HIROSHIMA UNIVERSITY



VOLUME 11 · JULY 2020

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CAMPUS PHOTOS SPRING · SUMMER



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 UPDATE

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COVER IMAGE

Exploring Wonderland

An illustration of Hiroshima University by Hirofumi Kamigaki



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RECENT NEWS

HU coping with the novel coronavirus outbreak #NotTodayCOVID19

Since the World Health Organization declared the outbreak of the novel coronavirus as a public health emergency of international concern on 30th January 2020, the outbreak has rapidly spread to many countries/regions of the world; they are now experiencing unprecedented challenges including economic and social crisis. Under such circumstances, making prompt decisions and taking effective actions are the key to prevent the spread of the virus and to lessen its impact on the global economy and communities.

In case of Hiroshima University (HU), the health & safety, education and welfare of the over 15,000 home students and 1,750 international students come HU's top priority to be seen to. In response to the rapid spread of the outbreak in and outside Japan, HU has drawn up a set of policy measures which all the members of HU can refer to and comply with, and made necessary arrangements to all the students so that their learning process can be fully supported and their health and welfare maintained at their optimal level during the stay-at-home period.

Emergency Aid for HU Students

HU launched 'Emergency Aid for HU Students' on 23rd April 2020 in order to support those HU students who have been under financial difficulties caused by the outbreak of the novel coronavirus. As of 15th June, 1,173 individuals have kindly made donations to HU, amounting to 59,211,000 yen. The Aid issues 30,000 yen per month to each qualified individual, and so far, a total of 778 students (as of 16th June 2020) have received the financial support.

Online classes

In order to provide all students with the opportunity to learn as much as possible, while prioritizing the health and safety of students and staff, HU conducted all the classes in the Spring Semester, in principle, online (either as video-streaming lectures or on-demand lectures). Only the classes in which educational value could not be gained without meeting in-person, such as experiments and practical training, were conducted with sufficient measures taken to prevent the spread of COVID-19 in place. It is thought that online education will probably continue even in the post-COVID-19 era, serving to increase the potential of higher education institutions in Japan.

Sienocean Biological

Technology Co., Ltd

On April 9, HU Hospital received 30,000 facemasks donated by Sienocean Biological Technology Co., Ltd, a pharmaceutical and food manufacturing company based in Hangzhou, China.

Sienocean has been collaborating with HU's Probiotic Science for Preventive Medicine Laboratory led by Professor Masanori Sugiyama, manufacturing and selling functional food products using plant-derived lactic acid bacteria.

The company offered to donate facemasks to HU by contacting Professor Sugiyama after learning that the university had a very tight stock amid the novel coronavirus outbreak in Japan.

Industry-Academia Collaboration

Manac Inc. CampusMedico Co., Ltd

On May 13, a disinfectant solution containing long-acting antimicrobial agent Etak, developed by Professor Hiroki Nikawa of the Graduate School of Biomedical and Health Sciences, was donated to HU by co-developer and manufacturer, namely, Manac Inc. and CampusMedico Co., Ltd., a venture company originated at Hiroshima University.

Etak, developed in 2009, is an antibacterial and antiviral agent whose effects last up to a week. In addition to influenza and norovirus, it is also said to be effective against the novel coronavirus.

Emergency Aid issues 30,000-yen a month for students in urgent need



Message from President

As President of Hiroshima University (HU), I am very concerned about and my heart bleeds for those students who may have suddenly found themselves in great financial difficulties and cannot properly feed their mouths as a result of losing their part-time jobs.

I can assure you that HU is committed to think about what it can do to those students in great financial difficulties and is determined to support them as much as possible.

Mitsuo Ochi





During difficult times #UnityIsStrength

RECENT NEWS

HU Achievements

Hiroshima University Launching New Graduate Schools

HU's graduate schools reorganizing process is now complete!

In April 2020, Hiroshima University launched additional two Graduate Schools: 1) Graduate School of Advanced Science and Engineering, located in Higashi-Hiroshima Campus; 2) Graduate School of Humanities and Social Sciences, located in Higashi-Hiroshima and Higashi-Senda Campus). Following the new launch above, HU now has four Graduate Schools in place. The reorganization of the Graduate Schools at HU involved 11 of them and has been completed in two stages: in the first stage, 'The Graduate School of Integrated Sciences for Life' and 'The Graduate School of Biomedical and Health Sciences' were launched in April 2019.

A billboard unveiling ceremony for the newly-launched Graduate Schools was held on April 1 on each campus. During the ceremony, President Ochi stated: 'One of the strengths of the new Graduate Schools lies in the flexibility of the programs where students with different school affiliations and specializations can collaborate with each other while pursuing their research topics. So, this new multidisciplinary environment is expected to break through the barriers and the limitations imposed by the conventional learning style at the previous Graduate Schools at HU.'



Unveiling ceremony - Graduate School of Advanced Science and Engineering (Higashi-Hiroshima Campus)



Unveiling ceremony - Graduate School of Humanities and Social Sciences (Higashi-Senda Campus)

As for the world ranking, HU was among the top 100 in five of the following 17 UN SDGs:

World Ranking of HU's SDGs performance

Ranking	Category
20th place	SDG6 (Clean water and sanitation)
52nd place	SDG9 (Industry innovations and infrastructure)
60th place	SDG12 (Responsible consumption and production)
65th place	SDG11 (Sustainable cities and communities)
98th place	SDG3 (Good health and well-being)

HU's Network for Education and Research on Peace and Sustainability (NERPS) contributes to the promotion of SDGs and serves as a resource hub for SDG-related initiatives on campus. NERPS aims to disseminate information related to university-based research and outreach activities related to the SDGs through its website and reports. HU is firmly determined to enhance all aspects of research, education, and social contributions towards the achievement of SDGs.

Don't forget to check out **NERPS Website**



https://nerps.org/

THE University Impact Rankings 2020



HU's outstanding performance in the Times Higher Education University Impact Rankings 2020!

On April 22, *Times Higher Education* (THE), a British journal dedicated to providing performance data on higher education, announced the "Impact Rankings 2020", a list that assesses universities against the United Nation's Sustainable Development Goals (SDGs). HU ranked in the 1st place in Japan for the following three categories:

SDG4 (Quality education),

- SDG6 (Clean water and sanitation), and
- SDG11 (Sustainable cities and communities).

For the overall scores, HU ranked in 4th place nationwide only after Hokkaido University, The University of Tokyo, and Tohoku University. Now in its second edition, the list evaluated 766 universities worldwide and 63 universities nationwide.

Outstanding researchers and awards

Commendation for Science and Technology FY2020 by MEXT in Japan

Five HU researchers including President Ochi were awarded Commendation for Science and Technology FY2020 by MEXT (the Ministry of Education, Culture, Sports, Science, and Technology) in Japan.

Awarded every year, the Commendation for Science and Technology by MEXT recognizes individuals who have attained outstanding achievements in the field of research, development, and promotion of public understanding of science and technology.

Among this year's awardees included five HU researchers—four selected for the Prize for Science and Technology and one for the Young Scientists' Prize—as listed below.

Young Scientists Prize

Recognition awarded to researchers under 40 with remarkable research outcomes as part of exploratory or innovative projects, demonstrating strong R&D aptitudes.

Awardee:

*Takashi Ogi (Associate Professor, Graduate School of Advanced Science and Engineering.

'Research on effective utilization of resources by the fusion of fine particle engineering and organic chemistry'

"In the future, I would like to see HU with a greater number of the awardees for Science and Technology as well as of Young Scientist, and to enable that, I would like to further enhance its research environment at HU" —

Comments by President Ochi

during the press conference.



Prizes for Science and Technology

Research Category

Recognition awarded to those who have produced highly creative achievements or inventions with the potential to advance science and technology in Japan.

Awardees:

*Mitsuo Ochi (HU President) *Nobuo Adachi (Professor, Graduate School of Biomedical and Health Sciences) *Naosuke Kamei (Associate Professor, Graduate School of Biomedical and Health Sciences

'Research on the development of a less invasive regenerative therapy of knee cartilage using magnetized MSCs* and magnetic force.'

*Mesenchymal Stem Cells

Science and Technology Promotion Category

Awarded to those who have contributed to the promotion of science and technology.

Awardee:

*Shinichi Kobayashi (HU Vice President/ Dean, Graduate School of Humanities and Social Sciences at HU)

'Promoting research and its practice on the integration of policies of science and technology with those of higher education'



From left to right: Associate Professor Kamei, Professor Adachi, President Ochi, Vice President Kobayashi and Associate Professor Ogi.

Egyptian students participating in a short-stay program organized by School of Medicine

In February 2020, a group of 73 medical students from 18 universities in Egypt arrived in Hiroshima to attend a short-term stay program organized by the School of Medicine at HU. The program consisted of lectures on medicine, technical and practical work in laboratories, and a guided tour of some laboratories/the University Hospital.





The program lasts one week and intends to provide the participating students with hands-on experience of advanced medical technologies at clinical sites, and operating room visits at HU's hospital.







HU is keen to further expand the scale of its student exchanges with the universities in Egypt in the future

ACTIVITIES

Operating the da Vinci Surgical System

RECEN'

During their guided tour of the Hospital, the medical students had an opportunity to see *the da Vinci Surgical System*, used when performing robotic-assisted minimally invasive surgery, and to try operating it. After receiving some instructions on how to operate Da Vinci by Associate Professor Jun Teishima at the Department of Urology, the students tried to control one of the arms, while looking at the 3D images displayed in a console. By trying to manipulate a ring in and out of a miniature cone, the students were able to see themselves the operative precision, dexterity and control of the da Vinci Surgical System.

Special lecture on the novel coronavirus (COVID-19)

Professor Hiroki Ohge of the Department of Infectious Disgave an easy-toeases understand lecture on the latest research findings of the COVID-19. As it was declared a Public Health Emergency of International Concern on 30 January 2020, the lecture was timely and entitled 'As a medical leader how each of you should cope with any pandemics?' The lecture was very thought-provoking and interactive as it saw an active participation by the students, asking many interesting questions.

Ain Shams University Alexandria University Assiut University Aswan University Benha University Beni Suef University Cairo University Fayoum University Kafr Elsheikh University Mansoura University Menofia University Minia University Port Said University Sohag University South Valley University Suez Canal University Tanta University Zagazig University

RECENT NEWS

Conferences and Seminars

Two presenters from HU win an award for research on art tourism in the periphery

At the 2020 Critical Tourism Studies -Asia Pacific conference hosted by Wakayama University (February 17-19), Meng Qu (a PhD candidate) and Andrew McCormick (a research scholar) from Hiroshima University (HU), assembled a three-part panel for their presentation. It was entitled "Art in the Periphery: Successes and Challenges of Art and Cultural Tourism-Based Revitalization Initiatives in Rural Communities." With "peripheral" communities around the world facing threats such as loss of services and cultural assets as well as outright extinction, the two panelists from HU critically examined a range of tourism-related interventions and initiatives in rural areas in Asia and Europe that employ sociallyengaged art, art/cultural festivals, arts investment, and creative placemaking activities to effect revitalization, boost tourism, and strengthen social bonds. Their presentation helps us to understand how art has been projected from different angles amid or against these issues.

For these panels, more than 15 presenters from universities and institutions across Japan, as well as the United States, Sweden, Denmark, and Hong Kong, reached across geographies and disciplines to present a range of nuanced cases of art and tourism in rural places, especially islands.

Qu and McCormick were given the Graduate Student Paper Award for their work on the Art in the Periphery panel. After the conference, Qu and McCormick organized a field excursion in which 13 international scholars were given a guided tour of Naoshima and Inujima in the Seto Inland Sea. The two islands are known as 'art islands' in Japan.

Both the conference and the subsequent excursion served as excellent opportunities for participants to exchange global-regional knowledge that bridged the fields of geography, tourism, and art.





International Seminar "Asian Young Geographers" Research Meeting in Hiroshima"

HU x University of Delhi



More information here! The Center for Contemporary India Studies at HU

https://home.hiroshima-u.ac.jp/ hindas/20200215_m7_rpt-e.html

On February 15, 2020, the Graduate School of Letters at Hiroshima University (HU) organized an international seminar in order to promote economic geography studies on Inclusive Growth in Contemporary India and Japan'. Entitled "Asian Young Geographers' Research Meeting in Hiroshima", the seminar was hosted by the Center for Contemporary India Studies at Hiroshima University (HINDAS) and the Japanese Society for Geographical Sciences. Three graduate students (Japan, China, and Vietnam) from HU and three young Indian scholars from the University of Delhi delivered their presentations. During the Q&A sessions of the seminar, the participants enthusiastically exchanged ideas and opinions on geographical issues arising in both countries.

OUTSTANDING STUDENTS



One HU student representing Japan participated at the 2019 SIYSS

A student on master's program, Mr. Taiyo Ishikawa, from HU's Graduate School for International Development and Cooperation (Completed the program in 2019), was chosen by The Japan Prize Foundation as one of the representative students from Japan for the Stockholm International Youth Science Seminar (SIYSS) held in Sweden in December 2019. The seminar is organized every year during the Nobel Prize Week by the Swedish Federation of Young Scientists in cooperation with the Nobel Foundation in Stockholm in Sweden. The event brings together students from all around the world to participate in The Nobel Prize Award Ceremony, and conducts international exchanges through research presentations and debates.

HU student was awarded the 10th JSPS *Ikushi* Prize

On March 18, 2020, Mr. Yu Yamane, a 3rd year Ph.D. student from HU's Graduate School of Advanced Sciences of Matter, was awarded the 10th Japan Society for the Promotion of Science (JSPS) *Ikushi* Prize. The *Ikushi* Prize was established to commemorate the 20th anniversary of Emperor Akihito's reign through an imperial endowment to support young scientists who are working diligently to advance their studies and research despite the challenging economic conditions. The award was established in 2010 to formally recognize outstanding students in doctoral courses who can be expected to contribute to Japan's future scientific advancement.





HU students contributing to the support of the local community amid COVID-19 outbreak

Two students, Mr. Koichi Koizumi and Mr. Akito Nakano, from HU's School of Engineering and Graduate School of Advanced Science and Engineering, have developed an application which shows many local restaurants available for take-out services on the local map. In the last three months or so, the local business of Higashi-Hiroshima City including its bars and restaurants has been seriously affected by the outbreak of the novel coronavirus. "By developing this application and supporting the local bars and restaurants, we felt we could do something to help the local economy of the city as well as those people including many students, who are employed by the restaurants. The restaurants we used to frequent, the local farmers and dairy farmers who are in the supply chain of delivering their products to these restaurants, and many of the local real estate agencies with their tenants being behind their rent, are all suffering from a business crisis caused by the novel coronavirus outbreak."- said Nakano.

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Launch of COVIDVENTILATOR Project

While the coronavirus infection sweeps through the globe, a project has started in Japan, which aims to provide free drafting data of a ventilator that can be made using 3D printers to the world.

With the global epidemic of COVID19 infections, the problem of the shortage of ventilators used to treat patients with severe pneumonia is becoming more serious in many countries around the globe. In light of the current situation, the COVIDVENTI-LATOR project was launched in March 2020, aiming to provide free blueprints that will allow health professionals to create ventilators using 3D printers.

The project was started by Naoyuki undergo industrial quality contro Ishikita, MD, PhD, Director of the process of medical validation Medical Device Innovation Laboratory feedback, and support research.

of Clinical Research Department in Niigata Hospital, and Associate Professor Tomohiko Kisaka, MD, PhD, Division Chair of Biodesign at Translational Research Center in Hiroshima University.

Ishikita has invented a ventilator that can be manufactured using 3D printers anywhere in the world which does not require power. Kisaka decided to launch the project, in response to an urgent call for the provision of this equipment to the medical sites fighting against the coronavirus infection.

For the time being, the project will work to receive certification as an approved medical device and to obtain licenses for medical treatment in countries and regions where this device is needed. Also, the project will undergo industrial quality control, the process of medical validation and feedback, and support research.

"The device, which works as a substitute for a mechanical ventilator, can be assembled from four 3D-printed parts," explains Kisaka

The COVIDVENTILATOR project, which started as a call to provide free data, has now become a nationwide movement to steer the country. So far, the project has received research funds from the Japan Agency for Medical Research and Development (AMED) to continue its efforts towards the approval of 3D printed models and molding models. Also, the project has been selected as one of the seven major projects supported by the Ministry of Economy, Trade, and Industry of Japan.

"We will live in moments of unity and save lives by making use of the power and wisdom of science," said Kisaka during a press conference.

Graduate School of Advance Science and Engineering

Assistant Professor Runsen Zhang

"What to expect when you're expecting electric transportation"

The influence of electric vehicles on the transport and energy sector



As many governments plan to phase out vehicles that use fossil fuels by 2050, researchers in Japan are researching the influence electric vehicles may have on the transport and energy sector.

While electric vehicles alone may not reduce carbon emissions, a new study reveals that when electric vehicles are powered with renewable energy and coupled with carbon policy strategies, they can help combat climate change without sacrificing economic growth.

In the study led by Assistant Professor Runsen Zhang at Hiroshima University, researchers combined economic and transport models and data from 17 regions around the world to produce six scenarios for transportation into the year 2100. As many governments plan to phase out vehicles that rely on fossil fuels by 2050, Zhang's data provides additional information that could be applied to climate mitigation strategies and policies worldwide.

In one scenario where countries produced only electric vehicles (including cars, two-wheelers, buses, and small trucks) and also implemented a carbon pricing strategy, the global mean temperature increase peaked at 1.82 degrees Celsius in the year 2090 and settled at 1.8 degrees Celsius in 2100.

This figure is lower than the 2 degrees Celsius climate goal that all countries in the United Nations Framework Convention on Climate Change have proposed to constrain global warming to, relative to preindustrial levels, as part of the Cancun Agreement. The results in this scenario with carbon pricing strategies could help meet the climate change mitigation goals.

"An electric vehicle policy is good for macroeconomic systems, but the condition is that we need a supporting policy and that is carbon pricing or renewable energy," said Zhang "An electric vehicle policy is good for macroeconomic systems, but the condition is that we need a supporting policy and that is carbon pricing or renewable energy," said Zhang.

While a carbon pricing policy initially revealed a negative impact on the economic system (ie gross domestic product loss), when carbon pricing was coupled with policies that mandated electric road transportation, this electric vehicle policy ultimately alleviated negative impacts of carbon pricing on the economic system.

The study also revealed how carbon pricing strategies were more significant in reducing emissions than a high preference for renewable energy sources. However, a high preference for renewable energy sources, such as wind and solar power, still facilitated growth in the power sector, so renewable energy remains an important strategy to reduce carbon emissions and maintain economic stability or growth.

Zhang notes a large proportion of a vehicle's carbon footprint is generated at the factory before cars reach the road. The limitations of this study included that the dynamics of electrical vehicle charging were not considered, but it could be an area of future research.

The 17 regions from the study include: Oceania, EU25, Rest of Europe, Former Soviet Union, Turkey, Canada, United States, Brazil, Rest of South America, Middle East, North Africa, the rest of Africa, Japan, China, India, Southeast Asia, and the Rest of Asia..



Original article

Zhang, R., & Fujimori, S. (2020). The role of transport electrification in global climate change mitigation scenarios. Environmental Research Letters, 15(3), 034019.

Link: doi: 10.1088/1748-9326/ab6658

Graduate School of Integrated Sciences for Life

Professor Sungrim Seirin-Lee

"Geometry of a common skin disease"



Researchers turned to mathematics to predict hive patterns in humans.

In a recent study from Hiroshima University, researchers turned to mathematics to predict hive patterns in humans.

Hives afflict 1 in 5 people, but the exact mechanisms behind the itchy red rashes are not well known.

The research team studied the patterns of hives in patients and reproduced the hive patterns using a mathematical model called a reaction -diffusion model, a common prototype for understanding how patterns develop. The researchers' model is a single equation type which had never before been used to generate complex patterns.

In response to injury, allergens, or stress, hives can form when cells called mast cells in the skin release a compound called histamine. The red swollen mark (also known as wheals) can range from a few millimeters to the size of a hand or even larger.

While research has shown that histamine itself helps mast cells release histamine, this study considers for the first time that certain mechanisms might also inhibit histamine release and that there may be more going on behind the disease than previously thought. "Our model succeeded in creating complex pattern of urticaria (hives), which is a very surprising result from both mathematical and biological points of views," said lead author and Professor Sungrim Seirin-Lee.

To create the equation, the researchers gave rashes to eight healthy volunteers and measured the time it took for the rash to form and determined the velocity of formation. The team then looked at 14 patients with urticaria and measured them using the same model as the healthy patients.

Rather than relying solely on biological studies to investigate hives, which often requires inducing hives in patients, the mathematical focus provides a new avenue for skin disease research. In the future, the mathematical model could possibly be used as a tool to find the molecules which play a role in the inhibition process, as well.

Ultimately, the findings from the study will help put together a more detailed picture of how the common skin disease develops and how to effectively deliver treatments.

"Finding the mechanism of urticaria is difficult only by biological methods," said Seirin-Lee. "Thus, we tried a completely different approach, mathematics. The approach using mathematical model for urticaria is the first trial in the world."



Original article

Seirin-Lee S, Yanase Y, Takahagi S, Hide M (2020) A Single Reaction-Diffusion Equation For The Multifarious Eruptions Of Urticaria PLoS Comput Biol 16 (1): .. E1007590 Link: https://Doi.Org/10.1371/ Journal.acbi.1007590

Graduate School of Humanities and Social Sciences

Professor Yoshihiko Kadoya

"Biometric devices could pinpoint factory workers" emotions and productivity"

Happiness, as measured by a wearable biometric device, was closely related to productivity among a group of factory workers in Laos, according to a recent study by a team of researchers from the School of Economics, Hiroshima University.

The researchers conducted a study to examine relationships between toy painters' productivity and on-the-job emotional states. While employee productivity has already been linked to job conditions, mental health, and other demographic factors, the study adds to a deeper understanding of how emotional states affect productivity.

Professor Yoshihiko Kadoya, lead researcher of the study, said the findings have implications for both operational and human resources strategies.

"Organizations need to consider employees' emotionality when producing workflow designs that could help ensure a pleasant working environment," he said.

In the study, 15 workers answered a questionnaire and wore a device on their wrist with built-in sensors to detect movement, pulse waves, environmental ultraviolet light, body temperature, and sound to continuously record physical activity, beat-to-beat pulse intervals, skin temperature, and sleep.

The device, Silmee(TM)W20, is produced by the TDK Corporation Tokyo, Japan.

Employees' emotional states were measured for three working days through a complex process of beat-tobeat pulse intervals via custom software developed by NEC Corporation Tokyo, Japan.

The researchers followed a common model in the field, Russel's circumplex model, to measure employees' emotions in four states: happy, angry, relaxed, and sad.

Using a random effect panel regression model, they found people's happy emotional state was positively related to their productivity. Meanwhile, no other emotional states were found to be related to productivity.

"The use of wearable biometric devices, which can track employees' emotional states provides an opportunity to examine more objective components of the emotion-productivity link," Professor Kadoya added.

The study's limitations included the possibility of device errors, the number of observations throughout the day, and the gender distribution (14 out of 15 workers in this study identified as female), therefore the results should not be over-generalized.

In the future, however, researchers hope to apply similar methods to explore the links between emotional

links between emotional states and productivity for different types of work.



Kadoya, Y., Khan, MSR, Watanapongvanich, S., & Binnagan, P. (2020). Emotional Status and Productivity: Evidence from the Special Economic Zone in Laos. Sustainability, 12 (4), 1544.

Link: <u>https://doi.org/10.3390/</u> su12041544

Graduate School of Biomedical and Health Sciences

Dentistry and Oral Sciences

"Oral hypofunction and tongue pressure measurement"

Professor Kazuhiro Tsuga

"Oral hypofunction" is a pathological condition that is caused by multiple factors of decreased oral function. If it keeps untreated, it may cause masticatory and swallowing disorders, and further impair general health such as malnutrition, frail and sarcopenia. So, it is necessary to manage oral function properly by observing the living environment and general condition of each elderly person. Symptoms of oral hypofunction include increase of microorganisms in the oral cavity, dry mouth, decreased occlusal force/motor function of tongue and lips/tongue strength, and deteriorated masticatory and swallowing functions. The use of the JMS tongue pressure measurement deviceTM developed by us in collaboration with JMS Co. Ltd. has been approved as a detailed examination of "tongue muscular weakness", which is one of the items of "oral hypofunction" (Fig. 1). Our research began in the 2000s, and this device was approved as a medical device in 2010 and started selling in 2011. It is superior in the safety and convenience and is used for large-scale epidemiological studies. And it is also used for objective evaluation and rehabilitation of oral function for each patient in medical care facilities (Fig. 2).

We understand that preventing the deterioration of oral function, maintaining and improving it, and taking proper nutrition will help maintain the general health and prevent frail and care, in order to protect the health of the elderly in Japan. Further achievement of this device in many fields is greatly expected.







(Fig. 2)

Research Institute for Radiation Biology and Medicine

Professor Satoshi Tashiro Professor Kazuo Awai

"Low-dose chest CT applied for lung cancer screening does not appear to damage DNA"



Peptide nucleic acid fluorescence in situ hybridization analysis performed to depict chromosome aberrations. Representative images of dicentric chromosomes with two centromeres (arrow) and of acentric fragments (arrowhead) are shown. The acentric fragments were created by the formation of dicentric chromosomes.

Large scale clinical studies in USA and Europe showed the reduction of lung cancer mortality rate in high-risk patients like longtime smokers by use of the low-dose chest CT scans for screening. However, the health effect of radiation exposure on patients with the low dose CT examination, delivering more radiation exposure than a simple X-ray, is a controversial issue from the epidemiological point of view. There have been no studies investigating the biological effect of lowdose CT scan on large numbers of subjects. A study group of Prof. Satoshi Tashiro, Director of Research Institute for Radiation Biology and Medicine, and Prof. Kazuo Awai,

Dean of School of Medicine, compared DNA damage and chromosome aberrations in 107 patients who underwent low-dose chest CT with that of 102 who had standard-dose chest CT. They obtained blood samples before and 15 minutes after CT. The median effective dose of low-dose CT was 1.5 milliSieverts (mSv), a unit of measure for radiation dose. The standard CT dose was 5.0 mSv. They clearly showed the increase of DNA damage and chromosome aberrations after standard chest CT scan. In contrast, even using these sensitive analyses, they did not detect the biological effects of low-dose CT scans. These findings could help assuaging fears

that such screenings will lead to an increase in radiation-induced cancer.

They are going to investigate the biological effects of various types of radiological diagnosis to establish the next generation management system of medical radiation exposure.

Original article

Sakane, H., Ishida, M., Shi, L., Fukumoto, W., Sakai, C., Miyata, Y., ... Tashiro, S. (2020). Biological Effects of Low-Dose Chest CT on Chromosomal DNA. Radiology, 295(2), 439–445.

Link: <u>https://doi.org/10.1148/</u> radiol.2020190389





Participant group classified by the type of CT scan

Box and whisker plot shows the absolute numbers of γ -H2AX foci (left) and chromosome aberrations (CAs, right) before and after CT in two independent groups. The numbers of γ -H2AX foci and CAs were significantly increased after standard-dose CT (SDCT). Before and after low-dose CT scanning there was no significant differences (LDCT).

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Graduate School of Biomedical and Health Sciences

Professor Yuji Yoshiko

"Bone matrix preserves miR-125b-5p that participates in osteoblastosteoclast communication"



Matrix vesicles (MVs), extracellular vesicles in a broad sense, secreted from calcifying cells including osteoblasts accumulate in the extracellular matrix. Besides being well-known role of MVs in initial hydroxyapatite crystal formation of calcified tissues, a group of Dr. Yoshiko identified that osteoblast MVs encase microRNAs that could be transferred to bone matrix. Of these, miR-125b-5p was highly expressed in osteoblasts and selectively embedded in MVs, and thereby focused on determining its role in mouse bone metabolism. During bone resorption, miR-125b-5p in bone matrix was released and targeted to PRDM1, a transcriptional repressor in osteoclast precursors, resulting in increased expression of the anti-osteoclastogensis factors IRF8 and MAFB that inhibits, followed by suppression of NFATC1-dependent osteoclast formation. In concordance with these in vitro findings, transgenic (Tg) mice overexpressing miR-125b-5p in osteoblasts exhibited decreased bone resorption and increased bone mass, while retaining osteoblastic bone formation. Osteoclast formation was decreased when either Tg or wild type (WT) mouse osteoclast precursors were cultured on Tg bones but not WT bones. Taken together with the results that Tg mice could evade bone loss caused not only by estrogen deficiency but also by immobilization, these findings indicate that MV-miR-125b-5p axis plays a crucial role in osteoblast-osteoclast communication. Thus, miR-125b-5p preserved in bone may represent a possible therapeutic target for osteolytic disorders.

Original article

Minamizaki, T., Nakao, Y., Irie, Y., Ahmed, F., Itoh, S., Sarmin, N., Yoshioka, H., Nobukiyo, A., Fujimoto, C., Niida, S., Sotomaru, Y., Tanimoto, K., Kozai, K., Sugiyama, T., Bonnelye, E., Takei, Y., Yoshiko, Y. (2020) The matrix vesicle cargo miR-125b accumulates in the bone matrix, inhibiting bone resorption in mice.

Link: https://doi.org/10.1038/ s42003-020-0754-2



The illustration of supernova SN 2006gy. (Credit: NASA/CXC/M.Weiss)

Read the full story in Discover Magazine



HU astronomy featured in DISCOVER MAGAZINE ONLINE

A study from Professor Koji Kawabata (Hiroshima Astrophysical Science Center) and collaborators sheds new light on what makes a super-bright supernova

The article "Astronomers Find a New Explanation for a Super-Bright Supernova" by Erika K. Carlson followed the release of a publication in the journal *Science* from collaborators at Max Planck Institute for Astrophysics, Stockholm University, Kyoto University, The University of Tokyo, and Hiroshima University. As published in Discover Magazine online, "When astronomers spotted SN 2006gy in 2006, it was the brightest super luminous supernova they'd ever seen. Later, a group of researchers led by Koji Kawabata, now at Hiroshima University in Japan, managed to capture a detailed picture of the light that the supernova was emitting at various wavelengths, or colors. They saw that SN 2006gy was emitting light in combinations of wavelengths that hadn't been seen in supernovas before."

Graduate School of Advanced Science and Engineering

"LHC-ALICE International Collaboration"

Hiroshima University x CERN European Organization for Nuclear Research

Professor Kenta Shigaki specializes in high energy nuclear physics, as evidenced by his leadership of the Experimental Quark Physics Laboratory in the Physics Department of Hiroshima University. The laboratory, with associate professor Yorito Yamaguchi and assistant professor Satoshi Yano, is a member of a gigantic international collaboration known as LHC-ALICE at the most renowned particle and nuclear physics laboratory, CERN in Geneva, Switzerland. ALICE is untangling 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.

Shigaki has been playing a key role in the field, after obtaining his PhD at University of Tokyo in 1995 based on a proactive experiment at Brookhaven National Laboratory in New York, U.S.A., where he successively joined the RHIC-PHENIX experiment and discovered the long-sought exotic state of matter, the quark-gluon plasma, in 2000's. The LHC at CERN is a new generation particle accelerator, 28 times more powerful than RHIC in terms of the top energy, which started to operate in 2008. ALICE is to elucidate the properties of the quark-gluon plasma utilizing the world-leading machine. ALICE is now ascending to a higher stage after harvesting a multitude of physics results in its first decade. The detector system is being upgraded toward the next data taking period from 2021 with the performance of the LHC also improving much. Shigaki and his colleagues are vital members of one of the major projects, called the "muon forward tracker", in a close collaboration with French groups and with the responsibility for its control system. The new detector is under commissioning at CERN, as shown in the photo with Yamaguchi and graduate student Motomi Oya from Hiroshima University, will be installed and operated in ALICE soon (after recovering from the COVID-19 pandemic), and will exert a great pull in the scientific voyage to approach the very early universe.



(Courtesy of CERN)



The "Muon Forward Tracker"

The "muon forward tracker" under commissioning at CERN in Geneva, Switzerland. With Yamaguchi (third from left) and Oya (second from left) from Hiroshima University.



Find more information about HU's Experimental Quark Physics Laboratory and the ALICE experiment here:

Experimental Quark Physics Laboratory: https://www.quark.hiroshima-u.ac.jp/

ALICE experiment: http://alice-collaboration.web.cern.ch/





CHECK IT OUT

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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 Education 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

ADVANCED COURSE

Special Course of Special Needs Education

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



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

INTERDISCIPLINARY GRADUATE EDUCATIONAL PROGRAM

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



HIROSHIMA UNIVERSITY UPDATE



HIROSHIMA UNIVERSITY UPDATE

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

Check out HU's video featuring the University's leading researches as well as everyday campus scenes.



Visit the following webpage to watch this video.

YouTube

https://youtu.be/OzZ4YBex8Ps



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HIROSHIMA UNIVERSITY UPDATE

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 UNIVERSITY MASCOT

Meet ひろティー(Hiroty) our new university mascot!

In 2020, the phoenix mark and the mascot character *Hiroty* were both created to build a sense of unity between the members of the university and to spread information and the charms of HU.



Phoenix Mark

The basic design of the phoenix mark is inspired by *The Phoenix*, HU's symbol, which portrays the sacred bird from Egyptian mythology and the leaf of the Palmae plant which is included in the school's emblem.



The mascot, *Hiroty,* has been designed to familiarize HU members with the phoenix mark, and its name was chosen via a campus-wide survey, taking the "Hiro" from Hiroshima and adding it to the "ty" from University.

Hiroty, HU mascot



UNIVERSITY OF WORLD-WIDE REPUTE AND SPLENDOR FOR YEARS INTO THE FUTURE



