology. I was highly honored to be a member of his research group at one of the best hospitals in the world.

What I first surprised me in the laboratory was the variety of nationalities,

from countries such as Italy, China, Brazil, Greece, Cyprus and Taiwan—so very different from laboratories in Japan which feature a few nationalities at most. Thanks to this diversity, we were able to share different opinions about research and discuss a variety of issues on the project every day.

I was so happy that I could conduct research with the awesome people at this laboratory. They were so kind to me, giving me constructive opinions and enthusiastic encouragement when my experiments didn't go well. Sometimes I got stressed out but I was able to achieve my projects thanks to the



In front of Kensington Palace

support of my daily supervisor and other members of the laboratory. It was one of the greatest experiences in my life.

One of the most impressive experiences in London was to observe a surgery performed. I was excited since I had never seen a surgery before even in Japan. The surgeon performed operations every week and I was able to observe his gastric surgery. He kindly gave anatomical explanations while performing surgery to both me and other ICL medical students. Furthermore, he told us that he learned his



With my lab members

With TMDU students (2019)

method of surgery when he was in Japan. He also said that he admired Japanese surgeons. At that moment, I felt proud of Japan and pleased to hear that. I would like to express my gratitude to him for showing us his great skills.

Throughout the research program, I

was always thinking how lucky I was to be able to do research in that laboratory. To be honest, I was anxious before going to London as it was my first time to visit Europe. However, TMDU has had the exchange program with ICL for more than ten years, and the accompanying support system helped me to live

life comfortably in London. I was able to improve my English skills through discussions with my supervisor and writing up the final report. I would like to thank all the people who were involved in this program and I hope this program will continue to benefit future students.

Report 02

Six Months on the Other Side of the World



Yoshihiro Sawaguchi
4th year student, School of Medicine
Project Semester in Chile



SEVENTEEN THOUSAND KILOMETERS and over 20 hours of flight. That is how far Chile is from Japan, where I spent six months for my Project Semester.

The University of Chile is a public university founded in 1842. It is located in the capital of Chile, Santiago, and has lead Latin America in various fields, from science technology to art. I had the opportunity to conduct research under the guidance of Dr. Miguel O’Ryan in one of the laboratories in the Program of Mycology and Microbiology.

I undertook two research projects, one about norovirus and the other about astrovirus. These two viruses are the leading causes of gastroenteritis, which is frequent and often fatal for infants. The aim of the research was to describe the molecular epidemiology of astrovirus in a suburb of Santiago, Colina, and to confirm the presence of norovirus recombinant (GII.P16/GII.1) for the first time in Latin America. As I had no

background in studying these viruses, I spent the first month studying by reading articles and presenting what I learned to the professor. The research taught me the methodology of epidemiological studies and how to perform the genotyping of the viruses.

The research itself went relatively smoothly and I was able to obtain data without much difficulty. However, I struggled with communication since in Chile the people speak Spanish. Although my professor and some other researchers were fluent in English, most of the people who I worked with could not speak English very well.

As a result, I had no choice but to try to communicate in Spanish with them. As the saying goes, “When in Rome, do as the Romans do.” I tried hard every day and after much effort I was able to discuss everything about my research in Spanish. It was definitely one of the most challenging periods of my life, but I feel confident and proud of



With another international student from Italy

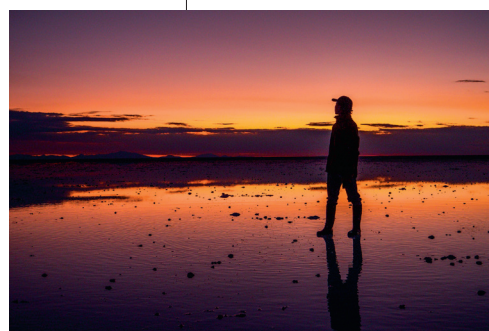
what I was able to achieve during my stay there.

At the same time, I was astonished by the language skills of the other international students I interacted with at the University of Chile. As I talked with them, I found out that the majority of the students knew three or more languages. They all could speak English in addition to their mother language, and were learning a second or third foreign language. This was something I doubt I would have experienced had I chosen to do my research in an English-speaking country.

One of the most impressive experiences I had besides doing my research was when I participated in a gynecology class. While the class was in session, unexpectedly a majority of students suddenly left the class. I asked my friend why they left the class and he told me that it was a form of protest



With the other members of my laboratory



At Uyuni Salt Lake

against the professor who committed sexual harassment at the hospital the year prior. I was surprised by the way the Chilean students protested the incident, how they thought about such

things, and the cultural differences between Chile and Japan.

Throughout these six months, I learned that it is not enough just to know English. I also learned much about how a

developing country struggles to become a developed country. In the future, I want to utilize both English and Spanish skills for working in California as an emergency doctor.

Report 03

My Experience in Finland



Kyoka Noda

3rd year student, School of Health Care Sciences
Study Program in Finland



IN AUGUST AND September, 2019, I participated in a study program in Finland. I learned so many things through lectures at Seinajoki University of Applied Sciences, visits to facilities, and shadowing in a hospital. I would like to introduce three things that especially impressed me.

First, I learned about lahihoitaja. In the educational curriculum, lahihoitajas learn about nursing and care for handicapped people, elderly people and children, pharmacy, and rehabilitation in the first and second years. In the third year, they choose one of eight study programs, such as children care, care of elderly people, mental health, foot care, and so on. After graduation, they can work at various places, for example, a hospital, kindergarten, or elderly home. The work Lahihoitajas do is very similar to that of registered nurses. I was surprised because I had not expected that they would be able to give so much medical care. Prior to the lecture, I had

thought that their training was wide yet relatively shallow, so now my image of lahihoitaja has changed. I think lahihoitaja is a very flexible occupation.

Second, I was impressed with how effective, efficient, and coordinated is the division of labor in Finland. When I visited a health care clinic, I was surprised that all nurses and physical therapists have their own room, and see patients earlier in the process than do the doctors. It is a good system because patients can receive care early thereby reducing the cost of medicine. Recently in Japan nurses have begun to handle outpatient services, but it is still far from the norm. I think it would be a giant step forward for these services to become more common in Japan as well.

Finally, I admired the effective use of technology in the medical field, especially the Kanta and Kela cards. Kanta is a national archive of health information. Only the individual and medical



Wearing traditional Finnish dress

workers can access the archive information. The Kela card, which is mandatory nationwide, has a security number. For instance, patients can obtain medicine just by showing their Kela card and the card enables doctors to check all previous prescriptions, thereby avoiding unnecessary duplication. It is more reliable than drug notebooks. I think this system not only protects the health of patients but also reduces national medical expenditure.

Additionally, medical equipment is embedded with advanced technology. In the ICU at Seinajoki Central Hospital, lighting adjusts automatically in order to support patients' natural circadian rhythms, thus preventing delirium. I noticed that it was important to take into consideration how to improve hospital design. Furthermore, in ICU and emergency ward, all nurses have smart phones, and alerts from the monitoring devices are automatically directed to the phones so that nurses can respond immediately to unusual signs from patients. All of this smart use of technology was fascinating to me.

I found many similarities and differences between Finland and Japan, which made me interested in seeing nursing within a larger context. Through this study program in Finland, I gained a lot of invaluable experiences. I would like to express my gratitude to all the people who supported this program.



With faculty members and student tutors at Seinajoki University of Applied Sciences

Report 04

My Experience in Thailand



Marino Shibuya

3rd year student, School of Health Care Science
Study Program in Thailand



I PARTICIPATED IN a short-term overseas training program in Chulalongkorn University for 10 days during summer vacation. In this program, I visited King Chulalongkorn Memorial Hospital and National Blood Center and did laboratory work for four days. The laboratory work consisted of transcriptome data mining, cell culture, analysis of hippocampus using confocal immunofluorescence microscope, rat behavioral analysis, and realtime data analysis. I rarely use confocal immunofluorescence microscope so having the opportunity to use it was invaluable for me.

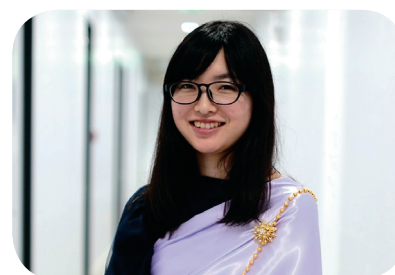
Professors and students at Chulalongkorn University treated us so kindly. They took us to and from the airport. In addition, they took us to Ayutthaya by van on the weekend, and they treated us to a meal almost every day. On the final

day, they held a farewell party and put beautiful traditional costumes on us. Through this program, I made a lot of friends with whom I am still in contact with them on social media.

The most surprising thing was the number of PhD students. It turned out that nine of the twelve students belonging to my laboratory were PhD students. At TMDU, more than half of medical technologist students go to the master's course but rarely continue on to the doctoral program. In addition, it takes students at TMDU about three years to obtain a doctoral degree, while at Chulalongkorn university it takes students more than three years. I suspect they might be acquiring more knowledge and skill for research. One other thing that surprised me is that students at Chulalongkorn University can



Lunch with members of my laboratory



Wearing traditional dress

see a university hospital doctor for free—which no doubt is very helpful for students.

One more thing that impressed me was the sheer number of international students attending Chulalongkorn University. There are a lot of student dormitories for international students around the university. I think the university environment is very accommodating to international students. Also, most students at the university appear to have high English-speaking ability. They can fluently speak not only in basic conversation but also in academic conversation. Whenever I asked a student in my laboratory about their research they gave answers and explanations that were easy to understand. As it is difficult for me to explain my research in English, seeing students close to me in age be able to explain their research in simple-to-understand English really inspired me.

I am confident that this experience will assist me in the future. I appreciate all the support I received from everyone.

Report 05

Invaluable Experience in Boston



Mio Nakayama

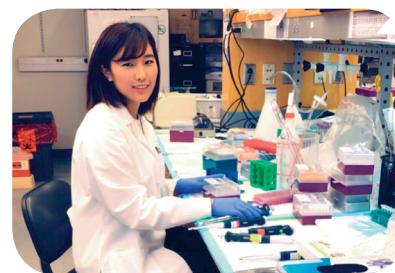
4th year Student, School of Dentistry
Study program in the U.S.



I PARTICIPATED IN basic research activities for three months at Harvard School of Dental Medicine. I visited Dr. Baron's laboratory, which was famous for bone research. During my stay, I was invited to join my supervisor's project (a postdoctoral student from

China) exploring the influence of high circulating Irisin on bone and osteocytes. Irisin is a newly identified myokine produced by skeletal muscles during physical exercise, suggesting an important role in bone remodeling.

At the beginning, I read many papers,



Performing an experiment

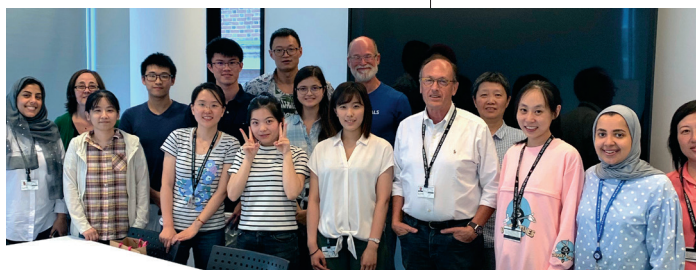
including those published in Japan by Dr. Baron, in order to prepare myself for this project. I discussed what I couldn't understand with my supervisor. While reading papers, I learned an

experiment technique needed for the project. Though I had learned some techniques in Japan, at Harvard I encountered difficulties learning unfamiliar protocols and new, challenging techniques. I found euthanizing mice to be particularly difficult. We had to dissect mice as fast as possible to get fresh samples, but the process was extremely time consuming. After much practice, I was able to do it more quickly. My first month was spent primarily acquiring knowledge and experimental technique.

My main project started the second month there. It was a collaboration with a researcher at DANA-FARBER, a can-

cer institute, where we euthanized mice and obtained bone material. Later we analyzed the mice in our laboratory using the new technique I learned. The Harvard laboratory experience was invaluable because it provided opportunities to learn about career paths from mentors and co-researchers and observe first-hand the environment of a large laboratory on a scope I had never seen in Japan.

It was also my first time to visit the U.S. I was surprised at the rich international environment. In my laboratory, Dr. Baron was from France, and other members came from other countries,



With members of my laboratory

such as Italy, China, Saudi Arabia and more. They all had different backgrounds. I really enjoyed talking with them and learned much about their respective countries. As most of them were doctors or dentists, I could ask them about the medical environment and education for dental students in their country. Outside the laboratory, I had dinner and lunch with them. At the end of my stay, they held a farewell party for me, complete with cake, and kindly gave me a card wishing me the best. I had a great time thanks to them.

I visited sightseeing place in Boston on my holidays. There were many famous places, for example, Museum of Fine Arts and Freedom trail. I usually went out with medical students from Taiwan in my laboratory.

My experience in Boston was invaluable. I am determined to make use of my experience there in my future career as a dentist.

Report 06

My Nine-day Special Experience in Thailand



Yuri Nakahama

3rd year student, School of Oral Health Care Sciences
Study Program in Thailand



IN SEPTEMBER, I visited Mahidol University in Thailand for nine days. I really enjoyed my stay in Thailand and gained a lot of valuable experiences.

In my overseas training, I experienced and learned three major things.

The first is about Thai dental education. At Mahidol University, dentistry students participated in actual treatment in hospitals as practical training. For

example, in the practice of elementary school screening, children were given treatments that are generally performed in dental clinics in Japan, such as removal of tartar, instruction on how to use floss, and application of fluorine. We were also allowed to participate in this training assistance. The children



With Thai students

were very friendly and cute. I was able to interact a little with them by teaching them simple Japanese, like “Arigato”.

Second, I learned about Thai dental treatment. After visiting various facilities, I was surprised to learn that dental treatment in Thailand was at a level not much different from that in Japan, or even better. The most impressive of these facilities was a clinic that provided a large volume of dental aesthetic treatment to foreigners. In this clinic, cleaning, sterilization, and packing of instruments were performed in a single set of treatments. The clean area was managed very strictly. This can only be done because the hospital is very large, which is difficult in a small dental clinic.



At community health center



During the actual treatment

ic in Japan. I imagined that foreigners would be pleased to receive treatment in such a well-managed clinic.

There were plenty of opportunities for me to speak English. Although I'm not particularly good at speaking English, I enjoyed communicating and interacting with Thai students.

Finally, I learned a lot about the cultural aspects of Thailand. I experienced

various activities, sightseeing and shopping. My favorite in particular was Thai food. I really like to try unfamiliar foods, especially exotic dishes sold by street vendors, various delicious sweets, and fruits that are not accessible in Japan.

Overall, through this overseas short-term training program, I was able to have many invaluable experiences. I

gained a lot of knowledge, so I hope that I can use that new knowledge in my future career as a dental hygienist. I would like to thank all those involved in this overseas training, teachers who sent me overseas, the professors and family members who took care of me in Thailand, and students from the School of Dentistry at Mahidol University who kindly made contact with us.

Report 07

My Overseas Stay in Sweden



Kimika Nakajima

3rd year student, School of Oral Health Engineering
Study program in Sweden



I PARTICIPATED IN a dental technology course in Sahlgrenska Academy at Gothenburg University (Sweden) from September 7th to 28th, 2019. While it was a short stay, I really learned a lot.

Firstly, I was surprised to learn that each procedure in the laboratory work class entailed many different aspects. I struggled to even grasp a hand piece engine. Just getting used to Swedish machines and tools was confusing and almost impossible at first. But in the end I figured things out and actually found such strange differences quite interesting. Of course, when I came back to Japan I had to relearn how to use the tools here! Naturally, I learned many things from my conversations with the university students about dental technician matters in Sweden. They were very kind and reached out to me early on. Thanks to them my lab work was fun. I felt like they always cared about me. When I was having difficulty, they

immediately gave me a helping hand. It was very heartening.

Secondly, I was very happy to be able to visit a dental material company and hospitals. I went to Dentsply Sirona Atlantis in Mondal. Ms. Sugata showed me around the company office and factory lab. She is the only Japanese in the office there. I learned much about implants, procedures, materials, machines, and people there. However, the most impressive thing is that there are job opportunities for non-Swedish people such as Japanese. Ms. Sugata working at the company showed me that it was possible to work abroad. It really encouraged me to set my own goals and to think about my future career.

I went to two hospitals in the university. One is Branemark Center, the other is University Hospital.

Branemark Center is named after the researcher, Professor Per Ingvar Branemark, who invented implant technology.



Designing teeth using CAD

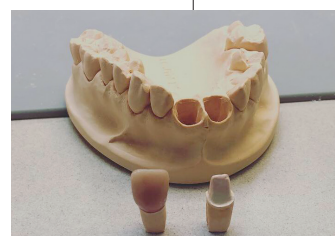
gy. He was a professor of the university. I had the opportunity to observe implants being used for dental treatment. Unlike Japanese insurance which does not cover implants, Swedish national health insurance covers implant treatment fees for any and all teeth. In fact, I heard the more teeth you had treated, the more insurance support you received. I was very impressed with dentistry in Sweden.

Because I was the only Japanese student in residence at Gothenburg, I had to learn overseas survival skills. Wherever I went, I had to do everything myself. This experience forced me to grow up mentally. Also, seeing people working outside Japan is really valuable to think about my future career. I am interested in working abroad, so living in Sweden helped me form connections outside Japan for the future.

I greatly appreciate with this opportunity. It is a lifetime treasure for me.



Farewell dinner with my close friends at the university



Waxing up for emax

Professor
Oral and Maxillofacial Surgery, Oral Health Sciences,
Medical and Dental Sciences, Graduate School of Medical and Dental Sciences

Hiroyuki Harada

The number of oral cancer patients is increasing along with population aging. Over 8,500 new oral cancer patients are diagnosed each year in Japan. In these circumstances, the expertise of Professor Hiroyuki Harada, who specializes in oral cancer surgery, is in great demand.



“100% universally effective treatment may be unattainable. But never cease endeavoring to save every patient”

TMDU DENTAL HOSPITAL'S Clinic for Oral and Maxillofacial Rehabilitation performs various surgical treatments for oral cancer, oral mucosa diseases and other conditions as well as wisdom teeth extraction and mandible rebuilding. Above all, the clinic has an outstanding track record for oral cancer treatment, devoting its expertise to some 240 oral cancer patients each year.

Professor Hiroyuki Harada, who has been combating oral cancer for more than 20 years, is the director of the clinic. Based on his great experience as an oral and maxillofacial surgeon, he has noticed a change in patients lately. “Although definitive data are lacking, my impression is that the mandibles of young people in recent years tend to be underdeveloped. Consequently, more wisdom teeth are growing sideways or backward. And since an underdeveloped mandible restricts how wide a patient can open his or her mouth, it is becoming more difficult to treat wisdom teeth.”

Surgery to retain patients' ability to speak and bite

Professor Harada's fascination with oral surgery began when he was a dental student. “As a young man, I was hungry for knowledge and thus eager to gain experience in various aspects of surgery. But the department had many young medical staff in those days and

one had to wait for one's turn to participate in surgery. So it took several years to become a fully fledged surgeon. I was fortunate in that I had a superb mentor who did his best to give me as many opportunities as possible. Five years after graduating, I conceived an ambition to become an oral cancer specialist.”

As an oral cancer specialist, Professor Harada's guiding principle is to do everything he can to preserve oral functions to the maximum extent possible. “Oral cancer is treated with surgery to remove tumors but this surgery may result in a loss of oral functions. As speaking and eating are important functions associated with the quality of life (QOL), our treatment policy emphasizes preserving these functions. We also emphasize the checking of functions after surgery and pursuing rehabilitation.”

Patient's death prompted personal mission to save as many patients as possible

Only once in his career did Professor Harada consider quitting his job as an oral surgeon. “Early on in my career, I had a male cancer patient who was about 50 years old. His cancer kept recurring and he suffered from multiple cancers. In the end, he passed away despite the treatment. His death weighed on my mind and for a while all I could think about was whether I could have

saved him if I had done this, that or the other. I even thought of leaving the university hospital to become a general practitioner. Though aware 100% universally effective treatment may be unattainable, I resolved that I would never cease endeavoring to save every patient.”

Professor Harada's personal mission continues to inform everything he does. As director of the Clinic for Oral and Maxillofacial Rehabilitation, he is striving to save as many patients as possible. Looking to the future, he has high expectations of the talented young surgeons who will devote themselves to this great work in generations to come. “In the world of oral surgery, the method of teeth extraction and the surgical instruments we use have been essentially unchanged for about 100 years. So many methods for diagnosis and treatment are ripe for improvement. It is my earnest desire that young doctors will have big dreams, acquire knowledge and skills, and change the world by deploying new expertise.”

Hiroyuki Harada

Graduated from Faculty of Dentistry, Hokkaido University in 1991. After working in the Oral and Maxillofacial Surgery Department of Hokkaido University Hospital and the Head and Neck Surgery Department of the Chiba Cancer Center, he joined TMDU Dental Hospital in 2001. Assumed his current position in 2015. Japanese Society of Oral and Maxillofacial Surgeons' Board Certified Specialist/Medical Adviser in Oral and Maxillofacial Surgery, Japanese Society of Oral Oncology Certified Medical Adviser for Oral Cancer, and Japanese Board of Cancer Therapy Certified Cancer Therapist. He is a specialist in oral cancer surgery. He also researches cancer metastasis and invasion mechanisms.

Professor
Ophthalmology and Visual Science, Cognitive and Behavioral Medicine,
Medical and Dental Sciences, Graduate School of Medical and Dental Sciences

Kyoko Ohno-Matsui

Professor Kyoko Ohno-Matsui is a specialist in pathologic myopia, a condition that can result in visual loss. She discusses her personal development as a medical practitioner who deals with huge amounts of images and medical records.



“Never-ending stream of discoveries and surprises:
Checking medical records of 100 patients a week”

TMDU MEDICAL HOSPITAL'S Advanced Clinical Center for Myopia started full-scale operation in November 2019. The center's director, Dr. Kyoko Ohno-Matsui, professor of ophthalmology and visual science, is an expert in the treatment of severe myopia and glasses myopia.

Although myopia can often be corrected by wearing spectacles, this approach is typically ineffective in the case of severe myopia, which often leads to pathologic myopia whose complications include glaucoma and retinal detachment. If symptoms progress, there is a risk of blindness. Pointing out the risks associated with myopia, Professor Ohno-Matsui notes that myopia is ranked fourth in a list of the factors accounting for vision loss in Japan. “With pathologic myopia, extension and/or deformation of the length of the eyeball (ocular axial length) can cause various disorders of the optic nerves and the macula of the retina. Even mild myopia triples the risk of glaucoma. As well as treating eye complications associated with severe myopia, the Advanced Clinical Center for Myopia emphasizes preventive treatment and guidance to mitigate the progress of childhood myopia and mild or intermediate myopia.”

Enchanted by the beauty of the eyes, observation of all the images becomes a fascinating daily task

Working as an ophthalmologist, Professor Ohno-Matsui became enchanted by the beauty of the eye. “Observing the eye fundus, you can directly see the blood vessels. I love watching them. For example, early on in my career, I used to read the medical records of all the patients in alphabetical order and observed all the fundus photographs. This self-imposed task undertaken in the office after completing the day's work was a source of great pleasure to me.”

But there is far more to the eyes than their sheer beauty. Vision is essential for a healthy life. Professor Ohno-Matsui recalls a patient who underwent an eye operation. “While contending with cancer, the patient was afflicted with a fungal infection that resulted in blindness, undermining his motivation to overcome cancer. Following an operation on his eyes, the patient regained his sight. Moved to tears by this extraordinary reversal of his blindness, he regained the will to persevere with the cancer treatment.”

Seeing is believing: put your trust in what you can confirm with your own eyes, not textbooks

Although textbooks and celebrated physicians can be illuminating, Professor Ohno-Matsui always seeks confirmation through her own eyes. She stresses the importance of learning from one's patients and from how they

respond to medical treatment. “I continue to thoroughly check the medical records of every one of my 100 or so outpatients with severe myopia. From medical consultations, I get clues that help me elucidate pathologic conditions. It's a never-ending stream of discoveries and surprises.”

In parallel with clinical treatment, Professor Ohno-Matsui is doing research with the aim of establishing a treatment method for pathologic myopia, a condition resistant to conventional treatment. The techniques being studied include mitigating eyeball deformation by fixing the rear part of the eyeball and affixing cultured cells of the patient to the eyeball. Expectations are rising that early diagnosis and treatment of pathologic myopia is within reach.



As a postdoctoral fellow at Johns Hopkins University

Kyoko Ohno-Matsui

Graduated from the Faculty of Medicine, Yokohama City University in 1987. MD, PhD. Joined the Ophthalmology and Visual Science medical staff at TMDU in 1990. Following a postdoctoral fellowship at Johns Hopkins University, she assumed her current position in 2014. Specializing in myopia, fundus diseases, and macular diseases. Having launched the Japan Myopia Society in 2016, she is preparing guidelines for treatment of myopia, researching pathologic myopia, and pursuing awareness-raising activities. Director of TMDU Medical Hospital's Advanced Clinical Center for Myopia established in May 2019.

The critical function of miR-146b against hematopoietic malignancy

THE NON-CODING RNA molecule miRNA 146a (miR-146a) was originally identified as an NF- κ B-induced miRNA capable of repressing NF- κ B activity. Further, miR-146a-deficient (knockout [KO]) mice showed autoimmunity, such as T-cell-mediated multi-organ inflammation.

A homolog of miR-146a, miRNA 146b has the same seed sequence as that of miR-146a and can also repress TRAF6 and IRAK1 expression. Therefore, miR-146b may also play a critical role in preventing tumor development. It was reported that reduced expression of miR-146b was observed in various types of tumors, such as breast cancer, glioma, gallbladder cancer, and large B-cell lymphoma. In addition, it has been reported that overexpression of miR-146b suppresses malignancy in lymphoma, leukemia, breast cancer, and gliomas. However, the physiological roles of miR-146b and the functional differences between miR-146a and miR-146b in the context of tumorigenesis remain elusive.

In this study, we generated miR-146b-knockout (KO) and miR-146a-KO mice by genome editing and found that both strains developed hematopoietic malignancies such as B-cell lymphoma and acute myeloid leukemia during aging. However, the B-cell lymphomas observed in miR-146a- and miR-146b-KO mice were histologically different in their morphology, and the malignancy rate was lower in miR-146b mice than miR-146a mice. Upon mitogenic stimulation, the expression of miR-146a and miR-146b was increased, but miR-146b expression was lower than that of miR-146a. Using a previously developed screening system for microRNA targets, we observed that miR-146a and miR-146b could target the same mRNAs, including TRAF6, and inhibit subsequent NF- κ B activity. Consistent with these findings, both miR-146a- and miR-146b-KO B cells showed a high proliferative capacity. Taken together, sustained NF- κ B activation in miR-146b KO mice could lead to the development of hematopoietic malignancy



Hiroshi Asahara

MD, Ph.D., Professor
Department of
Systems BioMedicine,
Graduate School of
Medical and
Dental Sciences,
TMDU



Takahiro Mitsumura

MD, Ph.D., Specially
Appointed Assistant
Professor
Department of
Respiratory Medicine,
Graduate School of
Medical and
Dental Sciences,
TMDU

with aging. The results of this miRNA study are expected to contribute to the elucidation of the pathological conditions of hematopoietic cancers and development of new therapy for these diseases.

The article "Ablation of miR-146b in mice causes hematopoietic malignancy" is published in *Blood Advances* at doi: 10.1182/bloodadvances.2018017954.

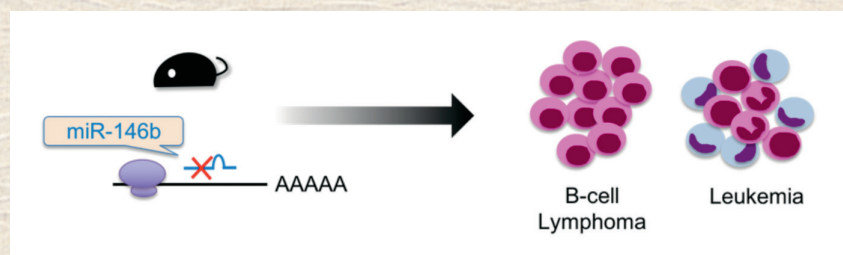


Fig. 1: miR-146b knockout (KO) mice developed hematopoietic malignancy.

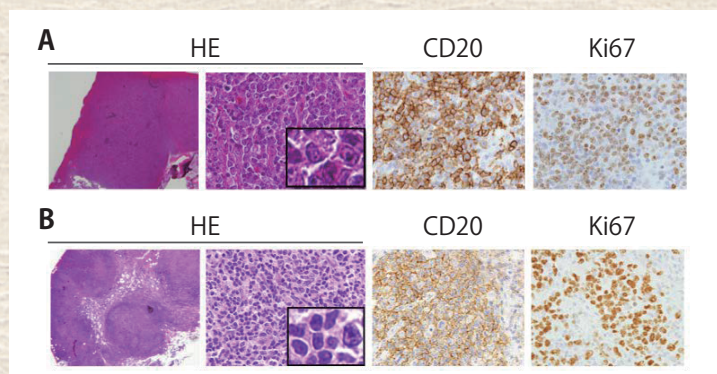


Fig. 2: B-cell lymphomas developed in the lymph nodes of miR-146a and miR-146b KO mice.

A: Lymphoma observed in the lymph nodes of miR-146a KO mice.

B: Lymphoma observed in the lymph nodes of miR-146b KO mice.

Summary : Tokyo Medical and Dental University (TMDU) researchers used knockout mouse models created by gene editing to reveal that the miRNA miR-146b, like miR-146a, is involved in the development of cancers, with each having similar but not identical effects. The knockout mice showed high rates of B-cell lymphoma and acute myeloid leukemia, which was associated with the absence of miRNA causing NF- κ B overactivation. These insights should help in the fight against cancers involving miRNA dysregulation.

How does estrogen protect bones? Unraveling a pathway to menopausal bone loss

TOKYO—OSTEOPOROSIS IS a condition in which bones become weak and prone to fractures. Fractures typically occur in the wrist, spine, or hip, and can often lead to permanently impaired mobility. Women over 50 are at a high risk of developing osteoporosis, which may be due to the loss of estrogen that occurs after menopause. While studies have linked estrogen levels to bone health, the exact details of this connection are not entirely clear. Researchers at Tokyo Medical and Dental University (TMDU) describe a new molecular link between estrogen and bone aging, which may eventually lead to new strategies to treat postmenopausal osteoporosis.

Bone is a complex tissue, consisting of a matrix of proteins and minerals that give it the flexibility and strength to support body movement. Bone also contains several types of specialized cells, including osteocytes, that help to maintain this matrix. Over a person's lifetime, many factors can affect how healthy bone structure is maintained. One of these factors is the female sex hormone, estrogen.

“Over the last few decades, we’ve learned that estrogen plays an important role in maintaining a functional bone matrix,” corresponding authors Tomoki Nakashima and Hiroshi Takayanagi ex-

plain. “Exactly how estrogen does this, though, is not fully understood. Our laboratory recently discovered that bone matrix is maintained by a protein called *Sema3A*, which is secreted by osteocytes. This led us to suspect that there might be a mechanistic relationship between estrogen and *Sema3A*.”

Sema3A does indeed appear to be linked to estrogen: the researchers found that blood serum levels of the protein decrease in premenopausal women as they get older—and drop even further once women reach menopause. But how, at the biological level, are estrogen and *Sema3A* related? And what is *Sema3A* doing in bone tissue?

To answer these questions, the researchers turned to mice. When mice are given an ovariectomy (that is, when their ovaries are removed), the loss of estrogen causes their bone mass to decrease. This can be prevented, however, by giving the mice an extra supply of the hormone. The team took advantage of this to explore the function of *Sema3A*.

“When we genetically removed *Sema3A* from the osteoblast lineage cells (including osteocytes) of mice, we found that intravenous estrogen no longer prevented bones from deteriorating after an ovariectomy,” lead author Mikihiro Hayashi describes. “In addi-



Tomoki Nakashima
Ph.D., Professor
Department of
Cell Signaling,
Graduate School of
Medical and
Dental Sciences,
TMDU

tion, we found that *Sema3A* sets off a chain of signaling events that promote the survival of osteocytes in these mice. This suggests that *Sema3A* serves as a key mechanistic link between estrogen and bone maintenance.

We believe that, as women lose estrogen with age and *Sema3A* levels drop off, osteocytes begin to die and bone loses the ability to maintain its supportive structure.”

The researchers hope that the discovery of *Sema3A* as a major player in bone health and the signaling molecules it controls in bone may offer new therapeutic approaches to treating osteoporosis.

The article, “Autoregulation of osteocyte *Sema3A* orchestrates estrogen action and counteracts bone aging” was published in *Cell Metabolism* at DOI: 10.1016/j.cmet.2018.12.021.

Summary : Women who have reached menopause are at a greater risk of developing osteoporosis, which can lead to bone fractures and long-term impairment of mobility. Studies have suggested a link between reduced bone density and low estrogen levels due to menopause, but the basis for this link is unclear. Researchers at Tokyo Medical and Dental University found that the protein *Sema3A* plays a key role in maintaining healthy bones, suggesting a new therapeutic avenue to treat osteoporosis.

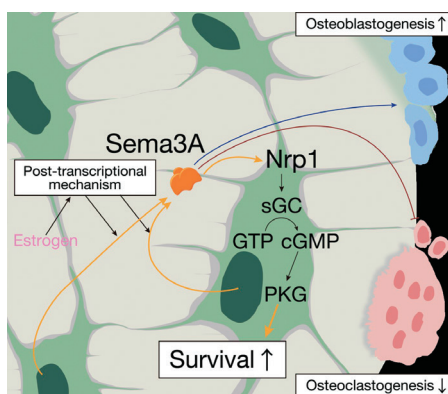


Fig. 1: Autoregulation of osteocyte *Sema3A* in bone homeostasis
Estrogen induces osteocyte expression of *Sema3A*, which acts on its receptor on osteocytes to promote survival, resulting in reduced osteoclastic bone resorption and enhanced osteoblastic bone formation. *Sema3A*-activated sGC—cGMP signaling through Nrp1 protected osteocytes from apoptosis.

“Instant Liver, Just Add Water”? Not Quite, but a Better Way to Grow Multiple Organs

TOKYO, JAPAN—PLURIPOTENT stem cells are specialized cells that can become almost any type of cell or tissue in the body. Because of this potential, they are often used in research to study disease. One way this is done is by coaxing stem cells to form organoids, which resemble organs but can be more easily studied in a laboratory. Researchers centered at Cincinnati Children’s Hospital Medical Center (CCHMC) and Tokyo Medical and Dental University (TMDU) have devised a better way to make one particular organoid to aid in studies of the liver, bile duct and pancreas.

“Our focus was on generating a hepato-biliary-pancreatic organoid, which would allow us to better understand how the liver, bile duct, pancreas, and associated tissues form during embryonic development and how they normally function together,” explains Takanori Takebe, senior author of the study. “The current technical approaches are fairly limited, though, and the resulting models lack the complexity of true organs.”

In the technique pioneered by the

research team, human stem cells are used to make small “spheres” of cells that each represent different parts of a developing embryo. The spheres are fused together to create an immature organoid, which is then allowed to mature and grow while suspended in a specially engineered three-dimensional gel. With the new technique, the resulting organoid bears a striking resemblance to a liver, pancreas, and the connecting bile ducts.

“What we are most excited about is the sophistication of the organoid,” says Hiroyuki Koike, one of the researchers involved in developing the technique. “We could see branches that directly connected the bile duct to the pancreas. Amazingly, the pancreatic tissue that emerged was able to secrete digestive enzymes through the ducts, similar to how the true organ would function. The complexity of the organoid is really quite remarkable.”

The researchers also showed that, by making specific genetic mutations, they can stop the stem cells from becoming a working organoid—demonstrating the potential usefulness of the system to



Takanori Takebe
Professor
Organ and Tissue
Neogenesis Consortium,
Advanced
Multidisciplinary
Research Cluster,
Institute of Research,
TMDU

study diseases that arise in these organs.

“There are still a number of challenges in the field with respect to creating a robust multi-organ model system that can be easily manipulated in a research setting,” Takebe adds. “The work here shows that it is possible to create such a system using human pluripotent stem cells. This is quite exciting, as it lends credibility to the idea that stem cells might be used to make personalized models to study how organs form and how genetic mutations lead to organ malfunction.”

The article, “Modeling human hepato-biliary-pancreatic organogenesis from the foregut-midgut boundary” was published in *Nature* at DOI: 10.1038/s41586-019-1598-0.

Summary: Pluripotent stem cells can be used to make experimental models of organ systems, but current techniques often produce models that bear limited resemblance to true organs. Researchers at Cincinnati Children’s Hospital Medical Center (CCHMC) and Tokyo Medical and Dental University (TMDU) developed an improved method to make a sophisticated three-dimensional organoid model of the liver, pancreas, and bile ducts. The model may help researchers understand how these organs form and how genetic mutations can lead to diseases in these organs.

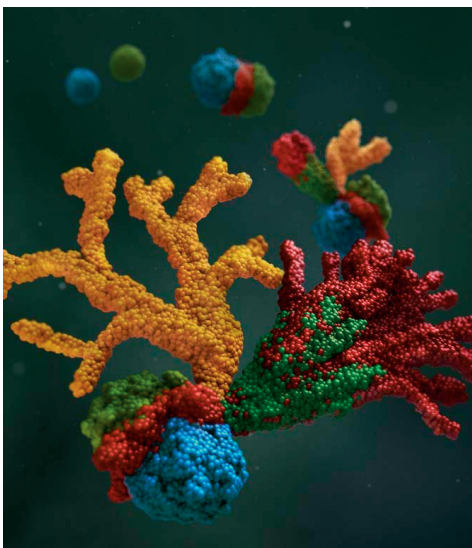


Fig. 1: 3D CG of multi-organoid model grown from human stem cells
Liver: red, Bile duct: green, Pancreas: yellow, Gut: other colors.



Cover of this issue

Spanning the Kanda River to the east of JR Ochanomizu Station, Hijiribashi Bridge offers a fine view of TMDU's Yushima campus, home to the General Education & Research Building noted for its impressive relief murals, the Dental Hospital, the Medical Hospital, the M&D Tower, and other facilities.

Cross the bridge and stroll toward the campus, which fittingly is adjacent to Yushima Seido, the temple in whose precincts Shoheizaka School, known as the birthplace of modern education in Japan, once stood.

EDITORIAL SUMMARY

WE ARE PLEASED to send you Vol.12 of the TMDU Annual News, with highlights of TMDU's international activities and campus events for the 2019-2020 academic year.

In this issue, we have looked back on the six-year tenure of President Yasuyuki Yoshizawa, whose term expires in March 2020, in an interview format. Also included are reports about campus information, reports on study abroad programs from TMDU students and letters from our graduates.

We will introduce the latest topics of Tokyo Medical and Dental University (TMDU) in the future. Please continue to support "TMDU ANNUAL NEWS"!

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 the TMDU Annual News, please feel free to contact the Public Relations Division by e-mail (kouhou.adm@tmd.ac.jp).



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.

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Published by Tokyo Medical and Dental University
1-5-45 Yushima, Bunkyo-ku, Tokyo Japan 113-8510
Phone +81-3-5803-5833, Fax +81-3-5803-0272
E-mail kouhou.adm@tmd.ac.jp
TMDU URL www.tmd.ac.jp/english/

