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

TMDU

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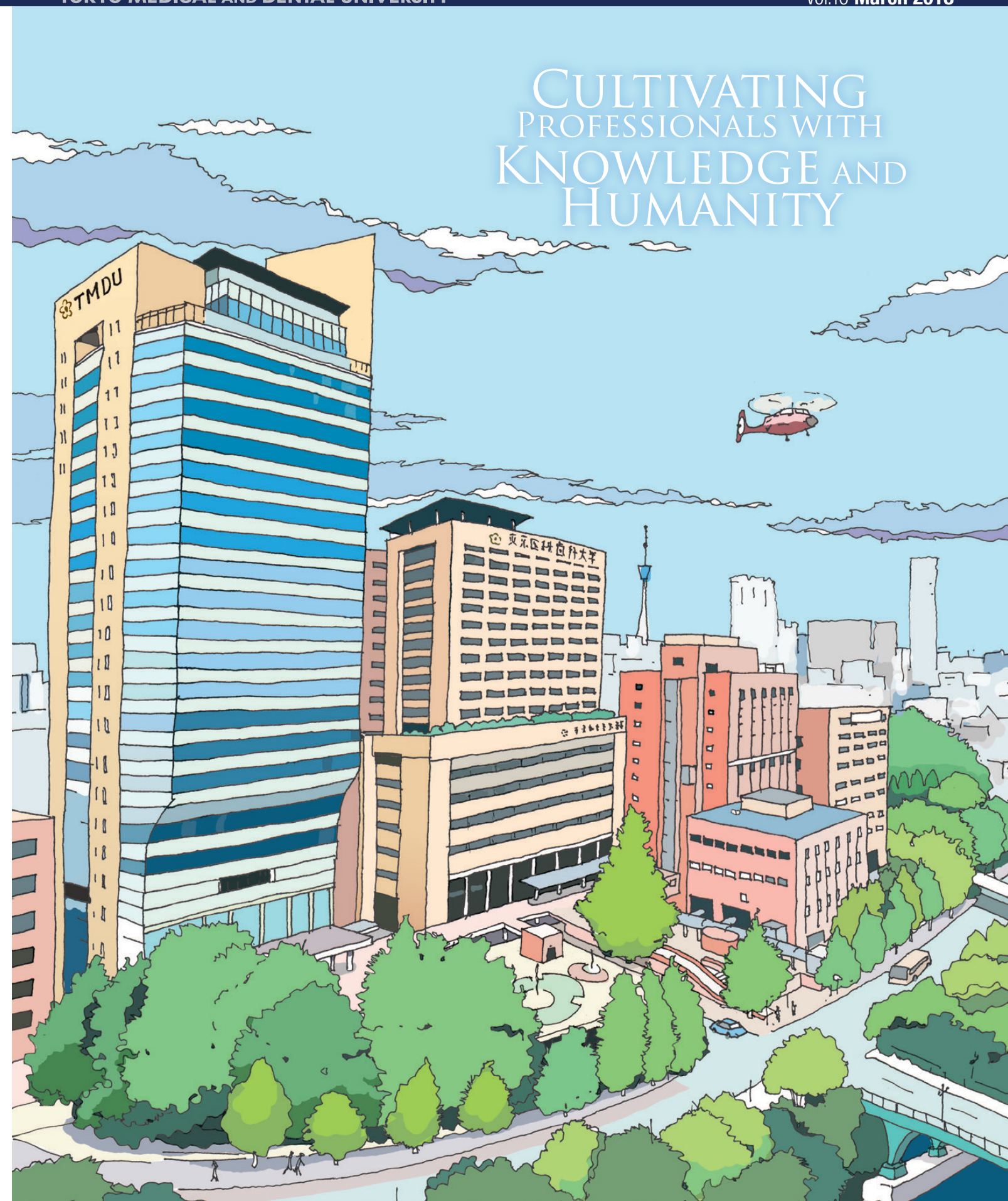
TMDU | ANNUAL NEWS



TOKYO MEDICAL AND DENTAL UNIVERSITY

Vol.10 March 2018

CULTIVATING PROFESSIONALS WITH KNOWLEDGE AND HUMANITY

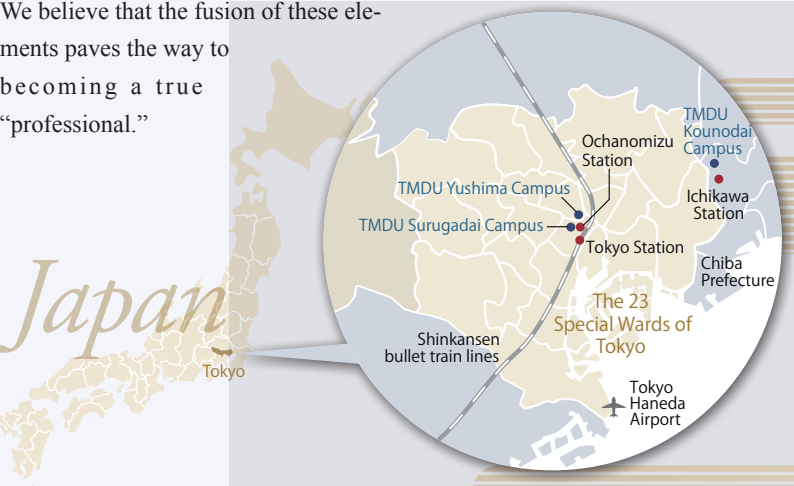


History and Location of TMDU

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, 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.

2018

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.



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

TMDU: Did you know...?

University Ranking by Subject

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

SOURCE: QS World University Ranking by Subject 2017

University Ranking by Ratio of Faculty / Students

Ranked #7 in Japan and #11 in the World

	Students	Faculty
Graduate	1,486	734
Undergraduate	1,525	

SOURCE: QS World University Ranking 2018

World's Best Small Universities

Ranked #1 in Japan and #17 in the World

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

University Hospitals Promoting Our Research

	Beds	Outpatients Per Year
Medical Hospital	753	570,969
Dental Hospital	60	436,058 *

* Ranked #1 among university dental hospitals in Japan

International Students

	No. of International Students	No. of Countries
Graduate Schools	304 *	39

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

How do you like life at TMDU?

Not only have I gained knowledge from informative lectures and stimulating seminars by Japanese and foreign experts here, I have also learned about the working processes of mind and service of the university staff and hospital staff, which I will adapt to my work when I return home. Furthermore, I have felt deeply impressed by the sincere help, good advice and beautiful friendship of the teachers and colleagues I have met here at TMDU.



Manivong Dasavanh
(Lao PDR)



Mieradili Mulati
(China)

It is a great privilege to do my research in one of the world's top universities for dentistry, TMDU. With eminent professors and researchers for guidance, easy access to cutting-edge technology and wide access to scientific literature, it is a great place to acquire advanced scientific knowledge. The friendly staff, sociable students and amenities available for day-to-day life make the living experience especially pleasing for international students.



Rajendran Arun Kumar
(India)

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TMDU ANNUAL NEWS

Tokyo Medical and Dental University

Vol.10, March 2018

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Mahidol University (Thailand)

TMDU PRESIDENT YOSHIZAWA and other professors visited Mahidol University in November 2017. Delegates from TMDU made a courtesy call on President Banchong, the new President of Mahidol University, and strengthened the relationship and cooperation between both institutions. Siriraj Hospital and TMDU mutually confirmed the outline of the Joint Degree Program (JDP) and agreed to launch JDP in 2020.

Also, they had a ceremony for opening a new office the “TMDU- MU Partnership Siriraj Office,” which was established at Siriraj Hospital, Mahidol University. In December, Professor Prasit, Dean of the Faculty of Medicine of Siriraj

Hospital, and delegates visited TMDU. Our mutual understanding was even more promoted by discussing and exchanging ideas further on matters of JDP.



With President Banchong (at Salaya Campus)



The opening ceremony for the new office (at Siriraj Hospital)



Professor Prasit and President Yoshizawa (in front of the new office)



Professor Prasit and delegates from Mahidol University with Professor Tanaka (TMDU Executive Director) and the surgery team from TMDU (at TMDU)

Brazil-Japan Joint Symposium on Adhesive Dentistry 2017

THE BRAZIL-JAPAN Joint Symposium on Adhesive Dentistry 2007 was held on Oct. 31st to Nov. 1st at the University of Campinas, Piracicaba (UNICAMP), Sao Paulo, Brazil. This event was supported by the Japan Society for the Promotion of Science (JSPS) and the Sao Paulo Research Foundation (FAPESP). The coordinators for Japan and Brazil are Professor Junji Tagami (Cariology and Operative Dentistry, TMDU) and Professor Marcelo Giannini (UNICAMP). The purpose of this program was to encourage young researchers to share knowledge, experience and ideas in the research areas

stipulated in the call for proposals, to provide them with a career development opportunity, and to build networks for future collaborations among them that may lead to the development of new research areas.

A total of 304 researchers and clinicians, including 14 Japanese researchers from 6 Universities participated this workshop. From TMDU, Professor Tagami (coordinator), Dr. Toru Nikaide (mentor) and the three young researchers; Drs. Rena Takahashi, Takaaki Sato (excellent presentation award) and Juri Hayashi (excellent presentation award) joined the workshop.



Total 304 researchers and clinicians participated the Brazil-Japan Joint Symposium on Adhesive Dentistry 2017



Japanese and Brazilian presenters of the Brazil-Japan Joint Symposium on Adhesive Dentistry 2017

Joint Degree Program (JDP) in Medicine with the University of Chile-A big Chance for an International PhD, Medical Specialties and Clinical Experience Abroad

IN 2015, TMDU was approved to start JDP courses with the University of Chile (UCh), which was established in 1842 and is one of the most historic and renowned universities in Latin America. JDP students join in collaborative research work in Japan and Chile and consequently achieve a Ph.D. degree accredited by TMDU and UCh, as a “Joint Degree”. This is the first trial in Japan to begin this kind of collaborative project. The students can earn not only an international diploma, but also medical specialties in Upper Digestive Surgery, Colorectal Surgery or Gastroenterology.

In 2016, the first student from UCh, Dr. Diego Zamorano, enrolled in a Colorectal Surgery course, and has already start-

ed to learn in class and clinical training. Moreover, this year, two more doctors entered the JDP scheme, Dr. Yuriko Matsumiya from TMDU, and Dr. Rafael Zanabria from UCh, who are also preparing their investigations and clinical activities.

The committee members of JDP from TMDU and UCh frequently visit each other to have direct talks on improving the program, in addition to a monthly meeting via teleconference.

In November, TMDU and UCh professors gathered at the “Joint Workshop 2017” at TMDU. Experts from both universities made wonderful presentations in each field, followed by meaningful discussions with the participants.



Paying a courtesy call on President Yoshizawa



President Yoshizawa and Dr. Matsumiya (JDP student from TMDU)



Joint meeting at UCh, Santiago

Joint Degree Program (JDP) in Dentistry between Chulalongkorn University and TMDU

FOR THE 2ND year of the Joint Degree Program (JDP) in Dentistry between Chulalongkorn University (CU) and TMDU, which was launched in August 2016, three Thai students (out of six competitive applicants) were newly matriculated after a strict admission examination. In October, Prof. Ono and Prof. Moriyama held a freshman orientation for them and introduced actual activities through the program and talked about research life at TMDU.

Another three students who were enrolled in the program a year ago passed the qualifying examination and successfully

advanced to the 2nd year of the 5-year program. For the 2nd year, they will spend a whole academic year at TMDU to pursue their study and research work either in the labs at the Department of Orthodontic Science or at the Department of Maxillofacial Orthognathics.

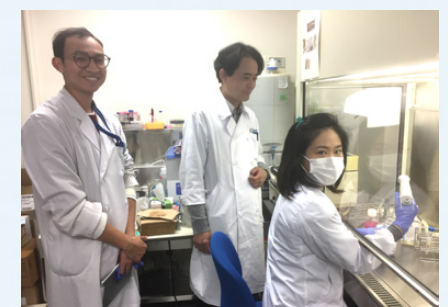
After accomplishing the very first academic year of the program, from August 2016 to July 2017, the Liaison council, self/external assessment, and faculty development seminar will be held in February 2018 and will expect to enhance the program through multilateral reviewing.



Newly enrolled students with Prof. Ono and Visiting Assist. Prof. Issareeya



Prof. Moriyama with students after the freshman orientation



Research work at Department of Maxillofacial Orthognathics

Working to Create a Society of Health and Longevity

The guiding philosophy of TMDU that informs our efforts to become a world-renowned medical sciences institution is “Cultivating Professionals with Knowledge and Humanity, thereby Contributing to People’s Well-being.” With the rapid aging of Japan, it is essential if we are to maintain our society’s vitality to extend average healthy life expectancy by preventing the onset of disease and making every effort to detect and treat it as early as possible. At TMDU, we are tackling these issues through a range of initiatives that build on our strengths and distinctive characteristics.

First, we established the Center for Personalized Medicine for Healthy Aging in 2015. This new graduate school of preventive medicine will further develop our strengths in this area. Lifestyle conditions such as cancer, diabetes and heart disease continue to pose serious challenges to medicine and society. The Center will be the first medical institution in Japan to apply approaches we have developed in-house to the analysis of individual genetic information with the aim of preventing the onset of lifestyle diseases to which that person is likely to be prone. To boost early detection rates of gastric and bowel cancer, both of which have an extremely high prevalence in Japan, the Center is equipped with private rooms with toilet facilities for individual patients to stay before they receive examination using the latest endoscopy equipment. In dentistry, another specialist area for TMDU, we have installed private rooms with specialist equipment to perform high-quality dental examinations. Anyone that is diagnosed based on these examinations can be treated at our Medical Hospital or Dental Hospital.

What distinguishes the services provided at the Center from standard medical check-ups is that we provide lifestyle guidance and health checks based on an individual’s genetic pro-

file through an in-house program that attempts to elicit specific health management implications from genomic information. Using this approach, the Center seeks not only to prevent the onset of disease through the adoption of better lifestyle habits based on an individual’s genetic make-up, but at the same time to contribute to the development of personalized medicine and preventive medicine through early disease detection and intervention. Going forward, besides providing healthcare services, we will focus on human resources development and research to help us realize new preventive medicine and related treatments.

Second, to build on the activities of the Center for Personalized Medicine for Healthy Aging, the Bioresource Research Center, and other TMDU initiatives, we are working on the construction of a new medical framework that goes beyond existing medical practices to utilize the Internet of Things (IoT), artificial intelligence (AI) and medical Big Data. By promoting a new research concept of personalized preemptive medicine that seeks to provide people with the necessary treatments and preventive approaches based on their individual condition while at the same time developing related human resources at an international level, we hope to contribute to the realization of a “super-smart society” where people enjoy health and longevity. In April 2018, as part of this goal, we reorganized our graduate schools to make TMDU an educational and research center that promotes integrative sciences for preemptive medicine.

At TMDU, we are proposing a new academic concept called “integrative sciences for preemptive medicine,” in which IoT, ICT and AI are applied to the integrated collection, management and analysis of patient data to devise personalized preemptive medicine. The data include not only genomic and epi-

genetic information as well as electronic patient records, but also information on lifestyle habits and environmental factors (suitably supplemented with real-time data). Developing the integrative sciences for preemptive medicine will require educational research to combine medical and dental sciences with disciplines such as life science and engineering. To this end, we have combined the Track of Biomedical Laboratory Sciences of the Graduate School of Health Care Sciences with the Graduate School of Medical and Dental Sciences to create a new master’s program and two new doctoral programs within the Graduate School of Medical and Dental Sciences.

As a development center for the integrative sciences for preemptive medicine, the reborn Graduate School of Medical and Dental Sciences includes a master’s program (Medical Sciences Program for Preemptive Medicine) and doctoral programs (Integrative Biomedical Sciences Programs for Preemptive Medicine). One of the notable features of the doctoral programs is that they overlap with the Medical and Dental Sciences (doctoral program) and the Biomedical Sciences and Engineering (doctoral program). The advantages of this structure are that (1) students can gain a top-down understanding of the complex field of preemptive medicine, (2) the programs specifically encourage academic interchange between students from the varied specialties that make up the integrative sciences for preemptive medicine, and (3) the programs help to build each of these specialties as well.

In fiscal 2017, in a separate move that will help to accelerate progress in our development of preemptive medicine, TMDU was selected by the Ministry of Education, Culture, Sports, Science and Technology to take part in a data science-related human resources development program. We are privileged to be one of only four universities selected by the government

for this initiative. Under the program, the Consortium for Data Sciences in Medical Care and Drug Discovery has been established by academia, research institutions and the private sector to develop new data science education programs and to organize international research conferences to exchange information in this area. Another aim of the program is to improve Japan’s international competitiveness in the area by developing new data science methodologies based on AI approaches from bio-related fields such as medicine, drug development and healthcare.

To ensure the human resources development program is attractive, a panel of lecturers has been invited from among specialists working in research in universities and research institutions. Program participants will also undergo training in highly advanced environments, making use of the databases owned by Japan’s leading state-owned research centers and universities. In tandem with our reorganization of the graduate schools, this move will help create the ideal conditions for cultivating the next generation of leaders to propel Japan into the future.

These various initiatives will help TMDU to contribute to the realization of a society of health and longevity through preemptive medicine. At the same time, achievements on the international stage by people trained at TMDU will help us to achieve our broader aim of “Cultivating Professionals with Knowledge and Humanity, thereby Contributing to People’s Well-being.”



Yasuyuki Yoshizawa, President



Practicing Preventive Medicine with a Customized Medical Checkup Program

Center for Personalized Medicine for Healthy Aging

In May 2016, the Center for Personalized Medicine for Healthy Aging started operation on the 16th floor of the Medical Hospital as the first health checkup center at Tokyo Medical and Dental University. Unlike ordinary comprehensive medical checkup facilities, the Center practices advanced preventive medicine based on individual genomic information. In this Special Feature, we focus on the role and mission of the Center at a time when societal needs for preventive medical care and advanced medical care are increasing.



Photo by Aflo

Everyone wants to live a healthy, long life. In fact, however, as the super-aging of society progresses, the numbers of people suffering from lifestyle diseases, cancer, and dementia are increasing, and Japan's medical costs continue to rise.

In those circumstances, preventive medical care is mentioned as an important national issue and a societal imperative. Whereas in conventional medicine, treatment is provided after a person becomes ill, the idea behind preventive medicine is to provide medical intervention to avoid illness. Expectations are high that preventive medicine will contribute to controlling constantly soaring medical costs.

In particular, since changes in lifestyle habits, such as eating and smoking behaviors, increase the preventive effect, group medical checkups, such as metabolic syndrome checkups, have been actively promoted and conducted.

The Tokyo Medical and Dental University Medical Hospital Center for Per-

sonalized Medicine for Healthy Aging has developed an advanced medical examination system and conducts medical checkups that can be utilized in preemptive medical care, which goes a step further than preventive medical care. The Center aspires to live up to its name by providing personalized services that help patients lead long, healthy lives.

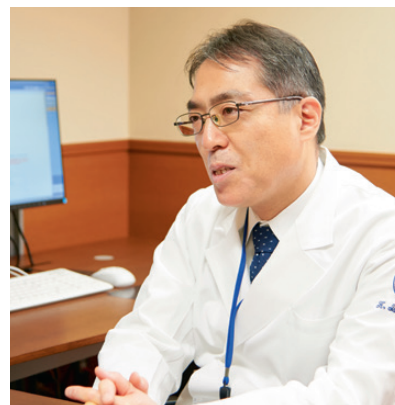
Health Management Genomic Information for Estimating Disease Risk

The Center performs examinations for heart, lung, esophagus and stomach, colon, urinary organ, brain, and vision and hearing. PET-CT whole body screening for occult neoplasm or inflammation, and women's cancer screening. Sleep examinations, motor organ examinations, and dental checkups, examinations seldom performed at ordinary medical checkup facilities, are also available.

An even more important characteristic of the Center is that it offers a unique

program for providing genetic risks of common non-communicable diseases, such as cancer and lifestyle diseases. Through this program, developed jointly with TMDU's Bioresource Research Center, the Center for Personalized Medicine for Healthy Aging performs gene analysis and informs disease risk factors and possible preventive measures to each individual.

Approximately 30 diseases are covered, including 10 types of cancer, such



Professor
Kinya Ishikawa
Director of Tokyo Medical and Dental University Medical Hospital
Center for Personalized Medicine for Healthy Aging

A summary of items offered by the Center for identifying individuals' genetic risks

More than
60 items

Cancer risk (approx. 10 types)

Breast cancer (women only), lung cancer, esophageal cancer, stomach cancer, colorectal cancer, prostate cancer (men only), etc.

Lifestyle diseases and other disease risk (approx. 20 diseases)

Type 2 diabetes, high blood pressure, ischemic heart disease, arrhythmia, non-alcoholic fatty liver disease (NAFLD), Graves' disease, rheumatoid arthritis, etc.

Genetic patterns associated with laboratory test values

Blood pressure, blood glucose level (HbA1c), cholesterol level, etc.

Drug responsiveness

Prediction for warfarin resistance, carbamazepine side effects, etc.

Approx.
30 diseases

Analysis of approximately 60 items, consisting of about 30 risk items for common non-communicable diseases, 3 items related to drug responsiveness and 30 genetic patterns affecting laboratory test values such as cholesterol level. This program does not deal with hereditary diseases such as familial colon cancer.

as breast cancer, lung cancer, esophageal cancer, stomach cancer, and colon cancer, as well as type 2 diabetes, high blood pressure, non-alcoholic fatty liver disease (NAFLD), and rheumatoid arthritis. Genetic risk diagnosis is performed for more than 60 items, including genetic patterns associated with blood pressure, blood glucose level, cholesterol level, and other laboratory test values as well as drug responsiveness, such as prediction for warfarin resistance. As the color of the pea plant is determined by the pattern of genetic variation called the genotype, it is considered that risks of some common diseases can be estimated from genotypes. Based on this idea, the Center analyzes genotypes from the individual DNA sample and determines genetic risk for each disease of interest. Furthermore, the Center assists patients in preventing illnesses by proposing ways of avoiding risk diseases devised by specialist physician groups within the University.

The important point is the Center's role does not end with providing genetic risk information and suggesting effective ways to prevent at risk diseases. It provides in as much depth as possible explanations and counseling about gene analysis results, which in many respects are difficult for people in general to understand, and offers nutritional guidance and lifestyle guidance with the aim of contributing to preventive medical care.

Furthermore, the Center carefully follows up after examinations by prepar-

ing a menu of checkup options in accordance with patients' risk. Some patients who had been unable to improve their lifestyle habits, despite being warned for many years about high blood glucose levels, modified their behaviors after disease risk was demonstrated using genomic information.

Director Kinya Ishikawa explains that this follow-up system is a unique strength of the Center for Personalized Medicine for Healthy Aging: "At the Center, we don't prepare manuals on examination flow or patient support. This is because appropriate examination items and medical checkup requirements vary from person to person. Here, we select examination items in accordance with the wishes of the individual and often change examination frequency or introduce additional examination items according to genomic information. I think the Center is highly regarded because of this ability to respond in accordance with the needs of each individual."

Expanding the Scope to Include Visitors from Overseas

During the nearly two years since the Center opened, the number of members has increased beyond expectations. According to Director Ishikawa, "Since the Medical Hospital is a health and medical care institution, it cannot actively publicize the medical checkup program, which is uninsured care. Even so, the program's reputation has spread.

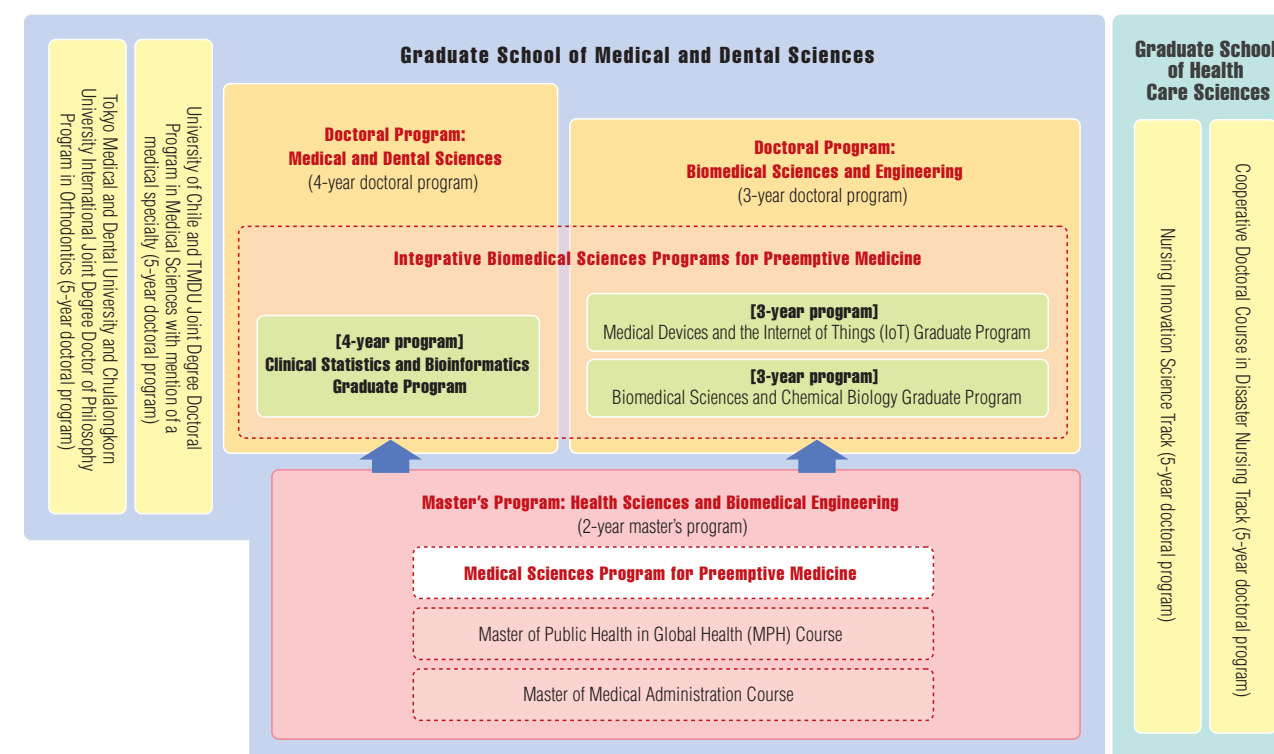
Recently we have been receiving applications for individual membership from several people each week, and we already have five out of a maximum six corporate members. It seems that the Center is highly rated for genomic information provision as well as access to examinations and diagnosis by university hospital medical specialists."

When the Center first opened, one challenge was how to not only announce its existence to patients, but also publicize it within the Hospital. Now, some three years since the preparatory phase, awareness within the Hospital is fairly high, and the handover of patients from the Center to clinical departments is proceeding smoothly.

Recently, the Center has been receiving an increasing number of inquiries from overseas, mainly from elsewhere in Asia, and is preparing to accept overseas patients. However, since the ability to relax and undergo medical examinations in a restful atmosphere is a positive feature of the Center, the aim is to increase the quality of the program without excessively increasing the number of patients. Director Ishikawa says, "I want to enhance the program as a whole without compromising the Center's positive features, such as an environment for performing endoscopic examination pre-treatment in a private room with a lavatory and careful examinations performed by highly skilled medical specialists using advanced examination equipment."

The Future of Medicine Using Big Data and AI

The use of 'Big Data' is growing across a wide range of fields, but in none are expectations so high as in medicine. AI-based analysis of huge volumes of medical data has the potential to transform healthcare in areas such as preemptive medicine and personalized medicine. Tokyo Medical and Dental University has reorganized its graduate school courses in line with the new 'future of medicine.' TMDU researchers are also making specific advances in these exciting fields.



Various researchers are applying the accumulating mass of medical Big Data from genomes, patient records and diagnostic samples to the development of next-generation medicine.

One area in the spotlight in terms of medical Big Data applications is preemptive medicine, which seeks to use genomic and other information to predict and prevent diseases through preemptive intervention. In Japan, where healthcare costs are rising rapidly, demand for such medical expertise in society is high.

With lifestyle diseases, which account for around 35% of medical costs, smoking, obesity and other environmental factors have a significant impact in addition to any congenital factors. Through integrated analysis of the complex web of medical information, researchers hope to discover unknown factors or mechanisms to help develop preventive interventions.

TMDU has reorganized its graduate program in preemptive medicine to enable an integrated approach for developing students active in the clinical and

research spheres.

Development of Preemptive Medical Personnel via New Graduate Program

The reorganization is based on a goal of TMDU's Third Medium-term Plan that began in fiscal 2016, namely, to "create a global education and research center dedicated to integrative sciences for preemptive medicine." Effective from April 2018, the reorganization involves combining the Graduate School of Medical and Dental Sciences and the Biomedical Laboratory Sciences Track of the Graduate School of Health Care Sciences to establish the new Graduate School of Medical and Dental Sciences offering new programs for fostering people who can play leading roles in preemptive medicine.

Offering broader options for students wanting to specialize in preemptive medicine, the new programs include a master's program (Medical Sciences Program for Preemptive Medicine) and doctoral programs (Integrative Biomedical Sciences Programs for Preemptive

Medicine). The doctoral programs are divided into a 4-year program for those studying Medical and Dental Sciences and a 3-year program for those studying Biomedical, Life and Health Sciences Engineering.

The programs adopt a broad approach to fields such as clinical statistics and biostatistics to help develop the ability to apply statistical and mathematical analysis to large volumes of medical data. The doctoral programs also include specialized programs in preemptive medicine such as the 4-year Clinical



Professor
Hajime Karasuyama
Executive Director & Executive Vice President
University Innovation and Globalization

cal Statistics and Bioinformatics Graduate Program, in which students learn how to analyze databases integrating genomic information with patient records or to apply data mining techniques to lifestyle habits or environmental factors.

In the 3-year Medical Devices and Internet of Things (IoT) Graduate Program, students learn about bioinformatics and device engineering, two subjects now essential to the development of medicine and healthcare.

In the 3-year Biomedical Sciences and Chemical Biology Graduate Program, students develop problem-solving skills by applying AI and network solutions across a wide range of fields, with the core focus on disease elucidation and prevention based on drug development.

Combining Resources for an Integrated Academic Approach

Executive Vice President Professor Hajime Karasuyama, who led the reorganization of the graduate school, explains the move was about establishing an integrated approach across TMDU to

teaching preemptive medicine as well as creating new academic structures.

"TMDU already had several departments involved in teaching, research and treatment related to preemptive medicine, including the Center for Personalized Medicine for Healthy Aging in the Medical Hospital. However, they did not really function cooperatively as an organic whole. By bringing these resources together, we have established new programs with a more integrated approach to preemptive medicine."

Parts of TMDU already operating in the area include the Center for Personalized Medicine for Healthy Aging, which undertakes prophylactic medical interventions based on environmental, genetic and other factors; and the Bioresource Research Center, which is building a database of genetic and clinical information. TMDU's Institute of Biomaterials and Bioengineering is also involved in the field with its development of sensing technology for collecting relevant medical data in the form of biomonitoring devices designed to

monitor pulse, blood glucose and other vital signs as well as lifestyle habits in real time. The Medical Research Institute has also recruited specialists in medical science mathematics from RIKEN to establish the necessary personnel base for analyzing such data.

Prof. Karasuyama stresses that offering all the programs on preemptive medicine under the Graduate School of Medical and Dental Sciences is an important development for the future of preemptive medicine.

"Through this broad framework, our aim is to create a structure to allow those without a medical or dental sciences background—such as someone who has studied programming as part of an engineering degree, for example—to study preemptive medicine alongside medical and dental students. We think it is extremely valuable for people with varied academic backgrounds, such as clinical technologists and device development engineers, to study together."

TMDU is focused on promoting progressive research toward such a future.

Future of Medicine Using Genomic Big Data and AI

At the Medical Research Institute, to promote personalized medical treatment and preemptive medicine, Prof. T. Tsunoda is searching for causes of disease and new biomarkers based on the integrative analysis of clinical information and other biodata derived from genomic and other omic profiles. His specialty is mathematics-based genomic medicine and biomedical science. One of the methods he applies in his research involves the use of AI.

“AI is a convenient way of analyzing medical Big Data. Having collected a vast volume of medical information, you can apply deep learning or other methodologies to train the AI. It is especially good at quickly drawing inferences or making predictions from data analysis. For example, we can expect AI-based analysis to be a useful adjunct to medical treatment by helping us discriminate between subtypes of diseases based on various symptoms, medical histories or physical findings, or by us-

ing genetic data to select drugs with fewer side-effects.”

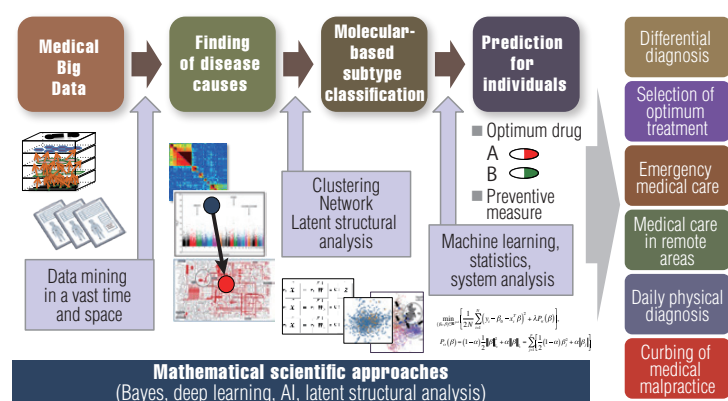
Practical examples of everyday AI application in medicine could include supporting treatment in emergency rooms or in remote areas, or reducing the incidence of medical malpractice due to human error based on the daily monitoring of vital signs.

“TMDU is steadily accumulating medical data on a large scale, and has begun preventive and preemptive medicine at the Center for Personalized

Medicine for Healthy Aging. Our aim is to prevent disease at the level of individuals by combining genomic data with information on lifestyle habits to help optimize disease prevention efforts.”



Professor
Tatsuhiko Tsunoda
Department of Medical Science Mathematics
Medical Research Institute



Using AI to Analyze Pathology Images

Clinical pathology is one area expected to benefit from the use of next-generation AI-based technologies. The diagnostic approach in pathology involves direct observation of cells under the microscope to investigate potential malignancy or other characteristics. Some overseas medical institutions have already introduced AI-based pathological diagnosis.

In the Department of Genomic Pathology at the Medical Research Institute, Prof. S. Ishikawa is applying deep learning as an AI-based technology for use in pathological diagnosis. “With earlier machine learning approaches, human input is required to identify unique characteristics. With deep learning, which is being developed mainly for image analysis, the AI can work out these characteristics itself by learning from large quantities of data. In clinical pathology, diagnosis is based on the ap-

pearance or form of cells. Unlike a human, who gets tired, the AI can process huge numbers of images to make effective diagnoses.”

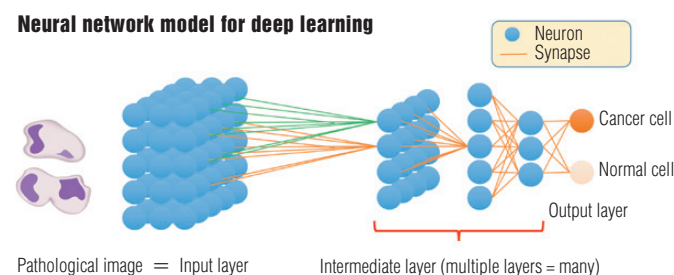
For example, even skilled pathologists find it hard to diagnose a cancer where a small quantity of tumor cells are present within otherwise healthy tissue. Prof. Ishikawa wants to start with AI supporting diagnosis in such cases, as a way of making sure nothing is overlooked. Based on recent successes in linking accumulated genomic data with pathology images, the team has been researching if data correlation can indi-

cate the need to look for genetic disease.

“The current issue with comprehensive genetic testing for cancer is its high cost. If we could establish strong links between specific disease genes and tissue images, highly cost-effective genomic treatments based on genetic analysis might become feasible at low cost.”



Professor
Shumpei Ishikawa
Department of Genomic Pathology
Medical Research Institute

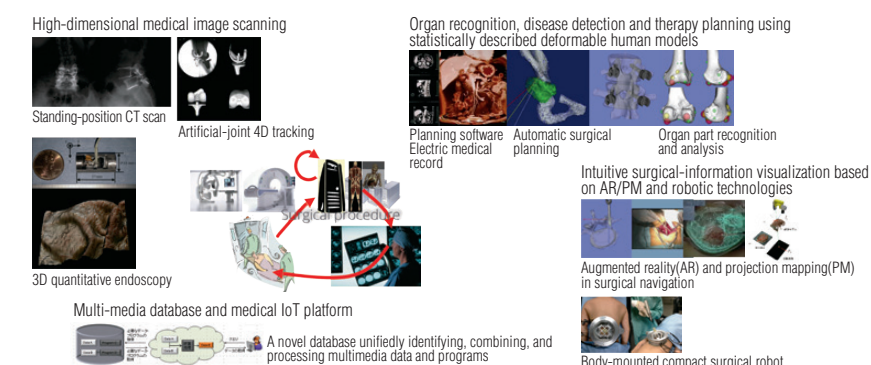


Cutting-Edge Data-Derived Medical Engineering

At TMDU’s Institute of Biomaterials and Bioengineering, Prof. Y. Nakajima is researching the integration and automation of various medical data. His specialty is medical engineering based on the links between computers and medical treatments. One approach is a surgical navigation system driven by diagnostic imaging equipment (such as CT or MRI scanners) and image sensors. With the aim of helping to support safer surgical procedures, the system combines data from preoperative treatment plans with images taken during surgery to guide surgical instruments. Another approach uses deformable human models to establish parameters for the location and size of healthy organs, based on links between these parts and relevant visual, textual or other information. By combining this information with data from patients, it is possible to estimate the probability of disease

based on deviation from standard parameters. The data also provide a searchable database of detailed medical knowledge.

“In my research, we combine diagnostic imaging data from CT or MRI scanners and conduct multi-dimensional analysis by applying the inter-data relationships to mathematical models. Entirely new types of analysis are possible with this approach because we can do a top-down analysis of the distribution or create mapping with other data.” The



Professor
Yoshikazu Nakajima
Department of Biomedical Information
Institute of Biomaterials and Bioengineering

institute has specialists in many different fields such as biosensing, device development, materials, pharmacology and software development. Assembling this array of talent promises to unlock new possibilities in next-generation medical engineering.

New Data-Related Personnel Development Program

In April 2017, TMDU embarked on a 5-year “data-related personnel development program” on behalf of the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Under the program, MEXT has set up the Consortium for Data Sciences in Medical Care and Drug Discovery with the twin aims of developing new data science education programs and of organizing international research conferences to exchange information in this area. As the lead institution in the consortium, TMDU is managing the personnel development program and liaising with medical IT enterprises and pharmaceutical companies. The program curriculum is aimed at 30 graduate or postdoctoral students, along with 30 course participants from the companies. The core curriculum comprises lectures and practical classes on medical Big Data and AI-based drug discovery. Besides

the pharmaceutical companies involved, the locations for the training program include the Tohoku Medical Megabank Organization and the National Institute for Educational Policy Research.

Prof. Tanaka, the program coordinator and manager of the Medical Data Sciences Office, emphasizes the program’s high quality, which includes a stellar lineup of lecturers.

“The data science lectures alone will be extremely valuable. The panel of lecturers includes Jun Tsujii, the head of the Artificial Intelligence Research Center at the National Institute of Advanced Industrial Science and Technology, and Professor Masaru Tomita from the Institute for Advanced Biosciences at Keio University. Participants will



Specially Appointed Professor
Hiroshi Tanaka
Manager
Medical Data Sciences Office

also benefit from internships at program-affiliated institutions and receive counseling from TMDU’s Career Development Office to support their careers after finishing the program.”

Activities of Consortium for Data Sciences in Medical Care and Drug Discovery

Consortium for Data Sciences in Medical Care and Drug Discovery

Working group activities Open Innovation Working Group

Data scientist development activity

Common courses (lectures and practice of Big Data, AI, and IoT)

Specialized courses

Big Data medicine (genomic medicine, Biobank, mHealth) **AI drug discovery** (Big Data drug discovery, AI drug discovery)

Training programs

Tohoku Medical Megabank: Use of Big Data and supercomputer
National Center for Global Health and Medicine: Identification of issues, data usage, pharmaceutical companies, IT companies
TMDU: Use of AI drug discovery program for training



Master of Public Health in Global Health (MPH) Course Opens April 2018

TMDU is a prestigious medical school in Japan dedicated to expanding its knowledge and expertise in the medical field in order to tackle urgent global health issues. In our current world, everything is interconnected, interactive, and mutually dependent. Which is why medical professionals who are passionate and dedicated to public health are now, more than ever, needed on a global scale. Aiming to develop such global leaders who can “think globally and act globally” and thereby find concrete solutions to pressing public health issues around the world, we at TMDU launched the Master of Public Health in Global Health (MPH) course.

TMDU faculty and staff can be counted on to devote their utmost time and energy to achieving these aims as embodied in TMDU’s central mission: “cultivating professionals with knowledge and humanity.”

Harvard/Johns Hopkins Lecture Series (HJLS)

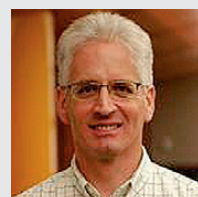
TMDU collaborates with renowned professors from Harvard T.H. Chan School of Public Health (HSPH) and Johns Hopkins Bloomberg School of Public Health (JHSPH), the world’s top two schools of public health, and offers the MPH students the world’s top class public health education in Tokyo.



Ichiro Kawachi
Professor of Social Epidemiology
Harvard T.H. Chan School of Public Health



S.V. Subramanian
Professor of Population Health and Geography
Harvard T.H. Chan School of Public Health



Brian Schwartz
Professor
Johns Hopkins Bloomberg School of Public Health



Pamela Surkan
Associate Professor
Johns Hopkins Bloomberg School of Public Health



Michele Decker
Associate Professor
Johns Hopkins Bloomberg School of Public Health

Our Mission

Promoting Evidence-Based Global Public Health Action

Knowledge generated from scientific research is a strong tool for carrying out effective health policy and practice. There is a great gap, however, between scientific knowledge and practice in today’s public health arena. The Master of Public Health in Global Health (MPH) course at Tokyo Medical and Dental University (TMDU) was designed to educate individuals from around the world who want to be leaders in their fields; generating, translating and disseminating public health-related scientific evidence in the real world to make the world a healthier place. The TMDU-MPH course offers ambitious people opportunities to gain the necessary knowledge and skills to become global public health leaders.

“We aim to elucidate how the social environment may be improved to prevent disease and promote overall health throughout the life-course. Furthermore, based on accumulated evidence, we can develop practical health policies and programs to improve our society.”

Takeo Fujiwara, MD, PhD, MPH
Professor, Department of Global Health Promotion, Tokyo Medical and Dental University

“By leveraging our partnership with faculties and institutions in North/Latin America, Asia/Pacific, Europe, and Africa, our program will equip you with practical skills and insight, and help you build a career in global health through innovative coursework, research engagement, and network-/community-building opportunities. Only at TMDU can you get such unique learning and professional development. Come join us, and let’s make a difference together!”

Kazuki Takada, MD, PhD, MPH
Deputy Director of Education, Tokyo Medical and Dental University



Why Study with Us

Earn a degree from one of the Japan’s top universities in the world’s largest city

Tokyo Medical and Dental University (TMDU) is the top small university in Japan^[1]. Founded in 1928, the university has a long history of cultivating health professionals and researchers from around the world with knowledge and humanity and advancing the health and social welfare of people across the globe. Yushima campus where the MPH course will be held is located in the sacred birthplace of scholarship and learning in Japan. With excellent transport links, the campus are just 2 minute from the station and students can benefit from a unique and rich learning and career building opportunities in the world’s largest city^[2].

[1] The Times Higher Education, “The World’s Best Small Universities in 2016” “The World’s Best Small Universities in 2017”
[2] United Nations, “The World’s Cities in 2016”

Overview

The Master of Public Health in Global Health (MPH) course at Tokyo Medical and Dental University (TMDU) was designed to advance your knowledge and skills in the core public health disciplines while preparing you to generate/translate/disseminate public-health-related knowledge in real-world contexts.

Program Components

- 1st year** In-class course work at our Tokyo campus
- 2nd year** Original public health research about the country of your choice (Tokyo campus/online)
Completion of a master’s thesis (Tokyo campus/online)
[Optional] Internship at an international organization

Teaching Methods

Both core and elective courses will be conducted using lecture-based and active, case-based learning approaches (known as case methods). Throughout the course, students will have ample opportunity to apply theories learned in lecture-based classes to realistic situations using case-based discussion. These case-based active discussions allow students to obtain more practical and cross cutting competencies such as collaboration, communication, critical thinking, and professional leadership. Students can also gain an overview of topics and up-to-date knowledge though lectures from invited first-class lecturers, and improve techniques such as statistical analysis though tailored exercises.

Academic Advisor

Each student will be assigned a TMDU-MPH course faculty member to be your academic advisor. The role of academic adviser is to provide you with academic guidance, information, and supervise your research project that you will conduct in the second year. You and your adviser must communicate frequently to discuss your plan and progress. You can express whom you would like to be your academic advisor at the time of application.

Core Courses

- >Behavioral Sciences
- >Biostatistics I
- >Environmental Health
- >Epidemiology I
- >Global Health
- >Health System and Management
- >Planetary Health
- >Public Health Practice I
- >Public Health Practice II

Elective Courses

- >Biostatistics II
- >Epidemiology II
- >Maternal and Child Health
- >Public Health Biology

Type of Degree

Upon successful completion of the course, you will be awarded a Master of Public Health in Global Health (MPH)

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MD, PhD, MS Deputy Director^[1] Professor^[2] Chair^[3]

- [1] Education
- [2] Institute of Education
- [3] Department of Professional Development in Healthcare Sciences

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

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

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

Colorectal Cancer Screening in Chile, Supported by TMDU

In Chile, the mortality from colorectal cancer has been increasing in the last two decades, and thus the need for colorectal cancer screening has grown rapidly. Approval was given in 2009 to start a screening project based on a proposal from Dr. López of the Clínica Las Condes (CLC), one of the biggest and most advanced hospitals in Chile. Due to the long history between TMDU and Chile, our university was invited to supervise the project. In 2009, the Health Ministry of Chile, CLC and TMDU signed a collaboration 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. Since 2012, PRENEC (the Prevention Project for Neoplasia of Colon and Rectum) has implemented, using Japanese methods in immunological fecal occult blood test and colonoscopy.

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

LACRC Members and University Activities

LACRC has been staffed by experts in pathology, endoscopy and molecular biology at TMDU. As of 2010, LACRC has been operated by nine TMDU doctors; as pathologists, Dr. Takashi Ito (April 2010 to March 2012) and Dr. Hiroshi Kawachi (March 2012 to March 2015); as endoscopists, Dr. Hiroyuki Uetake (July to 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); and Dr. Maki Kobayashi as molecular biologist (July 2012 to March 2015). In November 2017, Dr. Masamichi Yasuno visited Chile to supervise colorectal surgery with local surgeons.

LACRC is operated in the headquarters of TMDU by Prof. Yujiro Tanaka (Executive Director in International Health Care Partnerships), Prof. Masanobu Kitagawa (Dean of the Faculty of Medicine, Department of Comprehensive Pathol-



ogy), Prof. Uetake (Department of Specialized Surgeries) and other staff. In Chile, Dr. Odagaki is the present chief of LACRC, and he is engaged in PRENEC as an instructor of colonoscopy to the Chilean doctors. Moreover, his prominent technique such as in endoscopic resection for superficial cancer has been in great demand not only inside but outside of Chile. Dr. Odagaki has been invited to local Chilean cities, Bolivia, Argentina and Uruguay for lectures, actual demonstrations and international live sessions.

TMDU also operates the Project Semester Program, appointing medical students to institutions overseas. In 2017, two medical students from TMDU were attached to laboratories in the University of Chile where they conducted advanced research in collaboration with local doctors.

Conversation with the Imperial Family of Japan

In September, the Imperial Japanese Prince Akishinonomiya Fumihito and Princess Kiko paid an official visit to Chile, to attend the ceremony for 120th anniversary of diplomatic relations between Japan and Chile. They also visited the Hospital San Borja Arriarán to observe the collaboration with TMDU, having a conversation with Dr. Odagaki and the doctors from the hospital. The Prince and Princess took a keen interest in TMDU activities and the medical equipment there.

Public Releases of PRENEC

The colorectal cancer screening system at PRENEC has achieved magnificent results, detecting many cases of cancer. Owing to the experts from TMDU, the completion rate of the screening procedure and the detection rate of colorectal cancer have improved remarkably from before. Furthermore, most of the cancers detected in PRENEC were early intramucosal cancers without risk of metastasis, and these lesions were treated successfully by endoscopy. These results

have been reported in various medical journals and congresses by Dr. Odagaki and past doctors. More reports related to PRENEC results are in progress for future publication.

Spreading Network of TMDU-PRENEC in Latin-America

PRENEC and supportive activities by TMDU are now recognized as essential aspects of Chilean health care. Increasing numbers of participants have steadily enrolled in PRENEC in six major cities: Santiago, Valparaíso, Punta Arenas, Coquimbo, Osorno and Valdivia. As the TMDU-PRENEC network is still spreading all over the country, more cities or facilities have concluded agreements to join PRENEC in the near future.

TMDU has also tried to promote the same screening system in other Latin-American countries, in association with JICA and the International Cooperation Agency of Chile (AGCI). In August 2015, the first Third Country 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 courses were held in Santiago for medical professionals from Bolivia, Paraguay and Peru. Dr. Ito and Dr. Okada from TMDU and Dr. Odagaki from LACRC gave special lectures to them. In these countries, the same screening programs as PRENEC are scheduled to start with each government.



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Professor, Comprehensive
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Director of Satellite Office
in Chile

Hiroyuki Uetake
MD, PhD
Professor, Specialized Surgeries,
TMDU

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

1 Prof. Tanaka, Prof. Kitagawa, Prof. Uetake, Dr. López (CLC) and other committee members



2 Endoscopy training with Dr. Odagaki and doctors from Latin America

3 Dr. Odagaki performing an endoscopic procedure, in a live session with doctors in Argentina

4 Dr. Ito observing the operating room of a public hospital in Chile

5 Guidance concerning colonoscopy technique by Dr. Okada with doctors from Peru

Activities for Strengthening Relationships between TMDU and Thai Universities

CU-TMDU Research and Education Collaboration Center, Thailand

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

Appointment of Visiting Scholars

In 2017, TMDU appointed following three Thai alumni members as visiting scholars. Visiting Professor Thiravud Khuhaprema studied as an undergraduate student at Faculty of Medicine, TMDU for 6 years from 1974 to 1980. He is now a Director of Wattanosoth Hospital. He is a key person in the medical field between TMDU and Thai universities.

Visiting Associate Professor Atiphan Pimkhaokham studied for 5 years from 1997 to 2002 at the Graduate School of TMDU as a research student and a postgraduate student. At present, he is an Associate Professor, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University (CU) and he also contributes as a coordinator to the CU-TMDU Research and Education Collaboration Center.

Visiting Assistant Professor Issareeya Ekprachayakoon studied for three years from 2011 to 2014 as a research student. She is an orthodontist working in the special clinic of the Dental Hospital at CU. She is assigned as a coordinator at the CU-TMDU Research and Education Collaboration Center like Visiting Assoc. Prof. Atiphan Pimkhaokham, and dedicates herself mainly to manage the International Joint Degree Doctoral Program in Dental Sciences between CU and TMDU thus far.

These visiting scholars all speak Japanese language well and they support the various exchange programs of students and scholars, and also collaborative research between TMDU and Thai universities.

Collaboration with Mahidol University (MU)

In November 2017, President Yasuyuki Yoshizawa made his first trip to Thailand. President Yoshizawa and the delegates made a courtesy call to President Banchong Mahaisavariya, the new President of MU to strengthen the relationship and cooperation between both institutions.

Following the first on-site meeting which was held in June in Bangkok, Prof. Yujiro Tanaka (Executive Director), Prof. Satoshi Miyake and Prof. Keiichi Akita had a second on-site meeting with the faculty members of the Faculty of Medicine, Siriraj Hospital, MU. They mutually confirmed the outline of the Joint Degree Program (JDP) in Medical Sciences (Surgery) and agreed to work jointly to launch the program in 2020. They had a ceremony for opening a new office, the "TMDU-MU Partnership Siriraj Office," which was established at Siriraj Hospital, Mahidol University.

In December, Professor Prasit, Dean of the Faculty of Medicine Siriraj Hospital, and delegates visited TMDU. Our mutual understanding was further promoted by discussing and exchanging ideas on various matters concerning the JDP.

Student Exchange Programs between TMDU and Thai Universities

There were lots of student exchange programs between TMDU and Thai universities in the fiscal year of 2017. A total of thirty-eight Thai students came to TMDU and twenty-six TMDU students visited Thailand. An active and fruitful student exchange program in many health fields was conducted as follows:

Inbound Program

From CU, two 6th year medical students came to TMDU and participated in the research program for about 1 month. Ten students of the Faculty of Allied Health Sciences in CU studied for 10 days at the School of Health Care Science, TMDU.

Four dental undergraduate students from Chiang Mai University, and two dental undergraduate students from MU came to TMDU and attended the short-term dental study program at the dental hospital of TMDU. From CU, six Master course students studied at the Dept. of Gerodontology and Oral Rehabilitation. In Thailand, the aging problem needs special attention to insure dental care for elderly persons. They observed the visiting dental service at home and also in aged care facilities.

In November 2017, two Master course students of CU and four 6th year undergraduate students of Srinakharinwirot University (SWU) participated in the TMDU International Dental Program (IDP) with Indonesian and Vietnamese dental students. The purpose of this IDP is to bring together students from Asia to enhance the international exchange and introduce the TMDU graduate school and research through various activities; campus tours, laboratory visits, discussion sessions, and poster presentations on the TMDU Research Day. TMDU dental students also attended the program

and strengthened mutual relationships and understanding.

Eight students of CU studied for two months at the Institute of Biomaterials and Bioengineering

Outbound Program

Two 4th year medical students studied at CU for 6 months in a Project Semester research curriculum. Three 3rd year students from the School of Health Care Sciences attended a short term study program in the summer vacation period. Five 5th year dental students visited CU and participated in the Research Day program.

Two 6th year medical students visited MU for 1 to 2 months and participated in the clinical practice course. Five 3rd year students from the School of Oral Health Care Sciences visited MU and attended a short term oral hygiene training course. Dr. Pornpot Fuantharntip, a TMDU alumni JDAT member, supported and arranged this new program.

Nine 3rd year dental students visited Srinakharinwirot University (SWU) and attended the short term dental training course. They joined an English class along with SWU undergraduate students and presented Japanese dentistry and Japanese culture to them. They also enjoyed the cultural exchange program with SWU students.

We expect these exchange programs will expand health network in Asia.



① President Yoshizawa gives a certificate to Visiting Professor Thiravud Khuhaprema
② Visiting Associate Professor Atiphan Pimkhaokham



③ Prof. Moriyama, President Yoshizawa, Visiting Assistant Professor Issareeya Ekprachayakoon (front left to right) Three JDP students (back)
④ President Yoshizawa (TMDU) and President Banchong (MU), and delegates from TMDU at MU
⑤ Opening ceremony of the "TMDU- MU Partnership Siriraj Office"



Research Partnership between TMDU and the 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 International Research Collaboration

The international research collaboration project between TMDU and the Noguchi Memorial Institute for Medical Research (NMIMR) in Ghana started in 2008 as part of the Program for Founding Research Centers for Emerging and Re-emerging Infectious Diseases, supported by the Japanese Ministry of Education, Culture, Sports and Technology (MEXT). This project was replaced by the Japanese Initiative for Global Network on Infectious Diseases (J-GRID) program with a minor modification in the scheme. The first and second terms of the J-GRID program, which were supported by MEXT, were finished at the end of the Japanese fiscal year (FY) 2014 and the third term of the project restarted from FY2015 with the support of the Japan Agency for Medical Research and Development (AMED). Dr. Mitsu-ko Ohashi, the project associated professor of TMDU, was dispatched to Ghana as the team leader in 2015 and has managed the Ghana-TMDU Research Collaboration Center. In addition, Dr. Takaya Hayashi, the project lecturer of TMDU, joined the project from FY2017 and started to work together with her in Ghana. Currently, 11 Japanese and 10 Ghanaian researchers participate in the project and cooperate in several research areas. The main focus of the AMED/J-

GRID project is to promote innovative research collaboration with counterpart researchers for developing new diagnostic methods, finding the lead compounds for new drugs, and identifying the candidates for new vaccines. Furthermore, the AMED has made the request for information sharing with the National Institute of Infectious Diseases (NIID). Under this concept, our AMED/J-GRID project conducts the following four research initiatives; 1) the surveillance of dengue/chikungunya viruses prevalent in Ghana, 2) the genetic analysis of the rota virus, which is the causative agent of acute diarrhea, 3) the identification of carbapenem resistance bacteria, and 4) the development of new antiparasitic drugs from Ghanaian medical plants. To conduct the research more efficiently, we invited Japanese experts from NIID, Kitasato University and Nagasaki International University, and built the “all Japan collaboration team”. So far, we detected antibodies against dengue and the chikungunya viruses, indicating the infections with those viruses in Ghana. In addition, we showed that the genotypes of the rota virus changed after the introduction of its vaccine. The identified genotypes are different from the vaccine strain, suggesting that the efficacy of vaccine may decrease in future. The carbapenem resistance bacteria was firstly found in Ghana and the resistance gene was then identified. The drug resistance gene will be a useful



③ Session in 90th anniversary symposium of Dr. Hideyo Noguchi's arrival in Ghana.
④ Group photograph after 90th anniversary symposium.

molecular marker for the surveillance of this emerged resistance. The new chemical compound, which killed *Trypanosoma brucei*, the protozoan parasite, was identified from the Ghanaian plant, *Morinda lucida*. To develop the anti-trypanosomal drug, we now evaluate their activity using an animal model. To achieve the final goals, all Japanese-Ghanaian teams pursue further researches.

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

The collaboration between TMDU and NMIMR plays an important role in not only research, but also development of human resources in Japan and Ghana. TMDU implements an education program for medical students who want to gain experience with overseas medical institutions. Under this program, undergraduate students stay to carry out their research project out for a few months in NMIMR: one student visited NMIMR in 2017. It is a good chance for them to better understand the health problems which developing countries like Ghana face. On the other hand, TMDU accepted young and talented researchers as PhD. students under a scholarship program supported by MEXT. In the last 6 years, 11 PhD. students from NMIMR have studied in the doctoral course of TMDU. Taking the importance of the education of young Japanese and Ghanaian students and researchers into consideration, TMDU expanded more intensive exchange activities not only with NMIMR, but also with the University of Ghana. President Y. Yoshizawa, of TMDU, and Vice-Chancellor E. O. Owusu, of the University of Ghana signed a MOU for University-level exchange and a new student-exchange scheme was started. This University agreement between TMDU and the University of Ghana including NMIMR will strengthen the partnership between

them. Thus, the Ghana-TMDU Research Collaboration Center is expected to act as not only a research center, but also as an academic exchange center between Japan and Ghana.

90th Anniversary Symposium of Dr. Hideyo Noguchi's Arrival in Ghana

Dr. Hideyo Noguchi arrived at Ghana in 1927 and tried to identify the causal pathogen of Yellow fever. To honor his achievement and commemorate the friendship between Japan and Ghana, NMIMR held the 90th anniversary symposium of his arrival in Ghana. Dr. Ohashi and TMDU cooperated in the management of the symposium together with the Japanese embassy. More than 400 people participated in the symposium which was both fruitful and successful. From Japan, not only university and government agencies such as the Japanese embassy, AMED and JICA, but also the public interest foundation corporation of the Dr. Hideyo Noguchi museum participated in this symposium, and invited speakers talked about the historical and current contributions of Japan to Ghana in the medical science field. The Director of NMIMR, Professor Kwabena Mante Bosompem in his opening remarked on the research perspective. In his words, “the NMIMR since its establishment has been pursuing a threefold mandate : to conduct research into communicable and non-communicable diseases; build capacity for the next generation of scientists and provides specialized diagnosis and intervention tools in support of public health in Ghana.” Professor Emeritus Nobuo Ohta and I talked about the historical contribution and the achievements of our AMED/J-GRID project, respectively. TMDU is highly expected to contribute to the advance and development of NMIMR through the medical research. Therefore, the Ghana-TMDU Research Collaboration Center will be more important than ever.



The Director of NMIMR, Professor Kwabena Mante Bosompem

① Annual Meeting of AMED/JGRID project at Tokyo.

② TMDU medical students and the staff of Ghana-TMDU Research Collaboration Center



Advancing TMDU's Global Accessibility

AGAT is the Advancement of Global Accessibility Team created by President Yoshizawa and overseen by the Global Affairs Advancement Steering Committee to help globalize the university. The team consists of faculty members from the Institute of Global Affairs (IGA) and the College of Liberal Arts and Sciences. AGAT's vision is to assist in creating an environment that is global in reach and rich in international quality, attracting 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.

David Cannell
Associate Professor,
Institute of Global Affairs,
TMDU

Campus signs and university documents

Everywhere one looks campus signs and university documents are largely limited to the Japanese language. This has created a language barrier for those in the university community who cannot read or understand Japanese. In order to overcome these barriers, 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.

The focus of AGAT thus far has been on bilingualizing an array of university documents and forms that are frequently used in the medical and dental hospitals and by international students, foreign faculty and staff. For example, hospital patients are often required to sign consent forms or to read a variety of medical documents they may receive upon a visit to the hospital. Working in conjunction with faculty and administration in both hospitals, AGAT has identified high-priority documents and forms and is now overseeing their

translation. International students face a language barrier as well when they are asked to read or fill out forms available only in Japanese, such as forms related to conducting animal experiments or filing one's graduate thesis. The same language barrier exists for foreign faculty and staff who must fill out employment documentation or annual performance reports. AGAT has conducted surveys to determine which forms and documents must be translated in order to create a bilingual zone that increases the accessibility to campus facilities and resources for these important members of the university community.

Improving the environment for international students

A survey of all international students was conducted by AGAT in order to capture their impressions of academic and daily life at TMDU and in Japan. The survey garnered a high response rate, enabling us to identify the challenges faced by international students. One particular challenge for students is the initial transition to life at TMDU and in Japan. AGAT has made a concerted effort this fiscal year to streamline the initial process for



international students to study at TMDU. For example, we have had the initial contact date between international students and TMDU administrative staff and faculty moved up well before the students arrive in Japan so that they can be prepared mentally and physically to start a new life. Furthermore, as part of the tutor system, which was designed to assist first-year international students, we have introduced an orientation session for prospective tutors to prepare them to effectively meet the needs of newly arrived international students. Also contributing to these efforts are senior international students who play a crucial role in helping new students become acclimated to their new environment and providing updated information to TMDU faculty and administration about the needs of international students generally.

Other AGAT-related projects include creating opportunities for international students and Japanese students to work together, such as Discussion Cafe, an international event where students discuss topics of general interest in English. Other projects include cultural events held on campus to promote cultural exchange and encourage TMDU students to reach out to each other with mutual understanding and acceptance. Additionally, AGAT faculty members have started to work on expanding international appreciation opportunities outside the student community on campus, including projects conceived and spearheaded by international students. These projects have been a success and we anticipate building on these successes next year.

These are just a few of the significant strides that have been made on behalf of international students at TMDU. And yet, the results of our international student survey indicate that more work remains to be done to create a truly global environment to attract and educate talented students from overseas. Not all respondents felt that they



had access to the best that TMDU has to offer, especially in terms of curricular learning and cutting-edge research and expertise. Some dissatisfaction was expressed with regards to housing on campus, a challenge that AGAT and IGA have recently endeavored to make progress on. Going forward, AGAT will continue to work in tandem with other university committees to advance the cause of globalization at TMDU.

Further projects

AGAT would like to thank the many students, staff members and faculty members who have lent a helping hand to the projects outlined above. These efforts mark our first step toward creating an inclusive environment not just for international students and faculty but also for everyone in the university community, including Japanese students, faculty, staff, and hospital patients. Additional steps going forward will include improving the university website in terms of global accessibility and our methods of information dissemination to current and prospective international students. Ultimately, AGAT aims not only to assist in creating a global environment at TMDU but also to impart a global mindset to TMDU students, faculty and staff. We very much appreciate your input and cooperation for our shared goal of growing into a globally engaged university.

About the Institute of Global Affairs

In addition to enhancing global accessibility at TMDU, IGA is dedicated to providing high-quality language education in English and Japanese as a second language and engaging in international scholarly and professional activities such as holding the 1st Big Data Machine Learning in Healthcare in Japan (February, 2018) and Joint Symposium with Taipei Medical University (March, 2018).

③ Discussion Café provides a rich environment for discussion in English of current controversial topics with students from various backgrounds
④ Japanese Class offers international students the chance to learn Japanese language and culture

① Orientation session for prospective tutors affords the opportunity to learn their roles
② Orientation for new international students is designed to familiarize the students to ease their transition into TMDU



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 of the globe.

Letters from TMDU Overseas Alumni

Letter 01
Nippon: Memories in My Heart



Francis Ekow Dennis
Research Fellow, Noguchi Memorial Institute for Medical Research, University of Ghana



I GRADUATED FROM the University of Ghana, Legon, with BSc. and MPhil. degrees in biochemistry, after which I worked as a research assistant at the Regional Rotavirus Reference Laboratory, Noguchi Memorial Institute for Medical Research (NMIMR), University of Ghana. In October 2010, I arrived in Japan as a *Mobukagakusho* scholar after almost 20 hours of flying from Ghana. I was pleasantly surprised to be picked up at the airport by my extremely kind supervisor and head of department, Prof. Nobuo Ohta, and taken to my hostel at Odaiba. Thus began four wonderfully memorable years in Japan.

I first heard about TMDU in 2009, when the NMIMR-TMDU research collaboration was formally launched. The Public Health Leader Course, a specially crafted PhD program in the Division of Public Health, TMDU, was recommended by my professor, who encouraged me to apply. I had a keen interest in infectious diseases, and appreciated the need for generating relevant data to inform decisions on the health needs of vulnerable populations. The flexibility

of the program at such a respected institution was a perfect match, and I consider myself privileged to have enrolled, graduating with a PhD in Medical Science in 2014. While encouraging excellence in my chosen research field, the program also provided a platform for interaction with colleagues from different countries, as well as WHO public health experts, which helped shape my perspectives and taught me invaluable lessons. My research on the complete genomic characterization of rotavirus strains circulating in Ghana before vaccine introduction using next-generation sequencing involved working with rotavirus experts across Japan. TMDU greatly facilitated this.

I am currently a Research Fellow in the Department of Electron Microscopy and Histopathology, NMIMR, University of Ghana, where I focus on the use of molecular diagnostic platforms and epidemiological tools to answer questions of public health importance, especially pertaining to diarrhoeal diseases. My relationship with TMDU continues with the Japan Agency for Medical Re-



Recalling a funny incident while addressing staff and students of the Department of Environmental Parasitology, TMDU, at my farewell party, September 2014

search and Development (AMED)-sponsored TMDU-NMIMR Joint Research project on infectious diseases, describing the molecular epidemiology of gastroenteritis pathogens in Ghanaian children.

I spent the first six months in the *Kenshu* program learning Japanese language and culture. The events, trips and activities organized by Prof. Yoko Okita and her team were great fun, helping me overcome culture shock and homesickness. My favorite event was *omochi-tsuki* (preparing rice cakes), which I was pleasantly surprised to learn was similar to preparation of *fufu* back home in Ghana. I remember the kindness of the University President Prof. Takashi Ohyama in allowing a classmate and myself to join the customary sponsored trip to Hakone in our final year (missed previously because cancelled due to the Tohoku earthquake and tsunami of March 2011). I also had opportunities to share about my country at TMDU,

Ichikawa Elementary School and Bunkyo City Hall. The staff of the International Students Office were always helpful. I had all the help I needed every step of the way.

In the Department of Environmental Parasitology, I found a family. Faculty and students were all so kind and helpful, making me feel at home right from

the start. The regular reporting on my research progress at rigorous journal club meetings was good training and academically stimulating. It was not always work, though. I have many fond memories of fun times: my welcome party and first attempt at eating sushi, cooking for parties and storytelling, birthday celebrations and weddings,

cherry blossom, fireworks, a Tokyo Bay cruise, gifts at my farewell party...

The story of my life is incomplete without my time in Japan. Everyone now says I have become Japanese. I hope to give back the good I received from Japan. The memories of my unforgettable Nippon experience will always remain in my heart.

Letter 02
An Inspiring Experience: Bringing Together Science, Art, and Culture



Nurtami Soedarsono
Lecturer, Department of Oral Biology, Universitas Indonesia



ON BEING ACCEPTED for the PhD program at TMDU in 2001, I started preliminary studies with a six-month Japanese language intensive program. My days were filled with Japanese language and culture, which helped me adjust to my new life in Japan. I began the PhD program in the Department of Molecular Pathology (now Department of Oral Pathology) in 2002. My advisers were Professor Minoru Takagi and Professor Akira Yamaguchi. I studied oral pathology and did molecular research. I also trained in oral pathology diagnosis at the hospital. My biggest challenge was to read and understand medical records written in Japanese. But with help from teachers and Japanese friends, I was able to find a way.

I completed my research at RIKEN Yokohama Institute under the supervision of Professor Yoshiyuki Sakaki and Team Leader Professor Toshio Kojima. In a sophisticated research facility, I studied the human genome and the genetics background of several diseases. I felt privileged to be working at the university laboratory, the university hospital, and a research center. The work was tough but worth it. And what I learned about the campus system and the research environment could be implemented at my university in Indonesia.

Aspiring to live a balanced life, I explored

leisure opportunities too. I joined Tokyo International Singers, where I made friends from all over the world. We practiced on weekends and performed concerts at several Tokyo venues. The experience of performing with a professional orchestra was amazing. At Tokyo International Exchange Center in Odaiba, where I spent my final two years, students joined together, engaging in cultural exchanges at events. On campus, I sometimes gave cultural performances at TMDU events.

On returning to Indonesia, I resumed teaching and research at my alma mater. I did a JSPS Joint-Research Fellowship with the Department of Molecular Craniofacial Embryology under the supervision of Associate Professor Masaaki Ikeda from 2007 to 2009. Together, we established collaboration with the Indonesian Dharmas National Cancer Hospital in oral cancer research. We have been doing several research projects together ever since.

Apart from my main duties at the university, I was appointed to establish the Indonesian National Police DNA Laboratory, a facility for human DNA profiling. Soon afterward, I became one of the DNA leading experts and a permanent DNA consultant at the laboratory. Our main job at the DNA lab is to help police investigations for national and



At the Indonesian National Police DNA Laboratory

international cases. I am also responsible for human DNA research work and the lab's personnel development. I have been involved in many high-profile investigation cases: disasters, terrorism, human trafficking, and human rights. The beneficial impact of my experience at TMDU and RIKEN in the real world exceeded my expectations. I think that whereas applied research is more highly valued than basic research in Indonesia, the situation is different in Japan.

As a faculty member, I served as a students' manager from 2006 to 2008 who supervised students' welfare, exchange programs, and activities. Then, I was appointed assistant director of the Universitas Indonesia postgraduate program from 2011 to 2013. I just finished my term as Associate Dean for Resources, Venture and General Administration (2014-2018). I have also been serving as a national reviewer for the selection process of the Indonesia Endowment Fund for Education Scholarships and Fulbright Research Fellowships. In this role, I help graduates pursue their dreams in higher education.

I am looking forward to working with TMDU through research, students' programs, and other opportunities to strengthen the collaboration between TMDU and the Universitas Indonesia.



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 Unforgettable Experiences at TMDU



Su Su Lei Mon
3rd year student, Department of Neurology and Neurological Science,
Graduate School of Medical and Dental Sciences (from Myanmar)



ABOUT SEVEN YEARS ago, I came to Japan for a vacation and I immediately fell in love with Japanese culture and manners. On returning to Myanmar, I started searching for a suitable university in Japan where I could pursue further studies in medical science. Coincidentally, not only did TMDU come up as the top choice for graduate studies but also a high school senior of mine was attending TMDU at that time. With his help and guidance on everything from applying to enter TMDU and deciding on a major to applying for a visa, I was accepted by TMDU as a research student.

Thanks to my many unforgettable experiences at TMDU, I have memories that I will always cherish. I chose to major in neurology and neurological

science as I wanted to become a neurologist in the future and neuroscience research in Japan is very advanced and cutting-edge. Even now, I think I made a great choice as it taught me even more than I expected and gave me experiences in neuroscience that I could not have had in Myanmar.

Arriving in Japan and adjusting to a new lifestyle was challenging for me even with all the support I received from seniors, but it was exciting and full of pleasant surprises. Leaving my life and friends back in Myanmar, I found my first friends, international and Japanese, here at TMDU. Some of them, I am certain, will be with me for the rest of my life. I tried wearing a yukata for the first time, gave my very



Wearing a yukata for the first time

first presentation in Japanese, and met mentors who helped me with research and offered advice on my future career.

I recall how impressed I was the first time I looked around the university and the hospital. Myanmar, as a developing country, should take note of the advanced, systematic and clean working environment and follow the example. When I graduate and return to Myanmar, I would like to relay information to my colleagues and friends about the healthcare system in Japan. Another noticeably good thing about the Japanese medical system is National Health Insurance, which I found convenient and is affordable for people from all walks of life. If possible, I would like to see my country develop a similar healthcare system.

To conclude, TMDU is more than I could ask for as someone studying abroad for the very first time. The foreign student support section and the healthcare center are always there to help us whenever we need assistance and advice. The li-



Successful completion of the Japanese language class

brary is always open as a haven for new students who have yet to settle into their laboratories and offices. There

were, of course, struggles but there are also good memories and good people. So I would like to thank TMDU for giving

me this wonderful opportunity and also for allowing me to express my gratitude through this article.

Report 02 TMDU— Highway to Ultimate Success



Mohamed Moustafa Mohamed Ali Said
3rd year student, Department of Maxillofacial Prosthetics,
Graduate School of Medical and Dental Sciences (from Egypt)



Mohamed Moustafa Said, 3rd year student at TMDU, from Egypt

IN 2006, I earned my bachelor's degree in dentistry from Mansoura University, Egypt. As I have always been passionate about prosthodontics, I joined the Prosthodontics Department at Mansoura University in 2009 as a teaching assistant where I had many tasks to perform such as research, teaching and clinical work. During that time I decided to go overseas to seek more advanced dental education. I worked hard on my profile and myself in general in order to be a candidate worthy of joining a prestigious prosthodontics program.

In 2010, I received an offer from the University of Hong Kong (HKU) to study for a master's degree in oral rehabilitation for two years. During my studies at HKU, I had the chance to visit Tokyo for two weeks as an exchange student. That was enough time for me to be inspired by Japan and Japanese people and to decide to continue my studies in Japan. After gaining my master's degree, I moved to Tokyo to study for a doctoral degree in maxillofacial prosthetics at TMDU. Being at one of the world's leading universities and working in state-of-the-art facilities has

given me the opportunity to boost my research experience. I also have clinical access to a wide variety of cases that have provided me with valuable clinical knowledge in the field of maxillofacial prosthetics. It has been a blessing to join the maxillofacial prosthetics department because the professors' and other members offered me their utmost help and support. Their encouragement has been invaluable in helping me accomplish my goals.

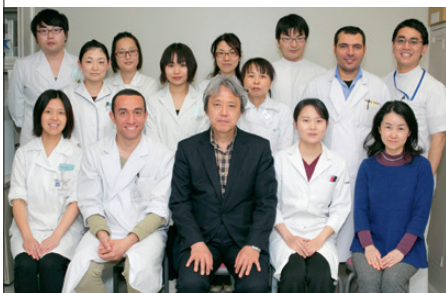
While studying at TMDU, I have published research in top impact factor journals on prosthodontics and presented my work at several international meetings. I was honored to receive the digital poster award at the American Prosthodontics Society meeting in Chicago in 2016.

I am also proud that we recently received a Joint Egyptian Japanese Scientific Cooperation Grant (2017 call), which is funded by the Science and Technology Development Fund in Egypt and the Japan Society for the Promotion of Science. In November 2017, I accompanied other members of the maxillofacial prosthetics department to Egypt where we attended a seminar in Cairo orga-

nized by the Prosthodontics Department of Mansoura University within the framework of this grant. The seminar was highly successful and members of both teams and young researchers in Egypt who attended this event were delighted by the presentations given by experts and professionals in the field. I had the honor of establishing a bridge between my department in Egypt and my current department in Japan to exchange knowledge and experience between members of the two teams in the field of maxillofacial prosthetics.

Maxillofacial prosthetics is a rare specialty in Egypt and this motivated me to learn more about challenging cases in the field. In this way, I have been able to acquire skills and enrich my experience in order to take this knowledge back to my home university in Egypt and get the most benefit for my community. I hope to be able, with the help of my colleagues in Egypt, to raise the standard of dental services for patients and enhance the support offered to both undergraduate and postgraduate students.

On the other hand, my life in Japan during the last four years was wonderful and had a huge influence on my personal development. I enjoyed every single moment of this unforgettable journey. I made many new friends from Japan and other countries, and experienced many new things—visiting new places, home stays, hot springs, cherry blossom, and last but not least enjoying Japanese food.



My welcome party in the Department of Maxillofacial Prosthetics, Tokyo



Japanese and Egyptian team members and young researchers during the seminar in Cairo



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 Fruitful Experience of the Overseas Elective Program



Kahori Cho
6th year student, School of Medicine
Clinical Training in the U.K. and the U.S.



FROM APRIL TO June, 2017, I was given the opportunity to participate in the overseas elective program in the U.S and the U.K. In April and May, I rotated in Child Neurology and NICU, both at Boston Children’s Hospital. Following that was a one month elective at Accident and Emergency in Leeds Teaching Hospital. During the course of these placements, I was able to see many different cases and improve my medical skill, as well as to experience different health care and medical systems.

During my rotation in Child Neurology at Boston Children’s Hospital, I was able to join different teams: the Inpa-

tient team, the epilepsy team, and the consult team which also covered a variety of cases seen at the Emergency Department. I played a role in taking new patients almost every day and presenting at rounds. The style of team rounds was what I felt is the most interesting difference between BCH and Japan; one team consists of only a small number of members; each team covered only 1/2-1/3 of the number of patients that Japanese ward teams would be in charge of, therefore, one visit to a patient’s room took about 30 minutes each, maximizing patient interaction.

NICU experience was also unique. Each morning, I was able to present my patient during “sit rounds” (in order not to disturb babies with rounds). Different from Japanese rounds, nurses are a must. Nurses are the ones who know how the patients actually were during the last 24 hours, and present the data. Nurse practitioners and fellows would present assessments and plans. This system, I felt, was one of the most efficient round systems that I’ve experi-



Picture with Marianna, the Fellow in charge. In the Fellow and attending’s room

enced, because each professional was only in charge of what they do best, saving both time and energy. This was certainly an eye-opener for me.

Each Accident and Emergency facility was huge in the University of Leeds teaching hospitals, with about 30-35 cubicles including resus cubicles. There I was expected to take history, about 5 patients each day, and formulate my own management and plan and present this to senior doctors. Because of my lack of experience in the number of patients I’d seen throughout my medical education, it was very difficult in the beginning to take history and come up with differentials at the same time. However, with experience, I got more comfortable with this process, which helped me become more comfortable around patients. I truly think this helps establish a good base for how to see patients in the future, and I’m very lucky that I was given this opportunity. It was also very interesting to learn how different the A&E and ambulance systems



With TMDU Harvard Medical School Exchange Clerkship students at the famous Ether Dome

were between Japan and U.K., which helped me think about what would be the best health care system.

Last but not least, I would like to thank everyone who helped to prepare and get me through daunting but fruit-

ful experience as a student doctor overseas. I strongly thought that not only the level of the institutions is important for doctors’ learning, but also teaching skills are very important in maintaining high medical standards, so that a high

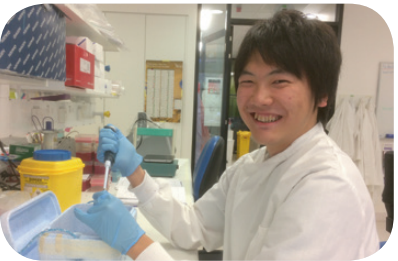
level of medical care can be provided. In the future, I hope that through acquiring good teaching skills and solid medical knowledge, I can become a good role model for others, leading Japanese medicine forward.

Report 02

Expedition of Experiment and Experience



Ryohei Watanabe
4th year student, School of Medicine
Project Semester in Australia



Doing experiments in the laboratory

THE DAYS AT Australian National University have revealed to me that diverseness and uniqueness is what I have to keep in mind in carrying out what Australians would call “fair dinkum” (honest and serious) research.

Diversity is a powerful activator to create a breakthrough. Since most of all ideas we come up with are already mentioned by another person, or covers only a limited situation, sorting out what is correct or applicable can be a challenge. When my lab members and I were talking about physical symptoms, for example, we easily realized that

clinical observation standards differed quite a lot among us. Our normal body temperature firstly is different in a range of a degree. If we think to focus on this data as an indicator of an event, there is quite a risk to overlook this difference in a homogenous group. Thus diversity can be said to decrease the possibility of ending up with a false result.

World-wide connections will help us to get contact with people with various ideas. Each person with a different background has their own perspective towards what they do. They all have different mindsets for ruling out the well-known ideas, or providing creative ideas. The more apart experience they have, the more various ideas that can be figured out.

Outside the lab, in the kitchen of the dormitory, I daily had a chance to chat with PhD candidates from all over the world. There we had a serious discus-

sion on what we can do with soy beans. To my surprise, people in Indonesia also use fermented soy beans *tempe*, which has similar but less pungent odor compared with Japanese *natto*. This discovery can quite easily inspire one to create a hybrid between those fermented foods, or use *tempe* in another Japanese food and vice versa.

It requires a huge effort for a person to change their customs. As Australia is rich in diversity, everywhere everyone was pleasantly gathering and comparing their own traditions from their original nations. There I learned how I should act as a member of a diverse group, and experienced a reconstruction of my thoughts and customs, inspired from unique traditions and ideas from all over the world. What I have to do is not to become a slave to global standards, but to broaden my perspectives.



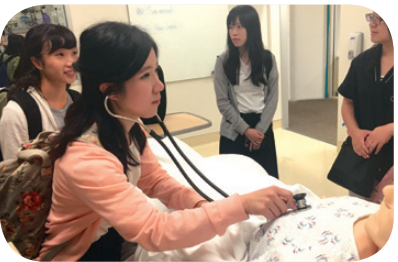
Dinner with members of the Burgio group

Report 03

Wonderful Experience in Seattle



Reina Hirono
4th year student, School of Health Care Sciences
Study program in the U.S.



Listening to lung sounds

IN THIS STUDY trip, I had the opportunity to visit a lot of facilities. From these experiences, I learned how different the health care systems are between the US and Japan and how to care for patients who have various backgrounds.

Firstly, I was surprised at the difference in the practice of nursing students. When we went to the learning lab in the University of Washington (UW) and Seattle University, the patient dolls looked like actual humans, because

they were able to show their vital signs, heart sounds, lung sounds and intestinal peristalsis sounds. Moreover, when they had pain, they could actually frown,

sweat and talk about complaints. Also, in the examination for students, teachers manipulated the dolls to create an actual clinical situation. It was wonderful, because it can reduce the reality shock for students when they start working at clinical sites. Also, the dolls can say various words, including Japanese. The US has a multinational society, and there are many opportunities to provide medical care for patients who have various backgrounds. However, nurses can take care of patients appropriately according to their backgrounds even though they have a language barrier, so this training is a good opportunity for students to learn how to provide sufficient medical care to such patients. I think we will have the same problem in Japan in the future, so nursing education may have to be changed so that students acquire skills to care of such patients.

Secondly, I was impressed when we attended the lecture at UW. The content was about nursing leadership. I could integrate the lecture with what I learned from practical training in Japan. We had the opportunity to give a presentation



My extended family

about Japanese nursing leadership in front of the UW students. In Japan, as part of team medicine, medical professionals hold conferences. The members are doctors, nurses as well as social workers and so on. However, such conferences seemed to be rare in the US. I thought it was due to the difference in the health care system.

Thirdly, we visited two hospitals in Seattle. One was the University of Washington Medical Center (UWMC). In this hospital, I learned how Nurse Practitioners (NPs) make them successful. I learned that an NP is engaged in initial medical care. Even in the United States, the shortage of doctors is getting worse especially in rural areas. As a result, NPs are expected to provide efficient medical treatment by diagnosing patients. However, if patients' conditions are serious, they can be connected with urban hospitals. Also, since an NP is not a doctor but a nurse, they tell their opinion as a nurse to the doctors and promote team medicine smoothly. NPs are not legally licensed in Japan. However, because of the aging of the population, NPs will also be needed in Japan, too.

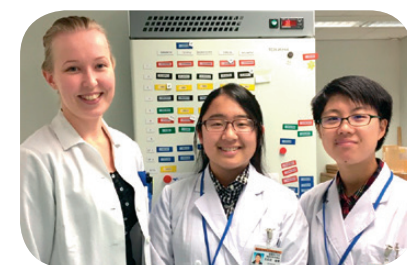
Fourthly, we volunteered at two geriatric facilities. There were various patients of different nationalities. Therefore, I had a problem with language. Although I tried to use intelligible English, I sometimes could not make them understand well. In addition, I could not



With UW students

be cognizant of the patient's signs and prolonged pain. Therefore, I asked staff how they realized patients' needs. They prepared a compatibility table of frequently used words. Moreover, they looked ahead at the request of the patients and asked for things before having to call for them. For example, they were trying to recommend patients going to the toilet before and after meals. However, it is most important to look closely at patient's expression and try to be considerate of patients' feelings. From this volunteer activities, I noticed what is important for foreign medical care is not only to deal with the language barrier and cultural differences, but also to be considerate to patients even if they are foreign patients.

I stayed with a host family during the period. My host family called us an "extended family" and treated us just like real family members. Therefore, I could spend time there without feeling lonely. Also, all of the people I met in the USA gave us kind words. I thought it is normal for American people who accept multiculturalism.



With Ms. Monica Nieminen, cell biologist in pathology

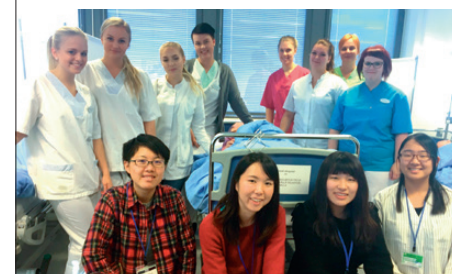
and blood glucose tests with public health nursing students.

In addition, we visited several health-care facilities. At the Home Care center, I heard about how they utilize informa-

tion technology. Time management and documentation are conducted electronically. Public health nurses and registered nurses are responsible for different work and the work was done in a vibrant atmosphere. Both help each other to make progress smoothly.

The health center provides regular consultations for patients with chronic diseases. It takes 30 to 60 minutes per one patient. I thought it may have caused overwork but there are no such kind of problems. This is because they control demands for medical services well and people can receive care or treatment not so many times but at a high quality. Neuvola, a perinatal care facility, is attached to the center and people can receive basic health services at the same place.

We learned about the social function



After practical training with public health nursing students, Seinajoki University of Applied Sciences

of Seinajoki Central Hospital (SCH). There are only five university hospitals and SCH is one of the main hospitals in the twenty hospital districts in Finland. The hospital works as an education hospital too and students in SeAMK do on-the-job training there. In this study program, we visited the clinical laboratory in SCH to observe the work place for two days. In Finland, "Bioanalyttikko" take charge of laboratory work such as microbiological and pathological tests. What is remarkable is that a physiological function test is included. This is similar to Japanese clinical laboratory scientists.

On holidays, we enjoyed sauna and swimming with three nursing students at summer cottage. In addition, I fortunately had chance to homestay with Ms. Soili Alanne, who works as dietician in SCH. I talked a lot with her and her family about careers for women, Finnish history and multiple native language education.

Finland, especially in Seinajoki, SeAMK, is a place where the city governance and other health facilities have strong connections and collaborate mutually. This system makes it possible to



With Moomin statue at Moomin Museum in Tampere

provide a well-rounded education for students. On the other hand, education is returned to the city in the form of health care services or other staff. I thought this is how Finnish society manages to work so well.

Before I left for Finland, I had done an internship at a hospital in Japan and visited the University of Washington Medical Center in the US. I had also experienced volunteer activities at an elderly care home. Through whole of last summer, I could feel how each country's health and social welfare systems are established reflecting people's way of thinking and culture in a broad sense. It was really exciting and what I never get in my daily life. I would like to express my gratitude for everyone who supported me through these study programs.

Report 04

A City where Education and Society Collaborate



Mutsumi Gotanda
3rd year student, School of Health Care Sciences
Study program in Finland



DURING THE LAST summer vacation, I participated in a study program at Seinajoki University of Applied Sciences (SeAMK), Finland. I would like to share my experience there.

At SeAMK, we took some lectures and joined practical training. Dr. Jaakko

Kontturi and Dr. Harri Jokiranta, directors of Seinajoki city, taught us about the efforts being made for elderly care and the renewal of the healthcare and social welfare system. I was impressed by these progressive policies. In the training, we practiced blood withdrawal

Report 05

My Precious Days at Oxford



Suzu Chida
4th year student School of Dentistry
Study program in the U.K.



OXFORD IS A great city for students and all people who have a desire for studying. More than 6 months have passed



At the Oxford Natural History Museum with my classmate Yuka KOIKE; who had been to King's College London last summer

since I returned from there but my memories of Oxford are still vivid and every time I look back on that, I feel transported back with a feeling of nostalgia.

I took off from Narita airport feeling nervous but my heart was full of excitement because it was my first time to go abroad. I stayed there for three months to study brain science. Professor Zoltan Molnar kindly accepted me as a summer student so that I could do research in the Department of Physiology, Anatomy and Genetics (DPAG) at the university of Oxford. My main theme was



The photo I was using as my thumbnail

analyzing the location and amount of the neuro-secreting protein neuroserpin, with a Hypoxia-Ischemia mouse model.

Hypoxia Ischemia is a serious disease for neonatal because it can cause a high rate of neonatal death and cognitive disability, but as there are few clinical treatments understanding the cascade of the disease and to find an effective neuro protective protein is important. My summer project was basic research but had a strong relation to

clinical areas so that I could learn how important it is to pair basic research and clinical trials with each other. Doing experiments was very interesting for me but I faced many difficulties in getting good results, and this despite reading lots of papers and having many discussions in my laboratory days. I had absolutely no idea as to how to solve such problems by myself and was often disappointed with my lack of knowledge. At times of difficulty, my supervisor often told me that the important thing is not to stop thinking about the reasons why I was not succeeding and to improve my knowledge by reading more papers in order to change failure into success. Such words encouraged me a lot and I could keep my motivation high in searching for a good result.

After finishing all the experiments and the final presentation, the professor told me “It must have been hard days but you did great job. Our aim in educating students is not to make technicians but

developing them like one would teach someone how to swim, and supporting their efforts in becoming good swimmers. This is Oxford.” These words remain in my mind and I came to understand the importance of thinking and making efforts by myself.

Of course, my free time was very stimulating as well. My days in my pretty accommodation are my treasure. It was small, but all the people who lived there were so kind and took me out to talk with me, having dinner parties and movie nights! All of them were so smart and proud of their countries and respected one another’s opinions and liked to have discussions. I learned the importance of not hesitating to show my opinion, having confidence in myself and asking questions about things.

Every tiny moment in Oxford became my treasure, doing experiments, talking with my friends, reading Harry Potter (and sometimes having a nap) in the park, going to the museum to see Ein-



Harry Potter quiz party at Blackwell. I took part in this event with my friends at my lodgings

stein’s blackboard and thinking about my future in the old streets. All my summer memories are still alive in my mind and I started feeling a subtle change taking place in me. I really want to say thank to TMDU Dental School which gave me an opportunity to go abroad, and to all the people who supported me and also the “Tobitate!” study abroad scholarship project. I want to connect my experiments to my future and someday, I want to go to other foreign countries and back to Oxford to see my professor, my supervisor and all friends.



Mates at the college

I had a really good time in Dublin, actually. It was my first time to stay in Dublin, so everything inspired me. Also I was shocked many times, as it was such a different culture. Although I was confused at first, I came to think everything would be precious experience for my future. I could feel the understanding a little of the meaning of “Think globally, Act locally.”

I had been to abroad only for studying language before I went to the Ireland, but I had never in my life visited and studied at a foreign college. Now I am sure that this is my first and also my last time in my life to have such an experience. I think that was different from

going abroad just for sightseeing. Of course, there were many things to confuse me during my stay in Dublin. But people there were so lovely, teachers, students, patients and host families. Not only them, but all Irish people I met in Dublin were all kind and they could help me all the time. I have no confidence in my communication skills and English though, but I tried my best and

I could come to tell my thoughts to others. I have learned from my experiences of staying in Dublin that it is so important to show my own ideas to others to live actively even if I do not have enough knowledge or sophisticated skills. Thanks to the help of many, I am sure that I had a precious time there in Dublin. I really appreciate it all. Thank you so much.



Lovely building of the hospital

Report 07

Precious Experiments in Sweden



Nahoko Komiya

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



I VISITED SWEDEN to learn at the University of Gothenburg. I attended the Dental Technology Course for three weeks. I could fabricate many prostheses in daily laboratory work, and visited the dental clinic in the university, the laboratory in the clinic and the implant center at a company. There were many interesting experiments for me.

There are 2 reasons why I wanted to study at Sweden. First, I heard Swedish people are more interested in their teeth than Japanese people. Most people have a dental examination in the clinic. Second, the public health service in Sweden is better than Japan, so Swedish people can receive various treatments at a lower price. For example implants, all ceramic crowns, and so on.

I fabricated three prothesis in the Dental Technology Course. I finished making the all ceramic crown (zirconia

frame and porcelain) as a first. Next was the e-max crown (casting by porcelain), and I finished the all ceramic bridge (zirconia frame and porcelain) in the last day of my stay. I think making the bridge was the most difficult because you have to use three times the porcelain of the crown for the bridge, and you should pile up porcelain as fast as you can.

Luckily, I participated in the 50th year anniversary ceremony of the dental facility. I listened to presentations about the history of dental facility and the future of dentistry by the teachers and students. Those presentation were very interesting. I remember the speech about the importance of digital dental technology for the future. When I listened to the speech, I thought I have to learn not only traditional dental technology, but also digital dental technology because digital dental technology will be commonplace in no time. The ceremony lasted all day, and there were



Experiments in Sweden were very important for me. I want to thank for teachers and parents. Here i am in front of the Implant center



With my class mates and professors



In the dental clinic in university

booths for dental companies outside the main hall. I enjoyed this event and learned new things.

I had opportunities to observe the dental clinic and in a company. I visited the dental clinic of the university. I watched dental examinations by the dentist who was a specialist in prosthodontics. Most of patients I saw received implant treatments. I surprised by one patient who used a removable denture which had an implant, and thought it is good for the support of the denture.

I also visited implant center at a company. I think it was most interesting observation for me. The guide of the center told me how to design implant coping, and that was a valuable experience.

In addition, I enjoyed life in Sweden. Swedish culture was interesting, for example, “fika”. At “fika” time, you can enjoy coffee and tea with sweets, and talking. I ate cinnamon roll and cake and other sweets with friends in the weekend. I also enjoyed communication with exchange students from other countries. Gothenburg was comfortable to live in and a beautiful city. On the weekends, I enjoyed the events for exchange students, and I could learn about another country’s culture.

Report 06

Lovely Days in Dublin



Haruka Okamoto

4th year student, School of Oral Health Care Sciences
Study program in Ireland



FORTUNATELY, I GOT an opportunity to visit Trinity College Dublin for two weeks as a dental hygiene student.

During my stay in Dublin, I studied with dental science, dental hygiene and dental nurses students every day and I also had some lectures and clinic lessons at the dental college hospital.

The most impressive thing was what I



At the Irish pub with friends

learned in clinic lessons and this was not only dental staff but also dental students were good at communication. Although I had known the importance of communication with patients that was my first time to feel the reality of it. Communication is not about just talking, but showing an interest in the patient.

Trinity College Dublin has a long history and the buildings were so lovely. The college has many departments so many events were held in the college on the weekends.

In the city, Trinity College Dublin is one of the famous places because of the Long Library that has a book of Kells, so many tourists visit the college every day.

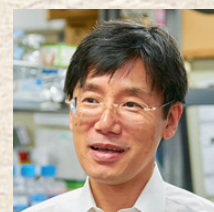
The Discovery of the Molecule's Role in Maintaining Liver Size and Function

THE LIVER IS one of the main detoxifying organs, removing waste and xenobiotics through metabolic conversion and biliary excretion. The waste and xenobiotics come from the gastrointestinal tract via the portal vein, and diffuse into small blood vessels known as hepatic sinusoids. Thus, the liver is constantly exposed to various stresses that can lead to tissue damage. Cellular stress in the liver leads to senescent, transformed, or damaged cells. These cells can impair tissue function or lead to tumorigenesis and therefore need to be eliminated and their loss compensated for by cell proliferation to maintain organ size. However, the molecular mechanisms that act to maintain three dimensional (3D) tissue and organ homeostasis during cellular stress are largely unknown (Fig.1).

The transcription coactivator YAP regulates organ size and cancer formation. Unphosphorylated YAP translocates into the nucleus, interacts with the transcription factor TEAD, and induces target gene expression. Our group isolated a unique medaka fish mutant, *hirame* (*hir*), which is sensitive to deformation by gravity. *hir* embryos display a markedly flattened body caused by mutation of YAP. We reported that YAP is essential for proper 3D body shape through regulation of cell tension (Nature 2015). In *Drosophila*, the cells with relatively lower fitness levels are eliminated from the tissue by a cell-cell interaction,

which is called “cell competition”. We found that active YAP-expressing mammalian epithelial (MDCK) cells are eliminated apically when the cells are surrounded by normal MDCK cells (Sci Rep 2016).

Our recent study has shown that YAP regulates the fate of hepatocytes by determining whether they proliferate to boost the organ's bulk or are degraded and removed (Nat Commun 2017). To examine how the Hippo pathway affects the fate of individual hepatocytes, we first established mosaic conditions by using hydrodynamic tail vein injection (HTVi) to introduce active YAP into mouse liver *in vivo*. We discovered that the fate of YAP-expressing hepatocytes changes from proliferation to migration/apoptosis depending on the status (healthy or damaged) of the liver (Fig.2). We also found that the elimination of YAP-activated hepatocytes is regulated by a mechanism distinct from adaptive immunity-dependent senescence surveillance. We found that both CDC42 and Rac which are small Rho family GTP proteins that regulate cytoskeleton organization and cell migration, contribute to YAP-activated hepatocyte elimination. Furthermore, we identified the upstream regulators of CDC42



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and Rac in hepatocytes expressing active YAP as Ect2 and Fgd3, which are guanine nucleotide exchange factors (GEF) for CDC42 and Rac. Thus, F-actin formation and YAP activation regulate each other through a feedback mechanism. In summary, YAP acts as a stress sensor that induces the elimination of injured cells to maintain tissue and organ homeostasis. These findings demonstrate the complexity of cell fate determination mechanisms *in vivo*, and highlight a new role for YAP in tissue dynamics.

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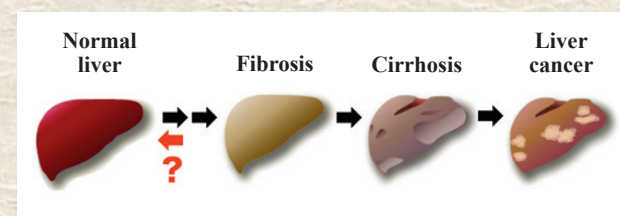


Fig. 1: Liver Homeostasis and Liver Diseases

The liver is constantly exposed to various stresses that can lead to tissue damage. Cellular stress in the liver leads to fibrosis, cirrhosis and liver cancer.

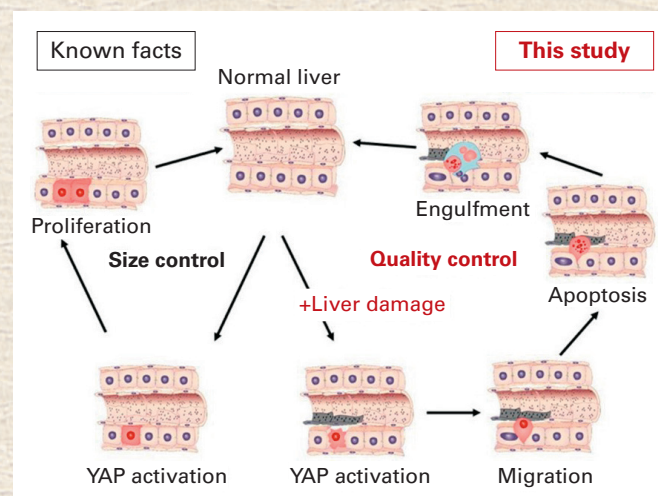


Fig.2: Schematic Model of the Change in Mouse Hepatocyte Fate

Active YAP (red cells) regulates liver size through hepatocyte proliferation (left; Previous work). In this study, we showed that active YAP selectively eliminates damaged hepatocytes (right). Hepatocytes expressing activated YAP in the presence of liver injury such as ethanol migrate into sinusoids, undergo apoptosis and are engulfed by Kupffer cells (blue).

A Lightning-Fast Human Influenza Virus Detector

RESEARCH CENTERED AT Tokyo Medical and Dental University (TMDU) builds a novel biosensor for the influenza virus that is almost 100 times more sensitive than conventional tests, and can distinguish between human and avian strains.

Tokyo, Japan – Researchers have developed a new, rapid biosensor for the early detection of even tiny concentrations of the human influenza A virus. Such early-stage diagnosis is crucial for averting a potential pandemic outbreak, as antiviral medication must be administered in a timely fashion. Conventional tests for detecting the flu virus are often slow and insensitive, and can miss early viral infections. In contrast, the new biosensor measures tiny changes in voltage in an electrically conductive polymer to quickly detect virus amounts almost 100 times smaller than the limit of currently available kits. The work was done at the TMDU, in a collaboration between the Department of Bioelectronics and the Department of Molecular Virology.

Conductive polymers are a class of carbon-based conjugated macromolecules that conduct electricity, but can also be used in biological environments. They are very attractive materials for

biosensor applications because researchers can easily attach bioreceptors to the polymers, which allow them to bind with specific targets, such as flu viruses. In this study, poly(3,4-ethylenedioxythiophene) (PEDOT) was modified with a trisaccharide that binds to human flu-virus, but not avian flu strains. “Conducting polymers have several advantages over inorganic counterparts,” explains corresponding author Yuji Miyahara. “These include the ability to conduct both electrical and ionic carriers, mechanical flexibility, low cytotoxicity, low-cost production by printing, and tunable properties via chemical synthesis or doping.”

When a solution containing H1N1, which carries a tiny positive charge on its exterior shell, was added, some of the viruses interact with the polymer (Fig. 1) and increased the voltage. Viral loads are often measured in hemagglutination units (HAU). The new biosensor can detect viral concentrations as small as 0.013 HAU. By comparison, commercially available kits that use immunochromatographic tests only work for concentrations greater than about 1.13 HAU. This represents an almost 100-fold increase in sensitivity. Study coauthor Shoji Yamaoka stressed the



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clinical applicability of the device. “We developed a conducting polymer-based sensor that can recognize a specific virus, which makes it a good candidate for wearable monitoring and point-of-care testing.”

The article, “Specific Recognition of Human Influenza Virus with PEDOT Bearing Sialic Acid-Terminated Trisaccharides” was published in ACS Applied Materials & Interfaces at DOI: 10.1021/acsami.7b02523

Summary: TMDU researchers built a novel biosensor for the rapid detection of human influenza virus using a bioreceptor-attached conducting polymer. The voltage-sensing detector was almost 100 times more sensitive than conventional tests, and distinguished between human and avian flu strains. The use of this biosensor may provide point-of-care testing and help prevent the outbreak of flu pandemics.

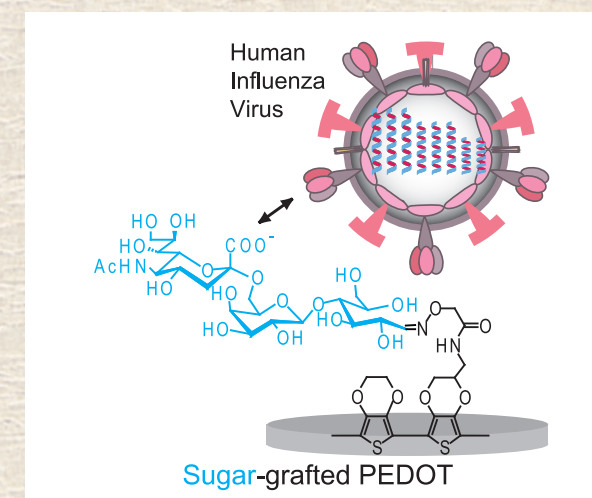


Fig. 1: Human Influenza Virus Recognition by Sugar-modified Conducting Polymers

A new conducting polymer was developed for detecting specific interaction of trisaccharide with hemagglutinin in the envelope of the human influenza A virus (H1N1) by electrical manners.

Protein Critical to Early Stages of Cellular HIV Infection Identified

TOKYO MEDICAL AND Dental University (TMDU)-led researchers identify a protein critical to the early stages of infection of cells by HIV, offering a potential target for anti-HIV treatment.

Tokyo, Japan – When a virus enters a cell, one of the first steps in the process of infecting that cell is removal of the protein coat that surrounds the virus's genetic material. The virus can then produce DNA from its own genes and insert it into the cell's genome. This allows the virus to hijack the host cell's machinery, forcing the cell to make copies of the virus.

HIV-1 is the most common form of HIV, the virus that causes AIDS. Now, a team led by researchers at TMDU have identified a protein produced by the host cell that is necessary for correct removal of the protein coat of HIV-1. The study was published in *PLOS Pathogens*.

In their search for factors involved in HIV-1 infection, the team interfered with the activity of over 15,000 host cell genes to identify those whose suppression allowed the cells to survive exposure to the virus (Fig.1). This led them to focus on a protein called maternal embry-

onic leucine-zipper kinase (MELK).

“Depleting cells of MELK reduced HIV-1 infectivity,” lead and corresponding author Hiroaki Takeuchi says. “The virus entered the MELK-depleted cell normally, but its protein coat was not removed correctly so it was unable to efficiently produce DNA from its own genetic material. When we restored MELK, the infection process was also restored.”

The researchers went on to investigate how MELK interferes with the protein coat removal step of infection. They discovered that MELK alters the coat by attaching a biologically active modification through specific phosphorylation of the capsid at serine-149. This in turn ensures correct removal of the coat (Fig. 2). When the team engineered a mutated version of HIV-1 that was already modified at this location, they found that MELK was no longer needed for coat removal.

“Our results reveal a previously unrecognized mechanism involved in removal of the protein coat of HIV-1 and contribute to our understanding of the early stages of the viral life-cycle,” corresponding authors Hiroaki Takeuchi and



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Shoji Yamaoka say. “Furthermore, our findings suggest that MELK is a potential target for anti-HIV-1 therapy.”

The article, “Phosphorylation of the HIV-1 capsid by MELK triggers uncoating to promote viral cDNA synthesis”, was published in *PLOS Pathogens* at DOI: 10.1371/journal.ppat.1006441.

Summary: A TMDU-led research team identified a protein, MELK, required for the HIV-1 to efficiently infect its target cells. MELK, produced by the cell, is necessary for removal of the protein coat around the HIV-1, which is essential for the infection process. The team further revealed that MELK modifies the protein coat through specific phosphorylation of the capsid at serine-149 to promote its removal. These findings offer a potential new target for anti-HIV treatment.

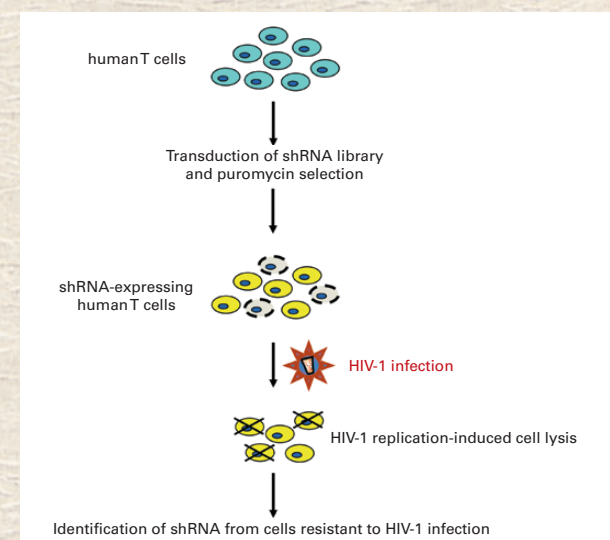


Fig. 1: Schematic Summary of the Genome-wide RNAi Screen to Identify Essential Host Factor(s) for HIV-1 Infection of Human Cells

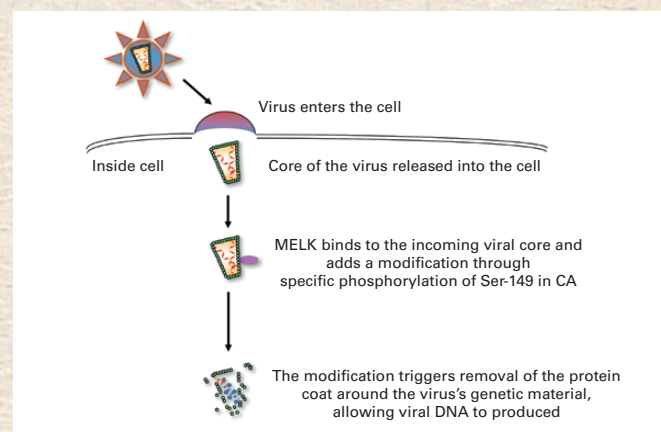


Fig. 2: Modification of the Viral Protein Coat by MELK Regulates Its Removal to Allow Viral DNA Synthesis
Shortly after HIV-1 entry, MELK produced by the target cell regulates removal of the protein coat (the capsid, CA, which is an important part of the core of the virus) by adding a modification at a specific location. This regulated coat removal promotes optimal production of viral DNA, allowing the infection process to proceed efficiently.

A Novel Synthetic Method for Phosphine Oxides with Three Different Substituents

RESEARCHERS CENTERED AT Tokyo Medical and Dental University (TMDU) have developed a facile method for preparing phosphine oxides bearing three different substituents (Fig.1).

Organophosphorus compounds have a wide application in various fields such as drug discovery and organic materials. Despite the importance of these compounds, synthesis of complex organophosphorus compounds, particularly tertiary phosphine oxides in which three different substituents are bound to the phosphorus atom, was difficult to achieve by conventional methods. This is because these methods often use starting materials with phosphorus-chlorine bonds that are unstable to water and also highly reactive to nucleophilic reagents, making difficult to control the desired sequential substitution reaction. In this context, a more practical method for the synthesis of organophosphorus compounds has been required.

The research team at TMDU has found that “phosphonic acid dithioesters” are suitable starting materials for their purpose. These compounds showed high stability toward water and were able to be purified by silica-gel chromatography without special care. Moreover, phosphonic acid dithioesters showed an appropriate reactivity in the sequential reaction with two different Grignard reagents to afford various tertiary phosphine oxides in high yields.

“The key point of the novel method is the moderate leaving ability of a sulfur atom,” the first author Yoshitake Nishiyama says. He explains: “The starting materials with phosphorus-chlorine bonds used in the conventional methods are generally highly reactive, but unstable instead. The starting materials with phosphorus-oxygen bonds are very stable, but in that case not reactive enough. Phosphorus-sulfur bonds in the starting materials and intermediates that appear

in this method have been found sufficiently stable and also reactive enough toward Grignard reagents.”

Using phosphonic acid dithioesters with stable phosphorus-sulfur bonds has rendered the research group able to achieve the synthesis of complex organophosphorus compounds in a combination with a bromo-magnesium exchange reaction. For example, they have demonstrated efficient synthesis of organophosphorus compounds such as a



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1,2-diphosphinobenzene derivative and a cyclic phosphinate, which are difficult to prepare by the conventional methods.

“The new method has enabled preparation of various organophosphorus compounds from three simple starting materials,” one of the corresponding authors Takamitsu Hosoya says. He adds: “This means that, in principle, a combination of a hundred type of each three materials could easily produce a million type of products, which would contain candidates for pharmaceuticals or other useful materials.”

The article “Synthesis of Unsymmetrical Tertiary Phosphine Oxides via Sequential Substitution Reaction of Phosphonic Acid Dithioesters with Grignard Reagents” was published in *Organic Letters* (Yoshida and Hosoya et al., *Org Lett*, 19: 3899-902, 2017).

Summary: TMDU researchers have developed a facile synthetic method for phosphine oxides bearing three different substituents. The choice of phosphonic acid dithioesters with appropriate chemical stability and reactivity as the starting materials was the key for success. Using this method, a wide range of potentially useful organophosphorus compounds have become easily available.

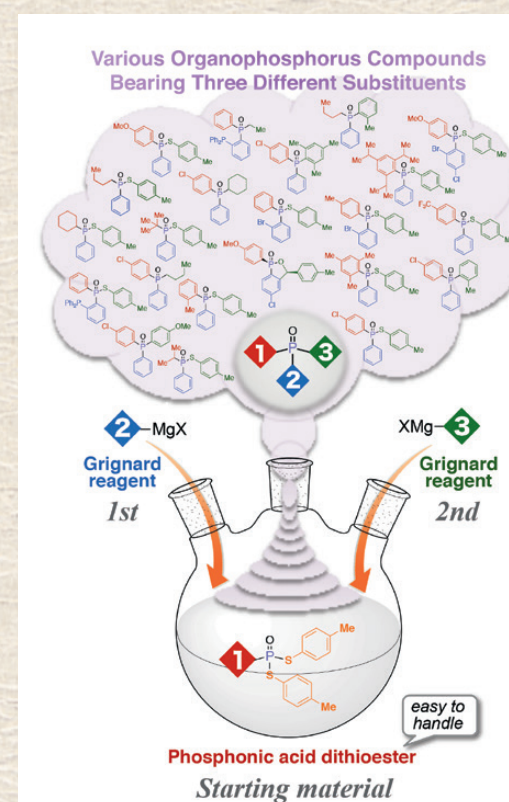


Fig. 1: Facile Synthesis of Various Tertiary Phosphine Oxides from Three Simple Starting Materials.

Professor Junji Tagami of the Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, receives the 2017 IADR Wilmer Souder Award

THE INTERNATIONAL ASSOCIATION for Dental Research (IADR) presented Prof. Junji Tagami of the Department of Cariology and Operative Dentistry, at TMDU's Graduate School of Medical and Dental Sciences, with the 2017 IADR Wilmer Souder Award at the 95th General Session & Exhibition of the IADR held in San Francisco on March 22, 2017.

The Award, founded in 1955, is the oldest of the 17 IADR Distinguished Scientist Awards, which honoring Dr. Wilmer Souder, the father of modern dental materials research, for his



motivating force in establishing the Dental Section at the National Bureau of Standards (currently referred to as the National Institute of Standards and Technology). This Award is designed to encourage advancement in dental materials research based on scientific concepts, and is made on the basis of scientific achievement of outstanding quality that is considered to lead to significant advancements in dental service to the public. It is intended to confer the highest honor in the field of dental materials research.

Prof. Tagami is the first Japanese researcher to have received the Wilmer Souder Award since 1999. His fundamental research on the mechanisms of adhesion to tooth tissue has greatly contributed to the development of new bonding approaches, leading to the advancement of adhesive dentistry.



Prof. Tagami (right), with Prof. Jukka Meurman of University of Helsinki, who was then President of IADR, at the 2017 IADR Wilmer Souder Award ceremony

Eugen-und-Ilse-Seibold-Preis (Eugen and Ilse Seibold Prize) awarded to Professor Takeshi Tsubata of the Department of Immunology, Medical Research Institute

PROF. TAKESHI TSUBATA of the Department of Immunology, Medical Research Institute of TMDU was awarded the Eugen-und-Ilse-Seibold-Preis (Eugen and Ilse Seibold Prize) by the Deutsche Forschungsgemeinschaft (German Research Foundation) on Oct. 10, 2017 in Bonn, Germany.

This Prize, named after marine geologist, Prof. Eugen Seibold, and his wife, Ilse Seibold, is awarded once every two years to one Japanese and one German researcher in honor of their long-term successful and dedicated commitment to academic and cultural exchange between the two countries, and for particular achievements in all fields of research. Prof. Tsubata is the first researcher to have received the Prize in the field of Life Science and Medicine. He is honored for an outstanding contribution to "discovering novel aspects of the basic principles of the humoral immune response."

In the normal immune system, antibodies are produced in reaction only to microbes, not to other components, including self-components. Prof. Tsubata's research group has made vari-

ous advancements and vital contributions to the immunology field, including identification and clarification of the mechanism by which antibodies are produced only to microbes, identification of the signal cascade for inducing the B lymphocytes of suppressive function, and identification of a receptor to prevent autoimmunity via recognizing self-components.



Prizewinners Prof. Tsubata second from left and his German counterpart, Prof. Thomas Bock, at the award ceremony with Prof. Katja Becker, Vice President of the German Research Foundation (left) and Dr. Ursula Seibold-Bultmann, daughter of the Seibolds (right).



Cover of this issue

Yushima Campus of Tokyo Medical and Dental University. The opening in 2009 of the M&D Tower, the second building devoted to Medical and Dental Sciences, has given added impetus to the fusion of basic and clinical research transcending traditional boundaries, collaboration in the medical and dental fields, and industry-academia-government collaboration in education and research through use of open labs. In 2015, the rooftop heliport of the Medical Hospital was upgraded to accommodate large helicopters, thereby enhancing the hospital's role as a Trauma and Acute Critical Care Medical Center in Japan's capital.

EDITORIAL SUMMARY

WE ARE PLEASED to send you Vol. 10 of the TMDU Annual News, with highlights of TMDU's international activities and campus events for the 2017-2018 academic year. President Yasuyuki Yoshizawa discusses in his "Message from the President" TMDU's initiatives to help extend our healthy life expectancy by detecting and treating disease early as well as by preventing it in consideration of individual genomic information. The initiatives include the launching of the new programs in the graduate school and the establishment and effective use of the Center for Personalized Medicine for Healthy Aging. The former initiative featured in this issue is by Professor Hajime Karasuyama, Executive Director and Executive Vice President, who introduces you to the master's program in "Medical Sciences Program for Preemptive Medicine" and to the doctoral program in "Integrative Biomedical Sciences Program for Preemptive Medicine". The latter initiative is detailed by Professor Kinya Ishikawa, Director of the Center for Personalized Medicine for Healthy Aging.

In Campus News, we highlight the delegation headed by President Yoshizawa in visiting Mahidol University (MU) (Thailand) to strengthen the relationship and cooperation between both universities and to celebrate the opening of a new office, the "TMDU-MU Partnership Siriraj Office".

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

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

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