



SAAP Bulletin

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Svante Pääbo"

Nobel Prize in Physiology or Medicine 2022

The 2022 Nobel Prize in Physiology or Medicine was awarded to the Swedish geneticist Svante Pääbo" for his research in the field of genomes of extinct hominins and human evolution.

Svante Pääbo was born 1955 in Stockholm, Sweden. He completed his doctoral studies at Uppsala University and joined the faculty at the University of Munich in Germany in 1990. He established the Leipzig, Germany-based Max Planck Institute for Evolutionary Anthropology in 1999, where he continues to be involved. He is also an adjunct professor at the Japan's Okinawa Institute of Science and Technology. He was the recipient of numerous prizes including Gruber Prize in Genetics in 2013, Breakthrough Prize in Life Sciences in 2016, and the Princess of Asturias Award in 2018.

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South Asian Association of Physiologists: Department of Physiology, Faculty of Medicine, University of Colombo, Kynsey Road, Colombo 8, Sri Lanka
Website <https://www.thesaap.org/> E mail: physiology.ac@gmail.com



**Editorial Board of the South Asian
Association of Physiologists
(SAAP) Bulletin**

From Editor's Desk



Editor-in-Chief

Professor Piyusha Atapattu
Sri Lanka
piyushaatapattu@yahoo.com

Members

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Dr. Shams Ruhani Islam
shams.ruhani@yahoo.com
Dr. Kamol Chandra Das
kamolchandradas@yahoo.com

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ncphysiolcu@gmail.com

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sadaf_mumtaz@yahoo.com
Dr. Arslan Ahmed Uqaili
arslanuqaili@gmail.com

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Dr. Karma Tenzin
Dr. Phurpa

The 8th Biennial conference of the South Asian Association of Physiologists and the 35th Anniversary Academic Sessions of the Physiological Society of Sri Lanka will be held from 11th to 13th November 2022 as a hybrid conference followed by virtual-post congress workshop on the 19th November 2022.

The Pre-congress hands-on workshop on autonomic function testing will be held on the 11th November 2022 at the new University of Colombo, Faculty of Medicine tower in the Department of Physiology. Eminent researcher Professor K. K. Deepak (MD, PhD), Professor in Physiology at the All India Institute of Medical Sciences, New Delhi is conducting this workshop.

The main conference will be conducted as a hybrid conference on 12th-13th November 2022 at the Bandaranaike Memorial International Conference, Hall, Colombo, Sri Lanka. An impressive two-day programme is contributed to by 20 overseas speakers and many local speakers, with the keynote address, 3 orations, 6 invited lectures, 6 guest lectures, 8 symposia and two panel discussions in addition to oral and poster sessions. The post congress workshop (hybrid) on Online Assessments for Learning and Evaluating Pre-Clinical Sciences Jointly organized by Physiological Society of Sri Lanka and Centre for Medical Education (CenMED), National University of Singapore on 19th November 2022, 8.30 am-12.30 pm (Sri Lanka Time)

will be offered free to all participants. The SAAP-8, PSSSL conference will enable further dissemination of current advances in physiology as well as regional and global collaborations, and promote physiology researchers and educators to come together to promote future developments in the field.

We cordially invite all SAAP membership to participate in the conference.

*Professor Piyusha Atapattu
Department of Physiology, Faculty of Medicine
University of Colombo, Sri Lanka
E-mail: piyushaa@physiol.cmb.ac.lk*

The gauge unification of fundamental forces of nature



Prof HR Ahmad
Physiologist
Aga Khan University
Karachi , Pakistan

Prof Mohammad Anis Alam
Professor of Environmental
Sciences
Lahore School of Economics
Pakistan

This Nobel lecture of Abdus Salam deals with *a set of ideas* relevant to the gauge unification of electromagnetic with the weak nuclear forces. This lecture coincided with the 100th death-anniversary of JC Maxwell, who matured the first unification of electromagnetic forces leading to the origin of the concept of gauge theories. It also coincided with 100th birth anniversary of Albert Einstein, who proposed the unification of *all* forces.

Abdus Salam showed us how *Ideas* are born, as gleams in several theoretical eyes, to travel years to reach a *predictive maturity*. It takes another time frame of years to receive *experimental evidence*. The axis of *ideas – predictive maturity – experimental evidence* is to examine some of the theoretical gleams by asking the question what could be predicted from the ideas of today to celebrate the experimental evidence in future. This celebration indeed took place with the award of shared Nobel Prize by Sheldon Glashow, Abdus Salam, and Steven Weinberg in 1979.

The question is to be raised how the complexity of nature could be comprehended in terms of a few elementary concepts. The first quest should stimulate a thought experiment of “wheels within wheels” as proposed by Feynman. However, the task is to discover the inner most wheels, if any such exist. The second quest then should search for the fundamental forces turning the wheels go round

while enmeshing with one another. The significance of gauge ideas is to synthesize the two quests in one by representing elementary particles by certain charge operators under the influence of Higgs field. The third quest emerges to seek for a unification between charges through their forces into a single entity.

How this single entity of forces displays various charges as components to be transformed one into the other should be sought. The question arises are all fundamental forces gauge forces? Could they be understood in terms of charges and their corresponding currents? If this could be true, how many charges are unified entity and what are the nature of charges? As Einstein modelled the nature of gravitational charge in terms of space-time curvature, could the nature of the entire unified set be equally a profound model? This dream is reinforced by the verification of gauge theory prediction. GP Thomson expressed in his 1937 Nobel Lecture, how to examine and nurture the ideas leading to predictive maturity and experimental confirmation: “The Goddess of learning is fabled to have sprung full grown from the brain of Zeus but is seldom that a scientific conception is born in its final form or owns a single parent. More often it is the product of a series of brainwork, each in turn modifying the ideas of those that came before and providing material for those that come after”. It may be inferred that a matter, that is definable, measurable, and falsifiable, is scientific. The nature is complex, and the life is short, therefore the baton of science is passed on to the next generation.

Dedicated to the fond memories of Abdus Salam for showing us the research pathway of enlightenment for mankind.



After winning the Nobel Prize in 1979, Dr. Abdus Salam had requested the Indian government to find Professor Anilendra Ganguly, who had taught him mathematics in the pre-partition era at the Sanatan Dharma College in Lahore. He had to wait for two years to meet his teacher and finally came to India on 19 January 1981 to pay his respects to Prof. Ganguly who had shifted to Kolkata after the independence. Prof. Ganguly was feeble and unable to even sit up and greet him when Dr Salam visited him at his house. Dr. Salam took his Nobel medal and said that 'Sir, this medal is a result of your teaching and love of mathematics that you instilled in me.' He then put the medal around his teachers' neck and said "This is your prize Sir. It's not mine." The gesture for his teacher by the Pakistani scientist was truly defying to the barriers of nations and religions that had grown after the partition. It was the ultimate tribute to a teacher that went far beyond the borders of the nations.

Cardiovascular physiology of transplanted hearts



Dr Pulasthi Lankaratna
MBBS (Colombo)

Demonstrator
Department of
Physiology
Faculty of Medicine
University of Colombo
Sri Lanka

Introduction

Heart transplantation, in which a patient's heart is replaced by a healthy donor heart, is the last resort in the management of end-stage heart failure. In 1967 Dr. Christiaan Barnard and his team performed the first-ever human-to-human heart transplantation at Groote Schuur Hospital, University of Cape Town. Even though the patient couldn't survive beyond 18 days post-operatively, 4 out of the next 10 patients lived beyond 1 year, creating much optimism and eventually making cardiac transplantation a viable management option (1). At present, about 4000-4500 heart transplants are performed annually (2) with a one-year survival of 80-90% and a mean life expectancy of over 12 years (3). In spite of these attractive figures, still many challenges exist including the limited availability of donor hearts, graft dysfunctions and rejections, and rapidly escalating waiting lists (4).

Physiological changes in transplanted hearts

Surgical denervation

A transplanted heart is surgically denervated as both afferent and efferent fibers are severed during its retrieval from a donor body. It results in major physiological changes in the recipient's cardiovascular system. Although the Sinoatrial (SA) node of a transplanted heart still functions as the generator of pacemaker potentials, its autonomic afferents are lost. The myocardium and pacemaker tissue become solely dependent upon hormonal and

intrinsic influences to maintain chronotropy, inotropy, and dromotropy. Baroreceptor regulation also becomes abnormal. Heart rate variability which indicates the influence of the autonomic nervous system on the heart is markedly reduced, and heart rate (HR) responses to autonomic and external stimuli such as excitement, physical activity, or change of posture are diminished (5,6). Loss of vagal tone results in increased resting HR, typically of around 90-110 beats per minute (7). Loss of efferent fibers causes an inability to experience angina (5).

Pacemaker tissue

During the first few days following transplantation, SA node dysfunction, which spontaneously settles over time, is frequent. Rarely a patient may require the insertion of a permanent pacemaker. Meanwhile, the AV node remains unaffected. However, medications acting on the AV node may exhibit atypical pharmacodynamics. For instance, the nodal depressant activity of Verapamil is enhanced, and Digitalis exerts minimal inhibition on the AV node of a transplanted heart (8).

Stroke volume and Cardiac Output

The baseline stroke volume (SV) of transplanted hearts is lower than that of non-transplanted hearts. In orthotopic Heart Transplantation, the most utilized procedure today, the allograft is anastomosed to an unexcised cuff of atria of the native heart, leading to asynchronous contraction of native and transplanted atria and abnormal atrial hemodynamics (9). Consequently, the atrial contribution to stroke volume (SV) becomes less in transplanted hearts. In addition, myocardial injury during organ harvest, rejection injuries, allograft vasculopathy, the altered diastolic function of ventricles, and pre-existing donor cardiac abnormalities may also contribute to this reduction in SV (10). Nonetheless, cardiac output (CO) at rest

in transplanted hearts remains relatively normal because of high resting HR.

Blood pressure

Many studies have appreciated elevated blood pressure levels among cardiac transplant recipients. The aetiology for this finding is considered multifactorial, driven by calcineurin inhibitors (CI) and glucocorticoid-mediated effects, increased vascular resistance, restrictive cardiac physiology, and ventricular-vascular uncoupling (7). The normal nocturnal decline of blood pressure is also blunted in these patients. It's hypothesized that increasing venous return on recumbent position coupled with the loss of baroreceptor-mediated downregulation of cardiac inotropy (which otherwise would have happened following an increase of venous return) leads to relatively higher SV, CO and subsequently to higher blood pressure during sleep (11).

Cardiac response to exercise

Exercise tolerance of heart failure patients following cardiac transplantation is substantially higher than their original status but less than that of healthy people. A transplanted myocardium becomes more sensitive to and relies upon circulating catecholamines to increase its chronotropy and inotropy. Therefore, the HR rise at the outset of exercise is lower, and the maximal achievable HR and cardiac contractility are comparatively lesser, leading to an abnormal cardiac output during exercise. The gradual rise of HR that normally happens during exertion may even continue beyond the period of physical activity, with a slower return to baseline HR post-exercise (5,12).

Haberbusch and his team described 20% lesser peak SV and a 40% lesser peak CO during exercise in transplanted hearts (13). Although the maximum achievable stroke volume and cardiac output are lower in cardiac allografts as mentioned above, still there is about a 20% rise in SV at the onset of physical activity, which gradually rises further during exercise. Likewise, the peak oxygen consumption of cardiac transplant recipients during

exercise is also lower than that of age- and gender-matched control subjects (12).

The Frank-Starling mechanism is vital for the enhancement of inotropy of transplanted hearts. It's supported by the observation of higher end-diastolic diameters (EDD) of cardiac allografts compared to native hearts during high-intensity exercise (13). Circulating catecholamines also have a substantial contribution. Diminished presynaptic neuronal uptake of catecholamines amplifies the sensitivity of the transplanted myocardium to circulating endogenous catecholamines, unfortunately with a drawback of increased susceptibility to arrhythmias (5).

Cardiac reinnervation

Usually from the post-transplant 2nd year, reinnervation of the heart has been observed to occur involving the SA node, myocardium, and coronary vessels. Cardiac reinnervation is generally time-dependent, and although variable, incomplete, and patchy, improves many abnormal cardiac parameters that were caused by denervation. The exercise performance, peak HR, SV, CO, and oxygen uptake improve significantly following reinnervation, providing patients with better functional status and quality of life (14).

Conclusion

Cardiac allografts work in a unique but substandard manner. Nonetheless, they dramatically improve heart failure symptoms, quality of life, and life expectancy of eligible recipients (10). To optimize and prolong these therapeutic benefits, physiological changes in transplanted hearts have been widely studied by researchers across the globe with subsequent application of generated knowledge to the standards of care of cardiac transplant recipients today.

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Neurohormonal mechanisms on sexual orientation



Dr Sharaka Hashan Yapa
MBBS (Colombo)

Demonstrator
Department of
Physiology
Faculty of Medicine
University of Colombo
Sri Lanka

South Asia is one of the most densely populated regions in the world, but spectacularly diverse in culture, ethnicities, religions, languages, and traditions. Although there's abundant evidence of the existence and acceptance of non-heterosexual sexual orientations in the region from ancient Kamasutra through to the Mughal dynasties, with the arrival of iron fist of values of Christian church hand in hand with western colonial rule widespread discrimination shadowed over the subcontinent. The same imprint of laws was imposed on penal codes of countries throughout South Asia labelling non-heterosexual activities as illegal and criminal. Consequent widespread homophobia, transphobia, and antagonism continued to be deeply embedded systemically in socio-political and religious spheres based on the belief that one's sexual orientation is of individual choice and against nature. But extensive scientific research has shed light on understanding the scientific basis of the work of nature on sexual orientation.

Sexual orientation has been defined as a person's identity about the gender or genders to which they are sexually attracted; 'homosexual', 'gay', and 'lesbian' are used to refer to people who are

attracted to the same sex, while 'bisexuals' attract to members of both sexes. Although there are distinct labels sexual orientation isn't confined to these defined categories; rather it lies on a spectrum.

"Transgender" often abbreviated as trans refers to people whose gender identity or gender expression does not align with their birth sex. Transgenders also may identify in different ways regarding sexual orientation.

Although the exact cause is yet to be established, scientists have speculated that it's a product of both nature and nurture, an interplay between several factors. Many hypotheses have been tested including genetic-hormonal, immunological, and socio-cultural causes.

Neurohormonal explanation of the prenatal effect of hormones has been one of the most interesting and influential explanations. The development of genitalia in the foetus is influenced by androgens namely testosterone, dihydrotestosterone (DHT), and androstenedione. DHT produced by the conversion of testosterone from weeks 6 to 12 in the first trimester induces the development of male external genitalia while the absence of this androgen produces a female external genital phenotype. Sexual differentiation of the brain is followed by organizational the activity of sex hormones and various other factors. It is found that these two processes occur separately thus external sexual phenotype development doesn't necessarily relate to sex-specific changes in the central nervous system or inducing sexual dimorphism in brain.

Animal literature on hormonal manipulation established that administration of androgens during

critical periods of development causes changes in areas of the brain which is involved in mating behaviour. These hormonal manipulations caused changes in sexual behaviour as well as physical changes including genitalia. But no differences have been found between the genitalia of heterosexuals and homosexuals limiting the relevance of animal literature.

The irreversible effects of hormones in establishing sexual preferences in the developing phase of brain are deemed organizational while the activity of reversible effects on sexual behaviour during growth and puberty is activational.

The earliest human studies were carried out on the activational effects of human sex hormones. It was postulated that homosexual men have low levels of circulating testosterone which was proved null later. The levels of androgens were only associated with the level of libido not on deciding the direction of attraction. Evidence on the sex hormone levels of females has been controversial. Although significant differences have been found to exist between lesbians with masculine and feminine behaviours, small discernible differences were found between heterosexual, bisexual, and lesbian women.

The next line of studies exploring the possibility that sexual orientation reflects the organizational effects of early hormones in utero, especially testosterone, has far gained more gravity with evidence.

In the quest to rule out between nature or nurture affects sexual orientation and to establish where it's decided before or after birth a study on male neonates immediately reassigned to the opposite sex and brought up like females or vice versa would be ideal. If it's assigned after the birth they would be attracted to the males and if it's before birth they

would find themselves attracted to females. Due to ethical reasons, this is only hypothetical but several studies were taken on a few unfortunate children without any known prenatal hormonal abnormalities whose sex were reassigned shortly after birth due to various reasons like ablatio penis(sufficient damage to infants penis requiring removal) and cloacal exstrophy. The vast majority of these born males reassigned to females reported preserving their sexual attraction towards females. Despite being brought up as females after birth, their attraction being towards females illustrates how fixed the sexual orientation even before birth against psychosocial impacts after birth.



Apart from these hormonally normal males, several other intersex syndromes including congenital adrenal hyperplasia (CAH) and androgen insensitivity syndrome (AIS) induced by hormonal abnormalities have shed light on this hypothesis. These are two opposite conditions with opposite sequences. CAH females have a higher level of androgen levels from prenatal periods due to defects in cortisol production and instead, adrenal androgen secretion is exaggerated. AIS individuals are insensitive to androgens to various degrees. AIS individuals are born with male internal genitalia but

due to androgen insensitivity they develop female external genitalia and body features. They are raised as females. Females with CAH, whose androgen levels were high from prenatal life showed significant attraction to females on contrary to the AIS individuals who were resistant to androgen activity were attracted to males almost exclusively.

Another example of the role played by excessive androgen exposure in utero is the evidence with diethylstilbesterol (DES), a nonsteroidal estrogen with masculinizing effects as in CAH but not to the same extent. DES was used in the 19640s 1960s to treat pregnancies at risk until it was banned for its side effects. DES doesn't masculinize genitalia as it's administered after the first term of pregnancy thus the social effect on abnormal genitalia is not evident in this cohort. Increased homosexual fantasies were noted to be found in female offspring of mothers who used DES in several studies.

These consistent findings across various conditions and studies strongly suggest that prenatal androgen activity plays a key role in establishing sexual orientation. But most homosexual individuals don't have any endocrine abnormalities that have been detected so far. Looking into this, prenatal maternal stress is linked to variations in sexual orientation. Dorner et al 1980, studied the total number of homosexual men who were born during 1940s registered in venerology clinics assuming the women who gave birth during wartime experienced more stress. In Comparison of two cohorts of those who were born during the peak of World War II and after the war showed significant differences. The former group had a significantly high number. These findings have been replicated again in more settings, and reiterated the significance of prenatal stress of mothers on sexual orientation in males.

With ethical and technological constrictions assessing prenatal hormone actions in humans

several proxy methods have been implemented assuming homosexual individuals should express more cross-sexual anatomical and functional characteristics of the opposite gender if there were differences of hormonal changes in utero than heterosexual individuals.

In 1991 a group of neuroscientists published their findings on autopsied brains of homosexual and heterosexual men, the size of the third and interstitial nucleus of the anterior hypothalamus (INAH-3) of heterosexual men was larger than twice the size of that of homosexual men. But homosexual male individuals and heterosexual female individuals shared almost the same volume. This is quite important as the volume of INAH-3 was already established to be different between the sexes. This has been further strengthened by the evidence showing that INAH-3 volume and number of neurons of male-to-female transsexual people is similar to that of females. Further image studies have revealed that homosexual individuals have less sexual differentiation of white matter tracts as well.

Some studies focusing on anthropometric characteristics of sex-atypical hormone action, finger length ratio has been identified as a key characteristic. In women, the index finger(2D) is nearly equal in length to the ring finger(4D) whereas in men 2D is shorter on average than 4D and this can be observed from about 2 years of age. A small sex difference can be seen in the 2D:4D ratio. As all somatic sex atypical changes are believed to be the product of fetal androgens, this change might reflect the effect of androgens on males. It's also seen in female children with CAH having lower 2D:4D ratios regardless of sex. Large study samples have shown that the 2D:4D ratio of gay men is significantly closer to that of females further strengthening the role of androgen exposure variations in utero.

Evolutionary geneticists have found missing links causing inconsistent findings along the logic of the prenatal androgen exposure paradigm. They argue the involvement of epigenetics by misexpression of the modifier of testosterone sensitivity or insensitivity that affected the development of the brain. Particularly epi-marks which canalize (favours genotypes that deviate least from the trait optimum suppressing phenotypic variation caused by mutations) the sexual development preventing the intersex condition in the majority of the population. But failing to erase those markers across generations might cause reversed sexual orientation. These models are being tested with current stem cell technology.

Another interesting theory, “Prenatal thyroid model of homosexuality” was brought to light recently after an association between same-sex attraction and maternal thyroid dysfunction during pregnancy was found. Autoimmune inflammatory mechanisms as in Hashimoto’s thyroiditis, low circulating thyroid hormone levels, and indirect effects on prenatal androgen activity were speculated to be contributing factors. This has been further supported by several other authors including geneticists with genomic association studies revealing several chromosome abnormalities related to thyroid dysfunction in mothers of male homosexual individuals.

The above-explained hormonal mechanisms are only a small part of the bigger picture of evidence tallied so far in the journey to establish the neurobiological basis of sexual orientation. With the modern developments in the fields of physiology and genetics, further knowledge will strengthen the science clearing misconceptions and misperceptions

related to the sexual orientation benefiting the humankind.

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Integrating Technology into Physiology Education (Are we there yet?)



Dr Hansi N Gamage
MBBS
Demonstrator
Department of Physiology
Faculty of Medicine
University of Moratuwa
Sri Lanka



Dr Sajith Peiris
MBBS
Demonstrator
Department of Physiology
Faculty of Medicine
University of Moratuwa
Sri Lanka

*Tell me and I forget, teach me and I may remember,
involve me and I learn (Benjamin Franklin)*

Using multi strategic approach in teaching is proven to be better than using traditional teaching methods in current world education system. Innovative newer teaching methods include practical combined sessions, experimental methods, stimulative teaching methods, interactive sessions, and online teaching etc. Among them using technology aided practical sessions is a trend in current science education.

Physiology is a fundamental component in medicine and it is an experimental subject which is constantly getting updated. It is the place where we learn the normal functions of the human body. Having the proper foundation knowledge is crucial to all health care professionals. Compared to teaching and learning physiology theories, applying them practically in the clinical practice is a different art. For the acquisition of that ability, there is a significant role in using multi strategic teaching approaches, especially technology aided practical methods.

For example, getting the comprehensive knowledge of reading an ECG can be done in a better way when the teaching about ECG is combined with technological aspects of it. Practical demonstration of complex theories in a simplest way may be more efficient than lecturing about it.

Globally, most medical schools implement this concept in their academic curriculum, still it is not the situation in Sri Lanka. Some medical faculties in Sri Lanka, have attempted to use these methods and there, they have successfully conducted practical sessions in physiology too. But our academic sessions are yet to be improved with the incorporation of technology. Being established along with a leading engineering faculty in Sri Lanka, Faculty of Medicine, University of Moratuwa has got the opportunity to advance their teaching learning methods to reach up the global trends.

Successful implementation of these methods is mostly affected by lack of technical support in the premises, lack of resources and skillful technicians, poor support from the government and current economic crisis in Sri Lanka. And this may cause a significant impact on the quality of medical education where Sri Lankan medical professionals may not be able to compete with the global standards.

However, discussions on this matter will not be enough to address the situation, but could be the first step to motivate the responsible authorities. Emphasizing the importance of innovative methods to the administrative professionals and implementing them to possible level is the key to fulfill the ultimate goal of producing adaptive and innovative doctors who can compete with the world. On the other hand, diagnosis and treatment of a disease and monitoring and taking care of a patient could be done in a much more successful way, if the process is combined with technology compared to only using traditional methods. To produce that kind of successful professionals, it is essential to build the proper foundation with the knowledge of basic sciences and technology aspect of it also. So, let's get together to take the first step and let's re evaluate the curriculum systems with that.

Psychological Stress and Irritable Bowel Syndrome



Dr Sugumar Ahani
MBBS
Demonstrator
Department of Physiology
Faculty of Medicine
University of Moratuwa
Sri Lanka



Dr P G P Uthapala
MBBS
Demonstrator
Department of Physiology
Faculty of Medicine
University of Moratuwa
Sri Lanka

Irritable bowel syndrome (IBS) is a group of symptoms related to functional gastrointestinal disorder in the absence of a specific and unique organic pathology. However, evidence says that its more common among patients with a past or present history of emotional trauma leading to a query whether its stress related.

Gastrointestinal physiology is closely correlated to a vast range of both internal body systems and external stimuli. In that context, psychological stresses have a marked influence on intestinal motility, sensitivity, permeability, secretions and the immune response of the gut which are altered in Irritable Bowel Syndrome. In genetically predisposed individuals, both acute (E.g. Rape, PTSD) and chronic (E.g. abuse, loss of primary caregiver) early life stresses cause exacerbations or alterations in neurophysiological mechanisms in the development of Irritable Bowel Syndrome. Persistent stress results in over activity or underactivity of hypothalamo-pituitary-adrenal axis, autonomic nervous system, metabolic and immune systems.

There are numerous studies which describe the effects of stress induced physiological changes in IBS. Stress is known to suppress antral and small bowel motor activity and increase large intestinal motor activity leading to functional diarrhea and also it increases small intestinal permeability. Histology of patients with IBS showed increased Para cellular permeability and release of mediators such as trypase, histamine and PGE₂. Autonomic nervous system tone also maintains the gut homeostasis, increased sympathetic system activity and decreased parasympathetic activity is noted in patients with IBS compared to healthy individuals.

Stress management is a proven modality for the treatment of IBS. Several international guidelines including NICE guidelines recommend relaxation techniques as a treatment method. Trials with “Cognitive Behavioral Therapy,” which is a psychological treatment method focused on changing perceptions of the individual was found to be successful.

However, there are contradictions as well as statistically insignificant findings regarding the neurophysiological associations between stress & IBS. One such example even though there are physical, psychological stressors & hormone stimulation, there can be blunted HPA axis responses between IBS and control groups. Despite pros and cons the pathophysiology of IBS is still an interesting topic under research.

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News and Events

CPD Activity at RYK Medical College, Rahim Yar Khan-Pakistan



Prof Dr. Tehseen Iqbal
Head of Department
(Physiology)
RYK Medical & Dental
College
Rahim Yar Khan

Ex-General Secretary
Pakistan Physiological
Society
Cell#: +92-333-6144799

All institutions arrange seminars, conferences and workshops for the continuous professional development (CPD) of its faculty and staff. A CPD activity was arranged for junior and senior faculty in RYK Medical college, Rahim Yar Khan. Title of the seminar was “How to Read and Write a Medical Research Paper.” Prof Dr Tehseen Iqbal was presentor this seminar. He highlighted different parts and importance of a medical research paper. He said that the “Title” should be short, snappy and eye-catcher. It should contain “MeSH” terms to be indexed easily. He pointed out that although “Abstract” appears at the beginning of a paper, it is

the part which is written at the end of the writing process. The part “Introduction” contains the answer to the question “Why did we start?” It should mention “What is known about the topic?” and “What is not known about the topic?” and “What is the gap in present knowledge?” and “How this gap can be filled by this research project.?” Materials and Methods portion answers the question “What did we do?” Results portion answers “What did we find?” A software called “SPSS” is very helpful in analyzing results. Discussion part describes “What is the importance of our findings as compared with the findings of other workers?” He mentioned that “References” can be properly arranged and written with the help of a software called “End Note”. In the question-answer session, participants asked questions about searching for “topics” for research, calculating “sample size” and “Ghost Authorship” which was elaborated by giving examples. At the end, Prof Dr Tariq Mahmood Rehan, Principal RYK Medical College and Chairman of the session, appreciated the organizers and participants for their keen interest and participation.



Inter-Medical Faculty Physiology Quiz, Sri Lanka, for Professor Carlo Fonseka Challenge Trophy



**Dr Padmini
Dahanayake
Senior Lecturer
Department of
Physiology
Faculty of Medicine
University of
Peradeniya
Sri Lanka**

The Physiological Society of Sri Lanka (PSSL) organizes an annual Inter Medical Faculty Physiology Quiz to promote Physiology teaching and learning. The inaugural quiz was held in 2013 at the University of Sri Jayewardenepura with Professor Cheng Hwee Ming, Professor of Physiology of the University of Malaya being the quiz master. Since its commencement, student teams from all the Sri Lankan Medical Faculties have participated in this annual event with the quiz being hosted in rotation by different faculties. The trophy awarded for the winning team has been named the Professor Carlo Fonseka Challenge Trophy in honour of Emeritus Professor Carlo Fonseka, a giant in the Sri Lankan Physiology fraternity.



The quiz was not conducted for the past two years but in 2022, the Physiological Society of Sri Lanka was determined to conduct the quiz despite the corona virus induced health restrictions and the added hardship of the economic crisis with severe fuel and food shortages. It was decided that the only possible way of getting all the teams together would have to be the conduct of a virtual quiz. The daunting task was taken over by the quiz committee led by Professor Deepthi de Silva, with the invaluable guidance of the President of the PSSL, Professor Piyusha Atapattu. As a result, the 7th intermedical faculty physiology quiz was hosted by the Faculty of Medicine, University of Kelaniya with the participation of the largest number of teams so far (11 in total).



The quiz was conducted in three rounds.

- Round 1- Single best response questions answered by each team member (5 per team) who were physically present in their own medical faculty. The questions were sent to the team in a google form with 30 single best response type questions being answered in 30 minutes.
- Round 2- Six highest scoring teams from round 1 were selected to this round of the quiz. The questions were answered by the whole team working together. There were 20 questions to be answered in 20 minutes with the questions consisting of physiology related clinical data and

images. The questions were projected and the answers submitted via zoom by all six teams simultaneously. The answers were copied and pasted on a spread sheet and verified before the judging.



- Round 3 - Three highest scorers from round 2 were selected to this round. Each team got 3 minutes to answer as many questions as possible by completing a zoom questionnaire. This questionnaire was answered separately by each team with the non-competing two teams being invigilated to ensure that they were not communicating with the outside.



A highly competitive quiz requires a high standard of questions and ensuring that there are no unfair advantages given unintentionally to a team. In order to achieve this end, the questions were initially submitted by all the medical faculties via their quiz committee representative. They were discussed and modified as required by the

committee members with all the meetings being held via zoom. The final selection of questions based on a blueprint was made by four senior physiologists including the chairperson of the quiz committee. To ensure security, the zoom meetings were all monitored for non-participants and only one master copy was kept in the possession of the chairperson of the committee.

The conduct of the quiz also required a high level of scrutiny with both an invigilator from the faculty as well as remote invigilation by academic staff elsewhere. Some of the remote invigilators did this from home faculties while others were physically present at the computer centre coordinating the quiz. All the marks including verification of computer marking was done by a group of judges some of whom were present physically while others were joining from home.

Colombo Medical Faculty team were the winners of this first-ever virtual Physiology quiz, while Faculty of Medicine, Ruhuna and Jayewardenepura won the 2nd and 3rd places respectively. This first-ever virtual inter-medical faculty Physiology quiz marked a memorable event in the history of the Physiological Society of Sri Lanka. We feel that the virtual quiz format enabled a more equitable quiz, as all the questions were available to all the competing teams. There clearly needs to be more modifications made but for a first attempt at a virtual quiz, we feel that this was a resounding success !



Upcoming Events

Post congress workshop SAAP-8 PSSL 2022

Online Assessments for Learning and Evaluating Pre-Clinical Sciences

Jointly organized by Physiological Society of Sri Lanka and Centre for Medical Education (CenMED), National University of Singapore

19th November 2022, 8.30 am-12.30 pm (Sri Lanka Time)

Programme (Online)

- 8.30 am – Welcome and Introduction to the program- Prof Indu Nanaakkara- Conference Co- Chair
- 8.40 am - Address by the Dean, Faculty of Medicine, University of Colombo- Prof Vajira Dissanayake
- 8.45 am – Introducing the resource persons (and using padlet the participants will share their background information)- Prof Dujeepa Samarasekera Senior Director of the Centre for Medical Education (CenMED) NUS
- 9.am - Why do we need to change? What it is important to leverage on technology to improve assessments for students – Prof Vajira Weerasinghe- Professor of Physiology, University of Peradeniya
- 9.15 am - Evolution of assessment: onsite to online – Professor Rob Carroll, Chair- Education Committee- IUPS
- 9.45 am Comfort Break
- INTERACTIVE SESSIONS WILL BE FACILITATED BY ALL RESOURCE PERSONS AND WILL BE USING PollEv software from NUS <https://www.polleverywhere.com/>
- 9.50 am – (Interactive) – Where are we now? (Participants to share their own local schools the status of online assessment) Prof Dujeepa Samarasekera will anchor the online discussion
- 10 am – (Interactive presentation involving participants) Principles and theoretical framework for online Basic Science assessments (focusing on the intent of BMS in a medical program, design of a Program of Assessment) – Professor Chen Zhi Xiong, Department of Physiology and NUS Centre for Cancer Research Assistant Dean (Education)
- 10.30 am - NUS Digital Assessment Journey – why, what and how, What if? Where we are now and where to in the future? – Ms Wu Haixin, Senior Manager, Centre for Instructional Technology, NUS
- 11 am – Comfort break
- 11.10 am – (Interactive) Overcoming (Local) challenges – Focus on Strengths, Limitations, Opportunities and Challenges – Moderated by Prof Vajira Weerasinghe
- 11.30am – (Interactive discussion) Changing the mindset of faculty and students on online assessment – why, how and what to focus (support structures) – Prof Dujeepa Samarasekera
- 12 noon – Forum to clarify Q & A
- 12.15 pm – Next steps and wrap up (SAAP organizing team)- Prof Dinithi Fernando- Conference Co-Chair
- 12.30 pm – Close of workshop – Dr Chamila Dalpathadu, Conference Secretary

All medical and dental faculty contributing to pre-clinical academic activities are invited

Registration: Free (Online participants)

(Please register early to ensure your place, by completing the registration form below)

https://docs.google.com/forms/d/e/1FAIpQLSewkttjvTqpXCFuxdU3BbpNQQ5Kvfm1pNomncFhZW4dR2O0Bw/viewform?usp=pp_url

**8th Biennial Conference of the South Asian Association of Physiologists & 35th Anniversary Academic Sessions of the
Physiological Society of Sri Lanka**

11th - 13th November 2022, Colombo, Sri Lanka

11th November 2022: Pre-conference workshop on autonomic function testing
 12th and 13th November: Main conference
 19th November 2022: Post congress workshop on Online Assessment in Pre-clinical sciences jointly organized with the National University of Singapore

12th November 2022

8.00 am	Registration	
Inauguration-Mihilaka Medura (Hall A)		
8.30 am	Ceremonial Procession	
8.35 am	National Anthem	
8.40 am	Traditional Lighting of Oil Lamp	
8.50 am	Welcome Address by President - Physiological Society of Sri Lanka - Prof Piyusha Atapattu	
8.55 am	Address by the President - South Asian Association of Physiologists - Prof Kusal Das	
9.05 am	Address by the Conference Co-chair - Prof Dinithi Fernando	
9.10am	Address by the Chief Guest - Prof Susirith Mendis	
9.20 am	Presentation of the Awards	
	Professor KN Seneviratne Memorial Research Award	
	Professor KN Seneviratne Memorial Award for Physiology	
	Winners of Inter-Medical Faculty Physiology Quiz 2022	
9.30 am	Launching of Sri Lanka Journal of Physiology	
9.40am	K N Seneviratne Oration - Prof Deepthi de Silva <i>Insights into physiology through the study of rare genetic diseases</i>	
10.25 am	Vote of Thanks by the Secretary PSSL - Dr Chamila Dalpatadu	
10.30am	Tea	
11.00 am	Keynote address - Prof Kusal Das-Mihilaka Medura (Hall A) <i>Low oxygen microenvironment and vascular pathophysiology</i>	
	Session 1-Mihilaka Medura (Hall A)	Session 2-Hybrid room (Hall B)
11.30am	SAAP sessions - Bangladesh Respiratory and endocrine physiology <i>The effect of mosquito coils on pulmonary functions in adults - Prof Rokeya Begum</i> <i>Vitamin B₁₂ level in type 2 diabetes mellitus treated with Metformin - Prof Chandra Rani Sarkar</i> <i>Effects of thyroxine with vitamin B12 on electrophysiological changes in median nerve of newly diagnosed hypothyroid female patients - Prof Nayma Sultana</i>	SAAP sessions - India Cardiovascular physiology <i>Cardiovascular readjustment during gravitational manipulations around zero and the effect of active gravitational loading/unloading - Prof K K Deepak</i> <i>Vitamin D deficiency in cardiovascular diseases - Prof Lata Mullur</i> <i>Effect of Hot and Humid Environment on Exercise Performance: Role of Carbohydrate Electrolyte Drink - Dr Indranil Manna</i>
12.30pm	Invited lecture 1 - Prof Sharaine Fernando <i>Sex hormones, lung functions and the implications</i>	Invited lecture 2 - Prof Sampath Gunawardena <i>Health effects of asbestos: Sri Lankan perspective</i>
1.00pm	Lunch and poster viewing	
2.00pm	Free paper session 1- Mihilaka Medura (Hall A)	Free paper session 2- Hybrid room (Hall B)
3.00pm	PSSL symposium Gastrointestinal physiology <i>Novel insights into pathophysiology of gastrointestinal disorders</i> <i>Use of genetics in the diagnostics and therapeutics in gastrointestinal disorders - Prof Subra Kugathasan</i> <i>Psychological determinants of childhood constipation - Prof Shaman Rajindrajith</i> <i>Dyspepsia and diet - Dr Nilanka Anjalee Wickramasinghe</i>	PSSL symposium Physiology of ageing <i>Physiology of gait - Prof Dilshani Dissanayake</i> <i>Gait and falls in older adults - Prof Stephen Lord</i> <i>Gait and balance impairment - at the bedside - Dr Barana Millawithana</i>
4.00pm	Presentation by K N Seneviratne Research Award Recipient 2021 - Dr Manori Vijayakumari-Mihilaka Medura (Hall A) <i>The association between asthma and functional abdominal pain disorders in the paediatric population: common pathophysiological mechanisms causing this association</i>	
4.30pm	Carlo Fonseka Oration - Prof Panduka Karunanayake-Mihilaka Medura (Hall A) <i>Rediscovering Physiology in Contemporary Medicine: The Foundational Insights of Claude Bernard</i>	
5.15pm	Tea	
5.45pm	Annual General Meeting of the SAAP- Hybrid room (Hall B)	

13th November 2022

	Session 1-Mihilaka Medura (Hall A)	Session 2-Hybrid room- Hybrid room (Hall B)
8.30 am	Invited lecture by SAAP senior member - India Prof Amar K Chandra <i>Green tea catechins interrupt thyroid hormone synthesizing enzymes and regulatory factors leading to thyroid disruption – an in vitro study</i>	Invited lecture by SAAP senior member - Nepal Prof Rita Kadka <i>Cardiac parasympathetic activity and reactivity reduce earlier than cardiac sympathetic activity in patients with type 2 diabetes mellitus</i>
8.45 am	Invited lecture by SAAP senior member - Pakistan Prof Muhammad Aslam <i>Fostering trans-disciplinary learning for better healthcare</i>	Invited lecture by SAAP senior member - Bangladesh Prof Noorzahan Begum
9.00 am	Guest lecture 1 – Prof Niranga Devanarayana <i>A 20-year perspective on gastrointestinal motility assessment in clinical practice</i>	Guest lecture 2 – Prof Amaranath Karunanayake <i>Physiological blockchain in digital health</i>
9.30 am	SAAP sessions Nepal Altitude physiology High altitude research in Nepal <i>High altitude research in Nepal: Scopes and blocks</i> – Dr Mrigendra Amatya <i>Changes in cardiovascular autonomic function in Nepalese high-altitude dwellers</i> – Dr Rita Khadka <i>Congenital color vision deficiency in children living in high altitude of Nepal</i> – Dr Sushil Kharel <i>Rapid ascent to high altitude destinations in the Himalayas: an alarming phenomenon</i> – Dr Santosh Baniya	SAAP sessions Pakistan Renal physiology <i>Can bladder learn to behave with different people under unfavourable circumstances?</i> – Prof Samina Malik <i>Clinical aspects of fluid and electrolyte balance</i> – Prof Rehmani Lakho <i>Dramatization of counter current mechanism</i> – Prof Samina Malik
10.30 am	Tea	
11.00 am	Guest lecture 3 – Prof Tharaka Dassanayake <i>Cognitive effects of L-theanine, a constituent of tea: neurobehavioural, neurophysiological and neuroimaging evidence</i>	Guest lecture 4 – Dr Chandana Hewage <i>What is more important in life: ability to inhibit or ability to stimulate?</i>
11.30 am	PSSL symposium Reproductive physiology <i>Overview of Placental Extracellular Vesicles in health and disease</i> – Prof Manu Vatish <i>Kynurenine metabolism in pre-eclampsia</i> – Dr Prassana Logenthiran <i>Neonatal sequelae of pregnancy induced hypertension</i> – Dr Nimesha Gamhewage	PSSL symposium Neurophysiology <i>Probe the peripheral nerve pathology with electrodiagnostics</i> – Dr Sudath Gunasekera <i>Overview of NMJ disorders</i> – Prof Ajini Arasalingam <i>Overview of muscle disorders</i> – Dr Kishara Gooneratne
12.30pm	Guest lecture 5 – Dr Sujanthi Wickramage <i>Mindfulness – From calamity to tranquility</i>	Guest lecture 6 – Prof Janaka Lenora <i>Pregnancy, Breastfeeding and Bone Health</i>
1.00pm	Lunch and poster viewing	
2.00 pm	Free paper session 1- Mihilaka Medura (Hall A)	Free paper session 2- Hybrid room (Hall B)
3.00pm	Panel discussion on Respiratory physiology Every breath we take... air pollution induced deranged respiratory physiology <i>Moderated by Dr Lakmali Amarasiri</i> <i>Panelists:</i> <i>Dr Yamuna Rajapakse</i> <i>Dr Nayomi Ranathunga</i> <i>Dr Shashanka Rajapakse</i> <i>Dr Gihani Jayaweera</i> <i>Dr Sumal Nandasena</i>	Panel discussion on Sleep physiology Breathing When Asleep: a panel discussion on sleep physiology <i>Moderated by Dr Dilesha Wadasinghe</i> <i>Panelists:</i> <i>Dr Sudath Gunasekera</i> <i>Dr Shirmila Withana</i> <i>Dr Ridma Jayarathna</i>
4.00pm	Valentine Basnayake Oration – Prof Savithri Wimalasekera- Mihilaka Medura (Hall A) <i>Physical activity and Cardiopulmonary function in health and disease</i>	
4.45pm	Closing ceremony-Mihilaka Medura (Hall A) Presentation of awards Address by the President of SAAP Closing remarks – Prof Indu Nanayakkara Conference co-chair	
5.00pm	Tea	
5.30 pm	AGM-PSSL- Hybrid room (Hall B)	

The 10th Federation of the Asian and Oceanian Physiological Societies Congress



FAOAPS CONGRESS 2023

November 1-4, 2023
EXCO, Daegu, Korea

In conjunction with The 75th Annual Meetings of
the Korean Physiological Society

New Physiology for the New Normal

KEY DATES

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Early-bird Registration
Young Scientist Travel Awards Submission

Feb 1st - Apr 30th, 2023

Donghwasa, Daegu

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