

THE SPOT LIGHT



CONTENT

02

Situating indigenous resilience in
battling climate change

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04

New computer-assisted approach
to treat seizure

06

COVID-19 infection risk in cancer
patients

08

The first Instructional VR
Resource Center for Food Safety
in Taiwan

10

Active in global pandemic
prevention –
TMU's student club launched
e-services in Cambodia

Situating indigenous resilience in battling climate change

Tayal's "Millet Ark" effort redefines the integration of indigenous resilience in facing climate change by utilizing cultural practice and traditional ecological knowledge of the indigenous society.

Western epistemology has always been an integral part of modern society and constantly shapes the deeply-rooted ideology within the global community. Consequently, we have been dismissing the dissemination of knowledge based on different cultural and language entities, especially those of the indigenous people. Up until recent times, the indigenous people, despite being the most vulnerable community to climate change due to their co-dependency on nature, have never really been included in public debates on climate change adaptation. However, the knowledge, concerns, and adaptation strategies of indigenous communities are being given more importance in mitigating climate change strategies (Bayrak, Hung, & Hsu, 2020). This is proven through the increasing inclusion of the ideology of indigenous people in Intergovernmental Panel Report on Climate Change (IPCC 2014, 2018, and 2019) reports and assessments. Hence, this study reinstitutes an alternative mindset by pivoting on the "Millet Ark" initiative, a Tayal community's millet biodiversity conservative endeavor that effortlessly connects the community, nature, and culture.

This "indigeneity retrieval" effort began in 2013 with sincere collaboration between Taipei Medical University (TMU) and Frederick van Oudenhoven (a Netherland environmental NGO organization and a book prize winner). The International Network of Mountain Indigenous People (INMIP) then realized the grassroots network involving two of the authors (Pagung and Yih-Ren Lin) and a few members of Taiwan



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indigenous people and mountain farmers from nine other countries in Bhutan through walking workshop. Inspired and influenced by this experience, Pagung decided to revive long-left millet cultivation in her village. The study was conducted assimilating the spirit of the indigenous community, wherein most of the findings were derived using the walking and storytelling culture of indigenous people. "Millet Ark" initiative revealed Tayal's migratory history as an adaptation strategy to changes in the environment, their shifting cultivation that let the "land rest," unlike modern agriculture and the biocultural diversity in millets. Most importantly, the millet preservation movement highlighted the imperative role women of the community play in the millet cultivation process and their strong connection to the land. The success of Pagung in reinstating Tayal millets in the past five years, from one plot of land to a remarkable landscape of the village, is proof as to how efforts like this could transform the paradigm of agricultural effort when knowledge of the indigenous community is appreciated and applied.

The main aspiration of this study was to revive the values and practices of the indigenous community of Taiwan, particularly the Tayal ethnic group, via exploring the indigenous resilience, which is so brilliantly elucidated via the "Millet Ark" conservation narration. Indigenous resilience is defined as a

dynamic process of cultural and ecological adaptation and alteration in response to climate change that is imperative in ensuring the survival of human and non-human species without losing the ethos of a culture. This story illustrated the significance of juxtaposition of global and local initiatives in conservation efforts and the importance of adapting and learning in accordance with nature. Thus, this effort upholds not just one but three vital United Nations Sustainable Development Goals (UNSDG); "Goal 13: Climate action" via adaptability to nature, "Goal 15: Life on land" via sustainability of millet biodiversity, and "Goal 17: Partnership" through emphasizing the importance of global unity in ensuring sustainability. One of the limitations in the study, though, is the possible loss of essence that happens in the process of translating indigenous stories or songs into English or Chinese. In an attempt to retain the gist of the native stories, the authors tried their best to translate the ideas instead of words and accepted a certain level of untranslatability as the power of the alternative ideology that challenges mainstream which is the very purpose of this study. To recapitulate, this study is so uniquely crucial that it is proof of how the indigenous practice like Tayal millet foodscape sustained the bio- and cultural diversity, enhanced human-nature connection, and fostered a complex adaptive system we need in facing the climate change issue globally.



Original Research Article:
Situating Indigenous Resilience: Climate Change and Tayal's "Millet Ark" Action in Taiwan

Reference:
Bayrak, M. M., Hung, L.-S., & Hsu, Y.-Y. (2020). The effect of cultural practices and perceptions on global climate change response among Indigenous peoples: a case study on the Tayal people in northern Taiwan. *Environmental Research Letters*, 15(12), 124074. doi:10.1088/1748-9326/abcd5c

New computer-assisted approach to treat seizure

Using high-frequency oscillations in stereoelectroencephalography as a novel approach to identify the epileptogenic zone in patients with temporal lobe epilepsy provides a better prognosis after resection surgery.



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According to a 2021 study, an estimated 70 million people worldwide are affected by epilepsy, making it one of the most common neurological diseases globally. The cause of a seizure is vaguely recognized as abnormal brain activity, and an absolute cure for it is yet to be discovered. However, interventions, such as prescription of anticonvulsant medications and brain surgery, are more common in managing seizures. Unfortunately, not all types of epilepsy can effectively benefit from these existing interventions. About one-third of the patients with epilepsy do not respond to the prescribed drugs, thus forming a condition called drug-resistant epilepsy.

Seizure is the result of irregular activities in brain tissue. Most of the time, abnormality starts in a specific (single/multiple zones) brain region. This zone is called the epileptogenic zone (EZ). Identification of EZ is crucial in case patients need brain surgery. The procedure involves measuring the high-frequency brain waves ($\geq 80\text{Hz}$) associated with irregular neuronal activity during a seizure. These frequencies are called high-frequency oscillations (HFOs), which are detected using a procedure known as stereoelectroencephalography (SEEG). Therefore, HFO is considered to be a biomarker for seizures.

Conventional SEEG is a minimally invasive technology where interpretation is made by simple visual inspection. Often the lack of experience and expertise of the clinician leads to biasness or error in judgement. A research group at Taipei Medical University (TMU) came up with an innovative solution, Auto Segmentation App. for Predication of Arteriovenous Malformation (ASAP-Cerebral AVM), to control the limitations by using computer-assisted quantitative analysis. The innovation integrates the conventional diagnostic technique with artificial intelligence (AI) based analysis to produce a better and more reliable diagnosis.

In 2020, the ASAP-Cerebral AVM received its first international recognition by winning an award at the 14th International Exhibition of Inventions in Warsaw, Poland. The innovation can automatically detect the site of vascular malformation in the brain tissue where the electrodes are to be inserted when attempting epilepsy intervention. Following the clinical preliminary verification completion, it also received its patent from China (I680744). This newly improved high precision pre-surgical intervention not only makes brain surgery safer for the patients, but its ability to reconstruct clinically accurate 3D brain structure promises to benefit a broad range of other brain-related diseases. Among its unique features are the potential to provide clear imaging beyond just the surface of the brain, instead, extending its mapping range to include the brain's deep interiors, which were impossible under the conventional approach. Thus, clearly defining its application in neurodegenerative disease research and many more.

Compared to the West, the integration of AI in medical imaging is still at its infant stages for Taiwan. Yet, it is not surprising to see the country's researchers driving the adoption and advancement of such technology, given the excellent track record of Taiwan's booming computing and information processing capabilities. It is strongly recommended that these capabilities be combined with robust clinical resources to boost the development of related upstream and downstream industries to further advance Taiwan's AI-medtech industry. Given the ambition, it is essential to train computational science experts and clinicians to develop medical software that facilitates more AI medical-assisted diagnosis projects. Such

progress would encourage more medical institutions to participate and cultivate talents in the AI medical equipment industry. Moreover, hospitals should incorporate cloud platforms to lower hardware thresholds, gain credible and rich data from medical institutions, utilize hospital databases to construct models, and increase clinical studies to enhance the future development space of AI medical imaging diagnosis manufacturers.

In conclusion, AI-based innovation in the field of medicine improves the accuracy, precision, and reliability of interventions. As proven by the research outcomes, whether it is the novel approach of using HFO in SEEG or the invention of ASAP-Cerebral AVM, efficient diagnostics can now be readily provided in regions that lack skilled healthcare workers. Such successful attempts of incorporating AI into brain imaging technology serve as a good indicator of TMU's contribution in propelling the nation's aspiration to perform exceptionally in terms of the United Nations' 3rd and 9th Sustainable Development Goals, Good Health and Well-Being, and Industry, Innovation and Infrastructure. With that said, the implementation and commercialization of these promising technologies will require open acceptance among practitioners and careful resource allocation by public and private authorities.



Original Research Article:
Ictal networks of temporal lobe epilepsy: views from high-frequency oscillations in stereoelectroencephalography

Reference:

Cai Z, Sohrabpour A, Jiang H, Ye S, Joseph B, Brinkmann BH, Worrell GA, He B. Noninvasive high-frequency oscillations riding spikes delineates epileptogenic sources. *Proc Natl Acad Sci U S A*. 2021 Apr 27;118(17):e2011130118. doi: 10.1073/pnas.2011130118. PMID: 33875582; PMCID: PMC8092606.

Staflstrom CE, Carmant L. Seizures and epilepsy: an overview for neuroscientists. *Cold Spring Harb Perspect Med*. 2015;5(6):a022426. Published 2015 Jun 1. doi:10.1101/cshperspect.a022426.

AI & the sustainable development goals: the state of play. 2017. 2030Vision. Retrieved from: <https://assets.2030vision.com/files/resources/resources/state-of-play-report.pdf>. Retrieved on: June 2, 2021.

COVID-19

infection risk in cancer patients

Elevation of SARS-CoV-2 viral entry genes and dampening of the immune system following cancer treatment may make cancer patients more susceptible to COVID-19.



Dr. Liang-Tzung Lin

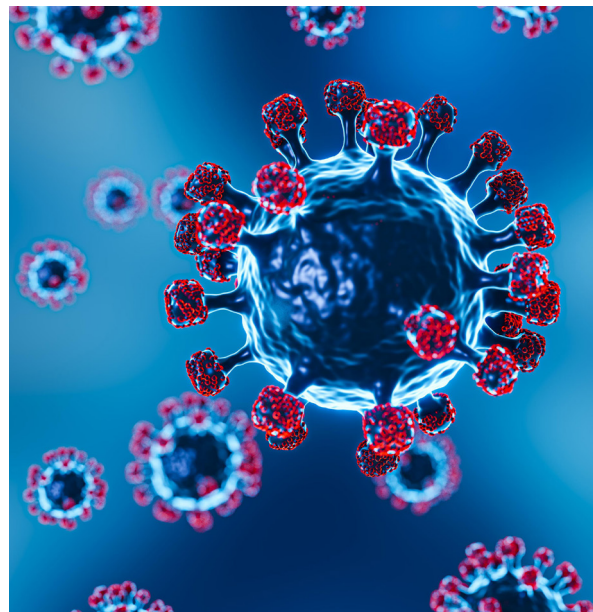
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Globally Covid-19 infection has surpassed over 150 million cases, and more than 3 million deaths have been reported by WHO as of early mid-2021. With multiple countries battling precarious second and third waves and more dangerous variants emerging in different parts of the world, COVID-19 is ranked as one of the top ten deadliest pandemics seen in human history alongside the Black Death, Plague of Justinian, Spanish flu, and a few other plagues much to our horror. How did a virus so simple bring the entire world to a worrying halt and change the definition of normalcy in our lives? What evolutionary brilliance that this virus possesses in the era where medical advancement is at its best and yet failed to curb the pandemic from spreading so sporadically? A Professor from the University of Cambridge answers these questions by elucidating the deceptive ability of this virus that dampens the immune system by shutting down the release of a chemical that acts as a warning signal. This enables the virus to become highly infectious even before you “fall sick”, making it so deadly and undetectable from an early stage of infection.

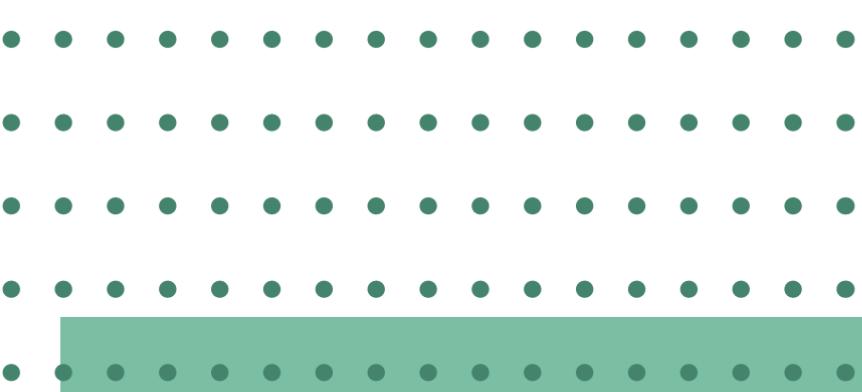
In addition to being highly contagious, the biggest concern in COVID-19 management is when patients have other comorbidities such as diabetes, heart

condition, high blood pressure, and cancer as they increase the severity of the infection. Cancer patients, in particular, are four times more likely to be infected by COVID-19 compared to the general population making it a concern of the health care system. Apart from increased vulnerability, cancer patients are also known to have more severe complications when they get infected by this virus. Hence, identifying treatment and management gaps in COVID-19 becomes vital to reduce the morbidity and mortality of both diseases.

In line with that, researchers from Taipei Medical University, Taiwan, alongside those from the University of Toronto, Canada, investigated the intricate relationship between cancer patients and COVID-19 infection to understand possible modifications needed in the clinical management of the disease. Large-scale genome-wide transcriptional analysis on normal and tumor tissues of adults and children was done to study relevant genes and other factors that thrive the infection. RNA expression of three significant genes responsible for SARS-CoV-2 entry into the body, including ACE2, TMPRSS2, and CTSL, were found to be upregulated in different adult tumor tissues tested. On the contrary, pediatric cancer samples were shown to have lower expression of viral entry genes, reflecting a lower incidence of COVID-19 infection among children. Chemotherapy and radiotherapy in cancer patients contributed to a temporary increase in the viral entry genes and dampening of the immune system during the treatment period, thereby increasing the risk of infection in this cohort. The findings published in Nature's Scientific Reports claim that, compared to the opposite sex, males are predisposed to a higher risk of infection. Likewise, smokers were also identified to express increasing CTSL expression with age. A previous study in China aimed to construct a risk map for tissues susceptible to COVID-19 infection based on ACE2 expression. Nevertheless, this study has comprehensively encompassed two additional essential genes and other factors, including age, sex, smoking, and cancer treatments. These findings create a framework to further investigate the link between cancer and COVID-19 to mitigate the risk of infection by optimizing treatment scheduling and close monitoring.




Existing COVID-19 treatment and management mostly follow the empirical guideline, as its association with a lot of diseases is yet to be unraveled. Consequently, the effectiveness of COVID-19 management could be compromised if the increased risk of infection and the corresponding reasons for different ailments are not investigated. To recapitulate, the outcome of this study will provide a fundamental to develop treatment guidelines for COVID-19 in cancer patients. The findings are imperative to guide clinicians and oncologists on managing COVID-19 in cancer patients to modify cancer treatment schedule or sequence appropriately if possible. As the infection is spreading faster than ever, every possible endeavor to understand the disease and its physiology is vital to reducing this infection's morbidity in different conditions. Studies like this that contribute to the knowledge of COVID-19 and its management will complement major ongoing efforts like vaccinations in an attempt to end this pandemic worldwide and restore the health of the global community. Such is ideally crucial to uphold the United Nations' Sustainable Development Goal (UNSDG) 3: Good health and wellbeing, which aims to improve global public health. With the pandemic being the current health emergency worldwide, every effort to improve its management becomes an integral part of fighting the battle. 



**The first
Instructional VR
Resource Center
for Food Safety in
Taiwan**

Taipei Medical University (TMU), in collaboration HTC Corporation (HTC), established its Instructional VR Resource Center for Food Safety. Aiming at improving food safety across Taiwan, this Center brings in VR technology and high-quality training content to the University's food safety education and promotes the digitization of Taiwan's food processing industry. This collaborative project between TMU and HTC stemmed from their ongoing partnership of talent development of food safety professionals using innovative technology.

Associate Professor Hui-Ting Yang from the School of Food Safety applies virtual reality to the courses she teaches, which allows trainees to accumulate a large amount of authentic experience within a short period of time and acquire the skills and abilities necessary to adapt to their workplace. Moreover, this training approach effectively prevents errors and subsequent business losses caused by their lack of familiarity with the operations.

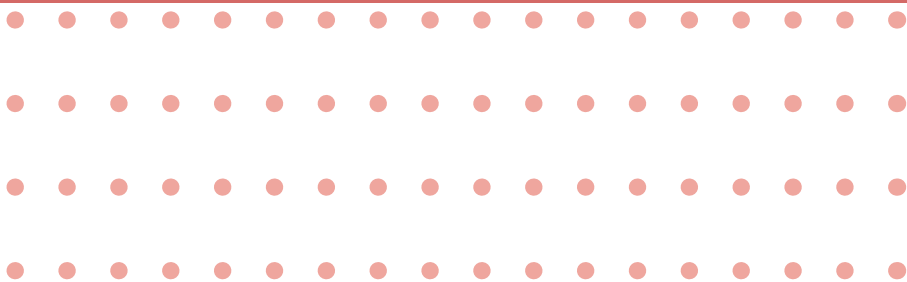

Raymond Pao, Senior Vice President of HTC, said, "The VR scenario simulation training has been implemented in teaching and learning in various types of businesses and schools. Through immersive learning experience, it can simulate real emergencies and reinforce correct contingency response capability in students." 



To learn more about Instructional VR Center for Food Safety,
please contact Associate Professor Hui-Ting Yang (d301091009@tmu.edu.tw)



Active in global pandemic prevention – TMU's student club launched e-services in Cambodia



As the COVID-19 pandemic continues, Taipei Medical University shows its presence in international pandemic prevention. The TMU FLYoung International Service Club has launched online services in place of its annual healthcare services to the Kingdom of Cambodia. It will continue to assist with improving local health care and water resources in order to fulfill the United Nations Sustainable Development Goals (SDGs) of eliminating inequalities in health and education.

Due to the shrinking of medical resources around the world as a result of the pandemic, the situations in disadvantaged and remote villages have worsened. In 2021, TMU FLYoung have successively accumulated masks, forehead thermometers and other supplies to donate to Cambodia to help with pandemic prevention. Since the team is unable to provide medical and health education activities in person, it has instead adopted online courses on "the respiratory system", "pandemic prevention" and other important pandemic related topics urgently needed by the locals.




The masks and other supplies collected by the TMU FLYoung International Service Club are donated to Cambodia for pandemic prevention.



In response to the pandemic, the TMU FLYoung International Service Club launched online services.

Huang Shao-Hua, a fourth-year student of the TMU College of Medicine, is the leader of this service team. He indicated that 2021 summer service is mainly divided into two major targets: the Cambodia-Taiwan Education Program (CTEP) and the Sunshine Classroom. The CTEP mainly trains local seed teachers in English and computer information. As with previous years, the Sunshine Classroom teaches topics such as trauma care and understanding of the digestive system. However, this year, it will also focus on the respiratory system and share Taiwan's experience in pandemic prevention. It will also include the concept of "isolation", emphasize not eating or being together with those who are symptomatic, and observing social distancing. These are essential pandemic prevention measures for Cambodia, where the pandemic is worsening.

With 109 student clubs, TMU has one of the most diverse student activity landscape among universities in Taiwan. 15 of these clubs provide services such as free clinics and medical and health education activities in remote villages at home and abroad. Although many clubs are unable to dispatch their service teams because of the pandemic, the students' passion for service has not diminished. Some clubs have adopted online operations in the hope of doing their part in global pandemic prevention and medical education. 

TMU Spotlight showcases impressive outcomes from our partnership collaboration, research excellence, talent development, and the University's commitment to making a positive social impact.

