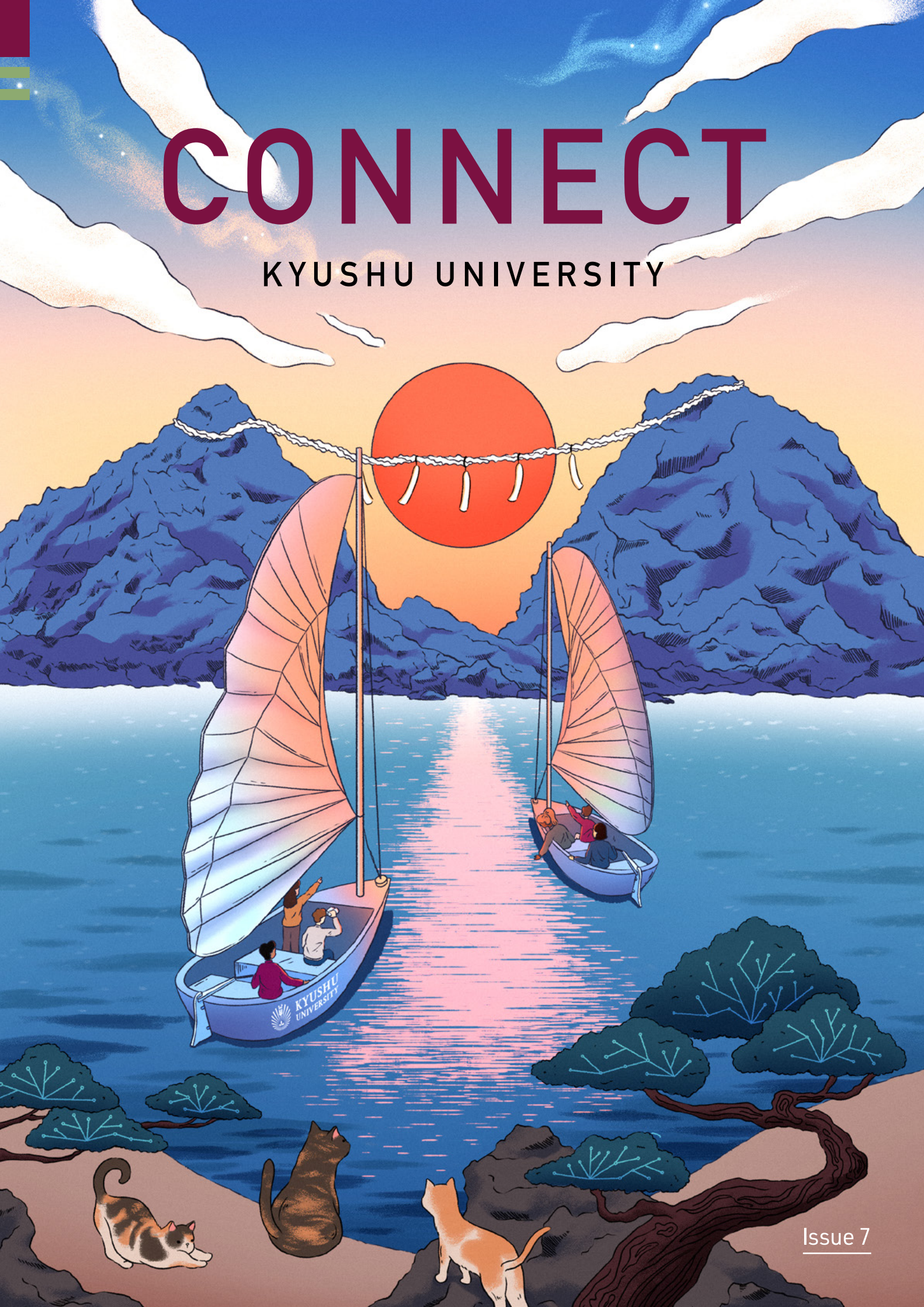
CONNECT

KYUSHU UNIVERSITY



Issue 7

Over a century of commitment to innovation

Founded in 1911 at the end of the industrial Meiji period, Kyushu University has long played a vital role in Japan's modernization through research and education. Its roots trace back to 1903 with the establishment of Kyoto Imperial University's Fukuoka Medical College. Northern Kyushu was then an emerging hub of heavy industries, from coal mining to steel manufacturing, and it was at this time that Fukuoka Medical College would merge with the newly established College of Engineering to create Kyushu University. Since then, the university has addressed societal needs, strategically expanding its research strengths to drive its mission of shaping the future of Japan and the world through cutting-edge research and innovation.

Innovation is about developing new products and ways of thinking that drive social change, and universities have long been a natural birthplace of such endeavors. However, translating research into real-world applications is challenging—something I experienced when I founded the company Aqumen Biopharmaceuticals (currently Aqumen) in 2005 during my time at the university's Department of Ophthalmology.

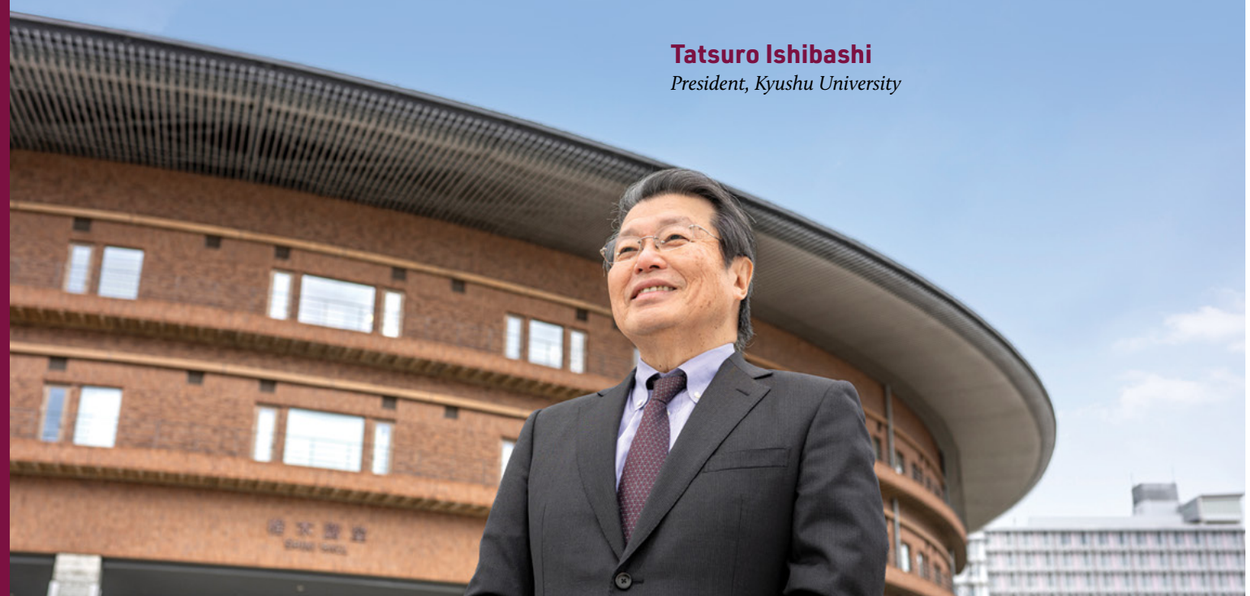
That experience taught me how much effort it takes for researchers to start their own business. To address this, we founded the Kyushu University Open Innovation Platform (OIP) in 2024. The OIP has strengthened industry-academia-government collaborations by helping university startups and researchers bring their findings to the business sector.

Fostering that entrepreneurial spirit within our students is also an important mission for the university. Since 2010, the Robert T. Huang Entrepreneurship Center of Kyushu University (QREC) has supported students through a diverse program of credit courses and business opportunities. Entrepreneurship is a vital part of integrative knowledge, and we encourage our students to test their ideas early. Although they may experience setbacks, failing early offers them the chance to refine those ideas and bring their dreams closer to reality.

Our commitment to innovation is also reflected in our tireless efforts to attract world-class researchers. Two years ago, the Institute for Advanced Study (IAS) launched the Inamori Frontier Program. The program is designed to recruit ambitious young researchers from any discipline, providing them with an environment to lead their groundbreaking projects. By bringing together researchers with diverse perspectives and creative approaches, we are cultivating fertile ground for innovative research.

From pioneering decarbonization technology and satellite manufacturing to medical technology and life-saving pharmaceuticals, we are continually at the forefront of innovative research, tackling societal challenges across diverse fields. I invite you to join us in turning bold ideas into lasting impact and help shape our future.

Tatsuro Ishibashi
President, Kyushu University

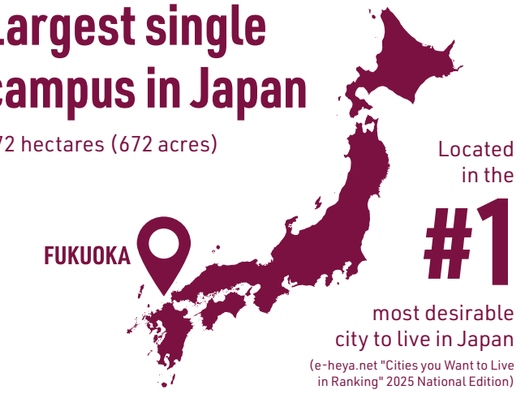


Fast Facts

5th
THE Japan University Rankings 2025
(out of over 257 ranked universities)

170th
QS World University Rankings 2026
(out of over 1,500 ranked universities)

Largest single campus in Japan
272 hectares (672 acres)



Located in the **#1** most desirable city to live in Japan
(e-heya.net "Cities you Want to Live in Ranking" 2025 National Edition)

76 programs offered in English

English Degree Programs
6 Undergrad
70 Grad

35th
QS Asian University Rankings 2026
(out of over 1,500 ranked universities)

1:9 Faculty to student ratio

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Main Feature

02
Kyushu University's Institute for Advanced Study: where young researchers excel

As a hub for global research excellence, the Institute for Advanced Study is redefining how to attract and cultivate top talent through its young researcher development programs.

Kyushu University's Institute for Advanced Study: WHERE YOUNG RESEARCHERS EXCEL

As a hub for global research excellence, the Institute for Advanced Study is redefining how to attract and cultivate top talent through its young researcher development programs.

▲ Masaharu Shiratani, Dean of the Institute for Advanced Study, describes the institute's young researcher development programs. (Kyushu University)

Since its inception in 2009, the Institute for Advanced Study (IAS) has pushed the boundaries of science. Founded as an international and interdisciplinary research and education center of excellence spanning all faculties, the institute aims to foster the development of early-career researchers with exceptional potential, act as a hub for distinguished professors, and promote cutting-edge research with societal benefits.

In 2023, as part of Kyushu University's VISION 2030 mission to drive social change with integrative knowledge, IAS incorporated two new initiatives for young researchers: the Inamori Frontier Program and the World-leading Researchers Training Program (QUEST), cementing the institute's status as a platform for nurturing the next generation of scientific minds.

With both programs underway, *Kyushu U CONNECT* recently caught up with Professor Masaharu Shiratani, Dean of IAS, and some of the early-career researchers taking part.

Inamori Frontier Program: Pioneering new academic disciplines

As IAS's flagship program, the Inamori Frontier Program recruits young researchers from around the world with exceptional potential for innovative research. It provides them with the benefits of an ideal research environment, including strong five-year financial support, no teaching responsibilities, and a pathway to tenure.

While hundreds of applicants apply each year, only five places are filled: an element that Shiratani, also a professor of the Faculty of Information Science and Electrical Engineering, credits for the program's success.

"There are two ways to grow a program: in size, or in quality. However, it's very difficult to do both," he explains. "Our goal is to be a small but excellent institute, which we do by selecting only the very best candidates."

Although many applicants are researchers with strong academic credentials, the panel in charge of selecting the program's faculty do so based on a unique set of criteria.

"The most important qualities we look for are their future potential and the originality of their research," says Shiratani. "We want to support those pioneering the beginning of entirely new scientific fields, who will lead the science of the future. While such researchers often find it hard to find positions within conventional departments, we can house them here at IAS."

▲ Associate Professor Tetsuya Takano, Inamori Frontier Program, Institute for Advanced Study. (Kyushu University)

Tetsuya Takano

Decoding the diversity of synapses

When Associate Professor Tetsuya Takano joined the Inamori Frontier Program in April 2024 as part of its first cohort, he was drawn by the freedom the program offered for his choice of departmental affiliation.

"Working at Kyushu University's Medical Institute for Bioregulation, which is well-known in Japan for its 'omics' research—genomics, proteomics, metabolomics—had long been one of my goals," says Takano. "The program gave me the chance to work here and build my own independent team."

Now, Takano leads a young, multidisciplinary lab of eight members, including four postdoctoral researchers and three technical staff members. His team studies how the brain's synapses—the junctions where neurons connect—are regulated at the molecular level.

"There are over 100 trillion synapses in the human brain, each with its own unique role and molecular components," he explains. "Neurons also work with astrocytes, a type of glial cell, to fine-tune these synaptic connections. This diversity enables brain functions like memory, emotion, and decision-making, but we still don't know which molecules regulate each synapse."

Traditional techniques can identify synaptic proteins, but not at the level of individual synapses. To overcome this, Takano's lab is developing methods to label proteins near specific neurons and astrocytes and then identify them using mass spectrometry. These techniques have already revealed hundreds of previously unknown proteins at distinct synapses in mouse brains.

Takano's work offers clues to the mechanisms behind neurological and psychiatric disorders such as autism, schizophrenia, depression, and Alzheimer's disease—conditions linked to synaptic dysfunction—and paves the way towards new therapies that target specific synaptic proteins. But Takano himself has a more fundamental motivation: a desire to simply understand how the brain functions.

"Through the Inamori Frontier Program, I have the research environment needed to relentlessly pursue our curiosity about how the mind works at the molecular level, together with a fantastic group of lab members," he says.

Doris Arzoumanian

Shining a light on star formation

One of the Inamori Frontier Program's newest members is Associate Professor Doris Arzoumanian, who established her lab in April 2025 in the Faculty of Science's Department of Earth and Planetary Sciences. With a background in astrophysics, Arzoumanian studies star formation by observing regions of the night sky that appear empty to the naked eye.

"These areas contain dust and gas—the raw ingredients for stars—which gather into enormous, elongated clouds called filaments," she explains. "Over time, this material collapses under its own gravity, becoming denser until it forms a chain of stars. However, we still don't understand aspects of this process, such as what determines the mass of such new stars, how long their formation takes, or why only a small fraction of the initial material ends up as stars."

Her fascination with star formation stems from a broader curiosity about the universe. "The birth of stars shapes how the universe evolves and what elements are created, which in turn influence planet formation and even the development of life," she says.

Before joining Kyushu University, Arzoumanian was a researcher at the National Astronomical Observatory of Japan. The move appealed to her as it offered the chance to interact more with students while retaining academic freedom.

"In this program, I don't have many administrative or lecturing duties, so I can devote most of my time to research," she notes. "That's rare in academia."

Instead of formal courses, Arzoumanian mentors students through hands-on research. The program's funding has also enabled her to hire a postdoctoral researcher and to plan her lab's further expansion.

"There's so much to explore and not enough time to do it all," she laughs. "But with this level of research freedom and support, I hope to advance research in my field and make a meaningful impact on society. Ultimately, I hope my work helps people see our place in the universe more clearly and feel connected to something larger than ourselves."

▶ Associate Professor Doris Arzoumanian, Inamori Frontier Program, Institute for Advanced Study. (Kyushu University)

Yueh-Hsuan Weng

Forming ethical frameworks for intelligent robots

While most researchers in the Inamori Frontier Program work in the natural sciences, the initiative is also open to scholars in the humanities—or, as in the case of Associate Professor Yueh-Hsuan Weng, those working at their intersection. With a background in law and computer science, Weng explores how society can coexist with artificial intelligence (AI) and robots through flexible legal, ethical, and safety frameworks.

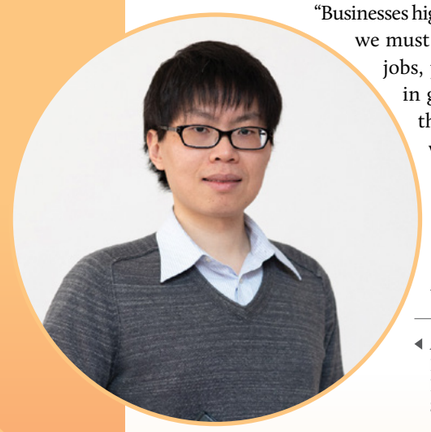
"In Japan, it can be difficult to conduct this kind of interdisciplinary research as most academic job positions are affiliated with a single faculty. This program appealed to me because it offers a unique environment that allows me to pursue my own AI and law research," he says.

A central focus of Weng's work is the AI pacing problem. "Due to the fast pace of AI development, traditional laws may not be effective at efficiently regulating intelligent robots," he explains.

To address this, Weng is examining whether non-binding soft laws can act as an alternative to traditional law, or whether a more interdisciplinary approach to governance—one that considers ELSI (Ethical, Legal, Social Implications) and RRI (Responsible Research and Innovation)—can be developed.

As AI becomes increasingly embedded in society, Weng's research plays an essential role by offering guidelines on how to design, develop, and use autonomous systems responsibly.

"Businesses highlight the benefits of AI, but we must also confront its risks—to jobs, privacy and mental health in general, and even to peace through lethal autonomous weapons," he says. "We are in a critical transition period for AI law; the aim is to move toward a universally recognized framework for AI governance."



◀ Associate Professor Yueh-Hsuan Weng, Inamori Frontier Program, Institute for Advanced Study. (Kyushu University)

QUEST: Extending beyond Kyushu

Besides attracting talented young researchers from around the world, IAS also nurtures the university's existing researchers through the World-leading Researchers Training Program (QUEST). The program fully funds young researchers to spend time in a lab abroad, forming international experiences and networks that can bring benefits for years to come.

"When I studied in France, I built connections with other young scientists in Europe who are now leaders in their fields. We still collaborate through projects and conferences," says Shiratani. "The young researchers in QUEST may not realize it yet, but such relationships with their peers will prove invaluable as their careers develop."

▲ Assistant Professor Masanori Nagao, member of the Faculty of Engineering and QUEST participant. (Kyushu University)

Masanori Nagao

Building bonds abroad

For Assistant Professor Masanori Nagao at Kyushu University's Faculty of Engineering, the opportunity to study overseas had a huge draw: the chance to collaborate with a leading professor in his field of polymer science.

Nagao's research focuses broadly on developing biomimetic polymers that mimic proteins. These synthetic polymers can have a wide variety of applications, from drugs that bind to specific pathogens to catalysts for chemical or industrial processes.

"One of the foremost experts in this area is Professor Christopher Barner-Kowollik from Queensland University of Technology," says Nagao. "Having read many of his papers, I was eager to work with him, and reached out as soon as I joined QUEST."

During his eight months at Barner-Kowollik's lab in 2024, Nagao explored how to develop new synthetic polymers that aid photocatalysis: the use of light to drive chemical reactions.

"We are trying to make synthetic enzymes that use light energy, inspired by photosynthetic enzymes in plants. Specifically, our goal is to design a protein that helps convert carbon dioxide into useful materials, such as biofuels," Nagao explains.

By the end of his stint, Nagao had published one paper under Barner-Kowollik's supervision, and they have since continued their collaboration.

"The academic environment in Australia is so different compared to Japan—I feel that it's far more international and competitive," reflects Nagao. "The experience was challenging, but also very rewarding and invaluable to my career."

Sharing knowledge and building community

Although the IAS community is spread across Kyushu University with no physical building, distinguished professors and IAS program participants come together during the academic year to give interdisciplinary talks on their research.

"As our researchers are very independent, this is an important opportunity for them to connect with each other and feel part of a community," says Shiratani.

THE GINGER 'MEOW-TATION' REVEALED

A small deletion in a gene on the X chromosome in cats lies behind the fiery coats of ginger tabbies and the mottled coats of calicos and tortoiseshells.

▲ Professor Hiroyuki Sasaki makes fast friends with one of the calico cats in the study. (Kyushu University/Hiroyuki Sasaki)

From Tama, Japan's famous stationmaster cat, to the lasagna-loving Garfield, cats with orange fur are cultural icons and beloved pets. But what gene is responsible for their ginger hue? Publishing in *Current Biology*, researchers from Kyushu University, Japan, have now identified the "orange gene," revealing it to be a deletion variant of a gene called *ARHGAP36* on the X chromosome.

The quest to find the gene began unconventionally, through a crowdfunding campaign that raised 10 million yen—double its initial target.

"Identifying the [orange] gene has been a longtime dream, and it's a joy to have finally cracked it," says senior author Professor Hiroyuki Sasaki from Kyushu University's Medical Institute of Bioregulation and Institute for Advanced Study. "I'm grateful to the hundreds of people who enabled this research."

For decades, scientists have suspected that the orange gene is located on the X chromosome in cats, due to a unique genetic twist: orange tabbies are more likely to be male, while calicos and tortoiseshells are nearly always female.

"Male cats need only one X chromosome with the orange gene to be ginger, while females must inherit it on both X chromosomes, making female ginger cats rarer," explains Sasaki. "Females that inherit one orange and one black gene develop the patchy or mottled coats of calicos and tortoiseshells. This is caused by X-chromosome inactivation, or X inactivation, where one X chromosome is randomly silenced in each cell early in development, ultimately creating both orange and black fur."

Sasaki's team started by analyzing DNA from 18 cats—10 with orange fur and 8 without—and found that all orange cats had the same deleted section of DNA in the *ARHGAP36* gene, while the non-orange cats did not. This pattern held for 49 additional cats. They also found that in mice, cats, and humans, the *ARHGAP36* gene was chemically marked for silencing during X inactivation, further supporting their hypothesis.

Looking deeper, the researchers found that the deletion boosted *ARHGAP36* activity. In skin tissue samples from four calico cats, *ARHGAP36* was more active in melanocytes—pigment-producing skin cells—from orange fur patches than in black or white patches. Therefore, through a currently unknown mechanism, the researchers believe that high *ARHGAP36* activity suppresses many genes involved in pigment production and causes a shift from dark eumelanin pigments to lighter pheomelanin, resulting in orange fur.

In future research, Sasaki hopes to uncover exactly how the mutation causes orange fur, and also when the mutation first occurred. "One idea is to study ancient Egyptian cat paintings, or even to test DNA from mummified cats," he says. "It's ambitious, but I'm excited to try."

▼ Calico cats (left) and tortoiseshell cats (right) have two variants of the *ARHGAP36* gene—one with the deletion mutation and one without—causing their coats to have both orange and black patches. (Kyushu University/Hiroyuki Sasaki)

SCIENTISTS USE LEGO TO PRINT CUSTOM FOOD FOR SWALLOWING DISORDERS

Researchers develop a new method to create customized food for individuals with dysphagia using a Lego 3D printer and microwave heating.

Researchers from Kyushu University and Cardiff University have developed a new food processing method that combines a Lego 3D printer with microwave heating to print tailor-made foods for people with dysphagia, a condition defined by difficulty swallowing. In a study published in *Scientific Reports*, the team demonstrated that they could customize the texture, adhesiveness, and water retention of protein-based emulsion gels for dysphagia diets using controlled radiofrequency (RF) and microwave (MW) energy.

Dysphagia affects millions of people worldwide and can significantly impair a person's quality of life. While texture-modified foods like purées can make swallowing safer, it can be difficult to tailor these foods to the wide spectrum of dysphagic conditions.

"For people with dysphagia, meals are often limited to jelly-like materials, which can diminish the enjoyment of eating," says Shuntaro Tsubaki, Associate Professor at Kyushu University's Faculty of Agriculture and the first author of the study. "Our goal is to create food that is not only safe but also appealing."

Tsubaki applied his expertise in microwave engineering to solve this challenge. "When you want to heat something up, conventional heating methods like water baths or ovens heat the entire material indiscriminately," he adds. "On the other hand, microwaves can be controlled to selectively heat only parts of the material. This precision is key."

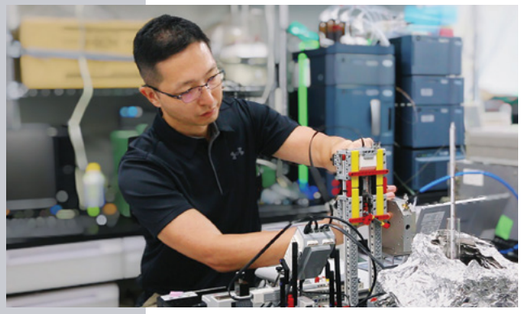
The team developed a bioink composed of a stable oil-in-water emulsion, an aqueous solution of egg white protein and stabilizers, and a microwave absorption aid. Initial tests of the bioink proved that its texture could be controlled with different MW energy frequencies.

To print this bioink, the team then loaded it into a custom 3D bioprinter that they constructed using a Lego Mindstorms EV3 robotics kit. "As we passed the bioink through the printer, we applied a burst of RF or MW energy to the bioink, turning it into a gel, which was then printed onto the dish," explains Tsubaki.

The team demonstrated that by changing the frequency of the microwaves, they could produce gels with a range of properties. A lower frequency of 200 MHz produced a significantly harder gel which held its structure and water content more effectively. In contrast, a higher frequency of 2.45 GHz produced a gel that was much softer and more adhesive.

"Our new method can potentially be applied to artificial meat, functional nutrition, medical food, and even space rations. We are already working on other edible materials and ways to enhance the gel's flavors," concludes Tsubaki.

▲ The bioprinter in action. The bioink is passed through the microwave emitter, which heats it with varying microwave frequencies. The resulting gel is then printed onto the platform. (Kyushu University/Shuntaro Tsubaki)



▶ Shuntaro Tsubaki assembling the Lego 3D bioprinter. (Kyushu University/Shuntaro Tsubaki)

Innovating from Nature

HOW ANCIENT WINGS ARE FANNING INNOVATION INTO SPACE

The unique folding mechanics of insect wings are inspiring new designs for compact aerospace components.

When packing for trips, folding clothes to save luggage space is instinctive. But when it comes to space travel, how tightly can we pack solar panels, telescopes, and even stadium-sized space stations into rockets while ensuring they function perfectly once deployed?

Among those tackling this challenge is Associate Professor Kazuya Saito from Kyushu University's Faculty of Design. Working with the University of Tokyo and the Japan Aerospace Exploration Agency (JAXA), Saito contributes to the development of a lunar base camp, working on innovative ways to fold and deploy photovoltaic panels. For this ambitious project, his inspiration comes from a tiny creature: the earwig.

"If I discover a biological form that strikes me as beautiful or elegant, I often assume it has a function. The moment I saw an earwig fold its wings, I was captivated," he says.

The folding ease of any jointed structure usually conflicts with its mechanical strength, as the more joints it has, the more brittle it becomes. However, insect wings resolve this conflict beautifully. Earwig wings in particular do more than just spread for flight;

▲ Saito's recreation of earwig wing folding through origami and applied geometric abstraction, intended for the design of deployable structures with diverse potential applications. (Kyushu University)

◀ An earwig wing under the microscope, exhibiting structural coloration via light scattering and refraction. (Kyushu University/Kazuya Saito)

they also fold tight enough to allow earwigs to escape predators by squeezing into narrow spaces, such as ant tunnels.

To unravel a structure refined over 400 million years of evolution, Saito spent a decade. By catching earwigs in the field, examining them under electron microscopes, filming them with high-speed cameras, and visualizing their movements with microscanners, he methodically decoded their secrets. This includes their mastery of a unique technique: folding their wings fanwise once and then axially, tucking them into wing cases that hold only about 1/15 of their original surface.

Yet, biomimicry—the emulation of natural systems to solve human challenges— is never a direct copy-and-paste. Aerospace materials, being metals and composites with their own thickness tolerances and fatigue limits, behave differently from organic insect wings. As such, Nature's complexity must be simplified and modeled to balance manufacturing efficiency with real-world performance.

To design fold lines and joints on machine components that pack compactly for launch and deploy predictably in orbit, Saito draws on traditional origami. This fusion of geometry and craft allows flat panels to expand into robust 3D structures, with applications ranging from complex solar modules and medical devices to everyday products such as umbrellas and fans.

Translating biology into engineering innovation always carries uncertainty. How can one prove a structure reflects evolutionary optimization and improves performance? Which ideas are worth pursuing, and at what point is research finished? While clear answers remain elusive, Saito trusts his intuition alongside rational verification.

"My work always has imperfections," he says. "But when I create shapes and diagrams that look cool, it gives me confidence that I'm on the right track."

ART-HISTORICAL VOYAGES INTO THE EAST ASIAN MEDITERRANEAN

An innovative cross-border project sheds light on the vibrant history of cultural exchange across Maritime East Asia.

▲ A rotated world map made by Toyama Prefecture and used in the project to present the East Asian Mediterranean from an innovative perspective, highlighting it as a space of exchange and connectivity. (Toyama Prefecture)

▼ Team members learn about dyeing and weaving from Michiko Uehara, a textile artist from Okinawa and one of Japan's Living National Treasures. (Kyushu University)

"In Fukuoka, we see coastlines every day. What if we took our research team out in a boat and explored the connecting coasts?" says Yu Yang, Assistant Professor at Kyushu University's Faculty of Humanities.

This idea sparked an art-historical adventure: *Shared Coasts, Divided Historiographies: Mobilizing People, Ideas, and Artifacts in the East Asian Mediterranean*. Co-led by Professor Anton Schweizer from the same department and Yang, this project explored exchanges of art, artists, and ideas in the "East Asian Mediterranean," a term the team used to describe the region of Maritime East Asia.

The project focused on the 1600s, when international trade was on the rise, and the early 1900s, a period of colonial expansion and rapid modernization. For more than two years, from 2023 to 2025, the team organized travel seminars across Kyushu, South Korea, Okinawa, and Taiwan—regions that historically functioned as vital hubs for cultural exchange.

"Tokyo and Kyoto often dominate Japan's art-historical narrative, making places like Fukuoka appear atypical, marginal, and implicitly less important," Schweizer explains. "Yet these places were vibrant sites where cultures mingled, and artworks circulated as gifts and political tools. We wanted to focus on these cultural contact zones."

By promoting a more inclusive vision of the region's shared heritage, this innovative project made Kyushu University the first Japanese university to receive generous funding from the prestigious Getty Foundation, a US-based program that supports research and preservation of visual arts worldwide.

◀ Assistant Professor Yu Yang (right) and Professor Anton Schweizer (left), Faculty of Humanities. (Kyushu University)

Schweizer and Yang selected 13 team members from around the world, many of whom were early-career scholars. By balancing different academic traditions, spoken languages, and specializations, they created a platform for genuine interdisciplinary and international dialogue.

During travel seminars, participants engaged with local artists, scholars, and curators, visiting galleries, studios, and historic sites. These encounters illuminated how art-historical practices intersect with tangible, personal experiences, as well as the enduring impacts of colonial history.

"Our activities naturally went beyond borders," Yang notes. "They also transcended the constraints of nationalism and disciplinary boundaries. For the first time, we brought our transcultural studies to the foreground, which was both encouraging and empowering for many of us."

These exchanges have generated new research questions, expanded existing networks, and fostered future collaborations. In December 2025, the project culminated in an exhibition at Kyushu University's Fujii Gallery—the endpoint of a two-year journey, and a point of departure for the group's future academic ventures.

Inspiring Hearts

PIONEERS AT THE DAWN OF MODERN MEDICINE

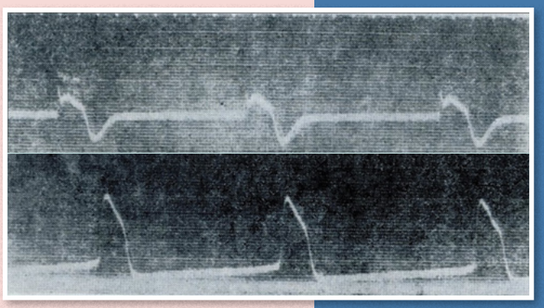
Over a century later, advances in medicine and public health by Kyushu University researchers continue to leave a local and global legacy.

In 1905, in the quiet town of Marburg, Germany, Sunao Tawara hunched over his microscope, examining samples of heart tissue. That same year, Ryokichi Inada was appointed Kyushu University's first Professor of Internal Medicine, and would later brave the coal mines of Kyushu searching for the cause of a deadly disease.

Though separated by continents, these two scientists would become intertwined in the founding story of Kyushu University.

"The early 20th century was when many mysteries in medicine began to unravel," says Tomonori Akashi, Associate Professor at Kyushu University Archives. "As anatomy advanced and microscopy improved, scientists could see structures once invisible to the human eye."

During this era, Japanese scientists began engaging actively with the international scientific community and emerging at its forefront. Among them was Tawara, who would eventually discover the heart's electrical conduction system.



▶ World's first ECG of Purkinje fiber activity, recorded at Kyushu University. (*Fukuoka Acta Medica*, 1930)

▶ Ryokichi Inada, Kyushu University's first Professor of Internal Medicine. (*Inada Ryokichi and His Family*, LibroScience)

In 1903, Tawara traveled to the University of Marburg to study under Ludwig Aschoff, a rising pathologist. Like many young researchers, Tawara started off with a task assigned by his mentor: investigating the cause of heart failure. The work was painstaking and repetitive. He buried himself in countless heart specimens, slicing them into sections only a few hundredths of a millimeter thick, staining them, and examining each one under a microscope.

After trials with over 200 hearts from humans, cats, and even pigeons, Tawara finally traced the path of electrical conduction in sheep hearts, observing that signals start in the atria and travel through the bundle to the ventricles. Along the way, these signals pass through a critical junction—the atrioventricular node, or Aschoff-Tawara node—where they slow down, setting the heart's steady rhythm. Defects in this system can cause irregular heartbeat patterns, or arrhythmias.

"Without Tawara's findings, it would have taken much longer to interpret the P, Q, R, S, and T waves on Willem Einthoven's Nobel Prize-winning electrocardiogram (ECG)," explains Akashi. "Tawara's research laid the foundation for the diagnosis and treatment of heart rhythm disorders, as well as the invention of pacemakers, which now help more than 400,000 people in Japan alone."

Upon returning to Japan, Tawara joined Fukuoka Medical College, the predecessor of Kyushu University.

▶ Ludwig Aschoff (left) and Sunao Tawara. (Medical Museum of Kyushu University)

▲ Kyushu University Library houses Japan's largest collection of coal industry records, including related books, work diaries, photographs, and even former workers' tools and clothing. (Kyushu University)

In 1911, at the same institution, Professor Makoto Ishihara recorded Japan's first ECG and co-authored the country's first paper on the subject with Inada, laying the groundwork for the field of cardiac physiology and for cellular-level studies of electrical signals in the heart.

Beyond his cardiac research, Inada was recognized more for his work on a deadly infection that once claimed countless lives in tropical and subtropical regions.

"It was a time of rapid industrial modernization in Japan," says Miyuki Kikuchi, Assistant Professor at the Kyushu University Library, home to Japan's largest collection of coal industry records. "Fukuoka's coal industry flourished, powering the nation's railways and factories. But prosperity also brought new public health challenges. One of the most feared was Weil's disease: a severe form of leptospirosis that causes bleeding, kidney failure, and often death."

The cause of Weil's disease was a complete mystery. While initially thought to be a local illness affecting farmers, researchers began noticing similar symptoms among coal miners. To investigate a possible link between the two conditions, they turned their attention underground.

◀ Assistant Professor Miyuki Kikuchi, Kyushu University Library. (Kyushu University)

Led by Inada and his assistant professor Yutaka Ido—who would later become Kyushu University's second Professor of Internal Medicine—the team joined physicians from local coal mine hospitals and ventured repeatedly into the dark, dangerous mines. Their investigations eventually traced the miners' infections to rats, whose urine had contaminated mine water and soil with a pathogen that entered the human body through open wounds.

In 1915, the team identified the pathogen as the cause of Weil's disease, and published comprehensive findings on its transmission, treatment, and prevention. In 1919, working with coal mining companies, they developed the world's first preventive vaccine for Weil's, which was provided to miners and proved to be effective. It was a landmark achievement in infectious disease control and occupational health.

"Inada's impact extended beyond medicine," Kikuchi explains. "The team's research also drove reforms that improved labor safety and protection."

In collaboration with government agencies, Inada and colleagues established a clear link between the disease and workers' conditions, leading to the official recognition of Weil's disease as an occupational illness less than a year after the investigation began.

Over a century later, you can still trace Tawara and Inada's legacies at Kyushu University's Hospital Campus. Walking along Tawara-dori and Inada-dori, you pass streets that quietly honor the pioneers whose discoveries helped shape modern medicine. Their spirit continues to inspire the university's commitment to addressing real-world challenges through collaboration with industry, government and the public.

"Innovation at Kyushu University has always grown from the intersection of the local and the global," Akashi adds. Grounded in its regional community yet connected to the world, Kyushu University continues to generate research that benefits society and leaves a legacy that spans generations.

"Innovation at Kyushu University has always grown from the intersection of the local and the global."

– Associate Professor Tomonori Akashi, Kyushu University Archives

Robert T. Huang Entrepreneurship Center (QREC)

INSTILLING A CULTURE OF ENTREPRENEURSHIP AT KYUSHU UNIVERSITY

Challenging the status quo with innovative ideas

▲ From left to right: Sabrina Suhaimi, Professor Megumi Takata, and Shinobu Utsumi, at BasE, QREC's public space on Ito Campus. (Kyushu University)

The Kyushu University Robert T. Huang Entrepreneurship Center (QREC) began in 1996 with the establishment of the Venture Business Laboratory (VBL). Before the '90s, entrepreneurial education was generally a staple of business schools; but as the value of such education became more apparent, higher education institutions around the world began expanding their entrepreneurial programs into different departments.

In 2010, Robert T. Huang, a well-known graduate of Kyushu University and founder of IT services company Synnex, donated a sizable sum to the VBL to commemorate the university's centennial. This donation enabled the laboratory to be restructured as QREC, establishing Japan's first full-fledged education and research center dedicated to entrepreneurship for both undergraduate and graduate students.

Professor Megumi Takata of the Faculty of Economics has headed the center since 2019, leveraging his decades of expertise to foster the next generation of innovative minds and entrepreneurial spirits.

"I am also a graduate of Kyushu University, although it was some time ago," laughs Takata.

During his master's program at Kyushu University in 1994, Takata studied the development of startups in Silicon Valley and other locations in the US.

"One focus of my research was technology commercialization. I was studying different systems of entrepreneurship and education, especially how research at universities translated to industry and application," recalls Takata. "Universities are the center of innovation, but in many cases their findings don't make it to market. One reason for this is that many universities don't have entrepreneurial education programs."

The QREC educational program has two main components: Lectures and Student Initiative Programs (S.I.P). Lectures consist of approximately 30 courses, with classes for students to learn about entrepreneurship from the basics to its applications. The S.I.P helps students set up, foster, and implement their innovative ideas through professional support and training. As of 2025, over 15,000 students have taken part in the QREC educational program.

Professor Megumi Takata

Department of Business and Technology Management, Faculty of Economics

Director, Robert T. Huang Entrepreneurship Center of Kyushu University (QREC)

Shinobu Utsumi

D3 Interdisciplinary Graduate School of Engineering Sciences (IGSES)

Founder of BONSAIENCE

Sabrina Suhaimi

M1 Graduate School of Design

Founder of Platy and Rei-deli

"One of the biggest benefits of joining QREC was being able to work with so many people and to build a team," explains Shinobu Utsumi, a third-year PhD student at the Interdisciplinary Graduate School of Engineering Sciences (IGSES). "The S.I.P didn't just focus on business or monetization; it also helped me see different dimensions of my research. I learned that entrepreneurship isn't just about starting a business, but building an ecosystem to harness your ideas."

Utsumi is the founder of BONSAIENCE, which began as an automatic watering system for bonsai before evolving into a company that digitally scans and constructs high-resolution 3D models of famous bonsai. In 2024, BONSAIENCE was selected for the MITOU Advanced Program, receiving 15 million yen in support funding. The team is currently working with the Omiya Bonsai Art Museum in Saitama Prefecture, with plans to use the digital assets they collected there to analyze the aesthetics of famous bonsai and quantify their beauty.

"I'm close to graduating, and my experience at QREC has allowed me to rethink my place in academia," adds Utsumi. "I want to work in the space between academia and industry, helping students and academics expand the potential of their research."

Sabrina Suhaimi, a first-year master's student at the Graduate School of Design, agrees with Utsumi on the value of opportunities QREC provides for students to network and team-build.

"Before joining the program, I always wanted to do something on my own, but I didn't know how or have the skills. I took lectures at QREC, and joined the S.I.P," explains Suhaimi. "For me, the biggest things QREC provided were knowledge, money, mentorship, and opportunities. I was even able to make networks with people outside of the university, such as those from the Fukuoka City government."

Like many international students at Kyushu University, Suhaimi is a Muslim who observes Halal dietary practices, which can be challenging when living in Japan. Using what she learned at QREC, Suhaimi founded Rei-deli and Platy: two organizations focused on improving food accessibility and helping people enjoy authentic, Muslim-friendly Japanese cuisine.

"QREC helped me find people to develop these organizations and even to test the food we made. As an international student, it was especially important to get Japanese language support," Suhaimi adds. "There is still more I need to learn, and I look forward to continuing this work. I also want to encourage more international students to join QREC."

Currently, the majority of QREC students are from Kyushu University's undergraduate schools. Takata wants to see more students in the program, especially graduate students, as they conduct independent research and stand to benefit greatly from entrepreneurial education.

"I want to see a culture of entrepreneurship take root here at Kyushu University. The experiences QREC offers will help students expand their own research and give them more choices in their careers after graduation," concludes Takata. "One message I want my students to take away is that innovation is about defying what is normal, and entrepreneurship is about disrupting the status quo. Innovation is a goal for us all, and entrepreneurship is the mindset that gets us there."

QREC | Robert T.Huang Entrepreneurship Center of Kyusyu University

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For more information, visit:

- QREC: https://qrec.kyushu-u.ac.jp/
- BONSAIENCE: https://museum.bonsaience.jp/en
- Platy: https://platy-co.webflow.io
- Rei-deli: https://reidelijp.wixsite.com/home

Center for Clinical and Translational Research (CCTR)

A 'PRODUCER' TO ELIMINATE THE DRUG-LAG FOR ORPHAN DISEASES

Supporting drug development from basic research to market approval

Developing new life-saving drugs is a long and arduous process, and certainly beyond what any one doctor or researcher can handle alone. Each step of drug development requires researchers, data analysts, medical professionals, and trial participants, as well as a large amount of legal expertise and capital to support the operation. The process can take decades.

So how would a researcher go about finding such support? At Kyushu University, they can turn to the Kyushu University Hospital's Center for Clinical and Translational Research (CCTR).

"Translational research is work that brings basic scientific research to real-world applications," explains Professor Koji Todaka, a cardiologist and Director of CCTR. "Similar to how movie producers oversee the creation of a film from start to finish, the center oversees pharmaceutical development from basic research to industry."

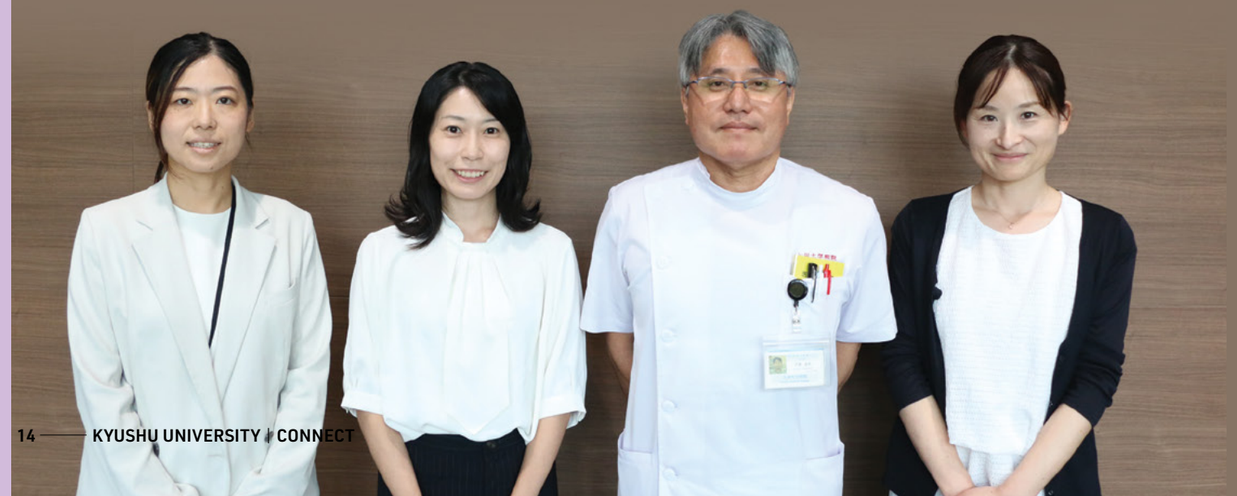
CCTR launched in 1999 and was initially founded to support industry-backed clinical trials. Through the years, the center grew and began working to support clinical trials driven by doctors and researchers at the university.

"There are several advantages to university hospitals conducting drug discovery research. For example, we are much closer to the patients and can understand their needs better. We can also focus on developing treatments for intractable or orphan diseases: pathologies that are rare or difficult to treat," Todaka explains.

Drug development is expensive, and pharmaceutical companies tend to develop drugs for common pathologies to generate profit. On the other hand, universities don't have to follow market trends. They also have resources and networks with other university hospitals that can help coordinate drug trials and even find the patients to join them.

"A good example is the recent approval of the drug edoxaban to treat patients with chronic thromboembolic pulmonary hypertension (CTEPH)," says Assistant Professor Yuko Kobayakawa, a neurologist who coordinated the approval trial. "CTEPH is a condition where blood clots form in the lungs. The condition is designated as an 'intractable rare disease,' with only 5,000 people in Japan estimated to have it. Edoxaban was a new drug candidate for CTEPH, and while it was already being used in other blood clotting conditions, rigorous tests and approval are required to use an existing drug to treat a different pathology."

▼ From left: Yuka Harada, Maya Suzuki, Koji Todaka, and Yuko Kobayakawa. (Kyushu University)



Professor Koji Todaka
Cardiologist
Director, Center for Clinical and Translational Research (CCTR)
Vice Director, Realization Hub for Biomedical Innovation

Kobayakawa's edoxaban trial was conducted under the project name KABUKI—short for Clinical Trial to Investigate Safety and Efficacy of Edoxaban in Patients With CTEPH—and was designed and run by CCTR in coordination with 11 other university hospitals across Japan.

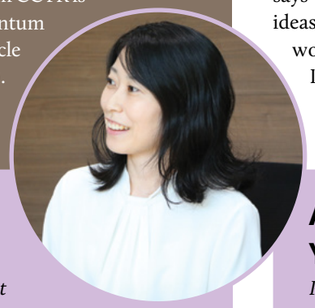
"Institutional coordination was critical in finding patients with CTEPH to join the trial. Also, the trial itself could only be done at university hospitals that treat CTEPH. It took seven years from project launch to drug approval, and we couldn't have done it without CCTR," adds Kobayakawa.

"CCTR's support has also been vital in my work on patient-proposed healthcare services (PPHS)," says Assistant Professor Maya Suzuki, a pediatric hematologist and oncologist. "These programs allow patients with serious illnesses to access treatments that are not approved in Japan, but are accepted in other countries. While such access still requires many hoops to jump through, CCTR provides the logistics needed for our patients."

Therapies under PPHS are treated similarly to clinical trials, which means they require submitting proposals to the government for approval. Moreover, the doctor in charge needs to negotiate with pharmaceutical companies to provide the drug itself. On top of that, the trial itself requires rigorous data collection and reporting.

"These processes take time. Recently, it took six months from a patient's request for a drug to receive use permission," Todaka adds.

A recent highlight from CCTR is the founding of the Quantum University Innovation Cycle from Kyushu (QUICK). QUICK kicked off in 2024 with the express mission to support medical startups and to train scientists in entrepreneurship and business development.



Assistant Professor Maya Suzuki
Pediatric hematologist/oncologist
Clinical Research Support Office, Department of Clinical Research Promotion, Center for Clinical and Translational Research (CCTR)

Assistant Professor Yuko Kobayakawa
Neurologist
Clinical Research Practice Office, Department of Clinical Research Supervision, Center for Clinical and Translational Research (CCTR)

"We understand that for most researchers, the barrier to starting a business is extremely high. QUICK provides the training and resources to lower that barrier," explains Assistant Professor Yuka Harada, a preclinical drug efficacy specialist and Chair of the Unicorn Creation Office in charge of QUICK. "We have many resources for researchers, such as a pool of pre-Chief x Officers (CxO) who can support their work, and experts who can advise them in Japan's laws and regulations around drug development."

To cultivate talent and find promising business ideas, QUICK also utilizes networks from the West Japan Academia Translational Research Network (WAT-NeW)—a group of 29 universities across Kyushu, Okinawa, and West Japan—in conjunction with networks developed at Kyushu University.

"We are also working on internal networking. Kyushu University is very big, and we want to connect medical researchers with chemists and biologists so they can find new and innovative treatments together," adds Harada.

Today, a majority of CCTR's funding comes from the government. The center is working on a plan to diversify their funding sources and become independent within the next five years.

"We also want to foster young talent and encourage them to pursue their innovative ideas. Even in our high school education programs, we see very talented students with fresh perspectives," says Todaka. "I hope that they cultivate their ideas during their college years and come work with us when they graduate. I would like to build a bright future of medicine and patient care with them."

Assistant Professor Yuka Harada
Preclinical drug efficacy specialist
Chair, Unicorn Creation Office, Department of Translational Research Promotion, Realization Hub for Biomedical Innovation

Alumni Spotlight

JUNKO TABEI

PROTECTING THE PEAKS SHE ONCE CONQUERED

Fifty years on from Junko Tabei's historic ascent of Mount Everest, *Kyushu U CONNECT* reflects on her journey from the world's highest peak to her research and advocacy in mountain conservation.

▼ Junko Tabei at Mount Everest's summit, in a photo captured by Ang Tsering Sherpa. (Tabei Junko Fund)

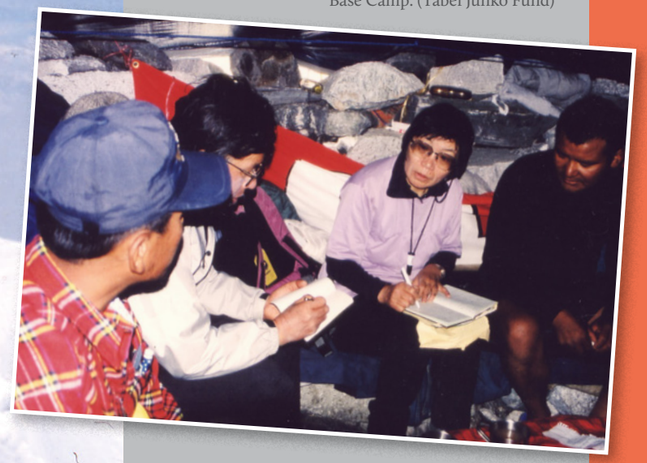
Two decades before joining Kyushu University as a master's student, the late Junko Tabei had already carved out a global reputation as a pioneer of women's mountaineering. Her love for the activity had begun in childhood, sparked by her first climb with her fourth-grade teacher. On May 19, 1975, Tabei made history as the first woman to stand atop Mount Everest—surviving a brutal avalanche and overcoming deep skepticism in the male-dominated climbing world.

In 1992, Tabei continued to break new ground, becoming the first woman to conquer the "Seven Summits": the highest peaks on each of the seven continents. She then set herself the ultimate goal of climbing the highest mountain in every country. With so many peaks left to explore, why did she return to university?

In fact, it was Tabei's love for the mountains—and her desire to protect them—that drove her back to academia in 1998, at the age of 58. For years, she had watched with concern as garbage accumulated across Mount Everest's remote slopes. During her own climb, she had left behind oxygen bottles, tents, and ropes in the struggle to survive, thinking little of it at the time. But Tabei had been only the 38th person to reach the mountain's summit; by the 1990s, with climbing booming and commercial expeditions on the rise, dozens could do the same in a single day, leaving Everest's fragile wilderness increasingly buried in waste.

When Sir Edmund Hillary—the first person to summit Everest—began calling attention to the problem, Tabei joined him in action. "Hillary called on us, saying, 'From now on, climbing alone

▼ Junko Tabei (second from right) interviews climbing teams about their handling of garbage at Everest Base Camp. (Tabei Junko Fund)



▲ Junko Tabei (third from right) leads Tōhoku schoolchildren up Mount Fuji in the summer of 2016. (Tabei Junko Fund)

isn't enough—mountaineering teams need to think more about the environment.' That's how the Himalayan Adventure Trust of Japan (HAT-J) was founded, and I became its representative," recalled Tabei, in a 2013 interview with the Japan Association of National Universities (JANU).

As Director of HAT-J, Tabei organized cleanup climbs in the Himalayas and helped build an incinerator in a local village near the South Everest Base Camp. However, she increasingly felt her lack of expertise in relevant areas.

"I was often asked to give talks about the environment. But I had never actually studied environmental science, so I lacked knowledge. It felt embarrassing and wrong to speak only from my impressions, like saying something 'looks dirty.' That's when I began wanting to study properly," she told JANU.

After joining Kyushu University's Graduate School of Social and Cultural Studies, Tabei focused her research on the environmental impact of climbers in mountainous regions, particularly on Mount Everest. Through questionnaires conducted with climbing teams from Japan and abroad, as well as onsite field surveys, Tabei became the first person to quantitatively estimate how much garbage lay scattered across Everest's slopes.

"An estimated minimum of 290 tons and a maximum of 1,115 tons have been left on Everest," she concluded in her thesis in 2000.

Tabei's time at Kyushu University deepened her understanding of mountain environments and gave her the scientific grounding and confidence to advocate for sustainable climbing. She went on to share her research through public lectures and call for stronger regulations to reduce climbing's environmental impact. Through her advocacy alongside Hillary and other well-known figures, she helped bring Everest's growing garbage problem into public focus in Japan, Nepal, and beyond.

In her later years, after the 2011 Tōhoku earthquake and tsunami, Tabei began guiding climbs up Mount Fuji for young people whose lives had been affected by the disaster. Only months before her passing in October 2016, she led her final ascent—helping those schoolchildren find strength and connection in the mountains, just as her own teacher had once done for her.

Today, Tabei's legacy endures in the generations of climbers and environmentalists she inspired: those who, like Tabei, see the mountains not only as summits to conquer, but as precious ecosystems to protect.

Strengthening Kyushu University through the Fund

Since its establishment in 1911 as a key university in Japan, Kyushu University has maintained the highest standards of education and research in the country, producing many graduates who have supported and developed modern Japan.

Kyushu University's VISION 2030 outlines the path to transform itself into a place that "drives social change with integrative knowledge." We strive to be an institution that not only attracts excellent researchers but also accelerates research and innovation that leads to new value creation. Furthermore, through integrative knowledge that fuses the entire spectrum of knowledge—from the natural sciences to the humanities, social sciences, and even design—we hope to solve social problems and forge new social and economic systems.

Research and education, as well as facility development and extracurricular activities, are all supported through the Kyushu University Fund. Your generosity promotes the activities of both students and researchers, helping Kyushu University thrive as a hub of world-class education and research.

For details on making a donation, please visit the website below. We sincerely appreciate your continued support for the university.

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