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Biochem Trends

Newsletter

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Turn the pages to discover

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Editorial

Biochemistry : For sustainable living

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Editor, CBSL

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Faculty of Medicine

University of Colombo

Today we look at a whole different aspect of Biochemistry, on how to use our knowledge in biochemistry and biology for sustainable living. With the deterioration of planet earth and terminology such as, 'healthy lifestyle' and 'think green' becoming household discussions, we need to promote practices that help with the survival of life on earth.

Biochemistry is the "study of chemical substances and processes that occur in plants, animals and microorganisms and of the changes they undergo during development and life" (https://www.britannica.com/science/biochemistry). Plant and animal material used as fuel has been identified as 'biomass'. Biomass can be transformed to create alternative energy sources, and thereby reduce harmful effects on the environmental footprint. This is done by replacing industrial chemistry with industrial fermentation.

On one hand the world today is facing a fuel crisis, on the other hand a food waste crisis, why not combine these two. Utilize this 'food waste' which is a rich source of biomass and convert this to biogas. Organic material (plant and animal products), broken down by bacteria in an oxygen-free environment (i.e anaerobic digestion), produce biogas. This process is called biomass gasification or fluidization (https://theconversation.com/heres-how-food-waste-can-generate-clean-energy-176352) This conversion requires a biomass gasification unit, where food waste would be fed in to an enclosed unit. Since it is organic material that is converted into biogas, this biogas will have both energy, in the form of a gaseous mixture: syngas (50-70% methane, 30-40% carbon dioxide, and trace amounts of other gases) and valuable soil products (liquid and solid digested material), also known as digestate. Digestate can be used as a soil amendment. Fluidization is deemed carbon neutral, and therefore sustainable.

Food waste from households will not include only plant-based material, it will include all food waste, water waste, crops and livestock waste. Mixing multiple wastes in the same digester is beneficial and will increase the biogas yield. This process of mixing multiple wastes is known as co-digestion.

As with any biological process, the optimum temperature is of utmost importance for the success of this digester. Typically, a temperature between 30 – 38 degrees Celsius (86-100 Fahrenheit) will increase efficiency (Figure 1).

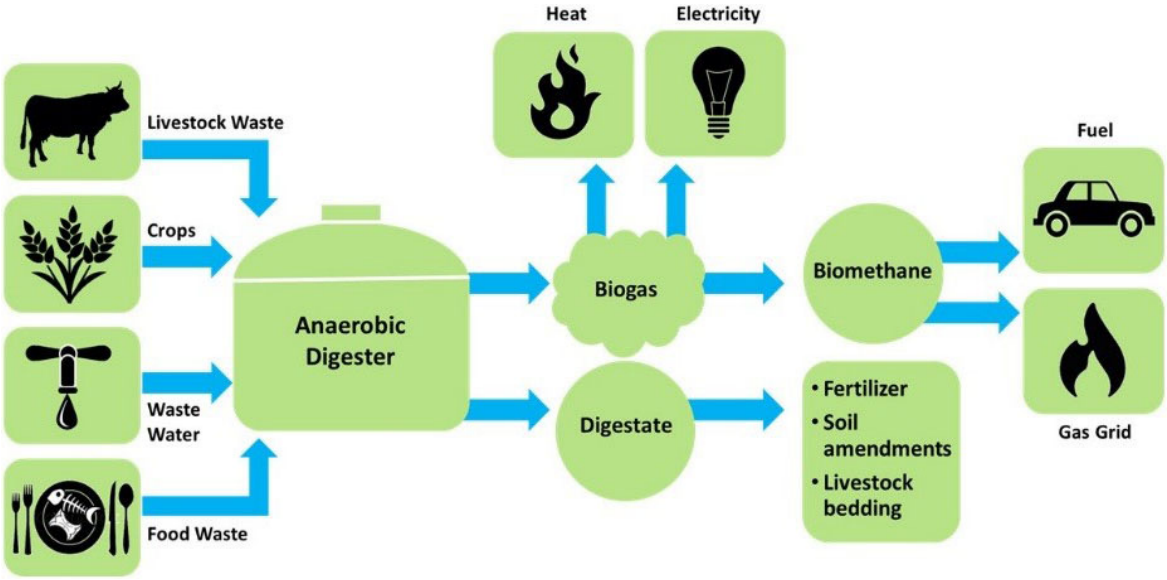

Figure 1: Anaerobic digestion process (Graphic by Sara Tanigawa, EESI)

DID YOU KNOW?

Acetogenic bacteria are a specialised group of strictly anaerobic bacteria that are ubiquitous in nature. Together with the methane-forming archaea they constitute the last limbs in the anaerobic food web that leads to the production of methane from polymers in the absence of oxygen. Acetogens are characterised by a unique pathway, the Wood–Ljungdahl pathway of carbon dioxide reduction with the acetyl-CoA synthase as the key enzyme. This pathway also allows chemolithoautotrophic growth on hydrogen and carbon dioxide and it is the only pathway known that combines carbon dioxide fixation with adenosine triphosphate (ATP) synthesis. Thus, it is considered the first biochemical pathway on earth. ATP is synthesised by a chemiosmotic mechanism with Na^+ or H^+ as coupling ion, depending on the organism. In cytochrome-free acetogens, energy is conserved by ferredoxin reduction followed by ferredoxin-dependent Na^+ (or H^+) translocation across the membrane (Rnf complex). Acetogens may represent ancestors of the first bioenergetically active cells in evolution.

https://onlinelibrary.wiley.com/doi/10.1002/9780470015902.a0020086.pub2

The natural fermenter:

Cattle, goats, sheep, giraffes, deer, among other hoofed mammals have been identified as ruminants. They are able to acquire nutrients from plant-based food by fermenting it in a specialized stomach prior to digestion. Principally through microbial actions.

Ruminant stomachs have four compartments. The digester used for production of biogas can be identified with the first compartment. It is the rumen microbes that ferment the food (cud) that enter the stomach and thereby produces gas. Plant material is initially taken into the rumen, where it is processed mechanically and exposed to bacteria. This digestion takes place is an anaerobic digestion.

A story from Sri Lanka

Mr. Oswald Gunawardena (*Assistant Commissioner, Attorney- at- Law Inland revenue department*) and Ms. Lanka Weerasinghe (*Assistant principal officer, Parliament of Sri Lanka*) were facing a problem with garbage disposal. They were in the habit of collecting the food waste in to a 20L container and taking it to a garbage dumping site. However, with the fuel crisis in Sri Lanka they were unable to transport this, and garbage started accumulating. The accumulating food was eventually collected in a 1000L water tank, in the hope of utilizing the same contraption to obtain fertilizer. The lack of cooking fuel in due course drove them to put on their thinking caps and extend this food waste collector into a creation that would generate biogas, and today this provides them with all the cooking fuel and fertilizer they require for utilization at home.

Mr. Gunawardena used the concept of digestion taking place in the stomach of a ruminant. In other words, he created a digester.

Step 1: A 1000L water tank was used to form the main unit where fermentation takes place. Two (2) separate units of 500L each (placed one on top of each other) acted as collectors (Figure 2), to collect the gas emitting from the 1000L unit. The 500L unit was connected to the stove (Figure 3).

Figure 2: DIY Biomass gasification unit

Figure 3: Gas line from biomass gasification unit to the stove.

Step 2: Cow dung (as a starter) was allowed to sit in the tank for 12 days
Step 3: Food waste was included from day 13, the more food added the more gas emitted, all food waste was added to the unit (including sea food and meat). The food was blended prior to addition, to mimic the mechanical digestion taking place in the ruminant.
Step 4: Water was also included with the food waste at a 1:1 ratio based on volume
Step 5: With time the efficiency of the digestion will decrease due to the drop in pH. Sodium hydroxide (NaOH) was added to increase the pH to pH 9 – 10 (Figure 4).

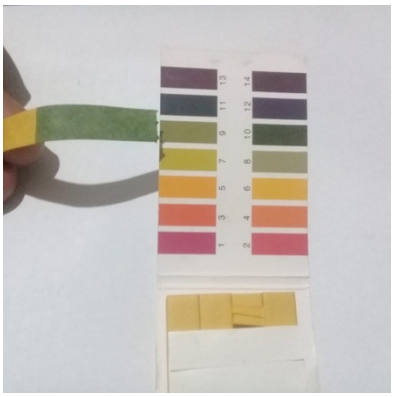

Figure 4: Maintaining the pH

Step 6: A stirrer was fixed to the unit to maintain continued mixing and thereby prevent crusting

Further details on setting up your own Biomass gasification unit can be obtained through the following links:
https://youtu.be/NJZ24qzKuyAhttps://youtu.be/5sgFqy6Sybw
https://www.youtube.com/watch?v=La6yXYwVq3A&t=27s
https://www.youtube.com/watch?v=jblgoSRwU44

The Benefits of the DIY Biomass gasification unit

Stored biogas obtained from anaerobic digestion has climate benefits, cost benefits and helps waste remediation. It is clean, renewable, and reliable. Will help meet power demands. Natural gas derived from biogas reduces greenhouse gas emissions up to 91% relative to petroleum gasoline. It provides both fuel and fertilizer.https://www.eesi.org/papers/view/fact-sheet-biogasconverting-waste-to-energy.

Therefore, while creating a Biomass gasification unit at home will provide three main benefits to the user,
Food waste management system
Obtaining natural fertilizer
Obtaining fuel for cooking purposes
It will also benefit society as a whole by being clean and renewable.

Newsletter Editorial committee

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Editor, CBSL

Dr. Niroshima Withanage

Dr. Kalpani Ratnayake

Corporate membership

Biochemistry is a field stemming from academia to research and now to the industry. Bridging gaps and building bridges between these sectors will create new partnerships and enable novel research ideas and findings to be taken into the industry. It will help propagate knowledge and enhance efficiency.

With this partnership in mind the College of Biochemists of Sri Lanka (CBSL) opens their doors to the industry. The College of Biochemists of Sri Lanka (CBSL), would like to offer a **new membership category: The Corporate membership category.** This is open to any institution, government/semi-government or registered entity in Sri Lanka to join together to form long-term, quality relationships.

This is an institutional membership, and the fee shall be *twenty thousand rupees per annum (Rs. 20,000)*, in addition to the registration fee of *one hundred thousand rupees (Rs. 100,000).*

Please email **collegeofbiochemistssl@gmail.com** for further details

Vitamin D deficiency in children and adolescents

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Vitamin D deficiency is a major health problem worldwide with reported prevalence of 30-80 % in children and in adults (Al-Agha *et al*, 2016). Although, the main physiological function of vitamin D is to maintain calcium and phosphorous levels in the body, evidence show that vitamin D deficiency plays a key role in many diseases such as, autoimmune diseases, cardiovascular diseases and in a variety of malignancies. Therefore, identification and proper treatment of vitamin D deficiency in early childhood will provide many health benefits throughout life.

Sources of vitamin D

Vitamin D production in the human body happens in the skin via cutaneous synthesis (90%) whereas, only 10% is obtained via dietary sources. The amount of vitamin D production by the skin depends not only on the amount of sun exposure during daytime (preferably mid-day, 10am – 3pm) and the exposure to ultra violet rays but also depends on the season, high latitude and penetration of ultraviolet B photons into the epidermis.

Vitamin D is referred as "Pro-hormone. It is synthesized from the precursor molecule 7-dehydrocholesterol in the epidermis and dermis and transformed into vitamin D. This is taken up by vitamin D binding protein and transported to liver and converted to 25-hydroxyvitamin D (25(OH)D) by 25-hydroxylase enzyme (CYP27A1) and then undergoes second hydroxylation in kidneys by1-alpha hydroxylase enzyme (CYP27B1) and produces 1,25-dihydroxyvitamin D ($1,25(OH)_2D$). This is considered as the biological active metabolite of vitamin D. The active metabolite exerts its function by binding to vitamin D binding protein. However, 25-hydroxyvitamin D is the major circulating form of vitamin D and is used in clinical assessment due to its long half-life and as it is not regulated by other hormones.

Vitamin D includes two forms of vitamins, vitamin D2 and vitamin D3.

Vitamin D3 (cholecalciferol) is synthesized in humans whereas, vitamin D2 (ergocalciferol) is of plant origin. Humans obtain vitamin D through fatty fish, fortified milk, milk products and by breakfast cereals.

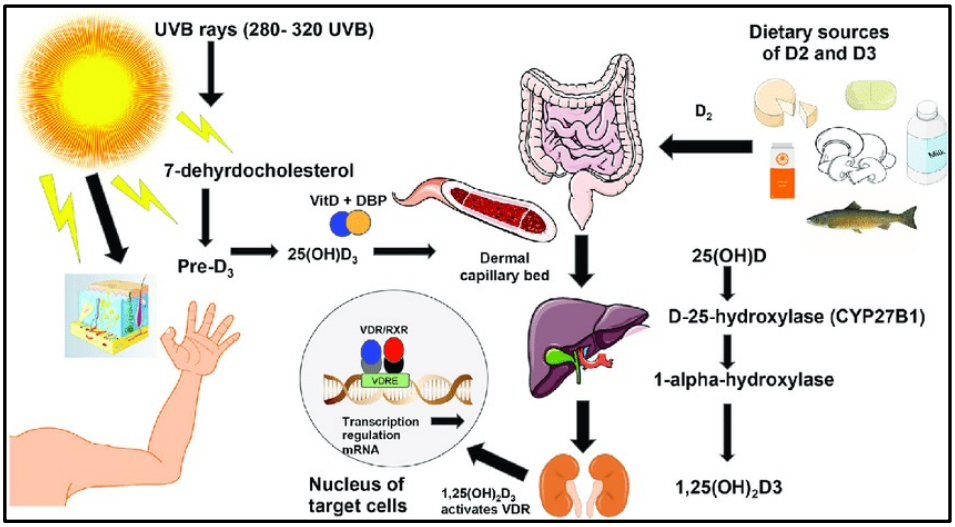

Figure 1: Vitamin D synthesis from sun exposure and food (Source: Clark A and March N, 2016)

Vitamin D deficiency: Definitions

Food and Nutrition Board (FNB) at the National Academies of Sciences, Engineering, and Medicine (NASEM) concluded that people with serum 25(OH)D level less than 12 ng/mL (30 nmol/L) are considered as vitamin D deficient subjects. Both the Institute of Medicine (IOM) and the American Academy of Pediatrics declared values less than 11 ng/mL (27.5 nmol/L) as vitamin D deficiency for infants and young children. Serum 25(OH)D levels greater than 30 ng/mL (75 nmol/L) is not only associated with optimal bone health but also with many other health benefits. In adolescents, there is an inverse relationship for vitamin D and parathyroid hormone. Further, IOM recommends 20 ng/mL (50 nmol/L) as the meeting need for children and if less than 30 ng/mL (75 mol/L) it is considered as vitamin D insufficiency.

Prevalence and risk factors of vitamin D deficiency

Vitamin D deficiency is regarded as a global concern of all age groups. It was reported that around 1 billion of the global population is suffering from vitamin D deficiency. According to the data in the United States, vitamin D deficiency was reported in 17% of southern adolescents during winter and 8% of northern teenagers during summer.

A high prevalence of vitamin D deficiency has also been reported in infants, children, and adolescents from different countries round the world, including the United Kingdom, France, Greece, Lebanon, Turkey, China, Finland and Canada. Although, there aren't many reported studies from Sri Lanka, few studies have shown the prevalence of vitamin D deficiency among pre-school children and adolescents. A study conducted in the Southern Province of Sri Lanka showed vitamin D deficiency in 26% of male and 25% of female children which used a higher cut off value for vitamin D (< 35 nmol/L) deficiency. A similar study also showed vitamin D deficiency (< 10 ng/mL) in 5.6% and insufficiency (10-20 ng/mL) in 29.1% in a group of children from an urban area in Western Province of Sri Lanka. Another study reported high rates (88%) of vitamin D deficiency/insufficiency (<50 nmol/L) among infants in a single centered study conducted in Western Sri Lanka. In this study, authors also observed vitamin D deficiency/insufficiency in pregnant and lactating mothers which eventually led to low vitamin D levels in infants of the study. A study conducted by Marasinghe et al (2015) in the Western Province of Sri Lanka has reported vitamin D values of <50 nmol/L among 35% in pre-school children between 2-5-years of age. A study on adolescents between 10-18-years of age observed the highest vitamin D deficiency in the Central Province (32.2%) and highest prevalence of vitamin D insufficiency in Sabaragamuwa Province (58.9%). However, low vitamin D deficiency (0.7%) and vitamin D insufficiency (34.7 %) was observed in North Central Province of Sri Lanka.

There are multiple factors affecting vitamin D deficiency whereas, children and adolescents are at greater risk of vitamin D deficiency. Factors include, reduced sun exposure, reduced dietary intake of vitamin D, impaired mucosal absorption and increased gastrointestinal vitamin D loss. Further, studies have shown that children with Crohn's disease and cystic fibrosis are also at greater risk of developing vitamin D deficiency.

Prevention of Vitamin D deficiency

An optimal vitamin D intake is needed to prevent skeletal and other associated health problems. The US Food and Drug Administration recommends 400 IU per day for all ages including children.

Exclusively breastfed infants, without adequate sunlight exposure and supplementation find it difficult to meet the demand as human breast milk contains little amount of vitamin D and is not sufficient for the needs of the growing infants. Further, the vitamin D amount in breast milk highly depends on maternal vitamin D status. Older children are able to meet recommended level through fortified foods or supplements. Scientists have suggested new recommended vitamin D intakes for adults as 800-1,000 IU per day, to achieve a serum 25(OH)D of more than 30 ng/mL (75 nmol/L) (Hanley *et al*, 2010). In children, the ideal 25(OH)D serum levels to prevent short and long-term health complications is unknown, suggesting a similar threshold of more than 30 ng/mL (75 nmol/L).

Acknowledgment: Prof. Lohini Athiththan, Department of Biochemistry, Faculty of Medical Sciences, University of Sri Jayewardenepura.

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The Colombo Medical Congress 2022:
Dept. of Biochemistry and Molecular Biology

The Colombo Medical Congress 2022, was held from the 23rd to the 26th of November with Pre and Post congress sessions as well. This was a mega event hosted at the brand new 17 story tower of the Colombo Medical Faculty, also known as the UCFM tower.

The theme of this congress was " Sustainable and affordable healthcare through research, innovation and practice". Members of the Department of Biochemistry and Molecular Biology were heavily involved in organizing this congress, and they chaired three congress symposia and one pre congress symposium.

Planetary Health Hackathon for University students

Planetary Heath: Transformation to heal the world

Pathway to greenn and sustainable clinical research laboratories

A Biochemical approach to anticancer drug development

In addition, the Department of Biochemistry and Molecular Biology contributed to several oral and poster presentations as well:

OP-05: Television marketing of food and non-alcoholic beverages (FNAB) high in fats to children in Sri Lanka. *S.M.D.R. Samarakoon, A.N.Y. Senevirathne, H. Abeysinghe, B.G.W.W.P. Piyasena, V.P. Wickramasinghe, P. De Zoysa, C. Arambepola, S.T. Thoradeniya*

OP-06: How do online and street vended lunch packets compare with nutritional recommendations for non-communicable disease prevention? *P.H.P.O. Mendis, M. de Lanerolle Dias, D.M.S. Jayawardene, P. Lanerolle, I. Waidyathilaka*

OP-09: Usefulness of different fractions of cell lysate of Leishmania in serodiagnosis of leishmaniasis: a preliminary study *A.U. Maha Gamage, T. Rathnayaka, B. Deepachandi, S. Weerasinghe, T.P. Andrahennadi, C. Witharana, H.V.Y.D. Siriwardana*

OP-21: Optimization of initial nanobiotechnology procedures to design a gold nanoparticle-based nucleic acid lateral flow assay to detect BRAF V600E mutation in papillary thyroid carcinoma. *N.D. Wijesuriya, W.S.S. Wijesundera, S.T. Thoradeniya, D.R. Jayasundara, A.A.H. Priyani*

PP-02: Development of a PCR based assay for the detection of *Rigidoporus microporus* (causative organism of white root disease of rubber). *S. Dharmadeva, K. Siridewa, O.V.D.S.J. Weerasena, L.N.R. Gunaratna, M.K. Ediriweera, T.H.P.S. Fernando*

PP-03: DNA methylation in methylenetetrahydrofolate reductase (MTHFR) gene promoter and 5-formyl-tetrahydrofolate (5-formyl-THF) levels in folic acid supplemented pregnant women. *S.A. Weerasinghe, S.T. Thoradeniya, W.S.S. Wijesundera, M.S.K. Rabindrakumar*

PP-06: Development and validation of an in-house ELISA to detect *Leishmania* parasites in dogs. *B.K. Greniyar, H.W. Dilanthi, T. Thoradeniya, S. Senanayake, N.D. Karunaweera*

SOP-03: The effect of physiotherapy in reducing pain and disability and patient satisfaction in patients with osteoarthritis of the knee joint attending the physiotherapy clinics at District General Hospital, Matara. *M.P. Rajapaksha, I. Waidyatilaka*

One Health/Planetary Heath: Transformation to heal the world (Symposium, CMC22)

One health and planetary health, despite certain differences, have a holistic interdisciplinary approach towards upholding health. Humans and other animals share the same planet thus they all face similar challenges in relation to physical and mental health and wellbeing. While, ***one health***, focuses on human and animal health; ***planetary health*** has a broader perspective and deals with current challenges in health-related areas. Both these approaches are solution oriented and transdisciplinary. When facing complex issues, sustainable solutions need to be sought out through both a multi- and trans-disciplinary approach.

Overall aims of the symposium

To create an awareness and interest on the area of one health / planetary health among University students in Sri Lanka, with the ultimate aim of developing experts in these areas.
To create a one health / planetary health student community within the University of Colombo and to spread awareness to other universities.

TOPICS COVERED

Planetary health and plastics. ***Speaker: Prof. Ajuth de Alwis***

Planetary health and a sustainable health system. ***Speaker : Dr. Inoka Suraweera***

A transdisciplinary approach to global health education. ***Speaker: Prof Michael Wikes***

‘Rescue Mission : Planet Earth’

PRE-CONGRESS PLANETARY HEALTH HACKATHON

The Planetary Health Hackathon, an innovative design competition was organized as a pre-congress activity of the Colombo Medical Congress 2022, on the 18th of November 2022. This hackathon was a part of a series of activities organised for undergraduate students of the University of Colombo to come up with innovative solutions to save the health of our planet. The aim of this was to build on previous activities led by the Faculty to enhance awareness and promote an interest in Planetary Health among the university students in Sri Lanka, with the ultimate aim of developing experts and future leaders in this area. Student participants worked in small interdisciplinary teams to come up with innovative solutions to save the planet from plastics. Team work was facilitated by the Team Planetary Health @UCFM

Team, Planetary Health

Dr. Tharanga Thoradeniya
Prof. Saroj jayasinghe
Prof. Piyusha Atapattu
Dr. Maduka de Lanerolle Dias
Dr. Ashwini De Abrew
Dr. Lakmali Amarasiri
Dr. Yamuna Rajapakse
Dr. Chaturanga Ranasinghe
Dr. Meran Ediriweera
Dr. KRM Chandrathilake

Topics covered and speakers

Planetary health and planetary boundaries
Prof. Saroj Jayasinghe, *Emeritus Professor of Medicine, University of Colombo*

Plastics and planetary health
Prof. Ajith De Alwis. *Professor of Chemical and Process Engineering, University of Moratuwa.*

Plastics and health
Dr. Sajith Edirisinghe, *Senior lecturer and Clinical Geneticists, Faculty of Medical Sciences, University of Sri Jayewardenepura*

Plastics recycling and upcycling
Dr. Randika Jayasinghe, *Senior Lecturer, Faculty of Technology, University of Sri Jayewardenepura*

Pathway to green and sustainable clinical research laboratories (Symposium, CMC22)

Despite the implementation of sustainability across many sectors in recent years, clinical and research laboratories have, to-date, been slower to develop and adhere to more environmentally friendly practices. Going green is an uphill struggle for these laboratories, which, by its nature, use massive quantities of water, energy, and single-use plastics and generate tons of harmful waste material.

Nevertheless, even small changes can make a big difference in the battle to reduce carbon footprint of clinical and research laboratories. It is necessity to implement green lab best practices for resource conservation in institutions including laboratories. Green lab programmes have been implemented at different Universities in view of achieving this target.

It will be useful to know the start, and strategies used to grow their program in terms of funding, staff, and their impact. Team approach, working with its scientists, building managers, facilities management, recycling, and other stakeholders to implement sustainable practices are important aspects in process design in the move towards green and sustainable laboratories. A growing focus of the green labs is the promotion of shared research resources and the efficient use of energy, laboratory space, and research funding. With advancement of the science and technology and modes of communication, numerous strategies can be implemented to build an environmentally friendly laboratory even in a low-facility set-up. However, this requires embedding sustainability into teaching curriculum and link this to training of future scientists and clinicians, considering how the standards of proficiency can be linked to sustainability. This symposium was helpful in enlightening the participants on the importance of going green and implementing green and sustainable laboratories in their working places.

TOICS COVERED:

Why go green with clinical and research laboratories?

Speaker: Dr Sakunthala Jayasinghe, Consultant Chemical Pathologist, Faculty of Medicine, University of Peradeniya, Sri Lanka

Reducing carbon foot print and embedding sustainability and green concept into laboratories – Experience sharing

Speaker: Dr Saroja Siriwardena, Consultant Chemical Pathologist, Sri Lanka

Move towards a sustainable future in clinical and research laboratory testing: Process designing and the way forward

Speaker: Prof Tony Badrick, Chief Executive, Royal College of Pathologists of Australasia, Quality Assurance Programs, Australia

Q. Ask your self...

How many pippette tips have you thrown away today?

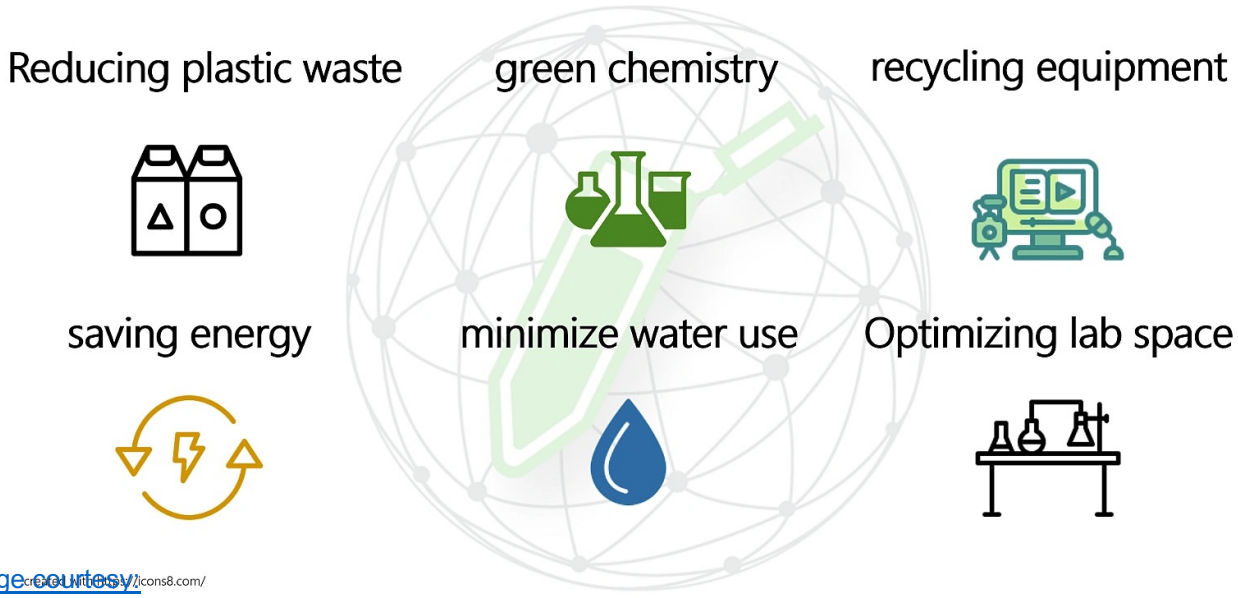

Image courtesy:
https://network.febs.org/posts/green-laboratory-work-conference-2022

A biochemical approach to anticancer drug development (Symposium, CMC22)

Although the pharmaceutical industry has made significant investments in anticancer therapeutics, cancer drug research remains a remarkably challenging field and therapeutic innovations have not yet achieved expected clinical results. Therefore, further advancement of cancer control requires rational approach to the treatment based on an insight of the biochemical or molecular mechanisms that are involved in the expression of malignant phenotype in the cancer cells. The existing biochemical features of malignant cells which are specific to cancers open up a path for the panacea of this disease in terms of biochemical aspects. In this approach, there are two practical strategic targets; metabolic processes associated with cancer cell proliferation and biochemical pathways that are specific to the tissue of origin of the cancer. As this second approach utilizes differentiated metabolic pathways, the proliferation-associated characteristics are considered to be the major tactical targets. Natural products, with remarkable chemical diversity, have been extensively investigated for their anticancer potential for more than a half-century. The collective efforts of the community have achieved the tremendous advancements, bringing natural products to clinical use and discovering new therapeutic opportunities, yet the challenges remain ahead. With the biochemical approach of anticancer drug development, strategies are revisited to understand natural products and to explore their therapeutic utility in an efficient way. Alternatively, drug repositioning for the discovery of new anticancer drugs have been advanced recently which exclude the requirement for carrying out toxicology studies. As a whole, the use of natural products to develop anticancer drugs will provide remarkable health benefits including less side effects and high affordability.

TOPICS COVERED

Key advancements in natural product-centered anti-cancer drug development and calls for the implementation of systematic biochemical approaches-

Speaker: Prof. Dilip de Silva, Retired Senior Professor, Department of Chemistry, Faculty of Science, University of Colombo

Drug repositioning and targeted anticancer biopharmaceuticals-

Speaker: Professor Udai Banerji, The Institute of Cancer Research, London (first choice) OR Professor Johann De Bono, The Institute of Cancer Research, London

Exploration of emerging directions through a biochemical approach and to revitalize natural products search in cancer therapy-

Speaker: Prof. L.M. Viranga Tillekeratne, University of Toledo, United States

Boosting a Diverse and an Open Research Culture: Enhancing Quality (Symposium, CMC22)

This symposium was focused on Technical Officers and Academic Support Staff, with the aim of the symposium being to showcase the current contributions of technical and support staff in researc, to enhance the quality of research, and to embrace futuristic approaches to enhance quality and efficiency in research.

The overall success of an institution depends on its staff. The key role of the staff of an institution is to manage, implement and carry out work that helps the institution attain its overall mission. In an institution, the technical and support staff are indispensable to research, teaching and knowledge exchange. In other words, the technical staff of an institution has distinct roles, providing key elements of research and enterprise activity and playing a key role in delivering a well-balanced education for undergraduate and postgraduate students.

The technical staff of the Faculty of Medicine is skillful. They play an extraordinary role to keep the function the Faculty of Medicine smoothly without any technical disruptions, providing a sustainable pipeline of talents and skills to the faculty. The co-facilities arm and the technical transfer office of the RPFC provide a voice for our technical staff to share their ideas and to network with other academics in the faculty. As an initial phase, in the CMC 2021, the Technical Transfer Office of the RPFC, planned an award ceremony to appreciate the staff members who have produced equipment with novelty and innovativeness to appreciate the innovative thinking of the staff. Currently, technical officers are involved in the establishment of a web portal (ResLink-e-portal: Resources-Researchers Link-e-portal) introduced by the RPFC, which allows to have an inventory of the resources, share research facilities, equipment and instrument.

The proposed symposium “Boosting a Diverse and an Open Research Culture: Enhancing Quality”, with the following objectives, is planned to educate, support, encourage and inspire technical officers to become part of the much needed faculty’s next generation of technicians.

Topics covered:

- Improving standards and accreditation of research laboratories
- Improving efficiency of resource sharing (RPFC ResLink-e-portal & other mechanisms)
- Progress, challenges and the way forward

Upcomming events: 4th CBSL conference

4th CBSL Conference

College of Biochemists of Sri Lanka

"Achieving UN Sustainable Development Goals Through Biochemistry and Molecular Biology: A Step at a Time"

7th July 2023

University of Sri Jayewardenepura, Sri Lanka

Key note speaker

Prof. Andrew H. - J. Wang

Former president IUBMB & FAOBMB

Deadline for abstract submission

31st March 2023

For further details: Visit https://collegeofbiochemists.lk/

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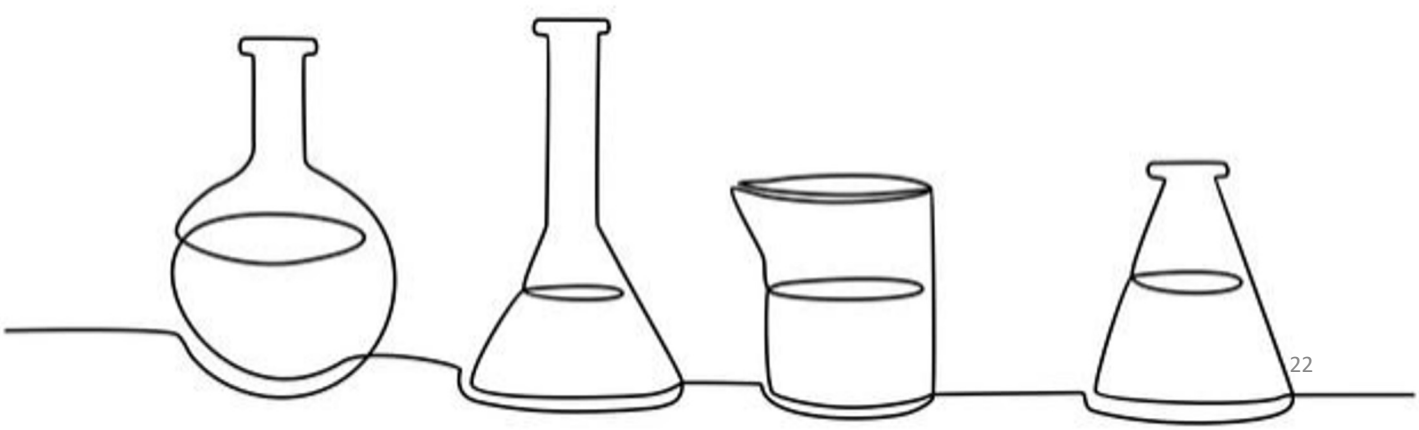
Articles should have a descriptive title, should not exceed 1500 words, including not more than 10 references, and include authors name (s), academic degree (s) and institutions(s), along with a photograph.

Letters to the editor

Letters should have a descriptive title, and should not exceed 500 words, including not more than 10 references. Begin with the salutation " to the Editor" and close with the authors name (s), academic degree (s) and institution (s).

Research Highlights

Short description on Research highlight, with a photograph



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