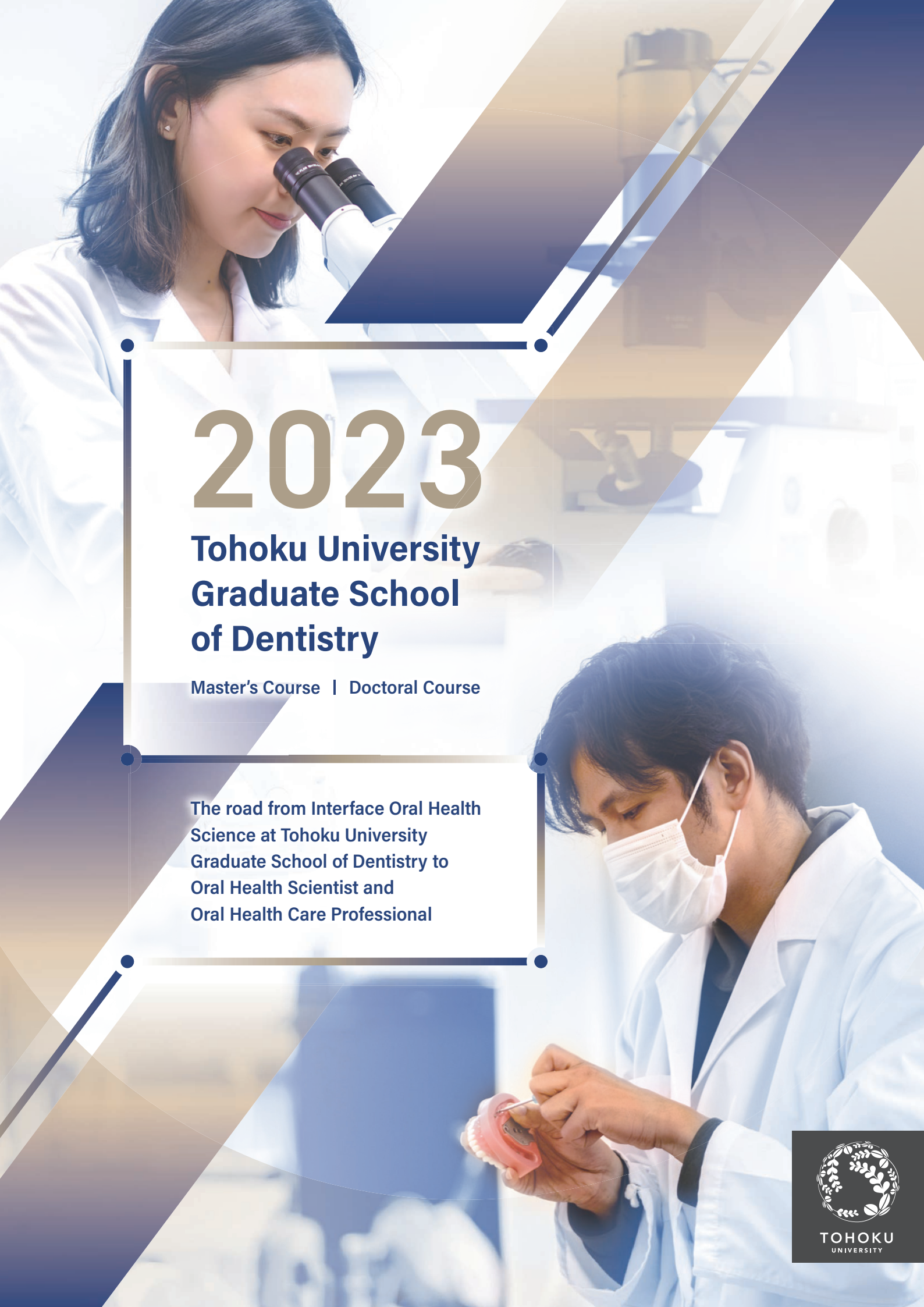


2023

Tohoku University Graduate School of Dentistry

Master's Course | Doctoral Course

The road from Interface Oral Health Science at Tohoku University Graduate School of Dentistry to Oral Health Scientist and Oral Health Care Professional

TOHOKU UNIVERSITY

Tohoku University Graduate School of Dentistry —A Pathfinder of Dentistry, Dental Care, and Oral Health for the Next Generation

The Graduate School of Dentistry's mission is to train global leaders and highly specialized professionals in dentistry, dental care, and oral health for the next generation. With the advantages of Tohoku University — one of the world's leading comprehensive universities —, we ensure the potential leaders a high standard of education and research systems in various fields. Besides, in the framework of our special programs such as the Interface Oral Health Science program, the Master's course, and the Asia Double Degree Program, students develop a sense of a research-oriented outlook and a scientific mind.

Nobuhiro Takahashi
Dean,
Tohoku University
Graduate School of Dentistry
School of Dentistry

First of all, let me briefly introduce the history of Tohoku University. It was originally founded in 1907 as the third Imperial University in Japan after Tokyo Imperial University and Kyoto Imperial University and is now a designated national university along with them. Blessed with many intellectual assets and excellent human resources, the university continues to produce world-class results and is, so to say, a game-changer of the world.

As a graduate school of Tohoku University, the Graduate School of Dentistry was established in 1972, seven years after the foundation of the School of Dentistry. Since then, we have focused on education and research based on Tohoku University's philosophy of "Research first", "Open doors" and "Practice-oriented research and education".

Dental health plays a vital role in individuals' quality of life. How does dentistry helps your life? Have you ever thought about what a mouth is? The mouth has a variety of functions, including eating, staying alive, and speaking and facial expressions, to communicate. All these functions are essential to life, and at the same time, they are deeply related to our vitality, enjoyment, and fulfillment in human relationships. The mouth is a "gateway" connecting our outer and inner worlds. When we interact with the outside world, our mouth serves as an "interface." Many oral diseases such as dental caries and periodontal disease, occur at the interface where the different systems coincide. Therefore, keeping the interface healthy can help us maintain and improve our oral health, as well as our overall health. In this era of 100 years of life, dentistry plays a crucial role in extending the period people enjoy a healthy and high-quality life, or "healthy life expectancy".

In 2002, based on the terminology "Interface", we presented the new concept of dentistry "Interface Oral Health Science (IOHS)", which encompasses the various functions and roles of the oral cavity. The IOHS concept views the oral cavity as consisting of three systems. The first consists of the tissues and organs that form the mouth, including the teeth, bone, and oral mucosa; the second of the vast microorganisms that live there; and the third of the biomaterials, which are essential and inevitable for dental treatment. Mechanical stresses, or complex forces such as occlusal force, are also applied alongside these three systems.

Since the proposal of the new concept "IOHS" and with the clear direction where dentistry research should proceed, advanced research rooted in the uniqueness and universality of dentistry has been promoted through several research/education projects adopted by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT). These projects, however, are not carried out by the Graduate School of Dentistry alone but are the fruit of university-wide wisdom, mainly thanks to the Institute for Materials Research; the Graduate School of Medical Engineering; the Graduate School of Engineering; and the Graduate School of Agricultural Science, as well as with other educational and research institutions in Japan and overseas. These initiatives have blazed the trail of "interdisciplinary fusion," ranging from the biomaterials research since the establishment of IOHS to the latest "SHOKU-gaku research project – Transdisciplinary Science of Eating, Food, and Nutrition for Health and Wellbeing." We have also established a Liaison Center for Innovative Dentistry that links these fields with other departments at the university, external research institutions, and local communities to realize cross-disciplinary research and interdisciplinary fusion. These are the strengths of Tohoku University, an institution with a long history and tradition and a track record of world-class results.

In 2004, we also established Japan's first Double Degree course as well as a Master's program in dentistry to expand the horizon of dental care and oral health.
These establishments boost "Open doors" in dental science education and research. Students from various professions—ranging from medical and co-medical to engineering; nutrition science; health welfare; and medical administration—are studying at the Graduate School. To develop research/education in the Master's course, we increased the quotas on students and strengthened ties with the Doctoral course in 2020.

The Graduate School of Dentistry has a high level of international competence, and as a base for dental education and research in Asia, our education and research are conducted with the world's leading dental schools. Approximately a quarter of graduate students are from outside Japan. It is common for us that students from various cultural backgrounds strive together toward the same goal to pursue dental science. Eventually, this environment nurtures leaders in the global society. On behalf of all faculty members of the Graduate School of Dentistry, we are proud to commit ourselves to educational research and are fully aware of our mission.

HISTORY

History of Dental Medicine and Tohoku University Graduate School of Dentistry・School of Dentistry

Milestones in the history of modern dental medicine and Japanese dental medicine

1723	Pierre Fauchard (known the father of modern dental medicine) announces "Le Chirurgien Dentist."
1728	Fauchard makes full maxillary dentures.
1840	First modern dental medicine school in the world, Baltimore School of Dentistry, established in U.S.
1844	Tooth extraction conducted under general anesthesia using nitrous oxide.
1846	Oral surgery conducted using ether anesthesia in the U.S.
1860	American dentist William Clark Eastlake opens dental clinic in Yokohama.
1876	Mizuhoya imports dental equipment from U.S. to Japan. Production of dental equipment starts in Japan.
1878	Kisai Takayama goes to the U.S. to study dental medicine at his own expense, returns to Japan after passing exam to practice medicine as a dentist.
1881	Takayama publishes first dental technical book in Japan, "Hoshishinron."
1883	Medical practice test rules established and dental medicine becomes specialized field.
↓	American dentist Willoughby D. Miller announces "Miller's chemico-parasitic theory."
1888	First school of dental medicine in Japan, Tokyo College of Dental Medicine, established (closed the next year).
1890	Takayama School of Dentistry established. (In 1900, changes name to Tokyo College of Dentists; in 1946 restructured into Tokyo Dental College.)
1891	Fact that dental plaque causes tooth decay discovered in U.S.
1893	Dental Practitioners Association established (in 1926, changes name to Japan Dental Association).
1902	Japan Association for Dental Science established.
1903	School of Dentistry at School of Medicine, University of Tokyo established.
1906	Dental Practitioners Law instituted.
1911	Dental College established.
1916	Dental Practitioners Law revised to restrict doctors from practicing dentistry.
1928	Cavity Prevention Day instituted.
	Tokyo High School of Dental Medicine (currently Tokyo Medical and Dental University) established.
↓	Dentist training by national institutions in Japan starts.
1946	Dental Education Council begun under the General Headquarters orders.
1947	Dentist National Examination begins.
1948	Dental Education Standards Draft passed.

History of the Graduate School of Dentistry, School of Dentistry

1965	Tohoku University School of Dentistry established, advocating the philosophies of "Training dentists who can think," "One mouth is a unit," and "Holistic dentistry."
1967	Tohoku University Dental Hospital opens.
1972	Tohoku University Graduate School of Dentistry established.
1975	Dental Technicians School established.
1993	Prof. Emeritus Hajime Yamamoto awarded Japan Imperial Prize for "Research into applications related to prevention of tooth decay by laser irradiation."
2000	Tohoku University Graduate School of Dentistry, responding to the government's educational policy of emphasizing graduate schools by educating students with inquiring minds and scientific perspective who can be leaders in dental research.
2002	Interface Oral Health Science concept proposed by Tohoku University Graduate School of Dentistry.
2003	Organizational integration of Tohoku University Dental Hospital and University Hospital.
↓	Tohoku University Hospital opens.
2004	Graduate School of Dentistry establishes first Master's course in dentistry in Japan.
↓	Graduate School of Dentistry starts conducting special education in oral science for people other than those in the medical and dental field.
2005	First International Symposium on Interface Oral Health Science held.
2007	Tohoku University Dental Hospital and Medical Center renamed, beds and operating rooms moved to new location.
↓	"Living body biomaterial high-performance interface science project" begins, sponsored by Ministry of Education, Culture, Sports, Science and Technology.
2008	Implant outpatients accepted at Dental Medical Center of Tohoku University Hospital.
2009	Renovation of Lecture Building of Graduate School of Dentistry completed.
2010	Prof. Emeritus Shobu Hinuma awarded Order of Culture.
↓	Medical Dental Center outpatient clinic transferred and integrated as Dental Department of Tohoku University Hospital.
2011	Liaison Center for Innovative Dentistry established.
2012	Renovation of Clinical Research Building, Graduate School of Dentistry completed.
2013	Center for Environmental Dentistry established.
↓	Dental and Digital Forensics established.
2014	Center for Epidemiology, Biostatistics and Clinical Research established.
2015	Center for Advanced Stem Cell and Regenerative Research established.
2017	Next generation Dental Materials Research established.
↓	Advanced Free Radical Science established.
2020	Courses restructured; Ecological Dentistry, Community Social Dentistry, Disease Management Dentistry, and Rehabilitation Dentistry established.
↓	Liaison Center for Innovative Dentistry reorganized as an affiliated educational research institute.
2021	Dental Technicians School closed.

CONTENTS

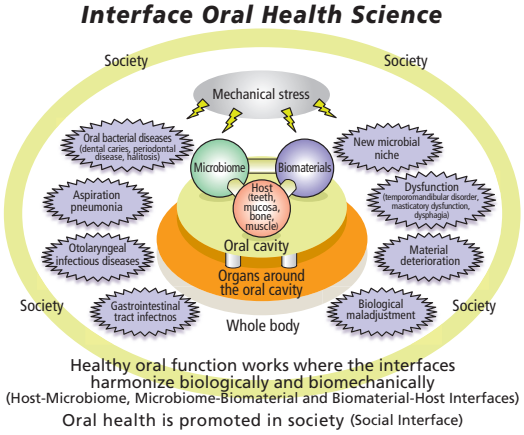
"What is Interface Oral Health Science?"

The Birth of Interface Oral Health Science

The academic field that is acknowledged as dentistry (dental medicine) nowadays was mainly treatment theory. Etiology and basic dentistry were subdivided and far from systematized. In 2002, Tohoku University Graduate School of Dentistry proposed connecting the various areas of expertise, which were at that time subdivided, and systematizing them as Interface Oral Health Science.

The oral cavity consists of 1) oral tissue (teeth, mucosa, bone, muscles, etc. –the living body); 2) parasitic microorganisms that live in the oral cavity; and 3) biomaterials, as well as mechanical stress as represented by the occlusal force. These are the characteristics of the oral cavity.

Interface oral health science concerns itself with the places where the various systems interact. In other words, healthy oral function works where the interfaces harmonize biologically and biomechanically. In addition, the oral cavity is itself an interface, between the inner body and the outside world. It is understood that oral cavity related diseases, such as aspiration pneumonia and gastrointestinal tract infections, occur due to the collapse of the interfaces between systems.



From Oral Cavity Interface to Academic Interface – and Society Interface

This concept not only covers the area of oral health science and dental science, it relates to a wide range of academic disciplines, including medicine, agriculture, materials science, pharmacology and so on. Practicing interface oral health science leads to further promotion of dental research and activation of interdisciplinary research in related areas.

In 2007, the "Highly-functional Interface Science: Innovation of Biomaterials with Highly-functional Interface to Host and Parasite" program was approved by Japan's Ministry of Education, Culture, Sports, Science and Technology, and we began collaborating with Tohoku University's Institute for Materials Research and Kyushu University's Research Institute for Applied Mechanics to conduct research and development on new biomaterials and develop clinical applications aimed at interface control. As a successor project, moreover, "Creation of a Biological and Non-Biological Intelligent Interface" was launched in 2012. These are the realization of the "Academic Interface" that aims to link existing academic fields and create a new academic discipline.

In addition, in order to achieve healthy oral function in local and international communities, it is essential to communicate with local and international communities interactively (two-way communication). In other words, it is necessary to gain an understanding of the status of the oral health of local residents, solve existing problems, and return these solutions to local communities. We also must investigate the oral health status overseas and provide what is needed, as well as cooperate with overseas research institutes and contribute to the general good by returning the outcomes of Japanese dental research to the international community.

We have set up a Liaison Center for Innovative Dentistry in 2011 to enhance cooperation with local communities and foreign research institutes; it has concluded international academic partnerships with core schools in Asia (27 universities), Europe (4 universities), North America (2 universities and 1 research institute) and Oceania (1 university). Under the MEXT's program "Innovative Oral Health Scinece Liaison for Multimodal Reserach and Education (2013-2019 and 2020-)", the Liaison Center is playing an important role as "Regional and International Interfaces."

Sending out 'Interface Oral Health Science' to the World

At present, the concept of Interface Oral Health Science is widely recognized in Japan and abroad as the next generation of dentistry and oral science. In 2005, the International Symposium for Interface Oral Health Science: IS-IOHS was held in Sendai and many researchers gathered there from Japan and overseas. Every 2 years since 2005, IS-IOHS has been held in Sendai, with publication of an English book about the new outcomes of IOHS. In addition to Sendai, satellite symposia were held regularly at the Harvard-Forsyth Institute in the United States, The University of Hong Kong and Peking University in China, National Taiwan University in Taiwan, Seoul National University in Korea and University of Sydney in Australia. Interface Oral Health Science is spreading more and more. In 2019, the 8th International Symposium was held in Fuzhou, China, and realized the overseas development of Interface Oral Health Science. Its foundation is in the characteristics of Tohoku University Graduate School of Dentistry –the uniqueness of dentistry and oral science and the desire to conduct unique research with universality to other academic disciplines; the passion of research educators and graduate students who gather at the place; and finally, the orientation toward international, interdisciplinary and fusion-oriented research.

Interface Oral Health Science(IOHS), since 2002

Next-generation oral health science from Tohoku University Graduate School of Dentistry

International joint education to establish standards of dental education in Asia

We have launched a multi-modal dentistry innovation program. This is a graduate school educational project aimed at establishing a setup for accepting overseas students, focusing on the Joint Graduate School Education system through collaboration with some of Asia' s core universities. Another of its goals is to construct an "Asian standard" through dentistry innovations with "global knowledge" and "integrated knowledge" as the keywords and to enhance the level of dentistry and dental treatment in Japan and Asia.

Specifically, we will step up educational and research collaborations by focusing on developing and implementing the Double-Degree Program (DD Program) with influential dentistry graduate school in China and South Korea. Under this program, a graduate student will be registered at two university graduate schools, receive education from the school of both universities, and earn academic degrees from both universities if he or she meets the requirements. By means of this setup, we aim to establish dentistry and dental treatment based on a foundation common to all of Asia (the "Asian standard"), and realize dental innovation.

While still enrolled in graduate school, participants in the DD Program study abroad at the partner university for a set period of time, and carry out joint research. An agreement has been made with several universities, including Peking University, Sichuan University, Wuhan University, and Tianjin Medical University in China, and Seoul National University, Yonsei University, and Chonnam National University in South Korea, and Chulalongkorn University in Thailand. These schools have already begun accepting graduate students from abroad.

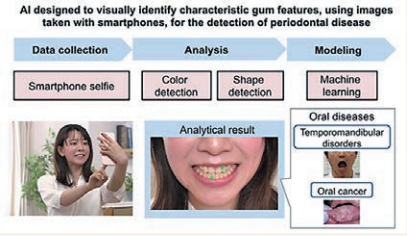
▲ Wuhan-Tohoku International Symposium 2019 (2019.10.18)


▲ The 8th IOHS International Symposium at Fuzhou, China (2019.1.11-12)

Study case of IOHS

Joint research with NTT DOCOMO on AI to detect periodontal disease

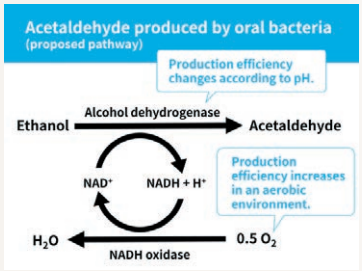
We are conducting research on AI to detect periodontal diseases in cooperation with NTT DOCOMO, with the aim of creating a society that can detect periodontal diseases that cause lifestyle diseases and tooth loss at an early stage. The Graduate School of Dentistry has a wealth of expertise in the diagnosis and research of oral diseases, and DOCOMO's AI technology is combined to jointly research and develop an AI that uses machine learning to detect periodontal disease by extracting features from images taken with smartphones. In addition to periodontal disease, we aim to detect and commercialize other oral diseases such as temporomandibular disorders and oral cancer.



▲ Overview of Periodontal Disease Detection AI

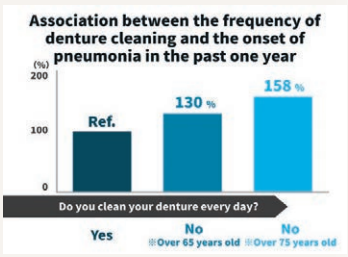
An oral cancer risk factor that oral bacteria produce

Acetaldehyde, which is produced by bacteria in the oral cavity, has been attracting attention in recent years as a potential risk factor for oral cancer, but the mechanism of its production and its metabolic characteristics have not been clarified. The Graduate School of Dentistry measured acetaldehyde production from ethanol as a substrate under various conditions assuming an oral environment, and found "many oral bacteria in healthy oral cavity metabolize ethanol to produce acetaldehyde." and "its production increases in the assumed environment in the healthy oral cavity". These results suggest that oral bacteria produce acetaldehyde from alcohol and may increase the risk of oral cancer even in healthy oral environments. (Scientific Reports 2019)



High association between denture cleaning frequency and pneumonia

The Graduate School of Dentistry has conducted many studies to investigate the relationship between oral conditions and systemic diseases. Recently, we announced that the frequency of denture cleaning was strongly associated with the incidence of pneumonia. An analysis of the association between the frequency of denture cleaning and the incidence of pneumonia based on data from a survey of approximately 70,000 community-dwelling elderly people aged 65 years or older revealed that those who did not clean their dentures daily had a 1.30 times higher risk of developing pneumonia in the past 1 year than those who cleaned their dentures daily, and a 1.58 times higher risk of developing pneumonia in those aged 75 years or older. The effectiveness of oral care in preventing aspiration pneumonia in inpatients and nursing home residents has been confirmed, but this study suggests that oral care may also be effective in community-dwelling elderly people. (Scientific Reports 2019)



What we study at the Graduate School of Dentistry

Graduate School of Dentistry Admissions Policy

The Tohoku University Graduate School of Dentistry strives to foster researchers and sophisticated professionals who: possess advanced knowledge and skills in dentistry, oral care, and oral health, as well as the sensibilities and fundamental human qualities that support that expertise; are closely attuned to the needs of society; and can identify problems on their own and develop concrete solutions for various challenges of dentistry.

Specifically, we seek applicants who aspire to become sophisticated professionals capable of contributing to society with their specialized knowledge and skills backed by sensibilities and fundamental human qualities, or to become researchers able to contribute to new advances in dentistry.

To attract such candidates we offer three admissions tracks: general admissions, special admissions for Working-adults, and special admissions for international students. We use these admissions processes to assess and select applicants, placing emphasis on whether each candidate has the high-level competencies and qualities needed to engage in research aligned with our educational principles and goals.

I The Doctoral Course

Admissions policy

The doctoral course seeks students who are highly motivated to study dental science, possess outstanding competencies, a broad perspective, and flexibility, and are able to pursue original, advanced, transdisciplinary, and exploratory research founded on bench founded on unity in specialization and academics.

The general admissions track evaluates applicants through three exams: a written exam of basic knowledge and understanding of specialized disciplines, an externally administered certification exam of English reading comprehension, and an interview and transcript review for comprehensively assessing whether the applicants possess strong motivation to study dental science, outstanding competencies, a broad perspective, and flexible sensibilities. These exams are given approximately equal weight in the selection process.

Special admissions for Working-adults evaluates applicants through three exams: a written exam of knowledge and understanding of specialized disciplines, an externally administered certification exam of English reading comprehension, and an interview and a review of transcripts and statement of purpose for comprehensively assessing whether the applicants possess strong motivation to study dental science, a broad perspective, and flexible sensibilities. These exams are given approximately equal weight in the selection process.

Special admissions for international students evaluates applicants through two exams: a written exam of basic knowledge and understanding of specialized disciplines, and an interview and transcript review for comprehensively assessing whether the applicants possess strong motivation to study dental science, and outstanding competencies. These exams are given approximately equal weight in the selection process.

Those who are not native speakers of English are expected to acquire sufficient ability in English comprehension and communication before enrolling.

Curriculum policy

The Graduate School of Dentistry formulates and implements the curriculum based on the following policy in order to enable students to achieve the aims of the Diploma Policy.

(1) Facilitate the acquisition of sophisticated knowledge and skills in specialized fields and transdisciplinary domains by providing specialized and transdisciplinary courses necessary for dental science research, and having students develop abundant expertise in dental science, dental care, and oral health, and write a dissertation based on that expertise.

(2) Provide opportunities to develop the high ethical standards and leadership necessary for engaging in research, and opportunities in Japan and abroad to learn about and report the latest findings in cutting-edge research.

(3) Achievement is evaluated by determining, using tests and reports, whether the student has reached the objectives described in the syllabus. The Doctoral dissertation is evaluated by determining whether it contributes to advanced research from an original perspective, and whether the student, as an independent researcher, has advanced research capabilities and extensive knowledge necessary for research activities and highly professional duties, and by evaluating final exams.

Diploma policy

The Graduate School of Dentistry awards a Doctoral degree to students who has studied the required subjects set according to the school's educational philosophy and objectives, has completed the credits required by the school, has acquired the knowledge and skills as described below, and has passed the Doctoral dissertation review and the final examination.

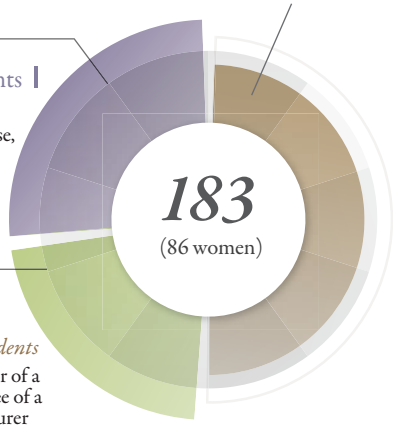
(1) Be able to complete independent, original, and transdisciplinary research in dentistry using one's abundant expertise and high-level specialized knowledge and skills.

(2) Be able to contribute to the advancement of society and scholarship by carrying out next-generation research as a leader in dentistry who tackles societal and scholarly challenges with original ideas, high ethical standards, and a firm sense of responsibility.

(3) Be able to lead dental research in Japan and abroad by utilizing one' s international perspective and communication skills, and by disseminating world-class research findings.

Number of graduate students in the doctoral course

(as of May1, 2022)



Doctoral course program

IOHS course

Completion of at least 3 classes each from Special Lecture on Dentistry, Dentistry Exercise, and Experiment/Technical Training Course is required.

Classes (minimum credits, 30)

- **Dentistry Theory** (9 credits) — Introduction to the specific research field
- **Dentistry Exercise** (6 credits) — Exercise in the specific research field
- **Experiment Technique Training Course** (6 credits) — Technical training in experiments

Special training for doctoral thesis preparation (9 credits) — Students will earn credits by attending the class "Foundation of Graduate Research," presenting a research subject and acquiring technical knowledge

CA+in D course

Completion from Special Lecture on Dentistry, Dentistry Exercise, and Experiment/Technical Training Course is required.

Classes (minimum credits, 30)

- **Dentistry Theory** (3 credits) — Introduction to the specific research field
- **Dentistry Exercise** (2 credits) — Exercise in the specific research field
- **Experiment Technique Training Course** (6 credits) — Technical training in experiments

Special training for doctoral thesis preparation (9 credits) — Students will earn credits by attending the class "Foundation of Graduate Research," presenting a research subject and acquiring technical knowledge

- **Psychosocial Science of Oral Health and Wellbeing** (3credits)
- **Entrepreneur Science of Oral Health and Wellbeing** (3credits)
- **Cross-sectional Science of Oral Health and Wellbeing** (3credits)
- **Global Exposure in Oral Health and Wellbeing** (1credits)

Common to both courses

Admission

First year → Second year → Third year → Fourth year

- First year: Research topic selection; Research topic decision meeting
- Fourth year: Final defense; Submit a doctoral thesis

Course completion

Participate in journal review meetings, case conferences, study seminars, research progress report meetings and clinical work

Attend and make presentations at scientific conferences in a specific field

Course acceleration — Students with excellent research achievement (eg, a first-authored paper accepted by an established journal) may complete the course in 2 years.

Striving for personal growth

Student's Message

I came from Egypt to Japan to fulfill my dream of studying abroad, advance my career and gain new knowledge in the dentistry field. I joined the International and Community Oral Health Department in the Graduate School of Dentistry where we utilize data through intensive statistical analysis to come up with better dental public health policies.

Embracing the concept of multidisciplinary research, the Graduate School of Dentistry in Tohoku University have good facilities with good research materials and supplies. Research fields ranges from basic to applied research where it advances most of dental research fields.

The graduate school of dentistry have lot of research collaboration and exchange programs with southeast Asian universities in china, south Korea and Thailand where international students have the opportunities to attend International conferences worldwide and gain knowledge from other' s experiences through competitive travel grants offered by the school.

The friendly atmosphere provided for foreign students here is quite noticeable. Tohoku university help foreign students setting up their lives when they come to Japan and break the huge language barrier through the individual tutor system for each new foreign student. Japanese tutors support foreign students with paper work to obtain their residence cards, housing contracts, bank accounts, etc. The university also offers Japanese language classes tailored to international student' s needs.

Tohoku University also offers a wide range of extra-curricular activities ranging from sports, hobbies, socializing events with professors, to even having research competitions that will keep you entertained during your study period.

Sendai is a great city for studying and conducting research with a lot of beautiful scenery, nature and greenery that is easily accessible from the city center. You can focus on your studies with no so much distractions here. Coming from a hot country and moving to a cold city like Sendai was really challenging. But, you will still be fine if you prepared for it by buying the suitable outfit. Also, Northern Japan and Sendai as its capital offers authentic delicious Japanese cuisine, especially seafood.

It' s an honor for me to be a graduate student in this school, and I hope that other foreign students will enjoy their studies here too.

Doctoral Course 3rd year | from Egypt

Hazem Abbas Farouk Abbas

Great Experience with a New Dimension of Life

Student's Message

Over more than a century, Tohoku University has been consistently ranked amongst the most prestigious academic institutions of Japan. Its world-leading educations, numerous research achievements and contributions, associated with global collaborative partners, led to be No. 1 of the Japanese university ranking by Times Higher Education in 2020. After completion of my DDS from Khon Kaen University, I was subsequently accepted as an academic instructor at Institute of Dentistry, Suranaree University of Technology. In order to improve my academic career, I believe that doctoral program could emphasize on intensive scientific research and innovative solution which are necessary for my professional development in the 21st century higher education. Fortunately, I was admitted into a PhD candidate of Professor Hiroshi Egusa at Division of Molecular and Regenerative Prosthodontics in Tohoku University Graduate School of Dentistry.

Almost two years have already passed, my life has also changed together with current perspectives of research in Japan. I have gained a lot of knowledges and laboratory skills not only my main area of interest which focuses on "Nano-surface implant and prevention of peri-implantitis", but also regenerative medicine in dentistry through journal club meeting and data report progression in every week. We usually share and update knowledge to each other; therefore, I am able to learn other fields what I am interested in. Furthermore, I was considerably fortunate to have a nice mentorship from our supervisors and staffs who guide me intimately how to seek and critically appraised information and how to conduct and prioritize research. In addition to the effective research environment, including excellent research facilities and technologies, professional resources, fruitful collaborations and international communications, it is a critical contribution factor for successful research work.

Regarding living in Sendai which is the modern city in natural harmony, I usually spend the time to visit attractive places, enjoy with delicious foods and also learn Japanese language and culture. Aside from my life in Japan, the Japanese Government (MEXT) scholarship provides fully-funded scholarship for the great opportunity to consolidate my academic goals and new experience in Japan.

Although sometimes I encounter challenging obstacles on the way of PhD student, there are valuable lessons to be learned for achievement goals of research. It would be a turning point in my professional career in the future to always challenge myself for lifelong learning. Graduate School of Dentistry opened the doors and introduced me to a new dimension that will still accompany with me forever. I am proud to be a part of Tohoku University.

Doctoral Course 4th year | from Thailand

Watcharaphol Tiskratok

The place where one learns more than one can imagine

Student's Message

Coming all the way from Indonesia to pursue higher education in Japan is such an amazing experience. It has been a blessing to gain the opportunity to experience diverse traditions, unveil new tastes, meet people from different cultural backgrounds, and make good friendships. Having decided to study abroad at Tohoku University has been one of the best decisions I have ever made. As well as being one of the most popular university in Japan, Tohoku University can also count itself among the best public university in Japan. Getting an opportunity to become a part as a PhD student in Orthodontics and Dentofacial Orthopedics, Graduate School of Dentistry, Tohoku University is like a dream comes true. Since my first year as a PhD student, the faculty provides a perfect learning atmosphere to broaden my knowledge in relation to bone biology research as well as to improve my clinical experience through weekly journal and book clubs, seminars, orthodontic typodont courses, and clinical courses. The faculty also allows you to get a supportive environment, where colleagues, supervisors, and faculty members are very friendly and helpful towards my PhD life. In addition, Graduate School of Dentistry offers a great platform for me to participate both scientific national and international conferences where I can expand my knowledge and skill, meet, learn and interact with experts, clinicians, scientists, researchers, and colleagues all over the world. Studying at Tohoku University always encourages me to become an independent learner which will be a key skill to overcome new challenges in a new place. I can openly share my idea and opinion, improve my independent and critical thinking skills, and build my creativity. Everything about my experience in Tohoku University is better than I had expected. I am truly grateful for having a memory to cherish for a lifetime.

Doctoral Course 4th year | from Indonesia

Adya Pramusita

II The Master's Course

Chronology of events that led to the establishment of the Master's course

Dental medicine has been progressing rapidly in recent years, and dental treatment support staff, such as dental hygienists, technicians and other professionals, is now being expected to acquire an even wider range of advanced knowledge and to possess specialized skills based on such knowledge. To promote the research and development of dental equipment and materials that support advanced dental medicine, moreover, it is becoming an urgent task to train researchers and developers who are familiar with the latest advances in dentistry and oral science.

On the other hand, the importance of oral functions such as eating and speaking is becoming more broadly recognized. People in occupations who have no opportunities to receive specialized dentistry education, such as nurses, speech therapists, nursing teachers, and health administration officials are increasingly being called on to demonstrate knowledge and skills relating to dental and oral care in executing their nursing, long-term care, health guidance, public relations, and other awareness-raising activities. Examples include the provision of oral health guidance and management, and education on maintenance of the oral cavity.

In April 2004, the Tohoku University Graduate School of Dentistry established a new Master's program especially for these types of individuals, and opened the door for specialized education and research in dentistry and oral science with the aim of cultivating the abilities needed for such advanced specialist professions, or the ability to conduct research on dentistry and oral science.

Admissions policy

The master's course seeks students who have diverse specialized knowledge and skills in disciplines such as oral hygiene, public health, health science, speech therapy, medical sociology, agriculture, engineering, science, and food/nutritional science, and who are highly motivated to study dental science, dental care, oral health, and other such fields.

The general admissions track evaluates applicants through three exams: a written exam of basic knowledge and understanding of specialized disciplines, an externally administered certification exam of English reading comprehension, and an interview and transcript review for comprehensively assessing whether the applicants possess strong motivation to study dental science, outstanding competencies, a broad perspective, and flexible sensibilities. These exams are given approximately equal weight in the selection process.

Special admissions for Working-adults evaluates applicants through three exams: a written exam of knowledge and understanding of specialized disciplines, an externally administered certification exam of English reading comprehension, and an interview and a review of transcripts and statement of purpose for comprehensively assessing whether the applicants possess strong motivation to study dental science, dental care, and oral health, as well as a broad perspective and flexible sensibilities. These exams are given approximately equal weight in the selection process.

Special admissions for international students evaluates applicants through two exams: a written exam of basic knowledge and understanding of specialized disciplines, and an interview and transcript review for comprehensively assessing whether the applicants possess strong motivation to study dental science and dental health, and outstanding competencies. These exams are given approximately equal weight in the selection process.

Those who are not native speakers of English are expected to acquire sufficient ability in English comprehension and communication before enrolling.

Curriculum policy

The Graduate School of Dentistry formulates and implements the curriculum based on the following policy in order to enable students to achieve the aims of the Diploma Policy.

(1) Provide specialized and transdisciplinary courses in dental science, dental care, and oral health, as well as an educational environment that enables students to focus on research for their master's thesis and other purposes.

(2) Provide opportunities to develop the high ethical standards expected of researchers and sophisticated professionals, opportunities to learn about the latest advances in Japanese/international dental science research and dental care technologies, and practical opportunities enabling students to acquire communication skills and advanced specialized techniques.

(3) Achievement is evaluated by determining, using tests and reports, whether the student has reached the objectives described in the syllabus. The Master's thesis is evaluated by determining whether it contributes to research from an original perspective, and whether the student has in-depth knowledge that functions as a foundation for research and operational duties with expertise, and by evaluating final exams.

Diploma policy

The Graduate School of Dentistry awards a Master's degree to a student who has studied the required subjects set according to the school's educational philosophy and objectives, has completed the study credits required by the school, has acquired the knowledge and skills as described below, and has passed the Master's thesis review and the final examination.

(1) Be able to carry out specialized research in one's field or engage in a high-level specialized occupation with a broad perspective and leveraging specialized knowledge and advanced technology in dental science, dental care, oral health, and other such disciplines.

(2) Be able to contribute to the improvement of health and welfare by addressing societal and scholarly needs regarding dental science, dental care, and oral health with high ethical standards and a firm sense of responsibility.

(3) Possess an international perspective and communication skills, and be able to apply them to dissemination of one's specialized research findings, or to one's high-level specialized occupation.

Master's course program

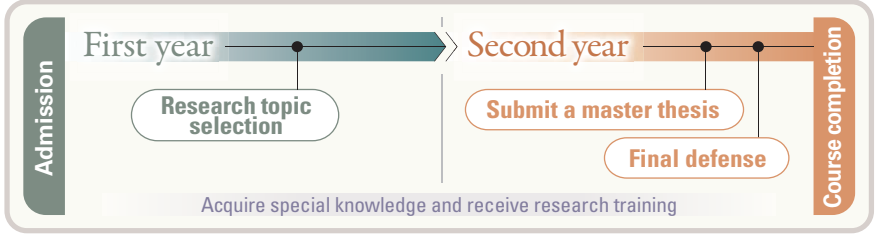
Classes (minimum credits, 30)

Required (18 credits) — Minimum of 3 classes in each of the following courses to be completed:

Introduction to Dentistry, Introduction to Clinical Dentistry and Hospital Tour/Practicum, Special Training for Master's Thesis Preparation, Research and Technological Training

Electives (12 credits) — Minimum of 6 of the following courses to be completed:

Oral Biology, Oral Pathophysiology, Biomaterials for Regenerative Medicine, Introduction to Digital Engineering in Dentistry,Food Science, International Oral Health, Social Dentistry, ComprehensiveDentistry, Oral Health Care for Children and Adolescents, Oral Restration, Stomatognathic Function, Dentistry for Disabled, Geriatric Dentistry, Dental Infection Control, Oral and Maxillofacial Reconstruction, Digital Engineering in Dentistry,Disaster Dental Science,Enviroment Dental Science , Immune Regulation and Oral Immunity, Geriatric Oral Science,Oral Health Science, Medical ethics and Social ethics, Innovative dentistry, Introduction to physical anthropology, Oral Care Program for Cancer Patients

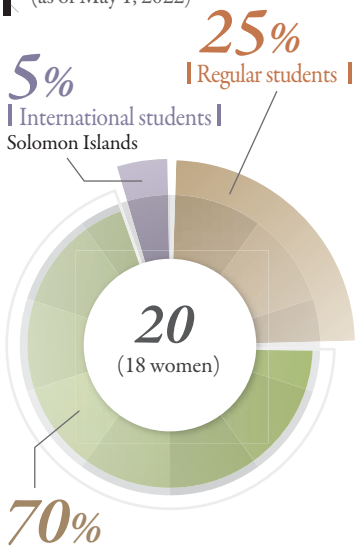


Course acceleration — Students with excellent research achievements (eg, a first-authored paper accepted by an established journal) may complete the course in one year.

Long-term enrollment — Working students and those with a compelling reason for long-term enrollment may stay in the course for up to 4 years with no extra cost other than the 2-year tuition.

Number of graduate students in the master's course

(as of May 1, 2022)



Occupation of adult students

Dental hygienist, dental technician, teacher at school, etc.

Admission fee and tuition

Admission fee *282,000 yen*

Tuition (yearly) *535,800 yen*

*The amount of the admission fee and tuition is subject to change. The newly established amount will be applicable at admission or while the student is enrolled.

Financial support system

Admission fee/tuition waiver

Students who are having difficulty paying fees may, pending application and screening, be exempt from paying tuition (all, two-thirds, half, or one-third of the amount) or be allowed to defer the payment or pay in monthly installments. Likewise, students may be exempt from paying admission fee (all or half of the amount) or be allowed to defer the payment.
Application information will be announced in February and August. Please see the campus bulletin board and website (http://www2.he.tohoku.ac.jp/menjo/) for eligibility and the application period.

Scholarship

Japanese Government (MEXT) Scholarship with Embassy Recommendation

You are advised to contact the Japanese Embassy 1.5-2 years before your enrollment. For details, please contact the Japanese Embassy or a consulate directly.

Tohoku University Global Hagi Scholarship

This scholarship is aimed to nurture "leaders capable of creativity and innovation" who will contribute to scientific and technological development.
With the scholarship (600,000 yen annually), the students are promised to be concentrated on their research. The Educational Affairs Section will inform you when the application opens.

Pioneering Research Support Project for PhD Students

The project is aimed at excellent PhD students with a strong desire to pursue studies/research in interdisciplinary, international, or academic/industry collaborative areas. Details will be informed when the application opens.

Other Scholarships

Self-financed students have opportunities to apply for various scholarships funded by Tohoku University and private foundations. You can apply for them only after your enrollment. The Educational Affairs Section will inform eligible students every time the application opens.

Funding

Part-time job within the university as a Teaching Assistant (TA) and/or a Research Assistant (RA)

Students who assist in classes or research activities will be paid an allowance (hourly rate). The program provides students with financial support as well as opportunities to teach and instruct other students or learn how to proceed with research activities and construct theories.

School of Dentistry Researcher Development Program

The School of Dentistry has a researcher development program to help doctoral students become international researchers and enhance their research activities. Up to 300,000 yen will be paid per student as travel expenses and conference participation fees.

Japan Society for the Promotion of Science Fellowship Program

The program provides fellowship support to researchers with excellent research ability, who are taking or have completed the doctoral course and wish to join research institutes such as universities in the future. A monthly amount of 200,000 yen (estimated in 2022) will be provided to fellows in the doctoral course.

Student's Message

Fascinated by "Regenerative Dentistry"

During the fifth year of my undergraduate day at Chulalongkorn University, Thailand, I was fascinated by the "Regenerative dentistry" from the research project I have undertaken. Since then, I was attracted to the terms of stemness and pluripotency. That curiosity helped me came up with the determination of pursuing a doctoral degree, related to the regenerative field. I desire to know how far the field of academics can lead me to, so I decided to continue the academic route right after finishing my degree in Thailand. With the opportunity that MEXT (The Ministry of Education, Culture, Sports, Science, and Technology) and Japanese Government has granted me, right now I got a chance to pursue my goal under the supervision of Professor Hiroshi Egusa and Assistance Professor Kunimichi Niibe in the Division of Molecular and Regenerative Prosthodontics, Prosthodontics department.

In our laboratory, we have actively researched the regenerative potential of induced pluripotent stem cells (iPSCs), mesenchymal stromal cells (MSCs), and others, applied for stem-cell-based tissue engineering. With high-level expertise and well-equipped facilities, coupled with a foreigner-friendly environment, our laboratory facilitates the productive learning morale of all students and researchers. Moreover, the doctoral program does not solely foster young and inexperienced researchers but also encourages scientific thinking as well. Those push the boundary of knowledge that oneself could attain via the provided intensive curriculums. Apart from the excellency in academic, Tohoku University Graduate School of Dentistry also provide me helpful assistance, supportive colleagues, and wonderful seniors. Besides the recommendation from the professor, I additionally got a chance to take part in the Science Angel Program (SA), leading to a brand-new circle of friends and larger opportunities. In the other words, studying abroad at the Graduate school of Dentistry does not only provide me the academic knowledge for the higher-level education that I yearned for but also the fantastic campus life.

For anyone who doubts living a life beyond the bor der of one own country, this is the priceless exper ence that awaits for you that couldn' t be found any where else.

Doctoral Course 4th year | from Thailand

Praphawi Nattasit

Variety of educational programs

Double degree program

The double degree (DD) program of Tohoku University Graduate School of Dentistry is a graduate school educational project involving the major graduate schools of dentistry in China and South Korea to improve dentistry and dental care in Asia by developing Asian standards through innovative dentistry based on global and integrated knowledge.
In the DD program each graduate student enrolls at two universities and studies at the sister school for a specific period of time. The DD program offers an opportunity to study under the faculties of two universities at the same time. Students will be able to earn degrees from both universities if the requirements are met.

The International Priority Graduate Program – Advanced Graduate Course for International Students –

Tohoku University Graduate School of Dentistry has launched the new PhD degree program "The International Priority Graduate Program- Advanced Graduate Course for International Students-" since 2014. The international students being accepted at this program can be adopted as a Japanese Government (Monbukagakusho: MEXT) Scholarship student. This program accepts excellent students from Southeast Asia, Southwestern Asia, Southern Asia and the East Asia countries.

Coordination with other research departments and institutions

A cross-department, integrated educational program involving the Schools of Medicine, Pharmacy and Engineering is available for the students at Tohoku University School of Dentistry. Students will be able to receive guidance from members of non-dentistry faculties.

Future Global Leadership Program

Tohoku University Graduate School of Dentistry has launched the new course "Interface Oral Health Science Course" taught entirely in English since 2011.
The conceptual objective of the "Interface Oral Health Science Course" is to integrate the diverse research achievements of the Graduate School of Dentistry in order to advance the understanding of issues concerning oral health. We offer an English education program covering wide range of Oral Health Science.

Mater's Degree and Internship Program of African Business Education Initiative for Youth (ABE Initiative)

Tohoku University Graduate School of Dentistry has launched the new Master's course "Mater's Degree and Internship Program of African Business Education Initiative for Youth (ABE Initiative)" since 2015. The objective of this program is to support young personnel who have the potential to contribute to the development of industries in Africa. This program offers opportunities for young African personnel to study at master's courses in Tohoku University as international students. Japan International Cooperation Agency (JICA) will provide the tuition fee, living allowance and round-trip airfare for participant of the program.

Dental oncologist training course

This course provides training for dentists to become dental oral surgeons specializing in oral cancer treatment.
Students will take the systematic lecture course to obtain general and particular knowledge about clinical oncology required for cancer treatment, participate in clinical work at affiliated institutions and related departments at the School of Medicine and prepare a thesis related to oral oncology in the doctoral dissertation program.

Student's Message

To pursue constantly, to improve always

Tohoku University is one of the great Universities in Japan, located in Sendai. I feel much honored to be a double-degree student in Tohoku University Graduate School of Dentistry. Tohoku University has encouraging academic atmosphere, advanced scientific instrument. Teachers here are very nice, professional and responsible.

I came from Tianjin Medical University of China in Oct 2019 and enrolled in Oral Molecular Bioregulation department. In here, I can focus on and enjoy my research, and increase my insight in dentistry. We can discuss the important and interesting research ideals in journal club every week. The great professors and teachers give me a lot of help, no matter in my research and my life in Japan. This university also offers free language training courses on Japanese, and holds a series of cultural activities to help foreign students integrate into Japanese community. I think I've improved myself a lot here. These entire great environments will make me into a great person.

Tohoku University is an ideal choice for further study. Beautiful city, delicious food, nice person and good academic environment, I believe you will love here.

Doctoral Course 4th year | from China

Song Liting

Entrance examination information

Selection procedures

	Doctoral course	Master's course
Special screening for foreign exchange students	Written examination (specialized subject) Interview Application screening	Written examination (Short essay writing) Interview Application screening

Qualification Screening

Applicants who graduated from foreign universities have to undergo the qualification screening for application in advance. Please contact us by e-mail before the beginning of qualification screening, if applicants want to obtain more detail information.

e-mail: international@dent.tohoku.ac.jp

Examination schedule

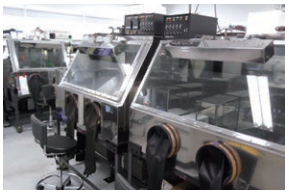
	Admission in October 2022	Admission in April 2023	
		First Recruitment	Second Recruitment
Accepting applications for Qualification Screening	May 23 to 27, 2022	May 23 to 27, 2022	October 7 to 14, 2022
Accepting application	June 6 to 10, 2022	June 6 to 10, 2022	October 31 to November 7, 2022
Examination date	July 12, 2022	July 12, 2022	December 2, 2022
Announcement date of examination results	July 21, 2022	July 21, 2022	December 22, 2022

ECOLOGICAL DENTISTRY

"Oral Ecology and Biochemistry"

Professor | Nobuhiro Takahashi

The oral cavity forms an ecosystem where the host (humans) and parasites (a tremendous number of microorganisms) cohabit. Using leading-edge techniques, we conduct research on the role of oral biofilm in oral health and disease from an oral ecological viewpoint. In addition, we propel clinical research on caries-preventive effects of xylitol, fluoride etc, and on parasite-induced deterioration of biomaterials. We also conduct metabolic studies on host cells, including oral cancer cells.



▲"The anaerobic experimental system" that creates anaerobic and hypoxic conditions

Main research themes

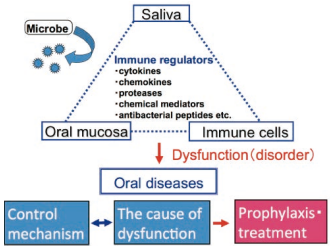
- Genomics, proteomics and metabolomics of oral microbial ecosystem (oral biofilm)
- Metabolism and pathogenicity of microorganisms associated with dental caries, periodontal disease and oral malodor, using an anaerobic experimental system
- Caries preventive properties of fluorides, sugar alcohols etc.
- Evaluation of cariogenic potential of food products and sweeteners using pH-telemetry
- Oral biofilm-induced deterioration of dental biomaterials
- Metabolism of host cells, including oral cancer cells

"Oral Microbiology"

"Oral Molecular Bioregulation"

Professor | Shunji Sugawara

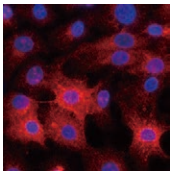
Interaction among oral mucosal cells, saliva and immune cells through immune regulatory factors and cell-to-cell contact is critical for mucosal defense, and dysfunction (disorder) of the interaction leads to onset of oral mucosal and salivary gland diseases. We investigate the underlying molecular mechanism to overcome these diseases. Moreover, we investigate the innate immune responses induced by the infection with oral bacteria, especially the enhancement or failure of immunological homeostasis in the oral mucosa.



▲Oral mucosal defense and research aim

Main research themes

- Host Defense and Diseases in the Oral Mucosa
- Inflammatory Mediators and Cytokines in Pathological Conditions
- Immune Regulation of Saliva and Diseases in the Salivary Glands
- Mechanism of Metal Allergy Development
- Regulation of Inflammation by Biotin
- Role of chronic allergic inflammation in oral infectious diseases
- Role of epithelial barrier dysfunction in oral infectious diseases
- Regulation of oral mucosal homeostasis by oral commensal bacteria
- Innate immune responses of bacterial cellular components

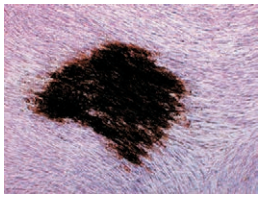


◀ *P. gingivalis* increases IL-33 expression in human gingival epithelial cells.

"Periodontology and Endodontology"

Professor | Satoru Yamada

One of our projects is studying on the onset mechanism of periodontal disease (marginal and apical periodontitis), representative chronic inflammation in the oral cavity, in terms of the interaction between host cells and bacteria, and also we study on the regenerative mechanism of periodontal tissue. In addition, I perform the study for apply ME such as lasers for periodontics and endodontics.



▲The calcified nodule formed of Periodontal Ligament Cells.

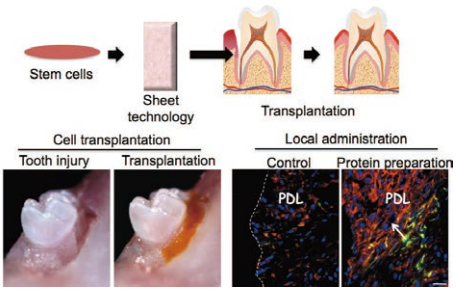
Main research themes

- Analysis of the onset mechanism of marginal and apical periodontitis
- Analysis of the interaction between cells in the periodontium
- Analysis of the periodontal regenerative mechanism and application to the treatment
- Development of method for periodontal diagnosis using ME
- Development of periodontal regenerative therapy using new biomaterials

"Operative Dentistry"

Professor | Masahiro Saito

We work mainly on research of the following topics from a clinical perspective: physical properties of composite resins used in restoration for diseases of the hard tissues such as the dental carries; measurement of adhesive strength onto enamel and dentin; observation of adhesion/joining conditions by electron microscope; long-term clinical performance of oral restorative materials using the replica method; conformity precision with respect to castability of titanium restorative materials and dentin; and strengthening of the physical properties of porcelain inlays. We also work on clinical studies that are re-restoration treatment with materials not containing allergic materials, and application of novel disinfecting technique using functional water. In addition to these studies, we develop regenerative therapy which expected to create innovative dental therapeutic systems in the 21st century. A feasibility study of the realization of tooth regeneration therapy is performed in research projects that are stem cell transplantation and local administration of bioactive molecules.



▶Development of tooth regeneration therapy
A model for tooth regeneration therapy (Upper panel)
Cell transplantation by using sheet technology (Lower left panel)
Local administration of bioactive molecules (Lower right panel).
Arrow indicated regeneration of fibers in tooth.

Main research themes

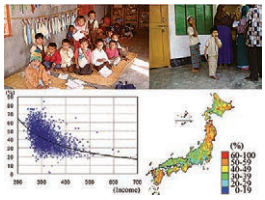
- Development of Tooth Regeneration Therapy
- Investigation of Molecular Mechanisms that regulate Periodontal ligament formation
- Research Related to Physical Properties and Adhesion/Joining Conditions onto Dentin of Composite Resin
- Research Related to Dental Precision Casting and Level of Conformity of Pure Titanium and Titanium Alloys
- Research Related to the Strengthening of Physical Properties and Clinical Application of Ceramic Inlays

COMMUNITY SOCIAL DENTISTRY

"International Oral Health"

Professor | Ken Osaka

We have carried out research on the influence that the social capital, or bonds to humans and society have on dental health. We have shown socioeconomic status has an impact on the number of remaining teeth in a cohort study. We have also established the number of remaining teeth has associated with the tendency of becoming nursing care-dependent and pneumonia deaths. We are working on education of young students in international support for developing countries, as well as analyzing the oral health condition and health inequalities in Japan and deepening our understanding of the dental care system, long term care insurance system for the elderly and dental public health.



Main research themes

- Association of dental status and society
- The Dental Care System and Health Gap
- Construction of a Project for Effective Prevention of the Need for Nursing Care
- Infectious Disease Countermeasures and Risk Management for Nursing Care Facilities

"Dental and Digital Forensics"

Professor | Nobuhiro Takahashi (collateral office)

Forensic dentistry is the science concerning the application of dental evidence to the resolution of legal problems. We aim to integrate the advanced knowledge and skills of information science into conventional research methods in forensic dentistry. Our division is the first and only one laboratory in the northern Japan, engaged in research and education of forensic dentistry. The education goal of the division is that the students gain knowledge and understanding of the process of forensic dentistry in Japan and of personal identification using dental records or skeletal remains.

Main research themes

- Morphological studies on the human skeletal remains
- Mass fatality incident management and assistance
- Comparative odontology on the mammals
- Application of dental Information in identification
- Morphological studies on the teeth of Japanese

"Preventive Dentistry"

Professor | Takeyoshi Koseki

The Division of Preventive Dentistry aims to prevent all oral disorders and to promote and maintain oral health and its full function. In the trend of rediscovering the importance of preventive dentistry, our researches focus on the effective measures of preventing oral diseases and the strategies of health promotion involving the individual QOL throughout their entire lifetime.

◀Portable measuring system of oral malodor

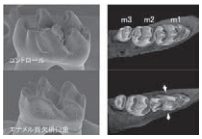
Main research themes

- Estimation of progression and future risk of dental caries
  1) Accurate evaluation of early lesion of dental caries by using ultrasonic devices
  2) Risk assessment of enamel surfaces by using laser technology
- Risk assessment of periodontal diseases
  1) Development of effective protocol of periodontal supportive therapy
- Oral malodor research
  1) Microbiological study of source of malodor
  2) Development of portable measuring system of oral malodor
- Application of uoride for caries prevention
  1) Development of educational dental health checkup with health promotion
  2) Monitoring the prevalence and incidence rate of oral diseases
- Developing preventive measures for systemic diseases such as cardiovascular disease and aspiration pneumonia through maintaining oral health
- Health management of oral mucosa under systemic medical intervention (prevention of cancer treatment-induced oral mucositis)

"Pediatric Dentistry"

Professor | Satoshi Fukumoto

Our division promotes clinical, basic and epidemiological research for tooth development, tooth trauma, mucosal disease to create healthy oral environment in children.



◀Enamel dysplasia using gene targeting (left). Control of tooth width using gene manipulation.

Main research themes

- Identification of novel gene involved in tooth development
- Analysis of gene associated with oral disease
- Development of stem cell research associated with syndromes
- Study of enamel formation
- Regeneration of tooth and salivary gland using tissue engineering
- Evaluation of new materials for prevention of dental caries

"Craniofacial Anomalies"

Professor | Kaoru Igarashi

Our division is a clinical dentistry field specializing in research on the diagnosis and treatment of craniofacial anomalies, including cleft lip and palate.

▲Anterior maxillary distraction osteogenesis (AMDO) appliance

Main research themes

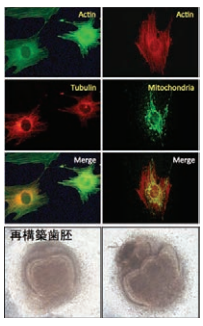
- Research on the diagnosis and treatment of craniofacial anomalies, including cleft lip and palate
- Research on the role of immune cells in osteoclastogenesis
- Research on growth and development of children with cleft lip and palate
- Objective evaluation of oral sensation with somatosensory evoked magnetic fields
- Development of a new anti-inflammatory bisphosphonate that also promote bone formation

"Orthodontics and Dentofacial Orthopedics"

Professor | Itaru Mizoguchi

One of the clinical dental department that focus on a research related to the diagnosis and treatment of abnormal morphological and functional occlusion. Our aim is to develop a new diagnosis and treatment methods and to elucidate craniofacial growth mechanics, by various clinical and basic scientific research.

We also offer a 3-year postgraduate orthodontic clinical training program with addition to the PhD course. Our department is accredited by the Japanese Orthodontic Society as a training institute for orthodontic specialists.



▲fluorescent images of subcellular organelle

Main research themes

1. Clinical research
- Development of temporary anchorage devices for orthodontic treatment
- Evaluation on outcomes of orthodontic treatment
- Analysis on maxillofacial morphology and facial soft tissue
- Study on the relationship between malocclusion and orofacial function
- 3D simulation of surgical orthodontic treatment

2. Basic research
- Clarification of biomolecular mechanism of orthodontic tooth movement
- Clarification of biomolecular mechanism of craniofacial development
- Clarification of responses of osteocytes, periodontal tissue cells and chondrocytes against mechanical stress
- Development of orthodontic materials
- Development of acceleration techniques of orthodontic tooth movement with physical stimulation
- Clarification of regulatory mechanism in endochondral ossification
- Study on effects of joint loading on extracellular matrix (ECM) expression of temporomandibular joint

Disease Management Dentistry

"Oral Physiology"

Professor | Junichi Nakai

Oral physiology mainly concentrates on the research on biological processes in the oral and maxillofacial regions. We are in the field of fundamental studies that establishes basic theories from our understanding of physiological functions, such as mastication, oral sensation including gustatory sensation, function of saliva and vocalization. Presently, many still unanswered questions exist in regards to the oral and maxillofacial region's connection to overall bodily functions, including higher brain functions. In the department of oral physiology we focus on individual organism and cell level research that investigate these questions by using electrophysiological and molecular biological techniques.

▲A spinal dorsal horn neuron and serotoninergic axon terminals.

▲Distribution of synapses between a spinal dorsal horn neuron and serotoninergic axon terminals.

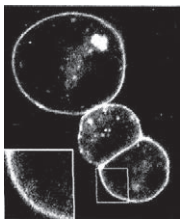
Main research themes

- Neurophysiological analysis of information-processing mechanisms in cortical somatosensory system
- Analysis of receptor mechanisms through mechanical stress in the periodontal tissues and its control by gene transfer
- Analysis of differentiation and regeneration inducing signal reception and its transmission mechanism in neurons and osteoblasts

"Dental Pharmacology"

Professor | Minoru Wakamori

The major goal of our research programs is to elucidate the operating principles of the body to keep homeostasis on the molecular level by utilizing electrophysiological and molecular biology techniques. Specifically, we are interested in "mechanisms to regulate intracellular Ca^{2+} concentration", "transduction mechanisms of oral sensations", and "regenerative medicine".



▶Cellular localization of TRPC5-eGFP fusion protein expressed in a single HEK293 cell.

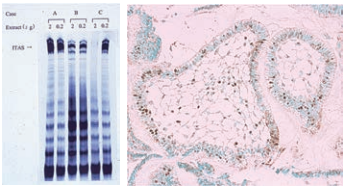
Main research themes

- Functional analysis of Ca^{2+}-permeable cation channels
- Molecular and neurobiological studies of taste, pain and mechanical stress sensations
- Developmental biology and morphogenesis of bone and teeth
- Chemical and pharmacological approach to stem-cell biology and regenerative medicine

"Oral Pathology"

Professor | Hiroyuki Kumamoto

To clarify the etiology, pathogenesis, pathophysiology, and outcome of various lesions occurring in the oral and maxillofacial region, basic macroscopic and microscopic observations as well as further analyses are performed. Our division research fields are as follows.



▲Expression of telomerase in ameloblastoma (a: TRAP assay, b: immunohistochemistry)

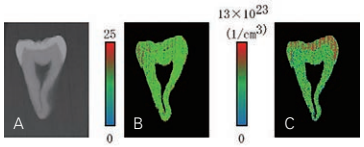
Main research themes

- Molecular pathology of lesions of the jaws
- Clinicopathological and genetic studies of developmental abnormalities of the teeth
- Clinicopathological and immunohistochemical studies of the oral immune diseases and cancer
- Investigation on regeneration of the oral and maxillofacial tissues and application of biomaterials

"Dental Informatics and Radiology"

Professor | Masahiro Iikubo

Our main research themes include the development of new medical devices and new treatment support systems in collaboration with other faculties, and research on improving diagnostic accuracy for oral and maxillofacial diseases using the latest imaging modalities, such as CT, MRI, Ultrasonogram, and nuclear medicine imaging. In addition, clinical research on oral management for patients with systemic diseases is performed in collaboration with the Perioperative Oral Health Management Department.



▲X-ray imaging using a semiconductor detector, which is currently under development, can reveal the effective atomic number and electron density of a material. A; Plane X-ray image, B; Color image of effective atomic number, C; Color image of electron density

Main research themes

(1) Development of new medical devices
(2) Imaging diagnosis of oral and maxilla-facial lesion
(3) Study on the relationship between systemic diseases and oral conditions

"Oral and Maxillofacial Surgery"

Professor | Hiroshi Egusa (collateral office)

In our division, we cover the diseases of congenital deformities, jaw deformities, benign and malignant tumors, and trauma in oral and maxillofacial area. Our research topics focus on the control and reconstruction of those diseases.

Before bone graft

After bone graft

◥A case of dental reconstruction after bone grafting to the alveolar cleft in a patient with cleft lip and palate.

After dental reconstruction

Main research themes

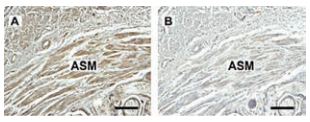
- Research on morphological and functional reconstruction in the oral and maxillofacial area.
- Research on bone augmentation using distraction osteogenesis and periosteal expansion
- Research on various augmentation method for implant placement
- Research on dento-alveolar reconstruction in patients with cleft lip and/or palate
- Research on pathophysiology of temporomandibular joint disorders
- Research on treatment modalities for facial trauma
- Basic and Clinical research on bone substitute
- Research on control of growth and invasion, and surgical reconstruction of oral tumors.
- Development of bone substitute with bone forming property
- Development of dental implants with bone forming property
- Diagnosis and Surgical simulation in patients with jaw deformities using 3D CT/photo
- Dento-alveolar reconstruction using Tissue Engineering

"Dento-oral Anesthesiology"

Professor | Kentaro Mizuta

Our research advances discovery in perioperative medicine and in a variety of related studies. The department's current studies include research in lung physiology and immunology, neuroscience, orofacial pain, clinical outcomes, robotic anesthesia, and more.

▲Evaluation of heat stimuli evoked responses in a postoperative pain model



▲Immunohistochemical staining of free fatty acid receptor 1 (FFAR1) in human trachea. (A) Protein expression of FFAR1 on human airway smooth muscle (ASM). (B) Negative control.

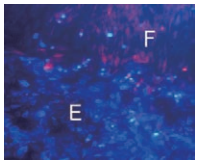
Main research themes

- Exploring novel therapeutic targets for bronchospasm, asthma, and COPD.
- Exploring pathogenesis of orofacial pain by in vivo multiscale brain imaging.
- Development of artificial intelligence-assisted robotic system for anesthesia.
- Development of new strategies to expand regulatory T cells for the therapy of allergic and autoimmune diseases.
- Clarification of the regulatory mechanisms of histamine production and its function.
- Exploring the effects of anesthetics on cell metabolism.

"Comprehensive Dentistry"

Professor | Masahiko Kikuchi

The department of comprehensive dentistry aims to develop superior primary care in general dentistry and also practices the management of clinical training program for post graduate residents. Furthermore, following basic and clinical research projects are conducted with the graduate students of this department.



◀The role of epithelial rests of Malassez to promote periodontal regeneration.

Main research themes

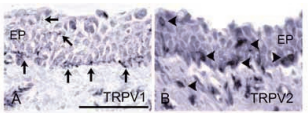
- Periodontal regeneration using periodontal ligament cells
- Relationship between dental diseases and systemic illness
- Circadian rhythm of dental pain
- Oral hygiene and oral microorganisms in the elderly
- Development of effective treatment methods in primary care

REHABILITATION DENTISTRY

"Oral and Craniofacial Anatomy"

Professor | Hiroyuki Ichikawa

Our division has research themes about the human anatomy, particularly focused on oral structures. The morphology of human and other mammalians is also compared. In addition, we are interested in motor, sensory and autonomic systems of oro-facial regions. For this purpose, the distribution and function of neurotransmitters, neuromodulators and others substances is investigated in the central and peripheral nervous systems. Morphometric methods are used for these anatomical and microscopic studies.



▲Arrows (A) and arrowheads (B) indicate TRPV1-positive nerves and TRPV2-positive cells in the rat pharyngeal mucosa, respectively.

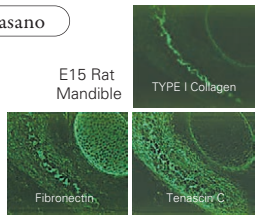
Main research themes

- Distribution and function of various sensors in the orofacial and cervical regions of human and other mammalians
- Change and mechanism of the pain threshold in animal chronic pain models
- Mechanism of motor and sensory dysfunction in muscular atrophy diseases

"Craniofacial Development and Tissue Biology"

Professor | Yasuyuki Sasano

We have been investigating development, regeneration and healing of bones and teeth using rat experimental models. In particular, we are interested in regulatory mechanisms of extracellular matrices on cell and tissue differentiation in the calcified tissues.



▲Expressions of extracellular matrix molecules in a rat embryonic mandible

Main research themes

- Regulatory mechanisms of extracellular matrices on differentiation of osteoblasts, chondrocytes, cementoblasts and odontoblasts
- Remodeling of extracellular matrices in the calcified tissues during development, regeneration and healing
- Differentiation and maturation of cells and extracellular matrices in the calcified tissue during development, regeneration and healing
- Regulatory mechanisms of calcification

"Dental Biomaterials"

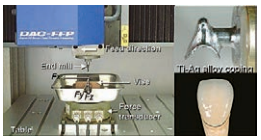
Professor | Osamu Suzuki (collateral office)

Dental and medical restorative materials are studied under developments of dental alloys, magnetic materials and devices, new implant materials, and machining and forming methods. Furthermore, degradation and safety of the dental restoration materials are inquired.

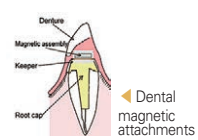
▲Osseous tissue formed on a titanium surface

Main research themes

- Development of new dental titanium alloys and their clinical application
- Research on mild antimicrobial or bacteriostatic dental alloys
- Research on functional devices and dental applications using magnets
- Research on new cutting- free dental materials suited to the CAD/CAM system
- Research on deterioration and safety of dental materials in an oral cavity



▲Measurement of cutting force



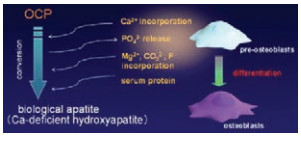
◀Dental magnetic attachments

▲Machining by a CAD/CAM system

"Craniofacial Function Engineering (CFE)"

Professor | Osamu Suzuki

We are focusing on the fundamental science and the applied research of tissue engineering with the biomaterial science and biology to investigate about regeneration of various bone defects in the fields of dentistry, oral surgery, and an orthopedic surgery. Especially, we are developing new functional biomaterials and new devices based on biomimetics.



▲The bone regeneration research using the originally developed artificial material (synthetic octacalcium phosphate (OCP)) to induce differentiation of osteoblastic cells and analysis of bone regeneration mechanisms.

▲Development of the culture device to load a mechanical stress on osteoblasts and chondrocytes. Analysis of stem cell differentiation process into osteoblasts and chondrocytes using the micro-nano manipulation technology.

Main research themes

- Bone regeneration using the synthetic octacalcium phosphate (OCP), which is originally developed in our laboratory and becoming clear to be replaced to hydroxyapatite (HA) spontaneously when implanted in vivo
- Device development of the controlled release of the growth factors which reproduce bone and periodontal tissues
- Surface designing of the metal implants using calcium phosphates to increase bone regeneration capability and mechanical adaptability
- Elucidation of biomineralization and its application to bone regeneration using synthetic or natural polymer carriers
- Development of the drug and the gene delivery methods utilizing the synthetic calcium phosphates and translational research into bone regeneration field
- Micro-nano manipulation technology in cell culture and examination using tissue engineering methods
- Development of the method to evaluate bone quality of the regenerated bone tissue

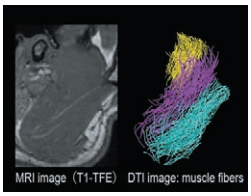
Advanced Prosthetic Dentistry

Professor | Hiroshi Egusa (collateral office)

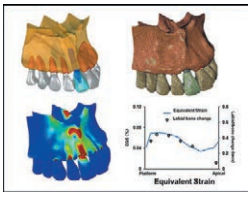
Focus of research and education of our division is on reconstruction of morphology and function of the patients with partial edentulism or maxillofacial defects. In addition to developing the conventional prosthodontic modalities such as removable and fixed dentures, we aim to create novel prosthodontics utilizing the dental implant, tooth transplantation, and tissue regeneration, and to clarify the biomechanical and mechanobiological interaction at the interface between prostheses consisting with biomaterials and living tissues, which is essential for the success of prosthodontics.

Main research themes

- Biomechanics and mechanobiology for stomatognathic morphology and function based on in vivo measurements and evaluation
- Studies on transplantation, regeneration and construction for prosthodontics, implantology and maxillofacial rehabilitation
- Studies on development and clinical application of novel biomaterials and creation of novel interfaces for prosthodontics, implantology and maxillofacial rehabilitation
- Developmental and translational research for novel dental treatment technology and dental equipment based upon multi-disciplinary research and academia-industrial collaboration
- Studies on clinical outcome of prosthodontics, implantology and maxillofacial rehabilitation



▲Muscle fiber analysis using Diffusion Tensor Imaging



▲Peri-implant bone stress distribution analysis by FEM

Molecular and Regenerative Prosthodontics

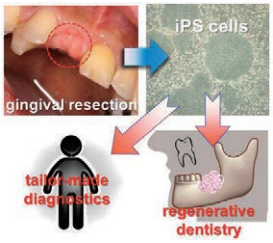
Professor | Hiroshi Egusa

Our major research focus is the development of next-generation biotechnology to 1) regenerate missing alveolar bone and teeth for functional and esthetic rehabilitation using cells and biomimetic materials and 2) introduce tailor-made diagnostics for prosthetic and implant treatments to prevent further tooth loss.

Main research themes

- iPS cell-based oral tissue engineering
- Development of gingiva-derived iPS cells for safe therapeutic application
- Biomimetic materials for bone tissue engineering
- Chemical biology for bone regenerative medicine
- Osteo-immunology in alveolar bone resorption
- Development of genome-based diagnostics for prosthetic/implant treatments
- Basic and clinical research on all-ceramic restorations

▶The patient's gingiva resected during dental treatment is a promising iPS cell source for oral tissue engineering applications, as well as for in vitro applications for tailor-made diagnostics.



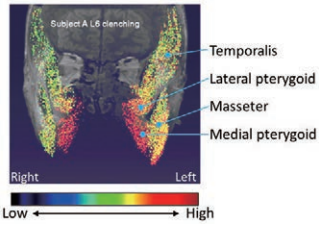
Aging and Geriatric Dentistry

Professor | Yoshinori Hattori

Through gaining a broad range of experience on dental practice, which includes collaboration with various different professions, in outpatient and domiciliary care, we examine how best to ensure geriatric oral health care in the future. We also spend enormous effort investigating the interrelation between oral and systemic health/QoL thorough longitudinal cohort study, and also developing evaluation and rehabilitation methodologies of various oral functions.

Main research themes

- Analysis of causal relationship of oral and systemic health/QoL through large-scale cohort study.
- Development of evaluation methods of oral functions by applying and combining diverse modalities.
- Research on the aging of oral functions
- Study on the delivering system of multidisciplinary dental care for the elderly



▲Mapping of masticatory muscle activities registered by using mfMRI (left unilateral molar clench)

Innovative Liaison Dentistry

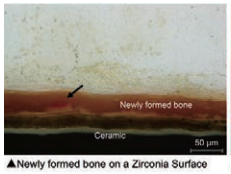
International Collaborative and Innovative Dentistry

Professor | Guang Hong

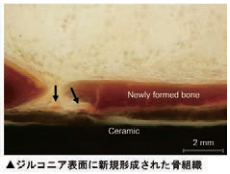
Our major research is focus on development and applied research of biomaterials and digital transformation in health care and educational settings based on the international industry-academia/interdisciplinary collaboration to improve oral health related QOL.

Main research themes

- Development of functional biomaterials
- Rheology of biopolymer materials
- Development of metal free dental implant materials
- Establishment of the international standard of dental materials
- Research and development on digital transformation in healthcare and educational settings



▲Newly formed bone on a Zirconia Surface



▲ジルコニア表面に新規形成された骨組織

Co-Creative Dentistry

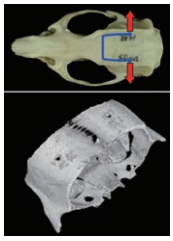
Professor | Hiroyasu Kanetaka

Our major researches are focus on translational research and regulatory science based on interdisciplinary research, industry-government-academia collaboration research.

Main research themes

- Translational research on medical device / material development
- Regulatory science through industry-government-academia collaboration
- Formulation of international and domestic guidelines for various medical devices and materials
- Development of advanced medical device / material through interdisciplinary research
- Development of medical system applying the latest AI technology
- Development of new functional food through industry-academia-government collaboration
- Brain function analysis for oral functions
- Application of next-generation synchrotron radiation to the dental field

▶Cranial suture expander using newly developed nickel-free shape memory alloy
(Upper figure) Application of expanding force to the rat parietal sagittal suture
(Lower figure) Micro CT image (2 weeks after application): The suture enlargement and bone addition were confirmed.



Molecular Pathogenesis of Oral Tumor

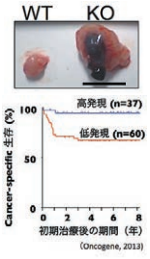
"Oral Cancer Therapeutics"

Professor | Hisanori Horiuchi

Small GTPases function as molecular switches in cell proliferation, cell movement and intracellular traffic. We are investigating roles of small GTPases in oral cancer proliferation, invasion and metastasis. Bisphosphonates are used for the therapy of osteoporosis by inhibiting lipid modification of small GTPases in osteoclasts. We are also investigating about the posttranslational lipid modification.

Main research themes

- Regulatory Mechanism of Oral Tumor Proliferation, Invasion and Metastasis by Small GTPases
- Research on Lipid Modification of small GTPases



◀We have discovered an inhibitory regulator of small GTPase Ral, RalGAP. In its KO mice, chemically induced bladder cancer were large and with high malignancy, compared to wild type (WT). Then, human bladder cancer with weak expression of RalGAP exhibited poorer prognosis compared to that with stronger expression. Thus, RalGAP could inhibit bladder cancer progression.

"Dental Nuclear Medicine and Radiology"

Professor | Yasuyuki Taki

It is important to preserve our cognitive function for entire life by preventing us from pathological brain aging in a super-aging society like Japan. In the situation, we aim to understand the recent researches for the relationship between dental issues and dementia, and also understand the methodology of brain MRI image analysis.

Main research themes

- Pathogenesis of the relationship between dental issues and dementia
- Methodology of brain MRI image analysis
- Methodology of brain and dental imaging epidemiology

Bio-Dental Engineering

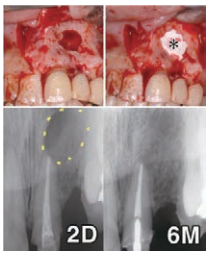
"Bio-Dental Engineering"

Professor | Shinji Kamakura

Teeth are worked enough when the root of a tooth is surrounded by intact bone tissue. If the bone around the teeth were broken by suffering oral and dental diseases, such as periodontal diseases, congenital anomalies, and jaw tumors, several problems including masticatory disturbance would be evoked. The division aims to regenerate bone that was lost by oral and dental diseases with applying biomaterials, and recover the functional disturbances. Furthermore, the division has managed both basic and applied research with considering a low-burden treatment for patients.

Main research themes

- Bone regeneration by octacalcium collagen composite (OCP/Collagen)
- Establishment of a new animal model for bone regeneration
- Research for quantification of regenerated bone tissue



▶Clinical application of OCP/Collagen (*) after cystectomy: Radiopacity in the affected region at 2 days (2D) after implantation of OCP/Collagen is increased at 6 months (6M).

Advanced Biomaterials

"Advanced Biocompatible Materials"

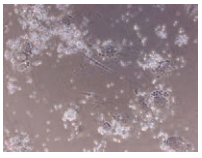
"Advanced Biofunctional Materials"

Immune Regulation and Oral Immunity

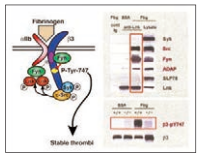
"Immune Regulation and Oral Immunity"

Affiliate Professor | Satoshi Takaki

The oral mucosa is a front line of host defense system against microbes and hazardous antigens. It also becomes targets of inflammation caused by autoimmune or allergic responses. Immune regulation of oral immunity is critical issue to control infections and keep Quality of Life (QOL) of disease patients. We are investigating, 1) Signal transduction and regulation by microenvironments operating in the host defense system, 2) Mechanisms for the production of autoantibodies involved in the disease development and maintenance of autoimmune disorders including Sjögren syndrome, 3) Regulations for the maintenance and expansion of tissue stem cells, to manipulate and regulate immune responses in oral mucosa.



Lymphocyte progenitor cells growing on bone marrow stromal cells



A newly identified regulation by Lnk adaptor protein in signaling through integrins

Main research themes

- Signal transduction and regulation in humoral immune responses
- Mechanisms for the generation and function of auto-antibodies involved in various autoimmune diseases
- Development of methods for manipulating or reconstituting the immune system

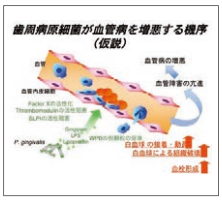
Geriatric Oral Science

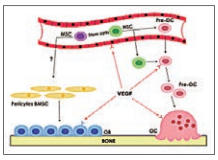
"Geriatric Oral Science"

Affiliate Professor | Kenji Matsushita

Affiliate Professor | Shumpei Niida

Japan has the highest longevity in the world. Maintaining the quality of life (QOL) of elderly is important for each individual and society. Our department conducts research on the molecular and cellular biology of bone and joint diseases (including alveolar bone and the temporomandibular joint) that lower the QOL of the elderly, and basic and clinical research on caries and periodontal disease causing tooth loss from the viewpoint of vascular biology and bone metabolism.





◀▲Relation of vascular and bone metabolism

Main research themes

- The role and application of nitric oxide in the periodontal tissue
- Diagnosis and control of the periodontosis
- Exploratory research of the aging and disease related biomolecule by Omics analysis

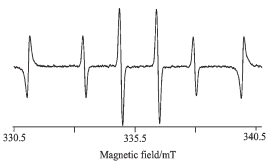
Redox Regulation

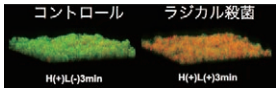
"Advanced Free Radical Science"

Professor | Keiichi Sasaki

Professor | Taro Kanno

Free radicals are generated in the innate immune system to kill or inactivate invading microorganisms. On the other hand, excessive free radical generation causes damage on healthy tissue. Thus, the control of free radical generation is a critical issue in the field of medicine. In our laboratory, we have conducted research to develop dental therapeutic devices based on antimicrobial chemotherapies utilizing the control technology of free radical generation.





▶◀▲Free radicals can be determined by using an electron spin resonance spectrometer. Microorganisms in biofilms are effectively killed by the radicals.

Main research themes

- R&D of dental therapeutic devices based on radical disinfection technique
- Development of novel antimicrobial treatment utilizing pro-oxidant activity of photo-irradiated polyphenol

Next Generation Dental Materials Research

"Next generation Dental Materials Research"

Professor | Keiichi Sasaki (collateral office)

In our research of dental equipment and materials, our aim is to deliver a healthy society for our ageing population by ensuring that diverse innovative new technologies that lead the way in the reform of clinical practice are promptly applied in the field of dentistry and used in clinical applications. We will analyze the basic technical properties of dental equipment and materials for reconstruction of lost teeth and bone tissue, and we will study the design, processing and biological safety of materials including their ability to function as intermediate materials. We will also develop mandatory test methods to ascertain the long-term durability of the materials themselves in the oral environment so that they can continue to function and maintain their shape when used *in vivo*.

Main research themes

- Research of materials for dentures and dental restorative materials that can contribute to oral health care, and an evaluation of their technical characteristics

The roots of Tohoku University Hospital lie in the Sendai-han (domain) Medical School established in 1817, which became the Tohoku Imperial University College of Medicine Hospital in 1915, and Tohoku University Hospital was born. Tohoku University Hospital is government-certified as an "advanced treatment hospital," and one of our missions is safely providing sophisticated medical care as well as development and training in this field. In the hospital, the Dental Division is composed of 11 specialized clinical departments as well as 6 facilities and 3 centers for specific disorders (see figure below).

To promote Interface Oral Health Science (IOHS), which is an original concept introduced by the Tohoku University Graduate School of Dentistry, it is essential to commit to not only basic research but also high-quality clinical research and clinical trials. Tohoku University Hospital has been recognized as a core institution for clinical research in the Tohoku region because it was one of the first in Japan to be accredited as a "clinical research core hospital". The Clinical Research Innovation and Education Center, Tohoku University Hospital (CRIETO) promotes a wide range of clinical research, drug discovery and medical equipment development. Recently established facilities and projects to promote industry-academia collaboration and higher education and training for artificial intelligence (AI) include the OPEN BED Lab and Clinical AI Human Resources Development Program.

After admission to the School of Dentistry, many graduate students will utilize these facilities and programs to obtain cutting-edge clinical experience at Tohoku University Hospital. We hope that the students will learn much through their research activities and patient care, and become global leaders in the development of dental science/dental care as highly skilled professionals.

General Vice Director,
Head of Dental Division
Tohoku University Hospital

Prof.
Hiroshi Egusa
(Fixed Prosthodontics Dept.)

Tohoku University Hospital

Tohoku University Hospital → **Dental Division**

Oral Health Enhancement
Pediatric Dentistry　Orthodontics

Oral Medicine and Surgery
Oral Supportive Care and Management
Oral and Maxillofacial Radiology　Oral and Maxillofacial Surgery
Oral Anesthesia and Pain Management

Oral Reconstruction
Endodontics　Fixed Prosthodontics

Oral Rehabilitation
Advanced Prosthetic Dentistry　Periodontics
Rehabilitation of Oral Function

Facilities for Specific Disorders
Comprehensive Dentistry　Dental Safety and System Management
Orthodontics and Speech Therapy for Craniofacial Anomalies
Dentistry for Disabled　Perioperative Oral Health Management
Maxillofacial Prosthetics Clinic　Dental Implant Center
Oral Medicine Liaison Center　Center for dysphagia (Dentistry)

Sendai: the City of Trees.

Tohoku University is located in Sendai called the "City of Trees", Sendai is a great combination of beautiful greenery and urban sophistication and is also known as an academic city rich in culture and history.

HISTORY

The quintessence of Date culture is still present

Surrounded by greenery and located along the Hirose River, Sendai used to be a castle town that yielded 3 million gallons of rice. Built by Masamune Date 400 years ago, Sendai still has the legacy of the Date Domain such as Sendai Castle, Zuiho-den and Rinno-ji Temple. It is also an academic town where a large number of students live. Apart from the museums, cultural activities at Sendai Mediatheque draw much public attention.

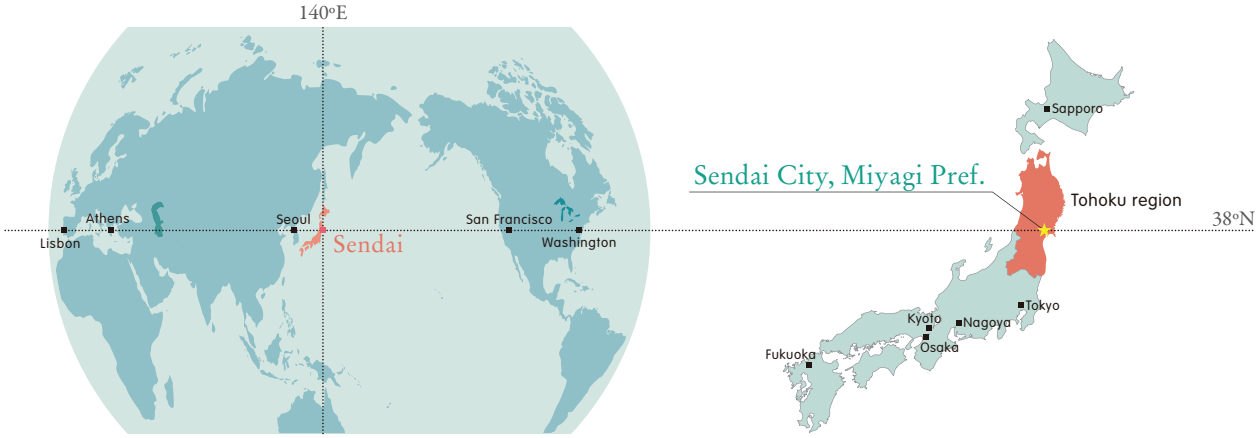
FESTIVALS

Traditional festivals taking place throughout the four seasons

Popular festivals taking place in Sendai include the Aoba Festival with floats and dances, a heritage of Date culture, in spring; Sendai Tanabata Festival with paper art blowing in the breeze in summer; Jozenji Dori Jazz Festival that fills the streets with music in the fall; and in winter the Sendai Pageant of Starlight that feels as if it has come right out of a fairy tale.

Photo credit: Tourist Division, Miyagi Prefectural Government

Location of Tohoku University



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