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NATIONAL TSING HUA UNIVERSITY

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NTHU CELEBRATES 60 YEARS IN TAIWAN

On April 24 NTHU celebrated its 105th anniversary and the 60th anniversary of its reestablishment in Taiwan. The ceremony, fair, and related activities were well attended by faculty, students, and alumni as well as many social and educational elites from Taiwan and overseas. During the assembly President Hong Hocheng recalled that when NTHU was reestablished in Taiwan 60 years ago, it only provided instructional programs in science and engineering, and then gradually added programs in the humanities, social sciences, management responding to the needs of the changing Taiwanese society.

President Hocheng also indicated that NTHU is now entering a new phase, dubbed "NTHU 3.0." He emphasized that in responding to the challenges of globalization we need to keep in mind the school motto—self-discipline and social commitment—and continue to place people at the center of all our endeavors so that we will turn out graduates who are of noble character and at home in both the East and the West. President Hocheng explained that the history of NTHU can be divided into three phases. The first 40 years can be considered as "NTHU 1.0." During this phase Tsinghua College was established in Beijing to train talented students to serve as bridges between China and the West. During the second phase, "NTHU 2.0," which began in the 1960s, the two Tsinghuas—one in Beijing and one in Taiwan—developed separately, first emphasizing science and engineering, and later adding departments in other fields as they expanded.

The NTHU Student Chorus leading the school song.

President Hocheng noted that since being reestablished in Taiwan six decades ago, NTHU has continually grown; over the years adding the College of Humanities and Social Sciences, the College of Electrical Engineering and Computer Science, the College of Life Science, and the College of Technology Management. He

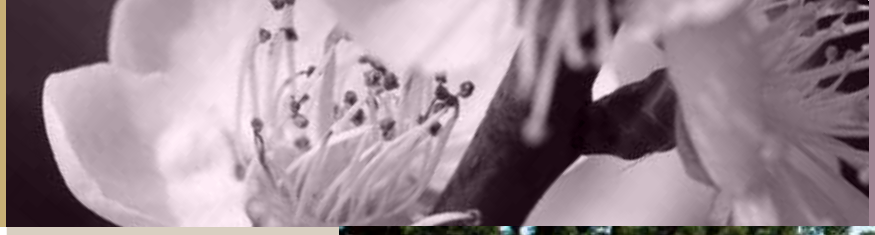
also stated that the recent decision to merge NTHU and the National Hsinchu University of Education will not only result in the addition of a college of education and college of the arts, but will also provide students with a greater diversity of educational and research opportunities, thereby expanding their range of knowledge and interests, especially in the humanities and social sciences. Thus the cultivation of world-class leaders with a strong sense of social responsibility is one of the main goals of "NTHU 3.0."

While various anniversary events had already been held since the beginning of the year, the main events took place on April 23 and 24. The annual footrace around the campus was held on the morning of April 23, with President Ma as the guest of honor. On the same day, NTHU also presented a special exhibition of the bird and insect calligraphy by Mr. Chao Mu-he, who is 106 years old. The sales of Mr. Chao's art works were donated to the university to fund the NTHU Rising Sun Scholarship. During the event Chao felicitated NTHU by taking up his brush and writing out the character *shou*, meaning "long life."

A number of additional events where held on the morning of the 24th, including the anniversary ceremony and fair, and the grand openings of the new Innovation Incubation Center and the Low-carbon Energy Research Center. All these memorable events created a festive atmosphere as NTHU celebrates six decades of providing top-quality education in Taiwan.

One of the highlights of this year's ceremony was the conferral of six "Distinguished Alumni Awards." This year's recipients were Nan-Chou (Joseph) Huang, President of E. Sun Financial Holding Company; Dr. Thompson (Chi-hsiang) Lin, the Founder, Chairman and C.E.O. of Applied Optoelectronics Inc.; Kin-Yuan (K.Y.) Lin, Chairman of the Microlife Co.; Wen-ying Huang, recipient of the Golden Horse Award and the C.E.O. of SinoMovie; Vigor Yang, the William R. T. Oakes Professor and Chair of the School of Aerospace Engineering at the Georgia Institute of Technology; and Lu Cheng-li, Chairman of INSIGHT Consulting Inc..

President Hocheng delivering his speech during the anniversary ceremony.



NTHU'S LATEST GREEN BUILDING

Funded by a generous contribution from alumnus Dr. Brent Wei-teh Lee, the Lee Tsen Min Building was inaugurated on April 24. The building was designed to maximize energy efficiency and will house various research laboratories that focus on the development of the new green-energy technologies, including high-efficiency batteries and wireless solar chargers. Thus the building is said to be "green inside and out."

Named in honor of Dr. Lee's father, this is the first NTHU building named after an individual, and is also known as the "Green Energy Teaching and Research Building." Lee's donation of NT$150,000,000 was the largest individual endowment ever received by NTHU since it was re-established in Taiwan 60 years ago.

At a press conference held on April 22, President Hong Hocheng expressed his gratitude to Dr. Lee for the generous donation as well as his stipulation that the building adopt an energy-efficient design.

Dr. Lee responded that he is very happy to give something back to his alma mater, and he hopes that others will follow his example. He also said that he wanted to have the building named after his father as a way of expressing his gratitude to both of his parents, who suffered much hardship after arriving in Taiwan from Shandong along with their children.

Construction of the Lee Tsen Min Building began in 2014 and was completed at the end of 2015. It's now the sixth "green building" on campus, and Dr. Lee hopes that it will inspire students to think and learn in new ways. In particular, the spacious and

From left to right: Shu-gang Liu, general manager of Best-giving Construction; Fan-Gang Tseng, Dean of the College of Nuclear Science; President Hong Hocheng; Dr. Brent Wei-teh Lee; Ching-hwa Chang, the Principal Architect; and Min Lee, Vice President and Chief of Staff of NTHU.

airy design is naturally appealing and is intended to stimulate collaboration and innovation, in contrast to the cloistered feel of conventional research labs.

Ching-hwa Chang, the Principal Architect, stated that energy efficiency and sustainable development were the main design considerations. Thus the design features an attractive white curtain wall on the east and west sides of the building which allows light and air in, but blocks direct sunlight, thereby reducing air-conditioning costs by around 70 percent.

Chang stated that the building further reduces the need for air conditioning by using high ceilings and making maximum use of natural ventilation. Moreover, in the future the building will be fitted with an energy management system designed by the Department of Engineering which is expected to reduce the combined annual electricity expenses of this building and the Engineering Building substantially.

The Lee Tsen Min Building features an attractive white curtain wall which allows light and air in while blocking direct sunlight, thereby reducing air-conditioning costs by around 70 percent.

THE DEPARTMENT OF ELECTRICAL ENGINEERING RANKS 40TH IN THE 2016 QS RANKINGS

In the QS World University Rankings by Subject for 2016, published on March 22, 17 NTHU departments were included (compared to 16 in 2015); 13 of which were ranked in the top 200. Amongst these, the highest ranked NTHU department was the Department of Electrical Engineering, 40th this year, up from 41st in 2015.

In this year's QS ranking eight NTHU departments were in the top 100. They are the departments of Electrical Engineering; Power and Mechanical Engineering; Chemical Engineering; Materials Science; Computer Science; Chemistry; Statistics; and Linguistics.

Of all the departments of electrical engineering in Taiwan, NTHU's was second only to that of NTU. The Department of Statistics was ranked 83rd, the highest of all such departments in Taiwan.

In the field of medical technology, NTHU again scored high in comparison with other such programs in Taiwan; only NTU, NCKU, NYMU, and Chang Gung University ranked higher.

Two NTHU departments were listed in the QS rankings for the first time: the Department of Economics and the Department of Education.

The 2016 QS World University Rankings include 42 disciplines divided into five major areas: arts and humanities; engineering and technology; life sciences and medicine; natural sciences; and social sciences and management. Each discipline is evaluated on four indicators: academic reputation, employer reputation, citations per paper, and H-index. Each indicator is weighted in accordance with the conditions specific to the discipline. For example, citation rates are generally higher in medicine, and the natural and life sciences than in the arts and humanities; and the electrical engineering field gives particular importance to employer reputation.

Additional information of the 2016 QS World University Rankings can be found at the QS website (http://www.iu.qs.com/university-rankings/subject-tables/).

Disciplines in which NTHU was included in the 2016 QS Rankings	Ranking
electrical engineering	top 50
mechanical engineering, chemical engineering, materials science, computer science, chemistry, statistics, linguistics	51-100
modern languages, biological sciences, math, physics, astronomy	101-150
management	151-200
medicine, environmental engineering, economics and econometrics, education	201-344

VIRTUAL REALITY COMES TO NTHU

A team of faculty members and students spent three years creating a VR system of the entire NTHU campus. Wearing a head-mounted display, lightly touch the map to visit any sight on campus.

It's no longer necessary to tour our campuson foot! A team consisting of faculty members and students from the Department of Computer Science and the Computer Center has recreated the beautiful NTHU campus using virtual reality (VR) technology. When you put on the virtual reality headset and lightly touch the map, each campus building will vividly appear, as well as the surrounding topography. Even without the headset you can use the "real-time campus view" to visit the entire campus via the internet.

Professor Hao-chuan Wang, Director of the Division of Learning Technology, Computer & Communication Center, says that the distinctive feature of their system is that in addition to buildings it also includes the entire campus landscape, so as to give the viewer a complete and realistic experience. Moreover, the system was entirely created by our faculty members and students.

The project originated in 2010, when Hung-kuo Chu, an assistant professor of the Department of Computer Science, planned a professional development course on 3D design. The next major step came in 2013, when he organized the project team and officially launched a course titled "3D Modeling and Design." The course focused on modeling concepts and developing practical skills, and attracted over a hundred students at the very first time it was offered.

Professor Chu says that they started from scratch and eventually covered about 90 buildings, all with different styles and characteristics. They also included the surrounding landscape, making this a huge undertaking. Students conducted on-site inspections on each building and took photographs from multiple angles. Then they worked on the computer to create a 3D model with exact details, right down to the patterns on the walls and window sills.

Team member Wei-ting Ruan of the Department of Computer Science said that the most difficult part of the whole project was modeling. Of all the buildings he worked on, he said that the most difficult and time consuming one was the Humanities and Social Sciences Building, because of its large scale, multiple angles, and design complexity

For those who would like to visit NTHU without even going out the door, the team has set up the "real-time campus view." Employing a high-definition webcam and video streaming technology, the website provides a continuous feed of the campus lawn and lake, even during major storms. The "real-time campus view" can be visited at: http://livecam.web.nthu.edu.tw/files/14-1931-97850.php

EIGHT NTHU FACULTY MEMBERS RECEIVE OUTSTANDING RESEARCH AWARD FOR 2015

The The Ministry of Science and Technology recently announced the recipients of the Outstanding Research Award for 2015, amongst whom are eight NTHU faculty members: Weileun Fang of the Department of Power Mechanical Engineering; Albert Kong of the Institute of Astronomy; Po-wen Chiu of the Department of Electrical Engineering; Shin-chieh Chang of the Department of Computer Science; Kingman Cheung of the Physics Department; Kuo Chu Hwang of the Department of Chemistry; Andrew Yeh of the Institute of NanoEngineering; and Nyan-hwa Tai of the Department of Materials Science and Engineering.
The followings are brief descriptions of their award-winning accomplishments.

Professor Weileun Fang
Department of Power Mechanical Engineering

WEILEUN FANG: PIONEER OF THE MEMS TECHNOLOGIES

Prof. Weileun Fang received his PhD from Carnegie Mellon University. His research focuses are the design, fabrication, and testing of microsystems. Recently, he concentrates on the development of physical, mechanical, and environmental sensors for the applications of the "Internet of Things" and "Industry 4.0".

Prof. Fang is a well-established researcher in the field of MEMS. He is well-known internationally. He serves as chief editor and editor for many prestigious international journals. He also became an IoP Fellow and IEEE Fellow respectively in 2012 and 2015. With the help from Prof. Fang, Taiwan hosted several important international conferences which further enhanced Taiwan's visibility in MEMS field. Moreover, Prof. Fang established the Micro Sensors and Actuators Technology Consortium (uSAT) to support the domestic MEMS companies in 2013.

Prof. Fang expressed his appreciation to all members of his research team. He enjoyed working with these talented young researchers to develop many novel and useful micro devices on chip. He thanked the inspiration and many help from his colleagues at Tsing Hua. He also thanked the peers around the world for expanding his horizon. Finally, Prof. Fang expressed his appreciation for all the support and encouragement he has received from his family over the years.

Professor Albert Kong of the Institute of Astronomy

ALBERT KONG: DISCOVERER OF AN X-RAY FLASH FROM A SUPERNOVA

Prof. Albert Kong of Institute of Astronomy specializes in high energy astrophysics, and is currently focusing on multi-wavelength observations of black holes, neutron stars, and white dwarfs.

In January 2008 Kong discovered an X-ray flash from a newly born supernova explosion and confirmed a theory proposed 40 years ago. This remarkable discovery was reported in the journal *Nature.*

Prof.Kong's research team has played a leading role in using NASA's Fermi Gamma-ray Space Telescope to explore the high-energy universe, and he has organized a research network to promote gamma-ray astronomy in Asia. Many of his research results have been reported by American, British, and Japanese media.

In response to the announcement, Prof. Kong thanked the Ministry of Science and Technology for its encouragement and long-term financial support, as well as NTHU for providing an excellent research environment. He also thanked the students and researchers of his team for their efforts. Finally, he thanks his family for their continuous support which allowed him to concentrate his endeavor on his scientific works.

Professor Po-wen Chiu of the Department of Electrical Engineering.

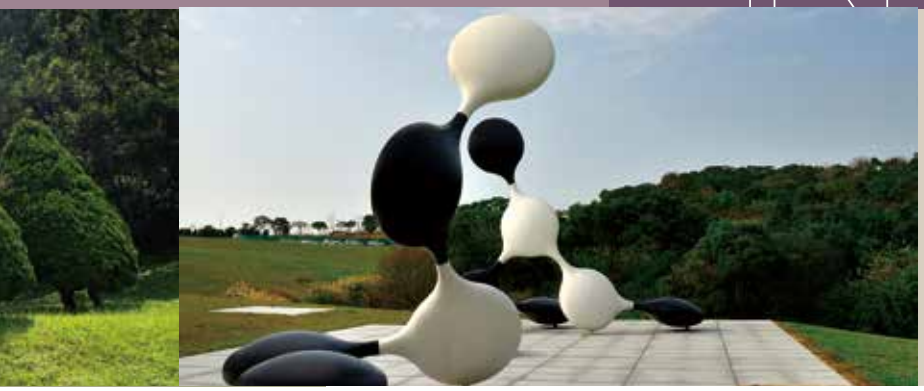
PO-WEN CHIU: A WORLD-CLASS RESEARCHER ON GRAPHENE

Prof. Po-wen Chiu of the Department of Electrical Engineering completed his bachelor and master degrees at NTHU's Department of Materials Science and Engineering. After earning his doctorate at the Department of Physics of the Technical University of Munich, Germany, he returned to Taiwan and began teaching at the Institute of Electronic Engineering. His research focuses on the physical properties of graphene and low-dimensional semiconductor materials and their applications in electronic components.

Prof. Chiu's current research focuses on using the chemical vapor deposition process to develop new ways of producing graphene and two-dimensional materials. Furthermore, he is working on applying graphene technology to the manufacturing of advanced semiconductors and photovoltaic elements, in cooperation with a number of domestic and overseas companies, such as Applied Materials, TSMC, AU Optronics, and Epistar.

Prof. Chiu's research results have been published in various leading journals in the fields of nanotechnology, physics, and chemistry, such as *Nature Communication, PRL, Nano Letters, ACS Nano, and Advanced Materials*.

Upon receiving the award, Prof. Chiu expressed his gratitude for the funding and support provided by NTHU, especially the kind assistance he has received from senior faculty members. He also thanked his family for their long-term encouragement and his enthusiastic research team for their tireless hard work and stimulating ideas.



Professor Shih-chieh Chang of the Department of Computer Science.

SHIH-CHIEH CHANG: AT THE VANGUARD OF CHIP DESIGN

After completing his Ph.D. in electrical and computer engineering at UC Santa Barbara in 1994, Dr. Shih-Chieh Chang began working at Synopsys, one of the largest companies in the field. In 2001, he joined NTHU's Department of Computer Science. Dr. Chang focuses on electronic design automation technology and concentrates on how a Boolean function can be transformed to a logic circuitry so as to enhance circuit efficiency.

Through his long-term cooperation with industrial sectors, Dr. Chang has gained extensive understanding of the key issues in chip design. His team has proposed efficient algorithm, circuit architecture and EDA software to tackle environmental and process variation so as to significantly reduce leakage power of an IC chip and therefore, increase the standby time of mobile devices for volume production.

Upon receiving the award, Dr. Chang thanked the Department of Computer Science for providing an environment conducive to research and his predecessors for their encouragement and guidance. He also added a special word of thanks to the students in his research team for their invaluable contribution. Finally, he thanked his family for their long-term support.

Professor Kingman Cheung of the Physics Department

KINGMAN CHEUNG: LEADING THE SEARCH FOR NEW PARTICLES

Prof. Kingman Cheung completed his Ph.D. in physics in 1992 at the University of Wisconsin-Madison and in August 2003 joined NTHU's Physics Department. His research focuses on theoretical particle physics and phenomenology, especially their application in colliders.

Prof. Cheung has accomplished a great deal in bridging the gap between abstract theory and experimental observation in such areas as high-energy physics, cosmology, and astroparticle physics. He is also working on the development of effective strategies to detect new particles and determining their unique signals in collider experiments.

He focuses on the most fundamental questions in physics, i.e., the origin of mass, a grand unified theory of forces, the structure of space-time, and the properties of dark matter. In recognition of his many accomplishments in collider physics and electroweak symmetry breaking, he was elected to the American Physical Society in 2013.

Upon receiving the award Prof. Cheung thanked NTHU and the National Center for Theoretical Sciences for providing resources and an excellent research environment. In addition, he thanked his predecessors and colleagues for their understanding, encouragement, and invaluable assistance, especially Professor Tzu-Chiang Yuan of Academia Sinica, Wai-Yee Keung of University of Illinois at Chicago, Jae-Sik Lee of Korea, and Po-Yan Tseng, Chih-Ting Lu and Jung Chang. Without the hard works and contributions of these people, he would not have the present achievements. "This is a real grace of God for His perfect plan." Finally, he thanked his wife and daughter for their encouragement, support, and companionship.

Professor Kuo Chu Hwang of the Department of Chemistry

KUO CHU HWANG: DEVELOPING A LOW-POLLUTION PROCESS FOR NYLON PRECURSOR

After earning his doctorate in Chemistry at Columbia University, Prof. Kuo Chu Hwang completed a postdoctoral fellowship at Rockefeller University in New York and then joined NTHU's Department of Chemistry. His research interests include the photochemical properties of organic molecules and metal nanomaterials, as well as their applications in photovoltaic and biomedical research. Prof. Hwang has a strong sense of curiosity. He often told his students that "If you don't know where a problem lies, then you won't find the answer; knowing the key bottlenecks of a field is the first step in doing good research."His research results have been published in a number of top journals. Recently Prof. Hwang's research team developed a new low-pollution method for producing nylon precursor, i.e., adipic acid. Their findings were reported

in *Science* in 2014, marking the beginning of a new green era for the nylon industry. Upon receiving the award, Prof. Hwang thanked NTHU for its generous financial support, the Department of Chemistry for providing research space and equipment, and the Ministry of Science and Technology for providing long-term research funding.

Professor Andrew Yeh of the Institute of Nano-engineering

ANDREW YEH: DEVELOPING THE NEXT GENERATION LIQUID LENSES

Prof. Andrew Yeh of the Institute of NanoEngineering and MicroSystems completed his Ph.D. in electrical engineering at Cornell University in 1999 and began teaching at NTHU in 2001.

Prof. Yeh's main areas of research are liquid zoom lenses, nano-optics, biomedical optoelectronics, and RF components. Amongst the many awards he has received are the National Science Council's Wu Dayou Memorial Award in 2006, and the National Science Council's Outstanding Research Award in 2013; in 2014 he was elected as a Fellow of the American Society of Mechanical Engineers.

In 2010 Prof. Yeh developed the first "dielectric liquid lens," which uses a lens curvature similar to that of the human eye. This lens can photograph an object as close as one centimeter as well as one at a great distance, thus making it suitable for applications such as photo-lens in mobile phones and endoscopes.

Professor Nyan-hwa Tai of the Department of Materials Science and Engineering

NYAN-HWA TAI: INVENTOR OF THE MAGIC SPONGE

Prof. Nyan-hwa Tai of the Department of Materials Science and Engineering completed his Ph.D. in mechanical engineering at the University of Delaware in 1990 and then returned to Taiwan to teach at NTHU. Tai's research areas cover the preparation and application of a variety of carbon materials, including carbon fiber composite material, carbon composites, ultra nano-crystalline diamond films, carbon nanotubes, and graphene.

The "magic sponge" invented by a research team headed by Tai has been found to be highly effective at cleaning up oil spills in the open sea. The magic sponge is the first invention developed in the academe of Taiwan to be uploaded by Google's Solve for X (SFX) think tank.

Prof. Tai expressed his thanks to the Department of Materials Science for providing an excellent research environment, saying that he was especially grateful for all the encouragement and support he has received from friends and colleagues in the field of materials science. He also thanked all the graduate students at his lab for their creativity and enthusiasm for pursuing new knowledge.

Prof. Tai also expressed his gratitude and respect for all his teachers over the years. Finally, he said he would like to share the honor with his family, whose care, support, and encouragement have been an integral part of any success he may have had in his professional career.

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WOMEN SCIENTISTS AT NTHU RECEIVE PRESTIGIOUS AWARDS

a Four awardees at the 2016 Taiwan Outstanding Women in Science Awards Ceremony (left to right): Professor Lily Hui-Ching Wang of NTHU's Institute of Molecular and Cellular Biology;Rui-hua Chen of Academia Sincia; Yu-ling Chang of NTU's Department of Psychology; and Li-an Chuof NTHU's Institute of Biotechnology.

b Associate Professor Lily Hui-Ching Wang with Professor Margaret Chang, Professor Wen-Ching Wang, and members of her research team.

Amongst NTHU's many outstanding women scientists, two have recently received prestigious awards from the Taiwan Outstanding Women in Science organization. Professor Lily Hui-Ching Wang of the Institute of Molecular and Cellular Biology received the Promising Women in Science Award for her work on the mitosis regulation and the pathology of viral hepatitis. Li-An Chu, a Ph.D. student at the Institute of Biotechnology, won the Meng Tsui-Chu Scholarship for her interdisciplinary work in neuroscience research.

Prof. Wang's main research involves exploring the mitotic regulatory protein associated with cancer formation. Her experiments have shown that the important mitotic regulatory protein Sgo1(Shugoshin-like protein 1) is present in the majority of liver cancers, and thus can be taken as a therapeutic target for future cancer chemotherapy.

Prof. Wang is also exploring how viral oncogene proteins respond to cellular mitotic machinery that ultimately lead to cancer. Her studies have shown that inhibition of cytoskeletal proteins may cause adverse effects that activate Epstein-Barr virus in nasopharyngeal carcinoma. These research findings are important information for physicians when choosing chemotherapeutic agents to treat nasopharyngeal carcinoma.

After completing her bachelor's degree at the Department of Power Mechanical Engineering (PME), Li-An Chu developed a keen interest in life sciences, and thus became a member of a research team headed by Dean Ann-Shyn Chiang of the College of Life Science. Applying her expertise in power mechanics, Chu and her coworkers have developed a photoluminescence system—a key element of Chiang's research on the neural pathways of the fruit fly which was published in *Science* in 2013.

Continuing their work along the same lines, Li-an Chu and her co-workers from PME Department and Institute of Photonics developed a laser tracking system for targeting fruit flies, which received considerable media coverage, including a 2014 report in *Proceedings of the National Academy of Sciences*. In addition, she teamed up with several students of the PME Department to develop an instrument for classifying tiny insects, which received three patents in Taiwan and one in the USA, as well as the National Innovation Award and the National Technology Innovation Award. Thus even before completing her Ph.D. Chu has made a number of significant contributions to the field of life sciences.

The Taiwan Outstanding Women in Science Award, the Promising Women in Science Award, and the Meng Tsui-chu Scholarship are jointly sponsored by L'ORÉAL and the National Women's League of the R.O.C. The recipients are selected by the Women's League and the Wu Chien-Shiung Foundation.

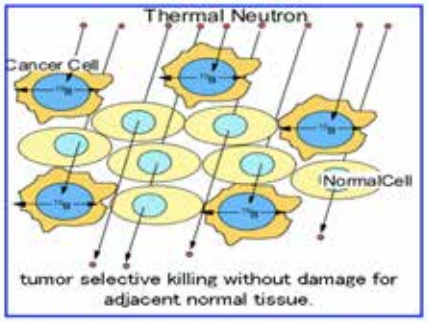
ⓐ Professor Fong-In Chou (right) and assistant
ⓑ Boron Neutron Capture Therapy
ⓒ Autoradiograph shows the high-density of alpha tracks in tumor and tumor vessel. BA-mediated BNCT targeted more boron to tumor cells and tumor blood vessels than to normal liver tissue.

OPENING A NEW PAGE IN THE TREATMENT OF LIVER CANCER

"It is possible to eliminate liver tumors by internal targeted radiotherapy without using chemotherapy or surgery!" A research team headed by Prof. Fong-In Chou of the Nuclear Science and Technology Development Center at NTHU has developed a new treatment for liver cancer using boron neutron capture therapy (BNCT). In this treatment, the patient is injected with an aqueous solution of boric acid (BA), and then undergoes neutron irradiation for 30 minutes. Two fractions of BA-BNCT treatment can successfully eliminate tumors, without affecting normal liver cell function.

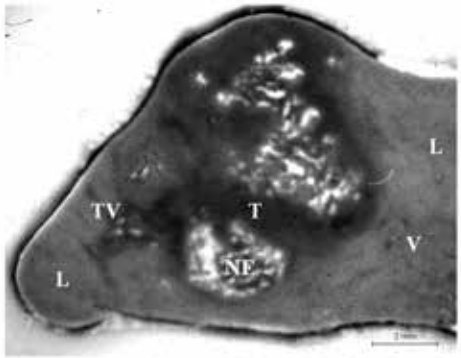
The results of the relevant research have been published in international journals, and patented in Taiwan and the United States. This new BA-BNCT technology has been transferred to the Taiwan Biotech Company, which will carry out clinical trials.

Prof. Chou has conducted a long-term investigation on the radiation biological effects of BNCT. In 2010, NTHU signed a tripartite cooperation agreement with Kyoto University and the Taipei Veterans General Hospital to use BNCT for cancer patients. In 2014, the research team carried out the two-fraction BNCT on 17 patients who were suffering from recurrent head and neck cancers, and succeeded in improving the condition and quality for life of each patient. Most surprisingly, in six patients, the tumor completely disappeared.



- BNCT provides a way to selectively destroy malignant cells and spare normal cells.
- BNCT provides high linear energy transfer (LET) radiation for internal targeted radiotherapy

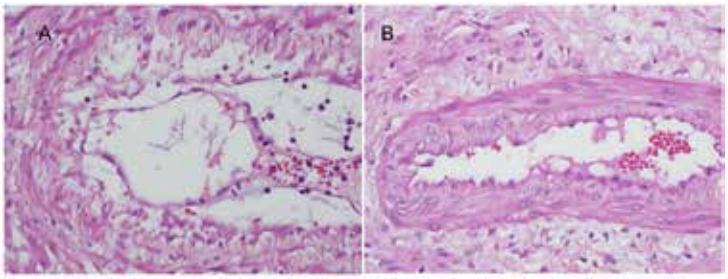
Figure 1 ⓑ



The track number in various area of tumor-bearing liver slice.
T: tumor; TV: tumor vessel; L: normal liver; V: normal liver vessel; NE: necrosis

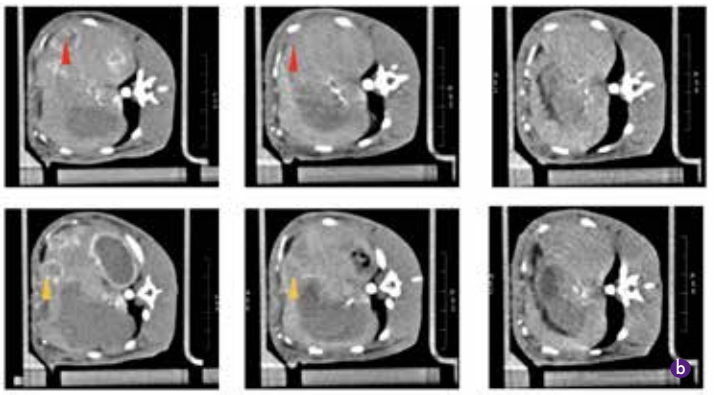
Figure 2 ⓒ

The research team then began to use BNCT to treat liver cancer. " BNCT is an internal targeted radiotherapy that selectively kills tumor cells," says Prof. Chou. The first step is to inject the patient with a boron-containing drug, which selectively accumulates in the tumor. Then, NTHU's nuclear reactor is utilized to perform neutron irradiation to kill the tumor cells (Figure 1).



Multiple, moderate, arteritis expressed as endothelial cell degeneration and edema with inflammatory cell infiltration around the peri-tumor area (A. 400x) when compared with normal artery (B. 400x, T2-2). H&E stain.

Figure 3 a



CT images of liver tumor 1 days before 1st BNCT

CT images of liver tumor 21 days after 1st BNCT (2 days before 2nd BNCT)

CT images of liver tumor 111 days after 1st BNCT (88 days after 2nd BNCT)

Figure 4 b

a Histopathological changes in artery of liver tumor in rabbit 5 days after 1st BNCT

b CT images show the therapeutic efficacy of two-fraction BA-BNCT for liver tumors in Rabbit (N0. L14)

Prof. Chou says that the boron-containing drug BPA has been used in BNCT for patients with head and neck cancer, but it does not specifically accumulate in the liver tumor, and much of it may accumulate in the normal liver tissue and the adjacent pancreas. Therefore, BPA is not suitable for BNCT against liver cancer. However, in the process of searching for a solution, boric acid (BA) was unexpectedly discovered to accumulate selectively in liver tumors (Figure 2).

Conducting experiments on rats and New Zealand rabbits, the research team confirmed that BA selectively targets liver tumors and their blood vessels (Figure 2). In animal experiments, the first fraction BA-BNCT treatment reduced the volume of most of the tumors. Twenty days later, a second fraction of BA-BNCT resulted in an overall improvement in the physiological condition and additional shrinkage or even disappearance of the tumor. In fact, 93.75% of the tumors were completely eliminated by two fractions of BA-BNCT. Moreover, histopathological examinations revealed no residual tumor cells in the liver and a lack of damage to normal liver cells. These results confirm that BA-mediated BNCT can deliver a curative radiation dose to tumors and tumor vessels while sparing the normal liver tissue (Figure 3), and multiple liver cancer can be completely eliminated without harming normal liver cells (Figure 4).

ALUMNUS KUEN-YUH WU SPEAKS AT NTHU'S FOOD SAFETY FORUM

On May 3rd Kuen-yuh Wu of the Legislative Yuan delivered a talk at NTHU's Food Safety Forum. A large audience was on hand to hear Wu's discussion on food safety and risk assessment of hazardous substances in food products.

In recent years repeated food scare incidents have shaken the public's confidence in the government's ability to ensure food safety. Amongst the dangerous substances discovered in commercial food products were melamine in 2008, plasticizers in 2011, toxic starch in 2013, and adulterated cooking oil in 2014.

A graduate of the Department of Chemical Engineering, Legislator Wu teaches at the College of Public Health at National Taiwan University and serves as the president of the Taiwan Society for Risk Analysis. Presenting complex issues in a form readily understandable to the general public, Legislator Wu discussed such topics as food additives; adulterated and counterfeit food products produced by unscrupulous operators; how they avoid detection; food containers; health risks related to processed meats; drinking water; and carcinogens in food products.

Legislator Wu noted that just because a certain food product contains a potentially harmful substance doesn't necessarily mean that you can't eat it, and that it's basically impossible to completely avoid every hazardous substance. Instead, what's most important is to conduct an objective, science-based risk

Legislator Wu's talk was attended by nearly 100 interested listeners from NTHU and the general public.

assessment. Legislator Wu advocates a food safety strategy which covers all bases, including origin, manufacture, handling, storage, transportation, sale, consumption, and even excretion.

This was the first NTHU Food Safety Forum. The series consisted of eight lectures presented over a period of two weeks. During the first week Assistant Professor Ching-Fu Lin of the Institute of Law for Science and Technology discussed food safety standards and international trade issues; Associate Professor Chao-Min Cheng of the Institute of Nano Engineering and Micro Systems shared his experience in developing food safety testing strips; Shu-chen Tsai, the Acting Director of Office of Food Safety, Executive Yuan, discussed food safety policies from the government's point of view; and Dr. Chii-cherng Liao, Director-General of Food Industry Research and Development Institute, presented the efforts being made by food manufacturers to improve food safety. During the second week talks were given by

Dr. Chong-hai Yan of the Chang Gung Memorial Hospital, Professor Ding-tzann Lii of the Institute of Sociology, and Assistant Professor Meng-chi Lien of the Institute of Law for Science and Technology. The Forum topics were rich and diverse, and the forum had attracted large audience from Hsinchu area.

NTHU Alumnus, Legislator Kuen-yuh Wu delivering his talk at NTHU's Food Safety Forum.

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