

MPN

Issue 001/July 2022

Myanmar Physiology
Newsletter



Anniversary



Physiology Department (UMMG)

MYANMAR PHYSIOLOGY NEWSLETTER**CHIEF EDITOR****PROF. SOE MINN HTWAY @ MG PONNYA****EDITORIAL BOARD MEMBERS****DR. THUREIN ZAW****DR. EI EI MYA THANT****DR. KYI KYI MYINT****DR. MYA PWINT PHYU****DR. WIN WIN THAN****PHOTOGRAPHER****MOE ZAW NYO****DESIGNER****WAI YAN MIN**

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UNIVERSITY OF MEDICINE, MAGWAY, MYANMAR**

EDITORIAL

THE FIRST ISSUE OF MYANMAR PHYSIOLOGY NEWSLETTER	4
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NEWS

GLOBAL NEWS	5
LOCAL NEWS	6
SPECIAL REPORT	8
SOCIAL ACTIVITIES	11
ACADEMIC ACTIVITIES	12

ARTICLES

MY NAME IS MAGWAY	13
MYOGENIC MYANMAR	15
LOVE THE TREES AND SAVE THE FOREST	16
PHYSIOLOGY & PHYSIOLOGIST	18
DEVELOPING A NEW TECHNIQUE	19
INTEGRATED CLINICAL LECTURE ON CARDIOVASCULAR PHYSIOLOGY	21

POEM

THE SPLENDIDLY BRILLIANT BEAUTY, UNIVERSITY OF MEDICINE, TAUNGGYI	23
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The First Issue of Myanmar Physiology Newsletter

Mg Ponnya

Chief Editor
Myanmar Physiology
Newsletter

"Welcome to the first issue of the Myanmar Physiology Newsletter."

This newsletter is published for our Physiology faculties and medical students to share the news and knowledge of the current Medical Physiology. So, main contents of the newsletter are the articles related to the medical education/research, local & global news, and our department activities.

In this issue, we present the "Global News", "Local news", "Special Report", "Social Activities" and "Academic Activities" of our department in the "News" section. In the "Articles" section, there are six articles related to the Physiology, Medical Education and Research. A poem is beautifully written by *Prof. Thae Nu Htwe* from the University of Medicine, Taunggyi.

For the future issues, news and activities of other Myanmar Medical Universities are welcomed. We also hope the articles



would be contributed by the retired Myanmar Physiology faculties. In the coming issues, we will add some more new sections such as "Book Review", "Letters to Editor", "Questions & Answers", "Events" and "Student Activities".

In the current issue, we report the news of the 20th anniversary of our Physiology Department as a special report. It is also chosen as a cover photo for this issue. This is a milestone of our department, and we have decided to celebrate yearly as the "Physiology Day".

As another milestone, we also report about the "Online Myanmar Medical Physiology Quiz (OMMPQ)" which is the first ever Online Physiology Quiz during COVID pandemic. It had been an international Physiology event and we have to thank *Prof. Cheng Hwee Ming* from Malaysia for inviting some international students to participate in the event.

In "Academic Activities" section, we report that PowerLab® has been using to teach Physiology practical. In Myanmar, this is the first

Medical University using PowerLab® as a teaching system.

In article section, I introduce my hometown "Magway" from both Anatomical and Physiological aspects. Moreover, *Prof. Sanda Kyaw* express her feelings about Physiology & Physiologist, and the integrated teaching experience is shared by *Prof. Ohnmar Myint Thein*.

We accepted two research articles from *Dr. Tin Tin Win Shwe* and *Mr. Daisuke Nakajima*. They are research scientists from National Institute of Environmental Studies (NIES, Japan) and interesting topics are presented.

One more article is from *Prof. Cheng Hwee Ming*. The name of the article is "Myogenic Myanmar". It was admirably written to encourage us and all Myanmar Physiologists. Surely, we will move on by our own intrinsic energy and effort.

Actually, this is my dream since the early days of my career to publish a Physiology Journal/Newsletter. Today, my dream comes true and so I would like to thank all my editorial board members, reporters, designer, photographer and authors. Without their contribution, the newsletter could not be published timely.

"See you in next issue"

MPN

Global News

Antibiotics ravage motivation and endurance in athletes

Antibiotics that kill essential gut bacteria ravage athletes' motivation and endurance.

DOI: 10.1016/j.beproc.2022.104650

Metabolic Regulation by the Intestinal Metformin-AMPK axis

AMP-activated protein kinase (AMPK) mediates the glucose-lowering effect of the antidiabetic agent metformin.

DOI: 10.1038/s41467-022-30477-3

Gut Bacteria Can Reduce the Effectiveness of certain blood pressure drugs

Gut bacteria can reduce the effectiveness of antihypertensive drug, quinapril.

DOI: 10.1161/HYPERTENSIONAHA.121.18711.

New class of antibiotics found to be highly effective against drug-resistant tuberculosis

A new class of antibiotics, PP derivatives (based on the presence of phenanthrene and pyrrolidine groups within the structures) is highly effective against drug-resistant tuberculosis.

DOI: 10.1371/journal.pbio.3001648

Meditation Enhances Immune System without Activating Inflammatory Signals

Meditation is an effective behavioral intervention for treating various conditions associated with a weakened immune system.

DOI: 10.1073/pnas.2110455118

Appetite-Regulating Hormone Affects Monetary Decision Making

Ghrelin, a stomach-derived hormone known to regulate appetite and other food-related functions, may play a broad role in reward-related behavior and decision-making, such as monetary choices.

DOI:10.1210/jendso/bvab048.1271

Drinking Coffee Daily, Even with Sugar Added, Reduces Mortality Risk: Study

Moderate dietary consumption (1.5 to 3.5 cups per day) of unsweetened or sugar-sweetened coffee is associated with a lower mortality risk, according to a paper published in the journal *Annals of Internal Medicine*.

DOI: 10.7326/M21-2977

Eating Blueberry Regularly Reduces Dementia Risk, New Study Suggests

A new study published in the journal *Nutrients* stated that blueberry supplementation

has neurocognitive benefit in middle-aged individuals with insulin resistance and elevated risk for future dementia.

DOI: 10.3390/nu14081619

Lack of Sleep Predisposes to Abdominal Visceral Obesity

New research from Mayo Clinic shows that lack of sufficient sleep leads to a 9% increase in total abdominal fat area and an 11% increase in abdominal visceral fat.

DOI: 10.1016/j.jacc.2022.01.038

Grape Consumption Modifies Gut Microbiome, Lowers Blood Cholesterol Levels

A new pilot study published in the journal *Nutrients* stated that consuming grapes significantly increases the diversity of gut bacteria, decreases cholesterol levels as well as bile acids which play an integral role in cholesterol metabolism.

DOI: 10.3390/nu13113965

COVID-19 and cerebral blood flow

Post-COVID-19 symptoms are associated with long-term changes in brain physiology and function.

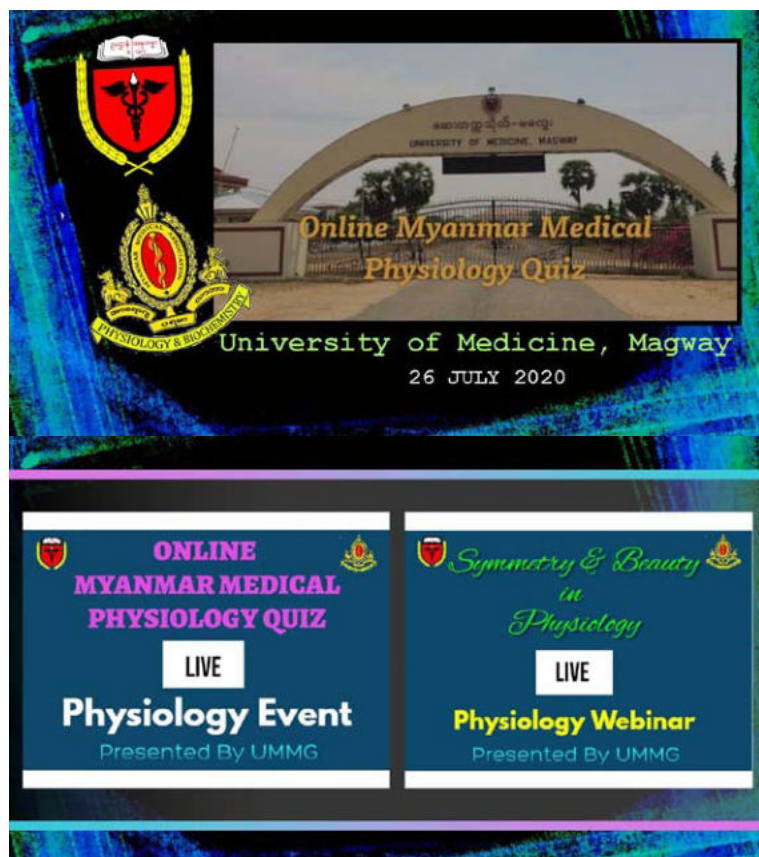
DOI: 10.1101/2022.05.04.22274208

Reported by Dr. Thurein Zaw

Local News

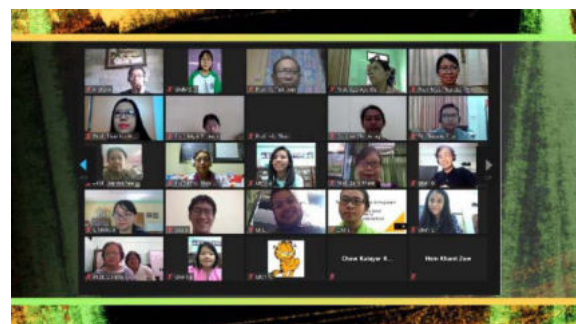
Online Myanmar Medical Physiology Quiz (OMMPQ) was the First Online Physiology Quiz Event hosted by University of Medicine, Magway, Myanmar. (26th July, 2020)

Total 40 participants from 9 University-Teams were participated in our Online Myanmar Medical Physiology Quiz. Myanmar teams are University of Medicine 1 (Yangon), University of Medicine 2 (Yangon), University of Medicine, Mandalay, University of Medicine, Taunggyi, and University of Medicine, Magway.



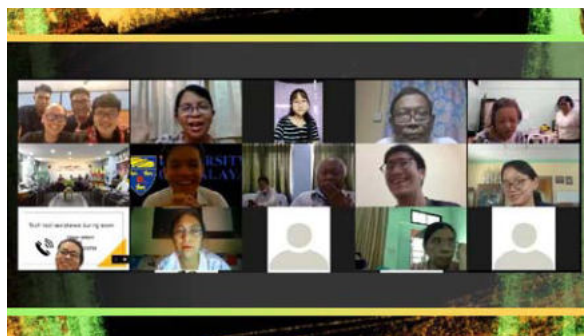
In the year 2020, Covid-19 was pandemic and our annual physiology quiz event had to be cancelled. However, Pandemic couldn't stop our Passion for Physiology Quiz. So, we organized this event to show our Physiology Team Spirit, like a "Phoenix" amid Covid-19 crisis.

International teams are 2 from Vietnam and one each from Malaysia and Indonesia: University of Malaya (Malaysia), University of Indonesia (Indonesia), Vo Truong Toan University (Vietnam), and Hanoi Medical University (Vietnam).



Prof. Hla Yee Yee, Prof. Nyunt Wai, Prof. Ye Win, Prof. Khin Myo Chit and Prof. Hla Than were the judges for this Online Physiology Quiz Event.

At first, we explained about the [QUIZ RULES & PROCEDURES](#). Total 9 teams were divided into 2 groups; 5 teams in group (1) and 4 teams in group (2). We asked 5 questions to each team. They got 2 points for a correct answer, and no punishment for a wrong answer. Team members could discuss each other, but only one member had to take the action by raising hand within 30 sec after reading the question twice.



Competitive response from other teams was not allowed. If there was a tie between two teams, we decided the winner by asking extra questions and we used “the sudden death rule”. The 2 group-winners and the best second team went to the Final, in which quiz mechanism was the same as the group stage.

Group 1	UMM	UMMG+1 Winner	UM+0+1+1+1	UM+0+1+0	UM2
1	0	2	2	2	2
2	2	2	2	2	0
3	2	2	2	2	2
4	2	2	2	2	2
5	2	2	2	2	2

Group 1 Results

In this competition, the Winner of Online Myanmar Medical Physiology Quiz (2020) was the University of Medicine, Magway. The first runner-up was the University of Medicine 1, Yangon and the second runner-up was the University of Malaya (Malaysia).

Reported by Dr. Mya Pwint Phyu

Group 2	VITU	UMTGI	IIMU	UM
1	0	2	0	2
2	0	2	2	2
3	0	0	0	2
4	0	2	0	2
5	0	2	2	2

Group 2 Results

Congratulations !!



FINAL	UM+0+1+1+1+0	UMMG (1st)	UM+0+1+1+1+1
1	0	2	0
2	0	2	0
3	0	0	2
4	2	2	0
5	2	0	2

Final Results

Special Report

20th Anniversary

of Physiology Department (UMMG) was held online (6th April, 2022)

It has been 20 years; the Physiology department was established in the University of Medicine, Magway in 2002. Professor Khin Myo Chit was the first Professor and Head of the Department of Physiology.



The University was built in December, 2000 and the class of 1st batch started in May, 2001. Since Physiology was taught in the second year, and so Department of Physiology was first run in 2002.

Professor Khin Myo Chit remembered clearly the date

of her arrival to Magway. It was the 6th April, 2002. So, we decided to celebrate the anniversary at 6th April, 2022.

Due to COVID-19 rules and regulations, we could not make face-to-face celebration. We have to celebrate online by zoom.

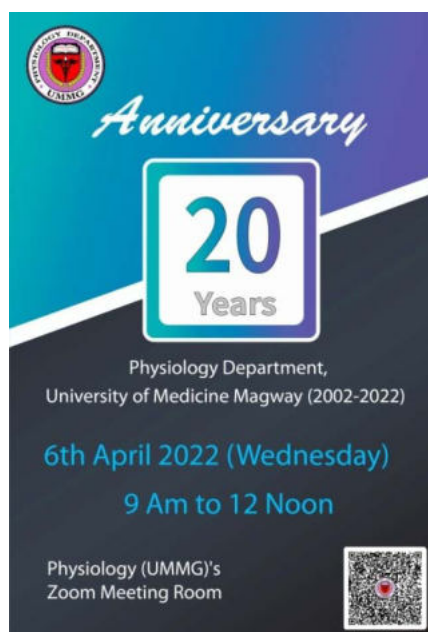
In the ceremony, the Rector, Prof. Aye Aye Oo gave the opening speech and then Prof. Soe Minn Htway welcomed all the attendees. After that, the former heads of the department told about their unforgettable moments in the department as good memories.



Prof. Khin Myo Chit



The University of Medicine, Magway is one of the five Public Medical Universities in Myanmar. It is located seven miles away from the downtown of Magway city.



Prof. Swe Swe Win



Prof. Kyaw Min



Prof. Nwe Nwe Yee



Prof. Nyunt Wai, Prof. Khin Myo Chit and colleagues

The former heads of the department were Prof. Khin Myo Chit (2002-2003), Prof. Swe Swe Win (2003-2004), Prof. Kyaw Min (2004-2006), Prof. Tin Tin Aye (2006-2010), Prof. Mya Mya Thwin (2010-2014), Prof. Nwe Nwe Yee (2014-2016), Prof. Mya Thandar Sein (2016-2019) and Prof. Sanda Kyaw (2019-2020).



Prof. Mya Thandar Sein



Prof. Kyaw Min and his colleagues



Prof. Tin Tin Aye



Prof. Sanda Kyaw



Prof. Tin Tin Aye and her colleagues



Prof. Mya Mya Thwin and her colleagues



Prof. Mya Mya Thwin

The current Prof./Head is Prof. Soe Minn Htway. He said that 6th April will be celebrated yearly as the "Physiology Day" of the University of Medicine, Magway, and starting from the July 2022, the newsletter will be issued biannually. The ceremony was successfully closed after open discussion by attendees.



Prof. Nwe Nwe Yee and her colleagues



Prof. Mya Thandar Sein and her colleagues



Prof. Sanda Kyaw and her colleagues



Prof. Soe Minn Htway and his colleagues



Social Activities

Donation to Monk's & Nun's Education Schools and Home for the Aged (15th June, 2022)



Sachets of cereal drink were donated to Sarsana-gon-yi & Thida-yon Nun's Education Schools, and Pyin-nyar-rama Monk's Education School.



These schools have been developed and managed by Buddhist monks and nuns to provide basic education especially for children of the poor family.



There are about 500 students in the Sarsana gon-yi school and about 200 in the Thida-yon school. In these schools, volunteers and teachers are actively participating for the children's education.



We also donated cereal drink to Phan-khar-myay Home for the Aged in which 25 elderly people have been cared. Totally, 5,000 servings of cereal drink were donated to the children and elderly.

Reported by Dr. Kyi Kyi Myint



Academic Activities

Practical Section using Power Lab

The students were divided into two groups. The two groups were taught in the Laboratory 1 and Laboratory 2 of the Department of Physiology, University of Medicine, Magway.

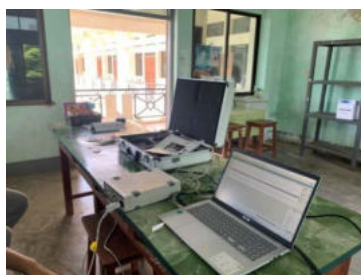


Two Power Lab systems were used respectively in the two Laboratories. Each system of the Power Lab consists of one Power Lab hardware and computer with LabChart® software. (LabTutor® software is also available).



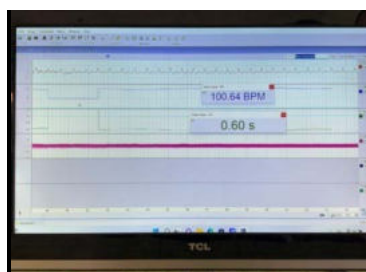
The Power Lab system can be used to acquire, store and analyze data. In Physiology teaching, the Power Lab system can be used for both animal and human studies. It is especially useful for teaching practical in the cardiovascular system and respiratory system.

Nerve, muscle and neuro-physiological studies can also be done by Power Lab.

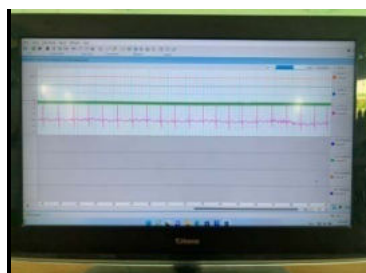


For cardiovascular system, the pulse transducer acquires the mechanical signal of the finger pulse and transform this signal into analog signal and transfer this analog signal to the Power Lab hardware.

The Power Lab hardware amplifies, filters, samples and transforms the analog signals into digital signals and then transfer these digital signals to computer with LabChart® software.



The LabChart® Software displays the digital signals as wave form. By using LabChart® Software, the pulse rate and cardiac cycle can be calculated.



Similarly, heart rate and cardiac cycle can be calculated from ECG data

obtained by connecting ECG electrodes, Bio Amp, Power Lab hardware and LabChart® software.



For respiratory physiology, by using spirometer kit, the Power Lab system displays and calculates respiratory parameters such as tidal volume, minute ventilation, respiratory rate, FVC and FEV₁.



The students were explained how to use the Power Lab hardware and the computer with LabChart® software by the teaching staffs of the Department of Physiology, University of Medicine, Magway.

Then, demonstration and practice using the Power Lab system and LabChart® Software was done by small group of students in rotation. There are about 80 students in total, and about 10 students each in one small group.

Reported by Dr. Win Win Than

"My Name is Magway"



Soe Minn Htway

Professor/Head

*Department of Physiology
University of Medicine,
Magway*

I am a city of the midland plain region in the central Myanmar. I was born about 900 years ago (Since Bagan Era), but I became a city of today only in 1974.

Anatomy

In anatomical position, I stand 60 m above the sea level. My contour is more or less plain, but there is a slight non-significant slope towards the west; the Irrawaddy River (Famous River of Myanmar).



"Mya-thalun Pagoda" is my landmark, which is located on

my head (at the North) for several years.



My BMI (population density) is 4238/km² and I have an average body built, comparing with other cities in Myanmar.



Major blood stream is the Irrawaddy River which flows smoothly with laminar flow from North to South, nourishing the land for cultivation of a variety of plants.



Up-and-down-stream transportation is also mediated by the river. My locomotor system is efficiently run by highway roads, railways and airlines.



Ref: <https://www.myanmaritv.com/news/convenient-traveling-yangon-magway-flight-resumed-operation>



There is a 2,739 meter-long bridge (one of the longest bridges in Myanmar) crossover the Irrawaddy River, connecting to the west bank of the river and the town named "Min-bu".



Energy Metabolism

Carbohydrate production (Cultivating Paddy field) is not mainly occurred in my region. Major metabolism is "Fat Production" (edible oil production from sesame seed and peanut), and so my nick name is "Oil Pot". Peanut oil contains heart-healthy unsaturated fat (80%) and peanut itself is also rich of protein.



Ref: <https://www.google.com/url?sa=i&url=https%3A%2F%2Ftwitter.com%2Fusaidburma>

One teaspoon of peanut oil contains 2.079 g of monounsaturated fat, 1.44 g of polyunsaturated fat and 0.76 g of saturated fat. Similarly, sesame oil also contains mostly unsaturated fatty acids (75-85%) and good for health.

Not only edible oil, but also some crude oil and natural gas for energy are produced. A kind of photosynthesis (Solar energy production) can also be seen in my region.



Ref: <https://www.frontiermyanmar.net/en/southeast-asias-largest-solar-power-plant-to-be-built-at-minbu/>

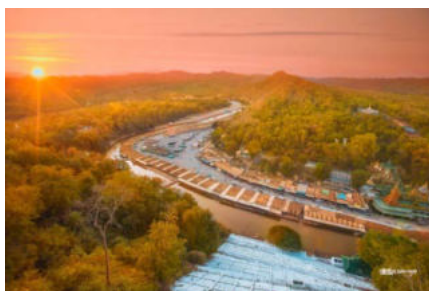
Physiology

Being a Poikilotherm, my body temperature is swinging up and down all the time. My day-time temperature is the highest in April (43 °C) and the lowest in December (32 °C). My night-time temperature might fall down to the lowest (8 °C) in the cold season.

You should come and visit me while I am cool and calm from November to February (Cold season). You should avoid visiting while I got fever (Hot season: from March to May), and at my shower time (Rainy season: from June to October).

More than 300 rooms are available for visitors (provided by 10 hotels). Moreover, many more rooms are provided by guest houses.

Famous places around me are Shwe-set-taw forest camp and pagoda, Beik-tha-noe world heritage archeological site and Bagan ancient city.



I breathe in a fair quality of the fresh air (AQ5 20-49) and I breathe out (CO₂ emission) 0.23 tons/capita/year.

I use both underground water (deep tube well) which is alkaline (pH ~ 7.8), and river water for general purpose. Drinking water supply is 100, 000 gallons/day (12 drinking water factories).

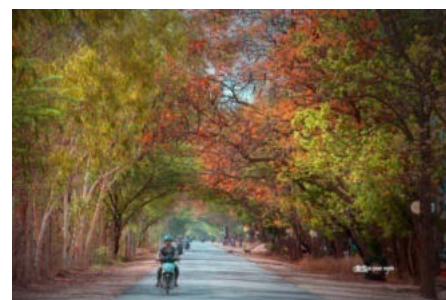
Scavenger functions are mediated by 20 cleaning-vehicles and 30 workers every day. Water drainage

system is not well developed and it naturally goes to the Irrawaddy River.

That is all my facts I would like to tell you. If you would like to know more physiological aspect of me, please send a mail to me (drsmhtway@gmail.com).

Yes, My Name is Magway !

(Special thanks to Moe Zaw Nyo for amazing photos)



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<https://www.google.com/url?sa=i&url=https%3A%2F%2Ftwitter.com%2Fusaidburma>

MYOGENIC MYANMAR



Cheng Hwee Ming

Professor

*Department of Physiology
University of Malaya,
Malaysia*

I take this privilege to write to my dear Myanmar colleagues in Physiology, thinking of the challenging times your nation is going through. As we talk of adaptation and compensation in homeostatic Physiology, I like to believe that your current national stresses will likewise strengthen your resolve as Physiology educators to continue to teach with the best of your abilities and creative opportunities.

I chose this title ‘*Myogenic Myanmar*’ to try to engage you in some physiology that has analogies to your community in Myanmar.

The word ‘myogenic’ broadly means an intrinsic property arising from the muscle itself, independent of extrinsic inputs either neural or circulating hormones.

‘Myogenic’ is more commonly used in the vascular smooth muscle responses to maintain a constant blood flow in cerebral, coronary and renal circulations. The vascular arterioles have mechanosensors that respond to increased blood perfusing pressure/stretch by vasoconstricting. The increased vascular resistance rises to match the increased pressure and blood flow is normalized.

I hear and see evidence of this ‘myogenic response’ to your current national pressures as many who love and care for the nation volunteer their time, effort in resistance activities and innovative projects. Students deprived of extrinsic guidance also showed intrinsic perseverance and diligence in autoregulating their tertiary studies.



Ye Tun Naung of Myanmar, 70kg Champion free posing 2016 SEA Championships (Source: [musclepinoy](https://www.youtube.com/watch?v=ybm3TDzNjeo))
<https://www.youtube.com/watch?v=ybm3TDzNjeo>

‘Myogenic’ can also be used for cardiac muscles. The intrinsic Starling’s mechanism can be described as ‘myogenic’, generating increased contractile force

when ventricular filling is larger. This end-diastolic volume/stroke volume relationship is useful in the closed, fixed volume cardiovascular circuit where continuous flow is dependent on the two synchronous beating rhythmic ventricular pumps.

Myanmar is richly blessed with abundant resources, although not all fully exploited and the fruits and benefits distributed to all. We will all echo the hope that there will be a similar heartfelt associated generous giving out of the nation’s lifeblood and resources to supply the needs of many in Myanmar.

‘Myogenic’ can also describe a recent finding in skeletal muscle in the secretion of myokines during contraction. These multi-organ chemical mediators are released during generation of muscle contractile tension. Myokines are now believed to mediate the benefits of exercise for health. Myokines have generally opposite actions to adipokines from fat tissues. So there is a homeostatic interaction between skeletal and adipose tissue mass.

As teachers, as we continue to flex our academic muscles, may we continue to have the impact on many in the community for good, comfort, resilience and health.

‘Myogenic Myanmar’

Love the Trees and Save the Forest:

Forest Bathing for Physiological and Psychological Health



Tin Tin Win Shwe
Chief Senior Researcher
National Institute for
Environmental Health,
Tsukuba, Japan

History of forest bathing:

Shinrin-yoku is the Japanese word and it means “forest bathing”. In Japan, forest bathing or forest therapy was begun in 1980s to promote physiological and psychological health especially in persons with illness or disease. The term was first introduced in 1982 by the Japanese Ministry of Agriculture, Forestry and Fisheries to encourage healthy lifestyles and maintain the Nation’s natural environments. Nowadays, it spreads widely all over the world and becomes popular habit in young and middle-aged peoples for health

benefits. Dr. Qing Li, an Associate Professor, a Physician and Immunologist from Nippon Medical School, Japan has been studying the research regarding forest bathing sustainably nearly 30 years ago.

What is forest bathing?

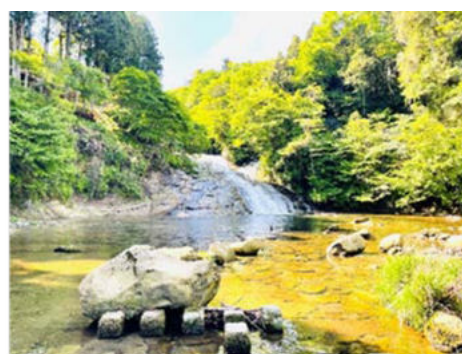
Forest bathing is the spending time in a forest to touch the natural environment by own senses. Walking in the forest connects the nature by five senses such as sight, smell, hearing, touch, and mind to improve our physical and mental health. Looking at the nature of green trees and blue sky make comforting us, reducing the stress and increasing anti-inflammatory cytokines of immune system.

Therefore, some houses and offices use photo or picture of nature, indoor green plants, aroma for relaxation and pleasant feeling. The sounds in the forest you can hear are sound of waterfall, wind and bird song without noise pollution as in urban. Easier forest adventure course in outdoor park attracts children and they can enjoy with their parents together. It was reported that 50% of good results of forest bathing is due to plant chemicals called phytoncides which are natural aroma from the trees in the forest atmosphere.

Phytoncides are volatile organic compounds and low concentration is effective for aromatherapy, but high

concentration leads to toxic effects. Touching tree or ground without layer or barrier like gloves or shoes allows naturally occurring bacteria such as *Mycobacterium vaccae* to enter our body and it can boost immune system and also acts as an anti-depressant. While walking in the forest, you can enjoy healthy local meals prepared by fresh local products like vegetables and fruits which cannot be available in urban areas, and some are beneficial as medicine.

Moreover, while walking in the forest, you can have a time to think without pressure and stress and it makes increased problem-solving ability and creativity power. During forest bathing, some gentle exercises like yoga or tai-chi with skillful trainer would promote normal physiological functions.



Awatama waterfall in Chiba, Japan

Good time for forest bathing:

The forest bathing time should be between 10:00 am to 4:00 pm in the sunny day. For beginners, no need to hurry, walking slowly and spend much time in the forest are recommended.

According to Dr. Li's talk, after 20 min, the subjects will notice their pleasant feeling and about 4 h is the best for physical and mental health. You can spend alone, or with a companion, or with family as a picnic. The forest bathing therapists are available in Japan especially for the patients. You can use as "me time" during which various activities such as studying the plants, writing a song or poem, thinking for important decision and future plan.

What are the benefits?

The main advantages of guided forest therapy walks are regulation of blood pressure, reduction of stress, supporting mental health, boosting the immune system and feeling very comfortable and peaceful. Dr. Li said that according to his research, one day spend in the forest, the benefits will cover for approximately 7 days. Staying two nights three days in the forest will cover approximately 30 days.

Possible mechanism of health benefits:

Phytoncides are wood essential oils and released from the trees such as Japanese cedar (SUGI) and Japanese cypress (HINOKI) and detected only in the forest atmosphere and not in the crowded urban atmosphere. Forest visit increases natural killer (NK) cell number and activity via intracellular proteins such as granzymes, perforin and granulysin and triggers boosting immune system and

anti-cancer effects. It has been also reported that forest visit was found to remarkably reduce urinary adrenaline and noradrenaline concentrations and saliva cortisol level. The inhibition of these stress hormones may lead to reduce stress and anxiety and make a relax and vigor. Moreover, decreased adrenaline and noradrenaline may reduce sympathetic nervous activity and which in turn reduce the blood pressure in the patients with hypertension.

Future plan for clinical research:

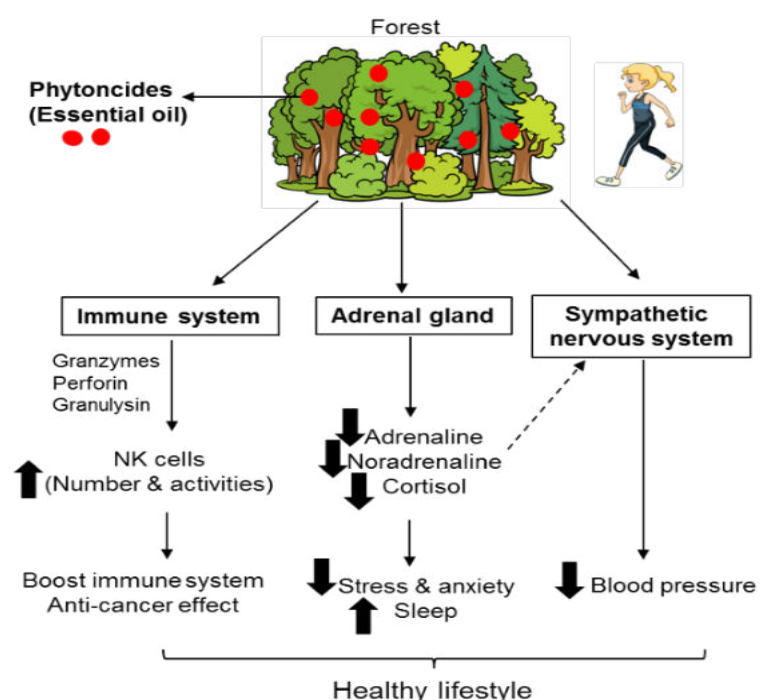
Based on the effect of forest bathing, the scientists have been focused to use phytoncides or essential oils as olfactory stimulants to release of memory-function related genes such as neurotransmitters and growth factors for treatment of dementia or Alzheimer's patients.

Finally, sustainable maintenance of the nature is a critical issue for fulfillment of the sustainable development goals by United Nations such as good health and well-being and climate action for our next generation.

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Possible mechanism of forest bathing for health benefits

PHYSIOLOGY & PHYSIOLOGIST



Sanda Kyaw

*Professor and Head
Department of Physiology
University of Medicine 2,
Yangon*

Physiology is the science of life, specifically, how cells, tissues, and organisms function in the body. Physiology is important because it is the foundation upon which we build our knowledge of what "life" is, how to treat disease, and how to cope with stresses imposed upon our bodies by different environment.

Physiological studies of normal biological function provide the basis for understanding the abnormal function seen in animal and human disease (pathophysiology) and for developing new methods for treating those diseases (translational research). Many physiologists use animal models as an important tool in their research.

The study of physiological processes can encompass a wide array of other disciplines, such as neurophysiology, pharmacology, cell biology, and biochemistry.

Physiologists can often be found as members of these other departments, in addition to department of physiology.

Physiologists are constantly trying to answer key questions in areas ranging from the functions of single cells to the interactions between human populations and our environment here on earth, the moon, and beyond.

To answer these questions, Physiologists work in laboratories, in research institutes, in the universities, and in the teaching hospitals. A physiologist can use the simple nerve networks found in marine snails to answer questions about the fundamental mechanisms of learning and memory.

A physiologist can investigate the cardiovascular system of an animal to answer questions about heart attacks and other human diseases. Physiologists can study how the body adapts to temperature and environmental extremes encountered on earth, or the zero gravity encountered in space flights, to learn how physiological processes cope with these environmental stresses.

Physiologists ask questions like . . .

- Why does blood clot in a wound but not while flowing through blood vessels?
- How does the nervous system convert stimuli into memories? How do we access those memories?
- What factors limit human athletic performance?
- What causes new genes to be activated and expressed in failing hearts, and how does this contribute to poor performance of these hearts as circulatory pumps?
- How does a person's genetic inheritance predispose him or her to certain diseases later in life?
- How do organs repair themselves after damage due to stroke, heart attack, or other insult?

Reference:

<https://www.gonzaga.edu/school-of-nursing-human-physiology/departments/human-physiology/physiology-as-a-career>

The study of physiological processes can encompass a wide array of other disciplines, such as neurophysiology, pharmacology, cell biology, and biochemistry.

Developing a new technique

TO DETECT CHEMICAL LEAKAGE DURING DISASTERS IN JAPAN



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Japan is known as a disaster-prone country. It is historically characterized by major earthquakes, with ten earthquakes in the past 100 years in which more than 1,000 people were killed or missing. Not only that, but flood damage is also a significant concern for Japan, given the country's location in the path of typhoons. In Japan, 97% of municipalities have experienced floods or landslides in the past ten years. Flooding has been a historical problem in Japan since pre-modern times, but especially since the 1950s, chemical leakage has added

concern. Today, industrial and household chemicals are stored everywhere in the city. For example, chemical plants store their raw materials, and farmers store their pesticides. These can spill during floods and cause damage to people and ecosystems.

In recent years, the most damaging typhoon in Japan was Typhoon Hagibis in 2019. Rivers overflowed in many locations, resulting in 90 deaths, nine people missing, and 4,008 houses totally or partially destroyed. There were many reports of chemical spills during the flooding caused by this typhoon, including oil (estimated total volume of 135 L) in Kakuda City, Miyagi Prefecture; aluminum phosphide material (product name: fumitoxin, 3 x 1 kg) in Shizuoka; sodium cyanide from two facilities in Koriyama City; tanks containing ammonium hydrogen fluoride in Motomiya City; and drums

containing trichloroethylene, dichloromethane, and isopropanol. These are all reports from businesses that were aware of the spill. It may not be possible to take an action if the spill is not noticed. Therefore, it will be necessary to establish a system for the government to investigate the possibility of chemical substance leaks separately from the reports.

The National Institute for Environmental Studies (NIES) is developing various technological development of methods for detecting chemical substance leakage in the event of disasters. One of these is the Automatic Identification and Quantification System (AIQS), which uses a gas chromatograph-quadrupole mass spectrometer. This method enables the identification and quantification of approximately 1,000 organic compounds in a single injection without the use of



Fig.1.AIQS analysis screen

(AXEL, NISHIKAWA KEISOKU CO., Ltd.)

standards. A database of substances that can be measured and three types of analysis software are commercially available, and an example of an analysis screen is shown in Fig. 1. The commercially available database includes 451 pesticides and other substances that may harm the environment, including substances subject to the PRTR (Pollutant Release and Transfer Register) Law in Japan. This selection of substances was based on the list of regular environmental monitoring. On the other hand, other substances could potentially leak in a disaster. We calculated the risk by multiplying the toxicity and amounts of chemical substances (manufactured and imported), then prioritized them in order of their risks and added them to the AIQS database on our own. So far, we have added about 200 substances to the database, making about 1,200 substances available for simultaneous analysis at present. For analytical chemists who do not have AIQS software and database, a web-based version of AIQS running in the cloud is under development.

The AIQS method was also used in the large-flooded area in Nagano Prefecture caused by Typhoon Hagibis mentioned earlier (Fig. 2). Sedimentary soil washed away by the floodwaters was sampled at 51 points and measured for toxic

substances using the AIQS, and high concentrations of DDT (dichlorodiphenyl-trichloroethane) were detected. The use of DDT has been banned in Japan since 1981. DDE (dichlorodiphenyldichloroethylene) and DDD (dichlorodiphenyldichloroethane), which are long-term degradants of DDT, were also detected at the sites where high concentrations of DDT were detected in the flooding, suggesting that hot spot soils used before the ban may have been spilled. The survey anticipated the possibility of seeing components of currently used pesticides and kerosene, a household fuel, but did not anticipate the detection of DDT. Therefore, DDT was usually missed to measure in standard targeted analytical measurements before developing AIQS. However, AIQS is not limited by the investigator's preconceived notions and searches all substances in the database. This leads to a



Fig.2. Place around the Chikuma river in Nagano Prefecture, Japan after flood caused by typhoon Hagibis

significant advantage for detecting DDT by our research team.

Thus, AIQS has been used as a leak detection method for organic chemicals resulting from floods and other events.

AIQS is an efficient detection method not only for disasters but also for environmental monitoring in steady-state conditions. Although its quantitative value has an uncertainty of several tens of percent, it is also useful when one wishes to obtain a rough idea of the concentration level of chemicals in the environment or when it is difficult to get reference material. Some practical examples have already begun to be reported.

The AIQS introduced here is measured by GC-MS. Only semi-volatile substances can be measured; for hydrophilic compounds that GC-MS cannot measure, Prof. Kiwao Kadokami from Kitakyushu University has separately developed AIQS with LC-QT of MS. AIQS-LC is more sensitive than AIQS-GC and is expected to be used for various applications in the future.

Acknowledgments

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INTEGRATED CLINICAL LECTURE ON CARDIOVASCULAR PHYSIOLOGY



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It was on 30th May (Monday), 2022. We first contacted the Head of Department of Medicine, Prof Daw Aye Aye Chit and she assigned Associate Professor Dr. Maung Maung Oo for the Integrated Clinical Lecture of three hours.

He was very considerate and visited our department prior to the lecture so as to discuss what we physiologists want from their physicians for the sake of second MBBS students.

We first considered to discuss nine very interesting cases of stable and unstable angina, congestive heart failure, ventricular tachycardia caused by hypokalemia, Wolff Parkinson White (WPW) syndrome, vasovagal syncope, hypertension, white coat hypertension and

intracranial haemorrhage & high blood pressure.

The first agenda was a brief elaboration of history of medicine concerning cardiovascular physiology that consisted Giants: Galen, William Harvey, development of thoughts in measuring blood pressure, electrocardiogram (ECG) to echocardiogram and percutaneous coronary intervention (PCI) by Sayer. It was followed by presentation of four cases by four groups of the students.

At first, there were nine cases as mentioned above and among them, we chose the most suitable four for the second MBBS students which are cases of stable angina, congestive heart failure, WPW syndrome and vasovagal syncope.

In the **FIRST** case of stable angina, we let the students recall the basic principles of electrocardiogram, normal findings of ECG and changes during ischemia and infarct and of course the hall mark of myocardial infarction. We also let them discuss why the patient was relieved by rest and introduce them the diagnostic tool cardio angiogram and even the treatment procedure of PCI. It was really a worthwhile thirty minutes of applied cardiovascular physiology.

SECOND case was a really interesting case and the case I like most among the four. It was a case of heart failure with bilateral diffuse crackles in lungs, elevated jugular

venous pressure, and 2+ pitting lower extremity edema. ECG showed normal sinus rhythm with left ventricular hypertrophy. So, no doubt we let the students discuss these physical signs and even let them diagnose whether the patient is suffering from left sided or right sided or congestive heart failure based on underlying mechanisms.

Furthermore, diagnosis of sinus rhythm with left ventricular hypertrophy by means of ECG and significance of ejection fraction was thoroughly explained by the students. Another interesting essential point is the Starling's forces explaining why there were crackles in lungs and pitting lower edema. It was really a case that highlighted the importance of understanding the basic principles in diagnosis and treatment of patient.

It was already eleven in the morning and we should give the students a break. Yet, it was a tightly scheduled program. So, we contributed them some refreshments of cookies in about five minutes. Very great to see their smiles having cookies and it made us smile, too. We really need such a break sometimes.

THIRD case was a patient with WPW syndrome. Though a bit difficult for second MB students, the presenter thoroughly explained the circuits and even the history of the great physicians that coined the name WPW.

The most interesting part in this case is that the student described the underlying mechanisms leading to tachycardia. After the presentation, I gave a remark that the student did not seem like a second MB student and that he even looked like a physician. One day, I am very much sure about is that he is going to be a great physician. I really mean it.

Last but not the least, the **FOURTH** case was a case of vasovagal syncope. According to the case presentation, the student explained the physiological mechanism of syncope. Also, discussed the orthostatic hypotension, its physiological importance and that it can be used to test autonomic function of the patient.

All in all, that morning clinical lecture of three hours is really a very fruitful morning. Based on the knowledge of basic sciences, physiology, the students learnt how to apply in diagnosis and treatment so as to relieve the sufferings of the patients.

That is the key part of the integration. Integration should not only be in the curriculum, in the time table-one subject after another..... I share my mentor's preaching to the students that integration cannot be achieved as long as the student integrate by himself, in his brain, all in his heart and soul. Wish students become great compassionate doctors.

As a closing remark, I thanked all the students for their great effort and enthusiasm. Also, deep gratitude to Associate Prof Maung Maung Oo for sharing his great experience, knowledge and interest. Before the conclusion, I requested him to contribute such a great clinical lecture and integration again after Respiratory Physiology.

Of course, my special thanks go to my colleagues and staff of Physiology Department, University of Medicine, Mandalay without their interest, effort and contribution, this Integrated Clinical Lecture on Cardiovascular Physiology could not be possible.



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"All in all, that morning clinical lecture of three hours is really a very fruitful morning. Based on the knowledge of basic sciences, physiology, the students learnt how to apply in diagnosis and treatment so as to relieve the sufferings of the patients."

"The Splendidly Brilliant Beauty, University of Medicine, Taunggyi"

Surrounded by endless lush
green mountain ranges

Filled with bountiful pine
trees and silver oaks rivalled
by the flamboyant blossoms
of cherry flowers, jacarandas
and rain lilies.

From the warm graceful rays
of the sun in the day

To the tranquil, melancholy
moonlight in the night

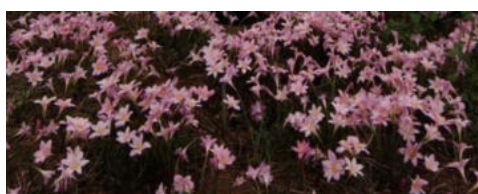
All students are invited and
welcome

Into the space in which you
feel safe and supported in
pursuit of knowledge,

Into the warm loving
embrace of a mother's love at
the gorgeous beauty,
Taunggyi Medical University.

Prof. Thae Nu Htwe

(Translated by Daw Nang
Kham Set)



“အလှတရား နဲ့
ဆေးတက္ကသိုလ်
တောင်ကြီး”

စိမ်းလွင်ပြင် တောင်တန်းတွေ

ဝိုင်းပါလို့

ထင်းရှူးမြိုင်မြိုင် ချယ်ရီတွေအပြိုင်

ပွင့်ပါတဲ့

စိန်ပန်းပြာပြာ ခါတော်မီနဲ့

မိုးကြိုပန်းတွေ လှိုင်လှိုင်ပွင့်နေတဲ့

နေခြည်ကဖြာ ရွှေရည်လသာတဲ့

မိခင်ဆေးတက္ကသိုလ်ရင်ခွင်

အေးချမ်းပါတိ...

ပညာနို့ရည်သောက်သုံးဖို့

လုံခြုံနွေးထွေး အားကိုးနိုင်စရာ

နေရာလေးမှာ

နားခိုလိုက်ပါ

သားငယ်သမီးငယ်တို့။

ပါမောက္ခ ဒေါက်တာသန့်ထွေး

"We welcome news and articles for coming issues of Newsletter. Local & global Physiology news, and the articles related to medical education and research are warmly welcomed"

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