HIROSHIMA UNIVERSITY UPDATE

HIROSHIMA UNIVERSITY

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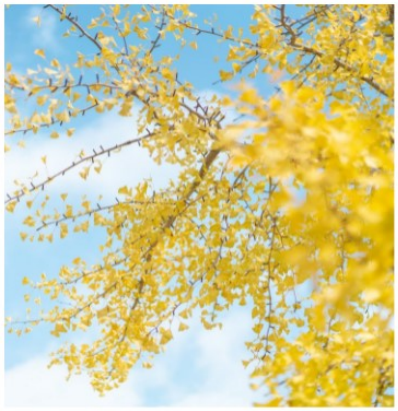
Find Hiroshima University's latest news
and high-impact research here!

CAMPUS PHOTOS

AUTUMN









HIROSHIMA UNIVERSITY

Embodying its founding principle of “a single unified university, free and pursuing peace,” Hiroshima University is one of the largest comprehensive research universities in Japan. Today, HU is making steady progress as a global university, taking on worldwide challenges and strengthening its global educational network by signing international exchange agreements with universities around the world and opening overseas bases at strategic locations.

HIROSHIMA UNIVERSITY

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Hiroshima University Associate Professor Dahlia Simangan talks about her research on peacebuilding, dealing with biases, and the importance of asking, "Who is our research for?"

HU OPENS NEW INTERNATIONAL EXCHANGE FACILITY

Hiroshima University's new international exchange facility officially opened on October 27, 2021. Get to know more about "MIRAI CREA."

Established in cooperation with Higashihiroshima City, MIRAI CREA will have multiple functions such as promoting innovation, facilitating interaction and the exchange of knowledge between people from Japan and overseas, and providing a safe and comfortable place for top overseas researchers and talented international students to stay.

A hill of exchanges interwoven with greenery

The building's symbolic exterior design embodies a sustainable society, with an organic architectural shape and a layout plan that inherits the existing trees, hills, and pathways.

The seven-storied building includes open and flexible multipurpose spaces, a community kitchen, a café, conference rooms, and accommodation areas. The last floor is configured with rooms to attract leading researchers.

Why MIRAI CREA?

HU unveiled the winning name, which garnered the most votes out of the 168 entries submitted by students, faculty, and staff. HU's International Exchange Facility Administration Working Group held a meeting based on the votes and decided that the facility's common name would be "MIRAI CREA." Meanwhile, its official name would be "Hiroshima University Phoenix International Center" to represent its function.

"I came up with the name 'MIRAI CREA' with the hope that it will become a place where diverse people from Japan and overseas can gather to innovate and create a sustainable future.

Shimo Natsuki
Submitter of the winning entry and student at HU's School of Engineering

DR. HARVEY ALTER SPEAKS AT HU'S 5TH NOBEL LAUREATE LECTURE SERIES

Wisdom from world-renowned researchers

Hiroshima University holds its fifth Nobel Laureate lecture series featuring Dr. Harvey J. Alter — American virologist and awardee of the Nobel Prize in Physiology or Medicine in 2020.

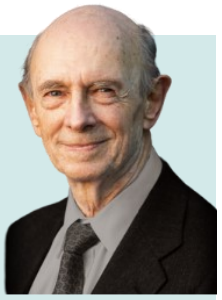


Photo: Joy Asico © Nobel Prize Outreach

Hiroshima University invited Nobel Prize winner Dr. Harvey J. Alter as a guest speaker last September 25 for the lecture series "From Hiroshima University to the World: Wisdom from world-renowned researchers." The event was held online due to COVID-19 restrictions.

Dr. Alter is a virologist and associate director for research in the National Institutes of Health — a research agency of the United States Department of Health and Human Services. The virologist is best known for his research that led to the discovery of the hepatitis C virus, for which he was awarded the Nobel Prize in Physiology or Medicine in 2020. Dr. Michael Houghton and Dr. Charles M. Rice were jointly honored with the prize.

The hepatitis C virus — a blood-borne virus — represents a global threat to human health. It can cause both acute and chronic infections such as cirrhosis and liver cancer. Globally, an estimated 58 million people have chronic hepatitis C virus infection, according to the World Health Organization, with about 1.5 million new cases every year.

In his lecture "Hepatitis C: The end of the beginning and perhaps the beginning of the end," Dr. Alter shared the highlights of his Nobel Prize-winning research.

Following the lecture, participants also exchanged opinions with HU researchers.

About the lecture series

HU invites Nobel Prize winners and other world-leading researchers to hold lectures and discussion sessions to disseminate its initiatives of research enhancement and contributions to local and international communities.

HIROSHIMA UNIVERSITY PEACE PROJECT | PEACE FROM THE PERSPECTIVE OF ART

On August 6, 2021, the day of the anniversary of the atomic bombing, Hiroshima University held its “Peace from the Perspective of Art” project on the Higashi-Senda Campus. During the event, a lecture was given by Mr. Sunao Katabuchi, director of “In This Corner of the World,” an animated film set in Kure during World War II. A cello party made from atomic-bombed trees was also unveiled.

H.E. Mr. Ayman Aly Kamel, Ambassador of The Arab Republic of Egypt to Japan, and Dr. Hany A. El-Shemy, Cultural Counselor of the Egyptian Embassy in Tokyo, were also in attendance at this year’s Peace Project, which included a signing ceremony for the establishment of the Hiroshima University - Galala University Peace Memorial Center.

The Peace Project has been held on August 6 every year since 2017, to pass on the memory of the atomic bombings and play a role in building a free and peaceful international society that fosters diversity, based on the pursuit of peace, which is the first of HU’s five guiding principles.

CONSUL GENERAL OF INDIA VISITS HU

Mr. Nikhilesh Giri, Consul General of India, Osaka-Kobe, visited the Higashi-Hiroshima Campus on October 19, 2021 and discussed areas of partnership with President Mitsuo Ochi.

They exchanged opinions on topics such as furthering student and academic exchange in HU’s ILDP program (Japan-India International Linkage Degree Program) and promoting ties between HU and India’s educational institutions.

They expressed hope that partnerships between HU and academic institutions in India will be further enhanced through academic and personnel exchanges.

HU ranks 8th in Japan Caring University Rankings 2021

Hiroshima University ranks 8th among Japanese universities in the UNIV PRESS' Caring University Rankings 2021 (面倒見が良い大学). It also places 2nd among national universities.

This ranking is based on the results of a survey of career counselors at 2,000 preparatory schools nationwide, asking them to recommend universities. Counselors from 739 schools responded to the questionnaire and listed their five "caring universities" that they deem to be good at taking care of students. The universities were scored by assigning points of five to one, with five being the highest.

In the 2021 Caring University Rankings, HU scored 37 points (8th in Japan) — a significant increase from last year's 13 points (65th in Japan). More here!

HIROSHIMA CASTLE LIGHTS UP GOLD TO RAISE AWARENESS FOR CHILDHOOD CANCER

Hiroshima Castle glowed gold from September 9 to 15, 2021, to raise awareness for childhood cancer as part of Global Gold September Campaign activities.

Childhood Cancer Awareness

The Japan Children's Cancer Group (JCCG) cooperated with the Global Gold September Campaign — a project that aims to raise awareness of childhood cancer and encourage those battling it — to light up gold architectural structures around Japan. Hiroshima Castle was one of the buildings chosen for this project.

Scenes of Hiroshima Castle were transmitted to the children watching from Hiroshima University Hospital during the lighting ceremony on September 9. The castle turned gold upon the voices of the children saying, "Light up!" This project was made possible by the support of Murakami Farm.

About childhood cancer

Childhood cancers such as leukemia and brain tumors are the leading cause of death among children aged 10-14 in Japan, with approximately 2,000-2,500 new cases per year. Hiroshima University Hospital is the only pediatric cancer treatment center in the Chugoku and Shikoku regions and plays a central role in community treatment.

*JCCG is a non-profit organization with more than 200 hospitals in Japan participating in clinical research for children with cancer.

Hiroshima Castle glowing gold, the color of the "Awareness Ribbon" for childhood cancer

THE HIRAKU-GLOBAL PROGRAM EXPANDS TO A NEW COHORT

The HIRAKU-Global Program held its annual Starter Course to welcome the 2nd Cohort of HIRAKU-Global Researchers (HGRs) last August 24. The four female and four male HGRs who form the 2nd Cohort are all talented Early Career Researchers (ECR) from differing research backgrounds, similar to the 1st Cohort. This year's Starter Course featured presentations by the 2nd Cohort, a meet-and-greet with Nanyang Technological University, and a seminar on Open Science.

The Starter Course followed last March's International Symposium where several ECR development experts, who also form the HIRAKU-Global Advisory Board, were invited as special guests to present the progress and challenges faced by researchers and organizations alike in developing world-class researchers. These insightful presentations were followed by an interactive panel discussion between the ECR development experts and the 1st Cohort.

By utilizing their experiences within these events, the HGRs are open and prepared to drive international collaborative research to become truly world-class researchers.

About HIRAKU-Global

The HIRAKU-Global Program is an ECR development program funded by MEXT (Japan). Hiroshima University acts as the Lead Organization. Please visit the website of HIRAKU-Global to learn more about the program and its researchers.

What's in the photo?

Participants of the starter course held on August 24

HU'S TRAINING SESSION ON SDGS AND SOCIAL TECHNOLOGIES

As part of the International Linkage Degree Program (ILDP), Hiroshima University held a training session for students in India and Japan from July 5 to 14, 2021. Twenty students from HU, Birla Institute of Technology Pilani, Indian Institute of Technology Bombay, Indian Institute of Technology Guwahati, and Gifu University took lectures on innovative technology developments.

Participants also discussed SDG-related activities in India and Japan and how they can propose a new contribution to achieve the SDGs by utilizing the technologies they learned through the program.

Participants expressed that it was very insightful to learn about social problems in different countries by interacting with other students, and it helped them enhance their communication skills. The lectures by the professors from diverse research fields increased the students' enthusiasm to study more about the introduced technologies.

HU holds webinar with Indonesian alumni

Hiroshima University held its 3rd webinar for Indonesian alumni on November 6 as part of the Hiroshima University Homecoming Day program.

The webinar focused on the three topics of "Activities," "Organization," and "Funding" in preparation for the launching of the Hiroshima University Alumni Association's Indonesia Chapter. Participants exchanged opinions in the form of an open discussion. Further discussions and idea exchanges among alumni will continue as part of the preparations for the establishment of an official Indonesia Chapter.

Learn more here ↓
https://www.hiroshima-u.ac.jp/en/international/news/67674

Facilitators of each agenda

Alumnus
Awaluddin Nurmiyanto

Alumnus
Muhammad Iqbal Djawad

Alumnus
Sumarsono Sudarto

HU'S RESILIENCE RESEARCH CENTER HOSTS INTERNATIONAL CONFERENCE

Hiroshima University's Resilience Research Center hosted two technical sessions online in the 14th Eastern Asia Society for Transportation Studies (EASTS) International Conference held from September 12-14

This time around, the EASTS conference was held with HU Vice President and Professor of the Graduate School of Advanced Science and Engineering Akimasa Fujiwara as the chair of the Conference Committee. A total of 711 researchers and practitioners from 28 countries/regions, mainly from Asia attended the event.

Paper presentations were done in two sessions entitled "Transportation and Natural Disasters," chaired respectively by Professor Fujiwara and Associate Professor Makoto Chikaraishi from HU's Graduate School of Advanced Science and Engineering. During these sessions, the latest research results from around the world on transportation management amid natural and man-made disasters in the "coronavirus era" were tackled.

Disaster transportation management is an important research area in terms of prompt rescue of human lives, transport of emergency relief goods, and the return of citizens' daily lives and economic activities as soon as possible. We will continue to make efforts towards the SDGs goals No. 11 (Make cities and human settlements inclusive, safe, resilient and sustainable) and 13 (Take urgent action to combat climate change and its impacts).

OYAKO PANDA JUKU | HELPING STUDENTS WITH LEARNING DISABILITIES

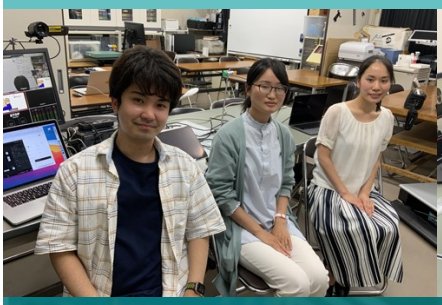
Meet the team behind Oyako Panda Juku, an online learning support program for elementary, middle, and high school students with learning disabilities.

For the past 25 years, the Center for Special Needs Education Research and Practice at Hiroshima University has provided learning support to elementary, middle, and high school students with developmental disabilities or visual impairment who have difficulty learning. Recently, the program was launched under a student-led system, taking over the activities of Associate Professor Kazuhito Ujima and others at the Center and switching to online support so that assistance could continue amid the spread of COVID-19.

"Our members are students and graduate students who study special needs education, and many of them aspire to become teachers," said master's degree student Kenta Ohara, a member of the Educational Design for Teacher Educators Program, Field of Special Needs Education.

While many students with developmental disabilities or visual impairment could benefit from ICT devices such as tablets for reading, writing, thinking, and information management, very few facilities in Japan provide lectures on how to use such tools. The Oyako Panda Juku offers themed workshops on how to use iPad applications in learning situations. At the same time, the Panda Math and English School allows students to learn about the effective use of ICTs through subject study.

Read the complete interview here.



KINDERGARTEN STUDENTS HARVEST RICE IN THE UNIVERSITY'S RICE FIELD

On November 4, 2021, preschoolers from the university attached kindergarten — under the guidance of staff from the Technical Center and students from the School of Education — harvested rice in the rice field of the Hiroshima University Ecological Experiment Garden.

This rice harvesting experience is carried out by the senior kindergarten students every year as part of their educational activities alongside rice planting.

The ancient black rice and Japanese rice were planted in June. Before harvesting the rice, the children tasted the raw ancient rice, commenting on how delicious it was, enjoying themselves as they peeled, smelled, and nibbled the fresh rice.

This 75-meter-wide rice paddy was originally an abandoned wasteland when the School of Science moved into Higashihiroshima City. It was restored in 1992 by the staff members of the School of Science and the Office of Plants Management to make effective use of the precious natural environment left on campus for educational and research activities.

HU STUDENT WHO COMPETED AT TOKYO OLYMPICS PAYS COURTESY CALL ON UNIVERSITY PRESIDENT

A Hiroshima University student who competed in the women's 100-meter hurdles at the Tokyo Olympics paid a courtesy call on HU President Ochi on September 2, 2021.

Ayako Kimura, a master's student at the HU Graduate School of Humanities and Social Sciences, was accompanied by her supervisor, Professor Hiroshi Sekiya, during the visit.

President Ochi, who specializes in knee joint surgery and has interacted with many of the world's top athletes, commented, "I wish more and more students like Ms. Kimura will excel in other fields besides academics. I hope you will continue to broaden your horizons beyond athletics."

"Interacting with students is refreshing, and I learn a lot from them," said Kimura regarding her life at graduate school. Kimura is currently researching the environment surrounding athletes and aims to engage in work to support athletes in their competitions in the future. This year's Olympic Games was Kimura's second time to join as an athlete following London 2012.

HU's RESEARCH NEWS

Hiroshima University's high-impact research

NEW METHOD CREATES 'ELITE' ANTIBODIES AT A PACE THAT KEEPS UP WITH PANDEMIC, CORONAVIRUS VARIANTS

Japanese scientists created "elite" antibodies that defeat various coronavirus variants even at an extremely low dose through a new method that accelerated the months-long process of finding such extraordinary antibody candidates to just ten days.

Our bodies produce specific antibodies to thwart invading pathogens. Some of these antibodies are the neutralizing kind that latches onto the virus' spike protein, preventing it from hijacking and reprogramming a cell into a virus-making factory. So-called "elite" antibodies, known as broadly neutralizing antibodies, are rare immune molecules capable of keeping up with disguises used by a virus' different variants to mask its spike protein.

"Monoclonal antibodies that neutralize the SARS-CoV-2 virus are so far the most promising therapeutic intervention," Hiroshima University Professor Tomoharu Yasuda, who leads the study, said.

"Mutant viruses resistant to current vaccines are a potential but realistic risk in the near future. To prepare to fight against such viruses and to save people from those infectious diseases, we need to hurry in developing effective drugs against broad SARS-CoV-2 mutant strains."

But these life-saving molecules are laborious to locate. Researchers have to screen hundreds to hundreds of millions of B cells from patient blood samples to find the most potent candidates they can enhance and grow in laboratories as therapeutic monoclonal antibodies.

By clarifying the typical characteristics of patients likely to carry "elite" antibodies and optimizing the discovery process, Yasuda and his colleagues have dramatically cut down the number of cells needed to be screened and sped up the identification of winning antibody candidates.

Eighteen recovered patients were enrolled as blood donors for the study from April 2020 to January 2021. The patients aged 23-93 years old experienced COVID-19 at different severities. Blood samples were taken over two weeks after the patients tested positive for SARS-CoV-2 — the virus that causes COVID-19 — based on the germinal center reaction theory on neutralizing antibodies production.

"Getting blood samples from severe COVID-19 patients over four weeks, ideally around eight weeks, after the primary infection obtains effective elite antibodies efficiently," Yasuda explained.

After analyzing the patients' samples, they found that even though all carried neutralizing antibodies, about 40% of those had weak or no activity to beat SARS-CoV-2.

Their findings also showed that 80% of participants with severe COVID-19 made a high level of "elite" antibodies, while only 20-30% of those with mild cases did.

The new method successfully obtained five "elite" antibody candidates out of 51 cells from two donor patients. They manufactured engineered versions of these antibodies and found that four work against more dangerous strains of SARS-CoV-2 even at a low dose.

All four antibodies quelled the Alpha and Delta variants, which are more infectious than the original strain of the novel coronavirus. Two of them also neutralized the Beta variant known to reduce the effectiveness of some vaccines.

According to them, this technology is the first in Japan to obtain "elite" antibodies that bind to multiple threatening strains of SARS-CoV-2.

> **"Our approach could be useful to develop antibody drugs even in other future pandemics, not only SARS-CoV-2 mutants.**

Their novel technique and the four "elite" antibodies they engineered are now awaiting patent approval. The next step for the research team is to develop a technology that accelerates at a pandemic pace the manufacture of monoclonal antibody therapies effective against future SARS-CoV-2 strains.

A member of the Japanese research team observes virus-infected cultured cells under the microscope.

DRUGS THAT MIMIC EFFECTS OF CIGARETTE SMOKE REDUCE SARS-COV-2'S ABILITY TO ENTER CELLS

Researchers have identified a potential reason why lower numbers of COVID cases have appeared amongst smokers compared to non-smokers, even as other reports suggest smoking increases severity of the disease.

Researchers have identified two drugs that mimic the effect of chemicals in cigarette smoke to bind to a receptor in mammalian cells that inhibits production of ACE2 proteins, a process that appears to reduce the ability of the SARS-CoV-2 virus to enter the cell. The findings appear in the journal *Scientific Reports*.

Something of a paradox exists with respect to smoking cigarettes and COVID-19. Active smoking is associated with increased severity of disease, but at the same time, many reports have suggested lower numbers of COVID cases amongst smokers than amongst non-smokers.

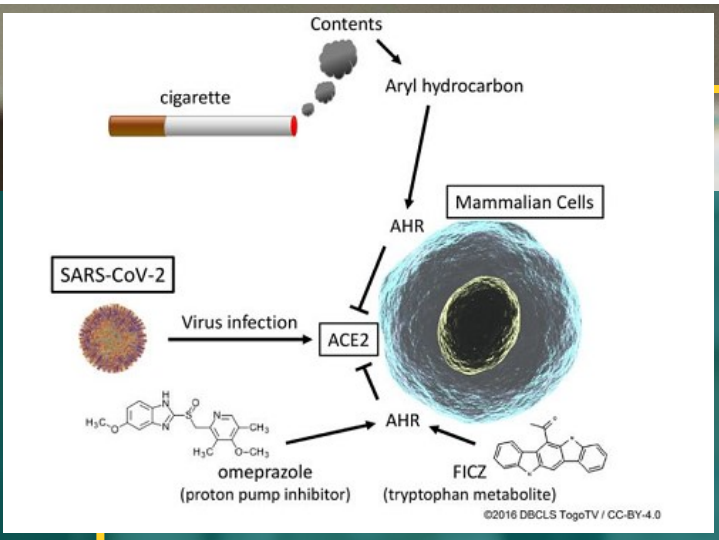
"Something strange was going on here," said Keiji Tanimoto of Hiroshima University's Research Institute for Radiation Biology and Medicine, the corresponding author of the paper. "But we had a few ideas about how to tease out what some of the mechanisms at work might be."

"We must stress the presence of strong evidence showing that smoking increases the severity of COVID-19," Tanimoto added. "But the mechanism we discovered here is worth further investigation as a potential tool to fight SARS-CoV-2 infections."

It is known that cigarette smoke contains polycyclic aromatic hydrocarbons (PAHs). These can bind to and activate aryl hydrocarbon receptors (AHRs). A receptor is any structure of the surface or inside of a cell that is shaped to receive and bind to a particular substance. AHRs are a type of receptor inside of mammalian cells that is in turn a transcription factor — something that can induce a wide range of cellular activities through its ability to increase or decrease the expression of certain genes.

Knowing this about the relationship between PAHs and AHRs, the researchers wanted to investigate the effect of drugs that activate AHR on expression of the genes that control production of the ACE2 protein — the infamous receptor protein on the surface of many cells types that works like a lock that the SARS-CoV-2 virus is able to pick. After binding the virus to the ACE2 protein, it can then enter and infect the cell.

First, the scientists investigated various cell lines to examine their gene expression levels of *ACE2*. They found that those cells originating in the oral cavity, lungs and liver had the highest *ACE2* expression.



Schematic representation of effects of AHR agonists

These high-ACE2-expression cells were then subjected to various doses of cigarette-smoke extract (CSE) for 24 hours. After this, the rate of expression of the *CYP1A1* gene, which is known to be inducible by CSE, was evaluated. The CSE treatment had induced increased expression of *CYP1A1* gene in liver and lung cells in a dose-dependent manner — the greater the dose, the greater the effect. However, this effect was not as pronounced in oral cavity cells. In other words, greater activity of the CYP1A1, less production of the ACE2 receptors — the route that the virus is able to enter cells.

In order to explain why this was happening in the presence of cigarette smoke, the researchers then used RNA sequencing analysis to investigate what was happening with gene expression more comprehensively. They found that CSE increased the expressions of genes related to a number of key signalling processes within the cell that are regulated by AHR.

To more directly observe this mechanism by which AHR acts on ACE2 expression, the effects of two drugs that can activate AHR were evaluated on the liver cells. The first, 6-formylindolo(3,2-b)carbazole (FICZ) is derivative of the amino acid tryptophan, and the second, omeprazole (OMP), is a medication already widely used in the treatment of acid reflux and peptic ulcers.

RNA sequencing data suggested that the *CYP1A1* gene was strongly induced in liver cells by these AHR activators, and expression of the *ACE2* gene was strongly inhibited, again in a dose-dependent manner.

In other words, the cigarette smoke extract and these two drugs—all of which act as activators of AHR—are able to suppress the expression of ACE2 in mammalian cells, and by doing so, reduce the ability of the SARS-CoV-2 virus to enter the cell.

Based on the findings in the lab, the team is now proceeding with pre-clinical and clinical trials on the drugs as a novel anti-COVID-19 therapy.

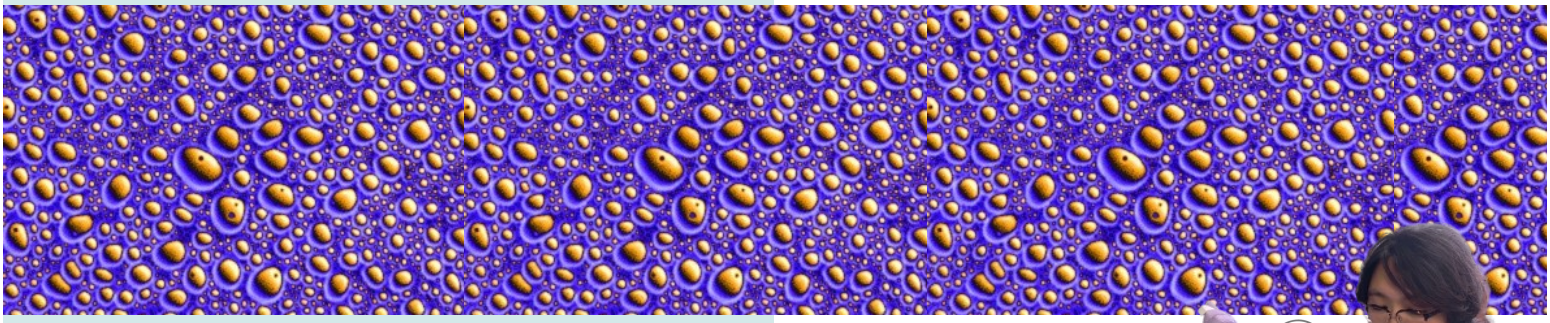
About the study

Tanimoto, K., Hirota, K., Fukazawa, T. et al. Inhibiting SARS-CoV-2 infection in vitro by suppressing its receptor, angiotensin-converting enzyme 2, via aryl-hydrocarbon receptor signal. Sci Rep 11, 16629 (2021).
https://doi.org/10.1038/s41598-021-96109-w

ANSWERING A CENTURY-OLD QUESTION ON THE ORIGINS OF LIFE

A team of Japanese scientists found the missing link between chemistry and biology in the origins of life.

Newly constructed proliferating peptide droplet



The missing link isn't a not-yet-discovered fossil, after all. It's a tiny, self-replicating globule called a coacervate droplet, developed by two researchers in Japan to represent the evolution of chemistry into biology. They published their results in the *Nature Communications*.

"Chemical evolution was first proposed in the 1920s as the idea that life first originated with the formation of macromolecules from simple small molecules, and those macromolecules formed molecular assemblies that could proliferate," said first-author Muneyuki Matsuo, assistant professor of chemistry in the Graduate School of Integrated Sciences for Life at Hiroshima University. "Since then, many studies have been conducted to verify the RNA world hypothesis — where only self-replicating genetic material existed prior to the evolution of DNA and proteins — experimentally. However, the origin of molecular assemblies that proliferate from small molecules has remained a mystery for about a hundred years since the advent of the chemical evolution scenario. It has been the missing link between chemistry and biology in the origin of life."

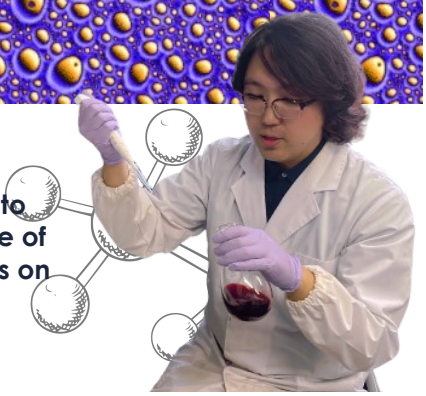
Matsuo partnered with Kensuke Kurihara, researcher at KYOCERA Corporation, to answer the century-old question: how did the free-form chemicals of early Earth become life? Like many researchers, they initially thought it came down to the environment: the ingredients formed under high pressure and temperature, then cooled into more life-friendly conditions. The issue was propagation.

"Proliferation requires spontaneous polymer production and self-assembly under the same conditions," Matsuo said.

They designed and synthesized a new prebiotic monomer from amino acid derivatives as a precursor to the self-assembly of primitive cells. When added to room temperature water at atmospheric pressure, the amino acid derivatives condensed, arranging into peptides, which then spontaneously formed droplets. The droplets grew in size and in number when fed with more amino acids. The researchers also found that the droplets could concentrate nucleic acids — genetic material — and they were more likely to survive against external stimuli if they exhibited this function.

"A droplet-based protocell could have served as a link between 'chemistry' and 'biology' during the origins of life," Matsuo said.

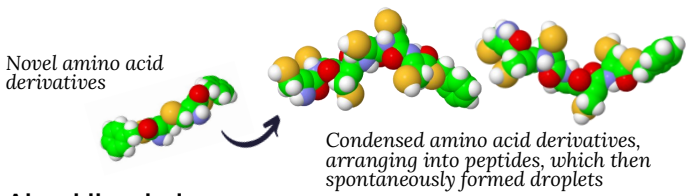
> **"This study may serve to explain the emergence of the first living organisms on primordial Earth.**
>
> *Muneyuki Matsuo*



The researchers plan to continue investigating the process of evolution from amino acid derivatives to primitive living cells, as well as improve their platform to verify and study the origins of life and continued evolution.

"By constructing peptide droplets that proliferate with feeding on novel amino acid derivatives, we have experimentally elucidated the long-standing mystery of how prebiotic ancestors were able to proliferate and survive by selectively concentrating prebiotic chemicals," Matsuo said. "Rather than an RNA world, we found that 'droplet world' may be a more accurate description, as our results suggest that droplets became evolvable molecular aggregates — one of which became our common ancestor."

At the time of the research for this paper, Matsuo was affiliated with the Department of Basic Science in The University of Tokyo's Graduate School of Arts and Sciences. Matsuo and Kurihara were both associated with the Department of Creative Research in the Exploratory Research Center on Life and Living Systems (ExCELLS), National Institutes of Natural Sciences. Kurihara was also affiliated with the Institute of Laser Engineering, Osaka University; the Institute for Extra-cutting-edge Science and Technology Avant-garde Research, Japan Agency for Marine-Earth Science & Technology; Faculty of Education, Utsunomiya University; and the Department of Life Coordination-Complex Molecular Science, Biomolecular Functions, Institute for Molecular Science, National Institutes of Natural Sciences.



About the study

Matsuo, M., Kurihara, K. Proliferating coacervate droplets as the missing link between chemistry and biology in the origins of life. Nat Commun 12, 5487 (2021). https://doi.org/10.1038/s41467-021-25530-6

A BETTER BLACK HOLE LASER MAY PROVE A CIRCUITOUS 'THEORY OF EVERYTHING'

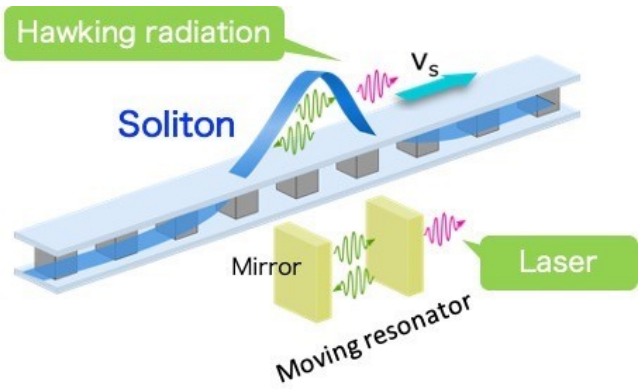
Researchers propose quantum circuit black hole lasers to explore Hawking radiation

The fundamental forces of physics govern the matter comprising the Universe, yet exactly how these forces work together is still not fully understood. The existence of Hawking radiation — the particle emission from near black holes — indicates that general relativity and quantum mechanics must cooperate. But directly observing Hawking radiation from a black hole is nearly impossible. So how can researchers study it to better understand how the forces integrate into a "Theory of Everything"?

According to Haruna Katayama, a doctoral student in Hiroshima University's Graduate School of Advanced Science and Engineering, since researchers cannot go to the Hawking radiation, it must be brought to them. She proposed a quantum circuit that acts as a black hole laser using an analogue black hole and a white hole as a resonator to amplify weak Hawking radiation. The proposal was published in *Scientific Reports*.

"In the proposed circuit, the metamaterial element makes it possible for Hawking radiation to travel back and forth between horizons, and the Josephson effect plays an important role in amplifying Hawking radiation through the mode conversion at the horizons, mimicking the behavior between the black and white holes," Katayama said.

The proposed laser also provides a future light source for quantum information technology. More here.



About the study

Katayama, H. Quantum-circuit black hole lasers. Sci Rep 11, 19137 (2021).
https://doi.org/10.1038/s41598-021-98456-0

IMPAIRED IMMUNE RESPONSE MAY CAUSE BONE RESORPTION IN PATIENTS WITH GENETIC DISORDER

About a quarter of the world's population is infected with tuberculosis bacteria, according to the World Health Organization, but only about 5 to 10% of those infected will develop symptoms. These pathogens are mycobacteria, which are everywhere, including in chlorine-treated tap water. Most people who encounter mycobacteria will never even know, but, for a few immunocompromised groups, the ubiquitous organisms can cause painful, difficult-to-treat conditions. One such group has Mendelian susceptibility to mycobacterial disease (MSMD), a rare genetic condition that results from a range of mutations involved in the body's immune response. Only about 400 people — mostly children — in the world have been diagnosed.

Now, a team led by Satoshi Okada, professor in the Department of Pediatrics, Hiroshima University's Graduate School of Biomedical and Health Sciences has revealed a molecular underpinning of the chronic bone infection in patients with MSMD. According to Okada, this finding could lead to better understanding the full immune response and reactions that leads to multifocal osteomyelitis — bone infection at multiple points — in patients with MSMD. They published their results in *The Journal of Allergy and Clinical Immunology*.

"The frequency of multifocal osteomyelitis is especially high in patients with MSMD due to an impaired response to a cell signal called interferon gamma (IFN-γ)," said first author Miyuki Tsumura, research fellow in HU's Graduate School of Biomedical and Health Sciences. "We initiated this study to investigate the possibility that IFN-γ signaling may play a role in the pathogenesis of multifocal osteomyelitis."

She noted that analysis of lesions of osteomyelitis suggest enhanced numbers of osteoclasts, the cells responsible for resorbing old bone cells during growth and repair. IFN-γ can prevent osteoclast production, so the researchers said the enhanced numbers of osteoclasts may suggest an impaired response to IFN-γ.

With osteoclast precursors derived from bone marrow cells cultivated from three patients with MSMD, caused by mutations that result in a defective response for IFN-γ, and healthy volunteers, the researchers examined osteoclast formation in the presence or absence of IFN-γ.

When IFN-γ was added to healthy cells, osteoclast formation stopped, as expected.

When it was added to the cells from patients with MSMD, the response was impaired — the cells resisted the call to stop formation.

"These results suggest that impairment of IFN-γ-induced inhibition of osteoclast differentiation and bone resorption in the context of signaling molecule deficiencies, leading to excessive osteoclast proliferation and increased bone resorption at infection points, may underlie multifocal osteomyelitis," Okada said.

The researchers plan to completely characterize the molecular mechanisms underlying multifocal osteomyelitis by further studying the overproduction of osteoclasts and investigating the role of osteoblasts — cells that make new bone.

About the study

Tsumura, M., Miki, M., Mizoguchi, Y., Hirata, O., Nishimura, S., Tamaura, M., Kagawa, R., Hayakawa, S., Kobayashi, M., & Okada, S. (2021). Enhanced osteoclastogenesis in patients with MSMD due to impaired response to IFN-γ. In Journal of Allergy and Clinical Immunology. Elsevier BV. https://doi.org/10.1016/j.jaci.2021.05.018

CHROMOSOME ABERRATIONS MAY PREDICT RISK OF SEVERE CHEMORADIOTHERAPY SIDE EFFECTS

The new radiosensitivity biomarker can make way for chemoradiotherapy treatments tailored to each cancer patient in the future.

Japanese researchers identified chromosome aberrations as a new biomarker in predicting an esophageal cancer patient's risk of experiencing severe chemoradiotherapy side effects.

"Chemoradiotherapy is the standard treatment for various types of cancer. However, while its usefulness is recognized, adverse events due to radiotherapy are of great concern," the study's lead author Nobuki Imano, assistant professor at Hiroshima University's Graduate School of Biomedical and Health Sciences, explained.

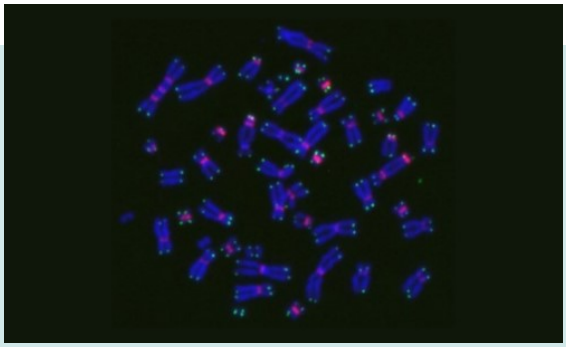
"These adverse events of chemoradiotherapy vary among patients and are thought to be due to differences in individual radiosensitivity. Therefore, it has been an important issue to establish an index for predicting individual radiosensitivity to predict the adverse events of radiotherapy."

Imano and his colleagues enrolled 18 esophageal cancer patients in a prospective study to evaluate individual radiosensitivity using DNA damage response and chromosome aberrations.

Peripheral blood lymphocytes (PBL), a type of white blood cell used to assess immune function, were taken from patients just before and 15 minutes after each treatment. PBL samples were also taken at four weeks and six months after patients completed their prescribed chemoradiotherapy treatment.

The researchers counted the number of misshapen dicentric chromosomes, which formed two centromeres, and O-shaped ring chromosomes to evaluate the number of chromosomal aberrations. Meanwhile, they tallied the γ-H2AX foci — a marker for DNA damage — per cell to assess DNA double-strand breaks.

They found no significant increase in the number of γ-H2AX foci during chemoradiotherapy in the patients. However, they discovered that chromosome aberrations were higher in patients who showed severe side effects (overreactor group) than in those who experienced lower grade toxicities (non-overreactor group).



This photo shows some aberrant dicentric chromosomes that formed two centromeres from an esophageal cancer patient undergoing chemoradiotherapy treatment.

"We found that the number of chromosomal aberrations increased during chemoradiotherapy and reached 1.04 per metaphase by the commonly used chemoradiotherapy dose of 50 –60 Gy for cancer treatment, and gradually decreased after chemoradiotherapy to approximately 60% in six months," the researchers said in their findings published in the March 2021 issue of the journal Radiation Research.

This study is the first they know of so far to report the relationship between acute toxicity and chromosomal aberrations in radiotherapy using in vivo data.

Imano said their study could lead to personalized radiotherapy treatments in the future.

"In this study, we showed that acute toxicities in esophageal cancer patients are associated with chromosomal aberrations in PBLs. We would like to continue to examine chromosomal aberrations in other cancers," he said.

"We would like to predict not only acute toxicities but also late toxicities and treatment outcomes to establish a personalized radiotherapy treatment for all cancer patients.

About the study

Imano, N., Nishibuchi, I., Kawabata, E., Kinugasa, Y., Shi, L., Sakai, C., Ishida, M., Sakane, H., Akita, T., Ishida, T., Kimura, T., Murakami, Y., Tanaka, K., Horikoshi, Y., Sun, J., Nagata, Y., & Tashiro, S. Evaluating Individual Radiosensitivity for the Prediction of Acute Toxicities of Chemoradiotherapy in Esophageal Cancer Patients. Radiation Research, 195 (3):244-252 (2021) https://doi.org/10.1667/rade-20-00234.1

Sex selection:

These frogs may be doing it platypus-style

(So-called "Frogypus")

Scientists found six sex chromosomes in the *Odorrana swinhoana* frog species endemic in Taiwan, giving new insights into how complex XY systems evolve. The findings appear in the journal Cells.

The discovery was a surprise to the international research team led by Associate Professor Ikuo Miura of Hiroshima University's Amphibian Research Center. Cases of multiple chromosomes in amphibians are rare and their karyotypes, or collection of chromosomes, are generally highly conserved with little rearrangement among species. Researchers took a closer look at the sex chromosomes and discovered that this frog is the first vertebrate known to retain descendant genes that have now gone on to determine sex in mammals, birds, and fishes inherited from a common ancestor.

The researchers found the Dmrt1, the male determining gene in birds, and Amh, the male determining gene in fish and platypus, on the Y1 chromosome; the Sox3, the ancestral gene of SRY in therian mammals and the male determining gene in medaka fish, on the Y3 chromosome; and an unidentified sex-determining gene on the Y2 chromosome. More here.

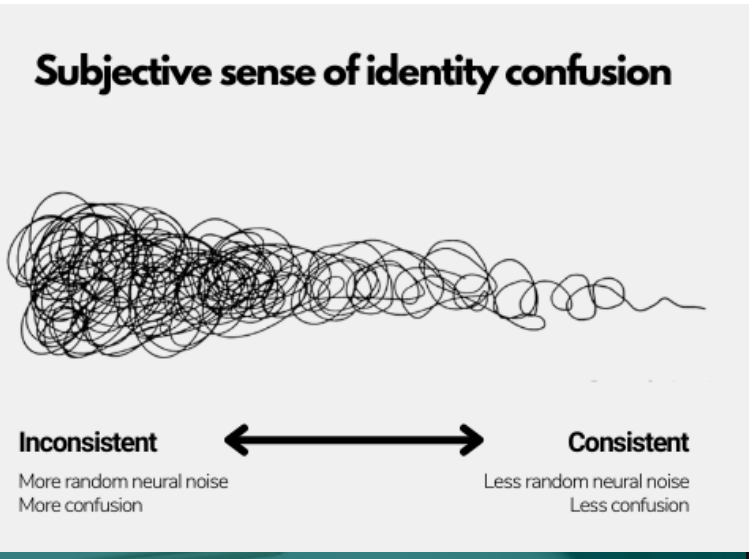
WHAT YOUR BRAIN'S NOISE TELLS ABOUT YOUR AUTHENTIC SELF

Feeling unsure of yourself? Your brain's background noise may be interfering with the long memory signals communicated by your neurons' electrical chatter.

Wrestling with the question of "Who am I?" during an inner dialogue but couldn't seem to reach an answer? Your brain's background noise may be disrupting the long memory signals communicated by your neurons' electrical chatter.

Hiroshima University's Professor Kazumi Sugimura and Associate Professor Takashi Nakao led a team of researchers to listen to the hum of neurons at the frontocentral lobe as people rest and find out what it tells about their subjective sense of identity.

The researchers observed noise interrupting the consistent rhythm of long memory alpha wave (8-12 Hertz) signals in people experiencing identity confusion.



Researchers found a link between the consistency of long memory signals communicated by our neurons' electrical chatter and our subjective sense of identity

Physiological reality of identity

A signal exhibits long-range temporal correlation (LRTC) or long memory if it remembers past fluctuation patterns. In the brain, LRTC is thought to reflect our capacity to take in fresh information and relate it to what we already know.

At a state of relaxation when our minds are prone to wander between events of the past and activities in the future, LRTC is associated with how we respond to situations based on our internal criteria of "What am I like?" But its links with our subjective sense of identity have yet to be explored.

"The subjective sense of consistent self across time has long been examined in developmental and clinical psychology through the concept of identity," Nakao, who is affiliated with HU's Graduate School of Humanities and Social Sciences and teaches undergraduate and graduate psychology courses at the university, said.

"While the previous studies have been mainly conducted based on subjective reports and theoretical considerations, this paper showed the physiological reality of identity. More specifically, it revealed for the first time the relationship between the subjective consistency of the self and the temporal consistency of the self-generated spontaneous brain activity."

LRTC's role in the consistency of self

Our neurons' electrical chatter is made up of excitations and inhibitions. LRTC emerges from neural networks with balanced excitatory and inhibitory connectivity.

Excitation happens when a neuron sends a message that makes the recipient more likely to fire. Inhibition is when the transmitted message makes the recipient neuron less likely to fire.

This chatter of excitation and inhibition produces brainwaves which, depending on their excitement level, are associated with our different mental states. LRTC has been observed in the brain's alpha, theta, and beta wave activity.

Although not the focus of their study, the researchers discovered that subjects who tested well in having a strong sense of who they are exhibited theta band (4 and 8 Hz) long memory signals with low noise contamination in their frontal lobe.

Meanwhile, those who showed feelings of identity confusion displayed long memory beta wave (12 and 35 Hz) signals with high noise interference in the centroparietal lobe.

"Thus, the temporal dynamics reflected in the LRTC of intrinsic brain activity likely have a crucial role in the consistency of self, including the subjective level, namely, a sense of identity," the researchers said in their study published in the journal Scientific Reports last January.

Hushing the noise

The researchers said their findings add to the evidence that long memory signals of the resting-state brain might serve as a noise suppression mechanism at the psychological level.

Nakao said his goal as a psychophysiologist is to uncover the function of the self.

> **"Based on brain science evidence, I would like to accumulate knowledge related to why people are bothered about themselves.**

"We believe such knowledge will help those struggling with questions such as 'Who am I?' and 'Why do I think so much about myself?' to see their situation objectively."

A total of 87 HU undergraduate and graduate students, all in good health, were recruited for the study.

About the study

Sugimura, K., Iwasa, Y., Kobayashi, R. et al. Association between long-range temporal correlations in intrinsic EEG activity and subjective sense of identity. Sci Rep 11, 422 (2021). https://doi.org/10.1038/s41598-020-79444-2

Feature

GET TO KNOW OUR DPs & DRs

We asked four scientists in the prestigious Distinguished Professors and Distinguished Researchers program questions about their fields and exciting developments in their research.

In 2013, Hiroshima University established its "Distinguished Professors" (DP) and "Distinguished Researchers" (DR) Program. Faculty members who are part of these programs are recognized to be engaged in extraordinarily distinguished research activities.

The DPs and DRs are selected based on objective evidence, such as the impact factor of their published papers, their acquisition of external funds, and academic awards received recognizing their outstanding accomplishments.

Kenta Shigaki

Distinguished Professor

Physicist Kenta Shigaki explores the state of matter that existed in the very early universe several millionths of a second after the Big Bang by colliding nuclei accelerated nearly to the speed of light. He specializes in the physics of multi-quark systems via relativistic nucleus-nucleus collision experiments.

Q: Can you please describe your field of research?

I specialize in high-energy nuclear physics. I am to untangle the mysteries of the quark-gluon plasma, a primordial mixture of elementary particles called quarks and gluons, which filled our universe a few millionths of a second after it was born 13.8 billion years ago with the Big Bang.

Q: Is there anything that surprised you the most in your current research?

Yes and no. We encounter many unexpected discoveries. For instance, the quark-gluon plasma itself was thought to be like a gas, but it turned out to be like a really smooth fluid with almost zero viscosity. But that is how science progresses. In that sense, I am not surprised.

Q: What achievement are you most proud of?

It is clearly the discovery of the quark-gluon plasma at the RHIC-PHENIX experiment in the 2000s. It was theoretically predicted already in the mid-1970s and took a quarter-century to find experimentally.

Q: Anything exciting coming up in your research?

I currently promote a gigantic international collaboration known as LHC-ALICE at the most renowned particle and nuclear physics laboratory, CERN in Switzerland. After harvesting a multitude of physics results in its first decade, the ALICE detector system is upgraded in the next data-taking period from 2022. I am on one of the major projects, called the "muon forward tracker," with the responsibility for its control system. The new detector will exert a great pull in our scientific voyage to approach the very early universe.

Kenta Shigaki

Professor

Graduate School of Advanced Sciences and Engineering

Junko Tanaka

Distinguished Professor

Epidemiologist Junko Tanaka is an Executive and Vice President of Hiroshima University. For a decade, she served as the director of Japan's Epidemiological Research Group on the Burden of Viral Hepatitis and Measures for its Elimination (VH-Epi), recognized as the country's top epidemiology research authority on viral hepatitis.

Q: Can you please describe your field of research?

My field of research mainly encompasses the epidemiology of viral hepatitis and hepatocellular carcinoma, their long-term prognosis. Epidemiology is first to grasp and understand the frequency and spread of diseases and their severity and then clarify their cause. And the ultimate purpose of epidemiology is to take measures based on that fact. I have conducted several epidemiological surveys on viral hepatitis in Burkina Faso, Cambodia, Uzbekistan, and Vietnam.

Q: What got you into this field?

Since I was a child, I was so interested in finding solutions for complicated matters. Somehow, I wanted to contribute even a little bit to human beings and around the world like the World Health Organization (WHO).

Q: What achievement are you most proud of?

Nationally, it's holding the director post of the VH-Epi for a decade. My research group is consistently recognized as the top epidemiology research group providing the scientific evidence for countermeasures against viral hepatitis and served as the pioneer for developing a viral hepatitis screening system and the safety of blood supply. Also, the result I'm most proud of in my research is its contribution to the eradication of viral hepatitis in Japan. Internationally, it's becoming the principal investigator, in joint collaboration with WHO, US-Centers for Disease Control and Prevention, and the Ministry of Health of Cambodia, in the 2017 nationwide study on the prevalence of hepatitis B surface antigen among 5 to 7-year-old children and their mothers in Cambodia.

And last but not least, my research on the epidemiology of the SARS-CoV-2 virus was selected by the Japan Medical and Research Development Agency this fiscal year and was one of the four selected candidates in the country.

Junko Tanaka

Professor

Medical Policy Office

Distinguished Professors

The DP program believes that active research pursuits by individual researchers is essential for the "formation of unique Centers of Excellence in research." To secure outstanding researchers, the university offers institutional priority status to select extraordinarily distinguished professors trying to solve pressing problems in their fields.

Distinguished Researchers

The DR program recognizes distinguished junior faculty members who are expected to become DPs in the future, enabling the university to ensure an environment where these faculty members can devote themselves to their research.

More here!

Yu Yamazaki

Distinguished Researcher

Neuroscientist Yu Yamazaki's research focuses on understanding Alzheimer's disease. Yamazaki took up postdoctoral training at the Mayo Clinic for six years. He is currently working on unraveling the role of vascular and glial cells in brain homeostasis maintenance.

Q: Can you please describe your field of research?

Alzheimer's disease (AD), the most common form of dementia in the elderly, affects more than two million people aged 65 and older in Japan. While AD is a devastating neurological condition associated with a continuous deterioration in memory, thinking, and behavior skills, there are currently no treatment strategies that can cure AD or delay the disease progression. As a team member of physician-scientists in the Department of Clinical Neuroscience and Therapeutics, my research focuses on neurobiological mechanisms and therapeutic approaches to cure AD and related dementias.

Q: From your perspective, what are the economic or social stakes of your study?

The ultimate goal of my research is to identify a therapeutic strategy to cure AD, which is highly significant to public health maintenance. At the same time, I am also responsible for passing along knowledge, skills, and research ethics to young students. Fostering the next generation of physician-scientist is vital in ensuring that talented researchers continue to join the AD research community for many years to come.

Q: Anything exciting coming up in your research?

Like many other labs, the research activity in our lab has been significantly impacted by the COVID-19 pandemic and accompanying social restrictions. Nonetheless, we have multiple projects ongoing, one of which includes the generation of humanized animal models of AD. We envision that they would provide more straightforward and relevant assay systems for studying human AD and related pathophysiology.

Yu Yamazaki

Lecturer

Hiroshima University Hospital

Nao Tsunoji

Distinguished Researcher

Chemical engineer Nao Tsunoji investigates the design synthesis of zeolite, mesoporous silica, and layered silicate materials and their potential application in solving environmental and energy problems. He had successfully synthesized a novel layered silicate which he named Hiroshima University Silicate.

Q: Can you please describe your field of research?

I am now investigating the synthesis of zeolite. Zeolite is crystalline aluminosilicate with pores below one nanometer, and this material is industrially used as a catalyst and adsorbent. By developing the precise synthesis technique based on molecular-level insight, I am aiming at an intentional structural design of zeolite that can freely tune the property demanded for potential applications in solving environmental and energy problems.

Q: What are the economic or social stakes of your study from your perspective?

Zeolites are industrial materials that possess adsorption, separation, and catalytic conversion abilities and have long been used in various fields such as oil refining and the chemical industry. Considering future restructuring of industrial structure for a sustainable society, new application fields of zeolite, such as carbon capture and utilization, environmental purification, and energy-saving technologies, are expected to develop.

Q: Anything exciting coming up in your research?

Until now, I am getting countless interesting synthetic examples in the current research. Recently, I have been developing zeolite materials for two NEDO (New Energy and Industrial Technology Development Organization) projects. One is carbon dioxide capture and catalytic conversion to chemical resources. Another one is the purification of automobile exhaust gas. I hope that these topics can contribute to the realization of zero emissions and a carbon-neutral society in the future.

Nao Tsunoji

Assistant Professor

Graduate School of Advanced Sciences and Engineering

WOMEN IN ACADEMIA

Meet our researchers

FOR WHOM?

Social scientist tackles why this one question matters in peacebuilding

Hiroshima University Associate Professor Dahlia Simangan talks about her research on peacebuilding, dealing with biases, and the importance of asking, "Who is our research for?"

If Hiroshima University Associate Professor Dahlia Simangan has one reminder to others planning to pursue a career as a peace researcher, it is to never forget the importance of asking, "Who is our research for?"

"For those planning to take the same research career, it's important to be reminded of the question, 'Who is our research for.' I hope they do their research always with communities in mind," she said.

Simangan's journey in peace research started right after she finished her undergraduate degree of BA Sociology at the University of the Philippines in 2006. She worked for the Philippine government researching the country's bilateral agreements with militaries of other nations. The experience sparked her curiosity on how states negotiate to achieve common goals despite conflicting interests.

Simangan during fieldwork at the war-torn city of Marawi, Philippines in 2019.

"That's why after that stint, I did my graduate studies in international relations. But in terms of research topics, my subfield is peace and conflict studies," she explained.

Simangan's research explores how to build and sustain peace after an armed conflict. But to reach an answer to this, she said you must go through a bunch of other questions first, such as: who builds peace, where do peacebuilding activities take place, and how to prevent conflict relapse.

In particular, she said she's interested in the interaction between international and local actors in a post-conflict or conflict-affected society. She said her ultimate goal in her research is to amplify perspectives from the ground.

"It's a long process and financially costly, peacebuilding is. And if it is not responsive to the needs of the people, it can backfire. So, when conflict relapse happens, that is just wasting the resources and efforts spent for the peacebuilding process," she said.

Simangan mentioned the importance of engaging local voices in peacebuilding in achieving the objectives of the United Nations Sustainable Development Goal 16. She handles graduate courses on global governance and peacebuilding case studies at the Graduate School of Humanities and Social Sciences.

"I am glad that we are in global conversations about peace and SDG16, especially in Hiroshima University because of the history here," she said. The pursuit of peace is one of the five guiding principles of HU.

Simangan during fieldwork in 2018 to research demining and transitional justice in Cambodia.

Closing the gap between research and practice

To Simangan, linking research with community service is essential.

"That's how we contribute, I think, to the broader society outside academia. I think this is also related to what I mentioned about the gap between research and practice."

And it's something she used to struggle with after accomplishing her Ph.D. at the Australian National University in 2017. However, that same year, she attended a conference about peace and reconciliation in Nepal that inspired her to start a non-profit organization there called Peace Perspectives.

"Conference delegates, including myself, were deliberating on how to build peace, and we were very comfortable in the fancy hotel where we were staying. All the while, just coincidentally, people in Kathmandu were having a hard time getting food, going to work, or going to school because of a fuel shortage due to the blockade between India and Nepal's border," she narrated.

"That disconnect hit me at that time. What's being negotiated by academics, what's being negotiated at the top is very different from what's being experienced on the ground."

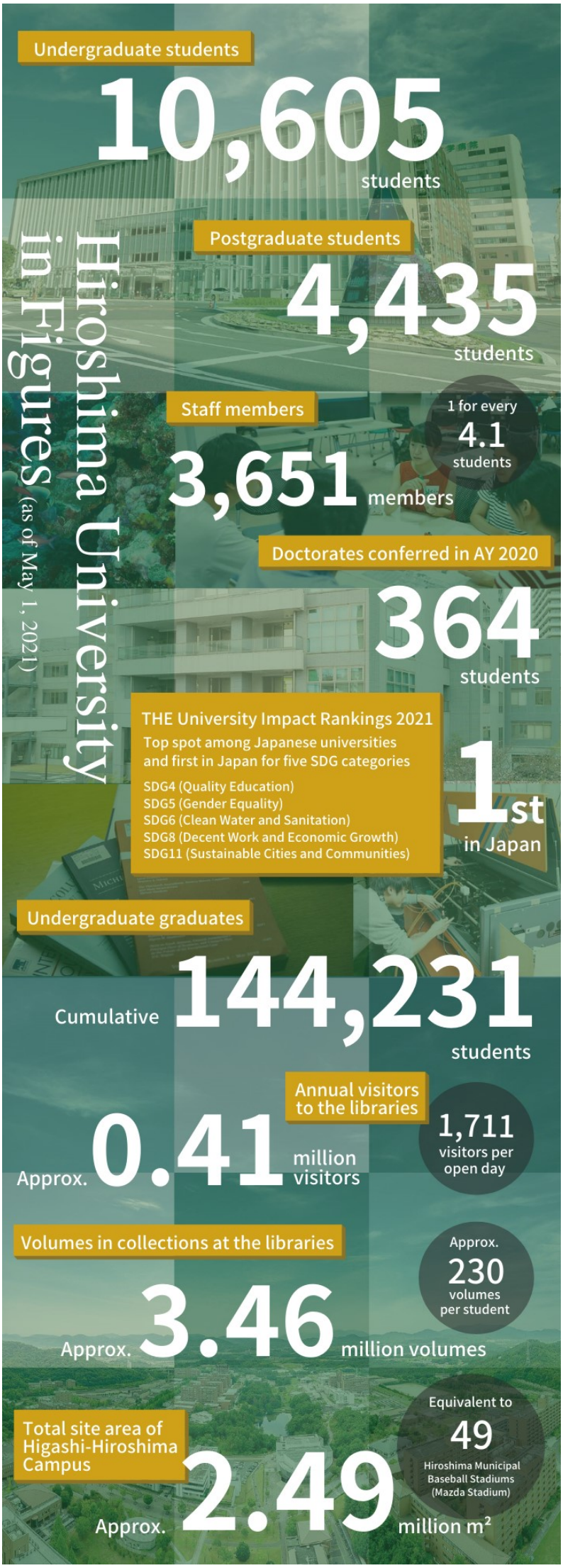
She explained that instead of finding the answer to achieving lasting peace for the communities, Peace Perspectives asks the everyday people what peace means to them. They then work with them based on those definitions of peace.

Dealing with biases

Dealing with biases and getting exposed to trauma while listening to narratives of conflict are occupational challenges for peace researchers. Simangan admitted that it could be challenging to separate your emotions, but it is crucial to maintain your neutrality as a researcher. She also highlighted that it is vital to verify and triangulate the data.

"I understand that there might be biases and emotionally-driven perspectives, so it is very important for me to verify them and triangulate them. So that takes so much time."

Although the COVID-19 pandemic has limited her ability to travel to collect data on the ground, she is grateful to be working with local researchers who are more knowledgeable of the issues on the ground.



SCHOOLS AND GRADUATE SCHOOLS

SCHOOLS (UNDERGRADUATE)

For undergraduate level, Hiroshima University consists of 12 schools which provide undergraduate courses including majors in the natural sciences, humanities, the social sciences, and many others.

School of Integrated Arts and Sciences
School of Letters
School of Education
School of Law
School of Economics
School of Science
School of Medicine
School of Dentistry
School of Pharmaceutical Sciences
School of Engineering
School of Applied Biological Science
School of Informatics and Data Science

GRADUATE SCHOOLS

Graduate level studies at Hiroshima University consist of 4 graduate schools below.

Graduate School of Integrated Sciences for Life
Graduate School of Biomedical and Health Sciences
Graduate School of Humanities and Social Sciences
Graduate School of Advanced Science and Engineering

ADVANCED COURSE

Special Course of Special Needs Education

INTERDISCIPLINARY GRADUATE EDUCATIONAL PROGRAM

In addition, three unique program offerings combine graduate level academic coursework with integrative research components.

Phoenix Leader Education Program (Hiroshima Initiative) for Renaissance from Radiation Disaster

TAOYAKA PROGRAM for creating a flexible, enduring, peaceful society

The Frontier Development Program for Genome Editing

CAMPUS LOCATION & ACCESS

❶ 〈Hiroshima City (Midori District)〉
Elementary School
Junior High School
Senior High School

❷ 〈Higashi Hiroshima City〉
Kindergarten

❸ 〈Hiroshima City (Shinonome District)〉
Elementary School
Junior High School

❹ 〈Mihara City〉
Kindergarten
Elementary School
Junior High School

❺ 〈Fukuyama City〉
Junior High School
Senior High School

NEW SPACES ON CAMPUS

HU Amphibian Research Center (ARC) launches a new building for the bioresource project!

In June 2021, the construction of a new building was completed to establish a core facility of the National BioResource Project promoted by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) and the Japan Agency for Medical Research and Development (AMED).

More than 10,000 amphibians — including Western clawed frogs, African clawed frogs, Iberian ribbed newts, and Axolotl — are bred in special breeding rooms of the building. These animals are provided to worldwide research institutions as bioresources for advanced life science studies, such as genome editing and regenerative medicine. The ARC also provides those frogs and newts to high schools to promote science education.

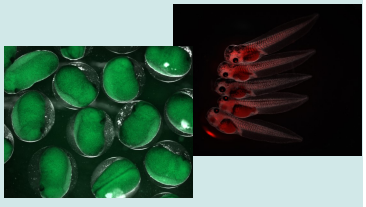
Snapshot of the opening ceremony of the building
June 29, 2021

Breeding room for Western clawed frog

Black-sharp nails of the Western clawed frog.

The Western clawed frogs (*Xenopus tropicalis*) are a standard model species for genetic studies due to their ease of breeding. The new breeding room has an automated water circulation and filtration system and a remote water quality control system to maintain the optimal environment for breeding the frogs.

Microscope room for live imaging of biological events in animal bodies



The ARC possesses a variety of microscope systems for advanced research. These photos show gene expression in living amphibians at 256x magnification.

About the Amphibian Research Center

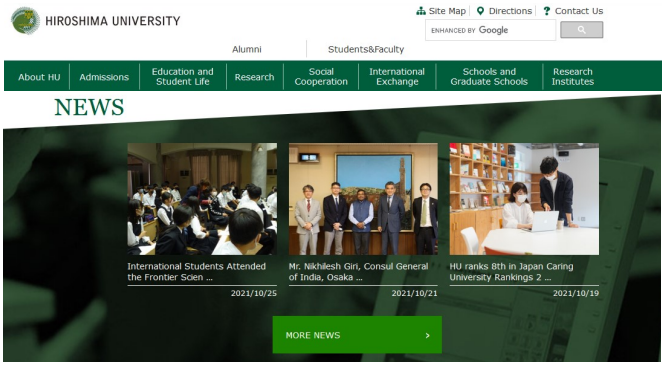
The ARC facility breeds and maintains approximately 30,000 amphibians in total — including model species for research, non-model wild-caught species, and endangered species. Using those amphibians, the ARC conducts all kinds of exciting research. Learn more here.

FIND MORE ABOUT HU

HU OFFICIAL WEBSITE – ENG

Latest News, Events and Research, as well as links to each university section are available from this webpage.

https://www.hiroshima-u.ac.jp/en



HU PROMOTIONAL VIDEO

Wondering what it's like at Hiroshima University? Here's our new video introducing our campuses and the mesmerizing sights of Hiroshima Prefecture.

https://youtu.be/r1Wg7oQZHYs

UPDATES FROM OUR LABORATORY

This webpage is the source for visitors worldwide to stay updated about what happens in the lab at HU.

https://www.hiroshima-u.ac.jp/en/laboratory-updates

NEW RESEARCHER DIRECTORY

Finding researchers at Hiroshima University is now easier than ever! Introducing the Researcher Directory — HU's brand new researcher search system — launched last July 1, 2021. Users may now search the research fields and achievements of approximately 1,900 researchers affiliated with HU by topic, Sustainable Development Goals (SDGs), discipline, alphabetical order, or simply entering a keyword in the built-in search box.

Check out the site here ↓

https://www.guidebook.hiroshima-u.ac.jp/en

SOCIAL MEDIA ACCOUNTS

HU Facebook
@HiroshimaUniv.en
https://www.facebook.com/HiroshimaUniv.en

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https://www.facebook.com/HiroshimaUniversityResearch

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https://twitter.com/HU_Research

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HiroshimaUniv
https://www.youtube.com/user/HiroshimaUniv

HU Instagram
@hiroshima_univ
https://www.instagram.com/hiroshima_univ

HU LinkedIn
HiroshimaUniv.en
https://www.linkedin.com/school/hiroshima-univ/

Autumn at Hiroshima University
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