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PRESCRIPTION

Latest news and updates from the Faculty of Pharmacy

IN THIS ISSUE

BJOUXZ AND NATTO

The girls were almost singing the tune 'ABCDEFG, HIJKLMN, OPQRSTU, VWXYZ' in the standard Sesame Street melody. The teaching-enhanced classroom (TEC) was comfortable with appropriate lighting, air conditioning, and a projector, though the outside temperature in the afternoon of mid-May 2023 might reach 35'C. The pharmaceutical chemistry lecturer wrote the alphabet on the board in good order and reminded the students about 'BJOUXZ'.

These six letters do not represent the one-letter acronym for the twenty natural amino acids. When the class reached the letter 'E', they were reminded of alpha (α)-glutamic acid (Glu). Subsequent questions on the tutorial sheet tested the students' knowledge of glutamic acid's structure, as well as their understanding of the amide functional group and dipeptide linkage. This chemical bonding is involved in the construction of the amino acid polymer, called poly-gamma (γ)-glutamic acid (γ-PGA).

The pharmacy undergraduates were asked to illustrate this polypeptide γ-PGA, starting with Glu, or 2-aminopentanedioic acid, as the monomer unit (Figure 1). In the γ-PGA molecule, peptide bonds are formed between the amino (-NH2) group at carbon-2 (C2 or C-α) of Glu and the carboxylic (-COOH) group at carbon-5 (C5 or next to C-γ) of another Glu unit at the end of its side chain (Ho et al. 2006).

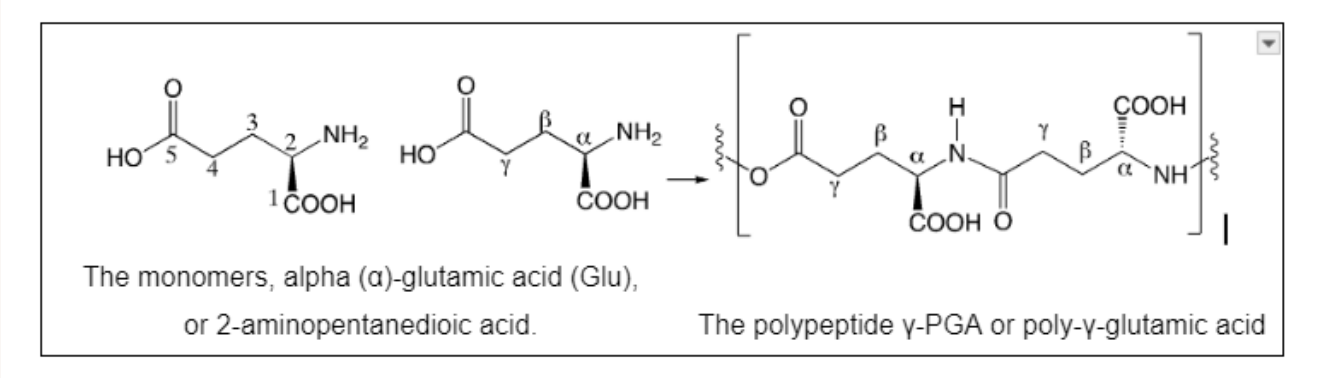

Figure 1: The chemical build-up of poly-gamma (γ)-glutamic acid (γ-PGA) could be illustrated from its monomer, alpha (α)-glutamic acid (Glu or "E").

Poly-γ-glutamic acid (γ-PGA) is produced by microbial fermentation of various Bacillus species (Johnson et al. 2022). The soybeans are typically fermented by *Bacillus subtilis (B. subtilis)* to give natto, a popular, traditional Japanese food (Li et al. 2021). Natto is served with soy sauce and rice, as sushi (Figure 2). It is a widely known source of γ-PGA. It has a sticky, slimy texture, a pungent odour, and a nutty flavour. It also contains protein, fibre, vitamins, and nattokinase, an enzyme that has been shown to lower blood pressure and reduce the risk of heart disease (Chen et al., 2018). High probiotic potential and other health benefits of natto have been reported (Afzaal et al., 2022).

The nattokinase consists of a single polypeptide chain, it is composed of a linear chain of 275 amino acid molecules (Yanagisawa et al., 2010) with spatial folding and without any disulphide bond. This is unlike the structure of the nonapeptide oxytocin hormone, that was presented in the online lecture on the organic chemistry subject (please see below, a book review of Lessons in Chemistry by Bonnie Garmus, 2023). While in the pharmaceutical biochemistry lessons, the amino acids are introduced to enhance the students' knowledge on the detection of those acids and the purification of proteins. The information on peptide degradation is also valuable. These pharmacists-to-be will then get more input on the smart probiotics once they are involved in their community pharmacy attachment.

Figure 2: Natto is served as sushi (left) at a Japanese dine-in. It is also an appetiser, with a nutty flavour and a sticky, slimy texture (right).

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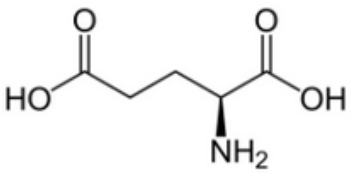
GRAPHICAL ABSTRACT

Poly-γ-glutamic acid (γ-PGA) and nattokinase are the main substances in natto, which are produced via solid-state microbial fermentation by *Bacillus subtilis* in soybeans. Both have wide application prospects.

Natto, a Japanese appetiser

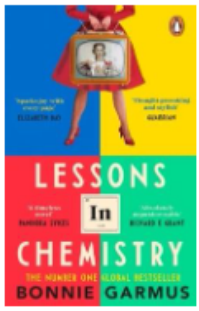


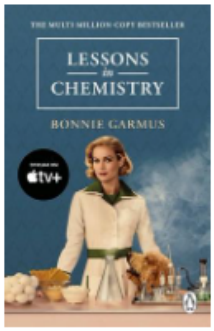
The chemical structure of glutamic acid

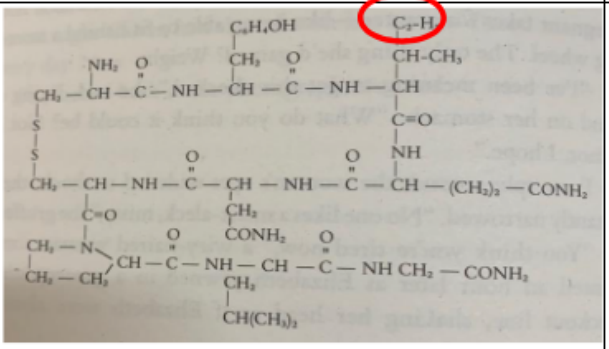
The fermented soybean or natto was garnished with seaweed and served as the Japanese appetiser. It contains a natural D- and/or L-glutamic acid biopolymer, called γ-PGA.

BOOK CLUB / BOOK REVIEW

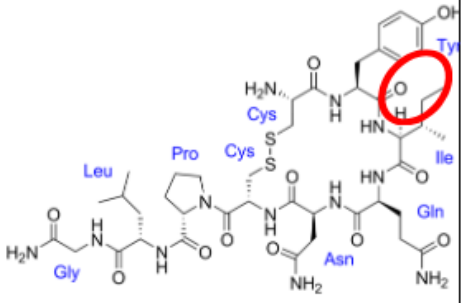
Lessons in Chemistry by Bonnie Garmus
Published: 2nd March 2023
ISBN: 978-1804990926
Lessons in Chemistry: Apple TV+
Published: 12th Oct 2023
ISBN: 978-1804993477
Imprint: Penguin
Format: Paperback, Page 126: oxytocin



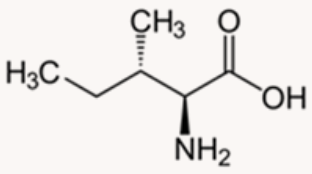




The ethyl group as a substituent in the polypeptide, might be unintentionally written as C_2-H_5 (Source: Garmus, 2023).



The ethyl group in isoleucine (Ile) can be shown in the line drawing of the oxytocin. The terminal methyl group is not drawn.



Isoleucine (Ile)

A simple write-up of oxytocin is as follows: H-Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Leu-Gly-NH2. Ile is the three-letter abbreviation for an amino acid, isoleucine. The hydrocarbon side chain of Ile includes an ethyl as the functional group (written as -C2H5 or -CH2CH3). However, the chemical structure of oxytocin (Garmus, 2023, Lessons in Chemistry, page 126) is not accurately presented (Garson, 2023). In writing the formula, there should be a true expression for linking the carbon and hydrogen atoms in the ethyl group, i.e., -C2H5, instead of C2-H5. It is noticeable and gives alert to the chemists, since there should only be three protons connecting to the terminal methyl (-CH3) of the ethyl group (-CH2CH3). The writing of C2-H5 gives the impression that all five hydrogens are directly linked to one of the carbon-carbon bonds, which is untrue. A similar illustration of oxytocin appears on the same page number of the paperback version, which was adapted for the Apple TV+ series, having Brie Larson as the main character. This review hopes that the printing of an ethyl group as C2-H5, might not be on purpose.

REFERENCE

Emeritus Professor Mary Garson AM [@MMaryGarsonae]. (2023, April 10). The chemical structure of oxytocin is incorrectly drawn! A small detail. [Tweet / Post]. X. https://twitter.com/MMaryGarsonae/status/1645373719987240966

About The Author

Assoc. Prof. Dr. Ibtisam Abdul Wahab teaches chemistry to pharmacy students. Her research interests include studies on traditional herbal medicines and analysis of natural products from plants.

Questions

Let's dive deeper into the article and evaluate your comprehension. We have 5 questions for you here.

MICROBIOTA-DRIVEN CXCL10-RHOA SIGNALLING IN *LACTIPLANTIBACILLUS PLANTARUM* LAB12-INDUCED NEUROPROTECTION AGAINST ALZHEIMER'S DISEASE

Alzheimer's disease (AD), which is the most prevalent cause of dementia in the world, is characterised by severe deficits in memory, cognition and motor functions. The burden of AD and other dementias accounts for an estimated 0.7% of the global population, translating to 51.6 million people worldwide [1]. In Malaysia, there are currently about 50,000 people living with AD. These are, however, underestimated figures as there are still many who remain undiagnosed, assuming that AD is a normal ageing process [2]. The causes of AD varied and not entirely understood [3].

Existing anti-AD drugs, which revolve around four major drugs that have been approved by the Food and Drug Administration (FDA) for AD treatment [i.e., three acetylcholinesterase (AChE) inhibitors (i.e. donepezil, galantamine and rivastigmine) and an N-methyl-D-aspartate (NMDA) antagonist (i.e. memantine)], are symptomatic-based [3]. Clinical administration of these drugs is also associated with several side effects. There is no evidence that these treatments are curative to limit the progression of cognitive symptoms and behavioural and psychological symptoms of dementia (BPSD) [4].

The major gaps in the knowledge of AD pathogenesis raise the need of reassessment from a different perspective. Emerging evidence on the microbiota-gut-brain axis suggests that ageing is associated with changes in the gut microbiota that increase susceptibility to chronic and degenerative diseases like AD [5]. It appears that gut microbiota alterations precede the development of key pathological features of AD, including amyloidosis and plaque-localized neuroinflammation [6]. It was postulated that ageing can increase intestinal inflammation and change bacterial taxa to a level that pro-inflammatory bacteria's abundance becomes higher than anti-inflammatory bacteria [7].

The emerging role of gut microbiota in pathogenesis of AD raises the possibility of nutritional interventions with food rich in antioxidants to prevent AD. Probiotics are one of the functional foods that contain high level of antioxidants and can therefore potentially act as anti-inflammatory as well as neuroprotective agents [8]. As part of the effort in uncovering superior probiotic strain with beneficial effects, we have explored the neuroprotective potential of locally isolated lactic acid bacteria (LAB) [9]. Our preliminary study found supplementation of adult zebrafish fed with high fat diet with *Lactiplantibacillus plantarum* LAB12 to be associated with improved spatial learning and memory [10].

The mechanisms underlying the LAB12-induced neuroprotection, however, remain to be fully elucidated. Our other preliminary findings implied LAB12-derived CFS as a potent RhoA inhibitor [11]. It was reported that CXCL10, a promising potential as blood-based chemokine biomarkers for AD [12], may activate RhoA and trigger migration of cancer cells [13]. In yet another preliminary study of ours, caecal content of LAB12-fed memory impaired (LPS-challenged) rats was presented with increased Bacteriodetes and decreased Firmicutes, indicating the potential of LAB12 in reverting dysbiosis of colonic microbiota [14].

We therefore hypothesise that the neuroprotection of LAB12 could be mediated through inhibition of microbiota-driven CXCL-10-RhoA signalling along the microbiota-gut-brain-axis. Our experiments are designed to unveil microbiota changes and the accompanying CXCL10-RhoA-related molecular events underlying neuroprotection of LAB12. Our studies will involve the use of cell-based (microglia and neuroblastoma cells) in vitro assays as well as Aβ-induced rats that mimic neuroinflammation and Aβ plaque aggregation in AD. It is our hope that the significant outputs from this study will yield important insights into current efforts of expediting development of natural LAB12 for use in prevention and management of AD.

Acknowledgement:

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Questions
Let's dive deeper into the article and evaluate your comprehension. We have 3 questions for you here.

Assoc. Prof. Dr. Lim Siong Meng, Prof. Dr. Kalavathy Ramasamy,
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FACULTY OF PHARMACY'S LUNCH TALK 01/24

On the 1st of February 2024, we held our first lunch talk at the postgraduate lounge. This event, which was open to all faculty staff and students, represented a significant stride in our ongoing efforts to cultivate a dynamic and interactive research community. The speaker for this inaugural session was Associate Professor Dr Nurhuda Manshoor from the Department of Pharmacology and Pharmaceutical Chemistry, Faculty of Pharmacy, UiTM. She delivered an enlightening talk entitled "Chemistry in Botanical Garden: Chemical or Natural". In her talk, Dr Nurhuda imparted her valuable insights she gained during her sabbatical at the Jodrell Laboratory of the Royal Botanic Gardens, Kew, London.

Our hope is to maintain the momentum of these lunch talks, hosting them every other week. We aim to create an environment that encourages staff and students to come together and share their unique skills and expertise in an informal setting. Our purpose of inviting speakers from both inside and outside the faculty is to expose researchers to a diverse range of ideas and experiences that may foster a culture of continuous learning, broaden their horizon and give them an opportunity for collaboration.

The inaugural lunch talk has set a positive precedent, demonstrating the potential of these gatherings to strengthen our research community. The success of this first session serves as a testament to the power of shared learning experiences in fostering a vibrant, engaged, and inclusive academic community.

We anticipate that these lunch talks will spark new ideas, foster collaborations, and strengthen the bonds within our research community. We look forward to the future sessions and the meaningful connections they promise to bring.

Dr. Aisyah Hasyila Jahidin, Mdm. Nik Ateerah Rasheeda Mohd Rocky,
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EMPOWERING IMPACTFUL WRITING: A SYNOPSIS OF THE WRITE2IMPACT WORKSHOP

The Write2Impact Workshop, a brainchild of the Faculty of Pharmacy, UiTM, was held at the Gallery, FF1 on the 5th of February 2024, from 9 am to 1 pm. The workshop that was opened to UiTM staff and students saw an enthusiastic turnout of 62 participants from various faculties.

The distinguished speaker for the event was our very own Professor Wong Tin Wui, who is ranked among the World's Top 2% Scientists in the field of Pharmacology & Pharmacy. The program was designed with the objective of empowering participants with the skills to author impactful articles, thereby elevating the standard of written communication within our academic community. This aim was clearly embodied in the activities of the day.

The programme focused mainly on expert guidance and a hands-on learning session. Participants had the privilege of gaining insights from the speaker that deepened their understanding of the fine details involved in writing impactful articles. This was complemented by the opportunity to engage in practical exercises using real manuscript samples, a hands-on approach that facilitated the application of their theoretical knowledge. These two components synergistically contributed to a unified and enriching learning experience.

In conclusion, the Write2Impact Workshop was a successful event that equipped participants with the necessary tools and knowledge to enhance their writing skills. The blend of theoretical knowledge and practical application, coupled with expert guidance, was a comprehensive and enriching learning experience for the participants. The feedback from the participants was encouraging and they indicated that the program was useful and tips that they learned will be out to practice in their future writing endeavours.

Dr. Aisyah Hasyila Jahidin, Prof. Dr. Kalavathy Ramasamy
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ENHANCING STUDENTS' CLINICAL COMPETENCY VIA OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE)

On 11th and 17th January 2024, the Department of Clinical Pharmacy (DoCP) conducted OSCE involving 173 fourth-year students as part of their continuous assessment for the courses PHC670 Community Pharmacy and PHC671 Applied Therapeutics in Infectious Diseases and Neoplastic Disorders. The four-station OSCE entails history-taking, drug-related problem identification and resolution, patient education, and care plan monitoring that spanned around 30 minutes. OSCE aims to evaluate students' clinical competency in providing optimal pharmaceutical care that requires them to employ analytical and critical thinking skills, effective communication skills, evidence-based practice, and professionalism. This performance-based examination complements the paper-and-pen examination ensuring a holistic and competent pharmacist graduate at the end of the Bachelor of Pharmacy program. This hands-on assessment method is crucial in preparing the students for their future careers and ensuring they are competent and confident in providing patient-centered care.

The OSCE assessed the students' ability to apply their knowledge and skills in a simulated clinical setting. Each station was carefully crafted to simulate different scenarios that the students may encounter in their future practice as pharmacists. In addition, OSCE evaluates students' ability to interact with patients, utilize scientific references and guidelines, provide drug information, and make appropriate clinical decisions.

As the roles of pharmacists evolve towards patient-centered care, OSCE is instrumental to evaluate and ensure our future pharmacists' capability is at par with the international standard. The OSCE served as a platform for students to demonstrate their clinical competency and identify the areas for improvement before they embark on their journey as pharmacists. By simulating real-life scenarios, OSCE allows students to practice their clinical skills in a controlled environment. This helps them gain confidence and prepares them for the challenges they may face in their professional careers. Additionally, the feedback provided after the OSCE allowed students to reflect on their performance and further enhance their knowledge and skills.

DoCP would like to take this opportunity to express our utmost gratitude to all the lecturers, simulated patients (postgraduate students), administrative staff, and lab staff for their invaluable assistance in the OSCE conduct.

Miss Nik Aisyah Najwa Nik Mustaffa Shapri
Faculty of Pharmacy, UiTM

ENHANCING REFLECTIVE PRACTICE IN PHARMACY EDUCATION: A PHARMACOEPIDEMIOLOGY AND PUBLIC HEALTH APPROACH

Reflective practice is an integral part of the pharmacy curriculum. It supports development of skills in decision-making, critical thinking, problem-solving, and is important for continuing professional development and ongoing professional practice. At the heart of reflective practice lies the encouragement of learning from both personal experiences and the experiences of others. This strategy not only bridges the gap between academic knowledge and real-world application, but it also encourages communication and collaboration across diverse teams, which are essential components of modern pharmacy practice.

In our initiative, we worked with second-year pharmacy students to organise a Pharmacoepidemiology and Public Health Day program designed to incorporate reflective practice through a written approach. The program tasked students with working in groups to develop creative and engaging presentations on selected pharmacoepidemiology concepts, demonstrating their application in research articles. Additionally, students were challenged to produce physical or digital tools to enhance audience understanding, ranging from interactive games and quizzes to informative pamphlets and digital booklets.

The concepts covered during the program encompassed a wide array of topics, including pharmacoeconomics, pharmacovigilance, study designs, health-related quality of life, and sampling techniques such as snowball sampling and stratified sampling. Through collaborative exploration and presentation of these concepts, students not only deepened their understanding but also honed their skills in critical appraisal and communication.

The second phase of the program centred on reflective writing, guided by Gibbs' reflective cycle. Students were asked to describe their experiences watching, listening to, and participating in other groups' presentations, followed by an evaluation of their own experiences, including both positive and negative feelings and opinions. Subsequently, students were encouraged to analyse the connections between their observations and their own presentations, culminating in suggestions for improvement.

By integrating reflective practice into pharmacy education through innovative initiatives such as the Pharmacoepidemiology and Public Health Day program, educators can empower students to become lifelong learners equipped with the skills necessary for success in dynamic healthcare environments. Through reflective engagement, students not only deepen their understanding of complex concepts but also cultivate the critical thinking and adaptability essential for future pharmacy practice.

Miss Zakiah Mohd Noordin, Assoc. Prof Dr. Mahmathi Karuppanan,
Mdm. Farhana Fakhira Ismail, Miss Izzati Abdul Halim Zaki
Faculty of Pharmacy, UiTM

PRP BOOTCAMP: CAREER PATHWAY FOR PROVISIONALLY REGISTERED PHARMACISTS

The Faculty of Pharmacy's Department of Clinical Pharmacy successfully organised PRP Bootcamp, a two-day event tailored for our Pharmacists-in-Training and other pharmacy students and graduates in Malaysia. Taking place from January 13th to 14th, 2024, at the Faculty of Pharmacy, Puncak Alam Campus, the program drew a total of 62 participants from University Teknologi MARA (UiTM) and various other universities. This first PRP Bootcamp was inaugurated by Prof. Dato' Dr. Abu Bakar Abdul Majeed, the dean of the Faculty of Pharmacy, UiTM.

The primary objectives of the program were to provide participants with insights into career pathways within different pharmacy sectors and to underscore the essential soft skills necessary to navigate future challenges as provisionally registered pharmacists (PRPs). Notably, the PRP Bootcamp featured experienced speakers from diverse pharmacy domains, including the Malaysian Pharmacy Board, hospital pharmacy, community pharmacy, industrial pharmacy, and research and academia. These speakers, including UiTM alumni and representatives from MOU partners; Alpro Pharmacy and Duopharma Sdn. Bhd., and Prof. Wong Tin Wui, shared their firsthand experiences from their respective fields and imparted invaluable soft and interpersonal skills crucial for PRPs to excel in their careers.

The program also offered lectures on emotional intelligence regulation, the code of ethics for pharmacists, and financial management skills, providing participants with essential preparation for their professional lives ahead. During networking sessions on the second day, participants seized the opportunity to engage with speakers, discussing various issues related to their interests, choices, and concerns.

Furthermore, the PRP Bootcamp provided hands-on sessions, allowing participants to delve deeper into their chosen tracks. On the first day, participants were divided into hospital pharmacy and academia/research tracks, engaging in activities such as outpatient pharmacy simulation, clinical case discussions and research preparation.

Meanwhile, on the second day, participants explored either the industrial or community pharmacy track, with highlights including a visit to the GMP plant at the Faculty of Pharmacy, led by committee members and alumnus Mr. Khubaib Azahari, Manager of Pharmaniaga Bhd. Additionally, the community pharmacy track featured a workshop on patient counseling and symptom response, facilitated by Ms. En Ni Lim from Alpro Pharmacy.

Overall, participants' feedback was overwhelmingly positive, with many expressing appreciation for the program's enhancement of their pharmacy skills and confidence for future roles as pharmacists. They enthusiastically recommended the program to future participants, underscoring its value in professional development. The success of the PRP Bootcamp owes much to the dedication of 30 lecturers and staff from the faculty.

Mdm. Nurul Ashikin Jamludin
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EMPOWERING COMMUNITIES: SAFE MEDICATION DISPOSAL CAMPAIGN

In our ongoing dedication to community well-being and environmental safety, the Safe medication Disposal (SAFE-MEDd) team embarked on a crucial mission to address the often overlooked issue- proper and safe medication disposal. As stewards of health and environmental responsibility, "Kempen Kesedaran Pelupusan Ubat secara Selamat" aimed at educating and empowering our community to safely dispose of medications.

The event was officiated by UCS Rector, Professor Dr Ahmad Tawfeek and witnessed by Dr. Mohd Shahezwan Abd Wahab.

The event commenced on Saturday morning, December 16, 2023, at Dewan MPKS Saujana Utama, Sg Buloh, with an array of engaging programs. Officiated by Prof. Dr. Ahmad Taufek Abdul Rahman, the rector of UiTM Selangor, the event featured insightful sessions led by esteemed experts. Mr. Kee Zheng Xun (Pharmacist, Alpro Pharmacy Saujana Utama), Mr. Ahmad Fauzi Dali (Lecturer, Faculty of Pharmacy UiTM), and Madam Hazwani Jamaluddin (Research Officer, NAHRIM) delved into topics such as good medication management, roles of pharmacist in and the environmental impact of improper disposal.

Besides the sharing session, there were also free health screening conducted by the BPharm. students, educational booths, and retails. Not to mention, several activities were conducted to attract the involvement of young children through soap making activity, 3D printing, animal care and coloring contest by several teams from the Faculty of Pharmacy UiTM.

The collaboration with Alpro Pharmacy with the features of Air Selangor, Fire and Rescue Department of Malaysia and non-governmental organizations, Ini Sains Beb! significantly amplified the campaign's outreach. As many have known, Alpro pharmacies across Malaysia facilitated safe disposal through strategically placed collection bins. During the event, Alpro pharmacy provided a collection bin where community return the unwanted medication. Ini Sains Beb! engaged children in educational activities to instill awareness, while Air Selangor advocated for accessible and clean water resources for the community.

The heart of our success was the active participation of the community. Saujana Utama's Residence Representative Council even shared the event details on social media, fostering widespread involvement. Over 300 participants, including community members and UiTM delegates, joined the event, demonstrating a shared commitment to health and environmental stewardship. Interestingly, the campaign managed to collect 5kg of various medications, including supplements, antihypertensive and antidiabetic medications that was returned during the event. This demonstrating a growing community awareness of proper medication disposal and their invaluable support.

Some of the activities during the events which include sharing sessions with the experts, heath screening, and retail activities.

Ini Sains Beb! (NGO), Air Selangor, Fire and Rescue Department and Alpro Pharmacy were among the exhibitors during the event.

The collected medication during the campaign was sorted and categorized for proper data analysis

As we celebrate this milestone, we acknowledge the need to expand our efforts to broader communities. Our commitment to promoting health and environmental sustainability extends beyond our upcoming event in 2024, which will serve as a collaborative effort involving other faculties and Hospital Al-Sultan Abdullah (HASA). This initiative marks the beginning of a new series of campaigns, demonstrating our dedication to expanding our impact. Additionally, we are eager to enhance Alpro's involvement as our primary partner through the signing of further Memorandums of Agreement (MoAs), laying the groundwork for future endeavors aimed at educating the community and empowering policy initiatives.

Finally, the success of our campaign to safely dispose of medication shows how powerful it can be when all parties work together. By joining forces, we've protected our community's health and set the stage for a safer, healthier future.

#Together,WeSupportSafeMedicationDisposal

Dr. Zafirah Liyana Abdullah, Dr. Hisyam Abdul Hamid, Dr. Noreen Husain,
Dr. Nadia Jalaludin, Mdm. Massita Nordin, Dr. Siti Nooraishah Hussin
Faculty of Pharmacy, UiTM

SEKOLAH KEBANGSAAN PUNCAK ALAM 2 ‘ADOPT-A-STUDENT PROGRAM’

On January 29, 2024, the Faculty of Pharmacy, Universiti Teknologi MARA (UiTM) demonstrated its commitment to community welfare with a heartening visit to Sekolah Kebangsaan Puncak Alam 2 (SKPA2) as part of their ongoing Adopt-a-Student initiative. This program, born in the wake of the COVID-19 pandemic in 2020, aims to provide financial support and educational enrichment to underprivileged students.

In addition to monetary support, the visit to SKPA2 featured engaging science activities designed to ignite curiosity and passion for learning among the students. From captivating discussions on the ‘Wonders of Animals and Plants’ to hands-on activities like the ‘Saponification’ experiment, the day was filled with moments of discovery and excitement. Finally, a talk on 'GERM Busters' underscored the importance of hygiene and health, empowering kids with the knowledge to safeguard their well-being.

The program's itinerary culminated in a closing session graced by esteemed guests, including the Dean, Prof. Dato' Dr. Abu Bakar bin Abdul Majeed, and the headmaster of SKPA2, En. Ahmad Badrul Amin bin Mohd Saibani. Heartfelt remarks resonated with gratitude and hope, while adopted students were showered with gifts as tokens of encouragement and support.

Looking ahead, the Faculty of Pharmacy, UiTM, envisions expanding its collaboration with SKPA2, by engaging Bachelor of Pharmacy students to foster deeper community connections and enhance their academic and interpersonal skills. As the initiative continues to gather momentum, the faculty extends sincere appreciation to all volunteers, expressing confidence in the enduring impact of their collective efforts to uplift young minds and transform lives.

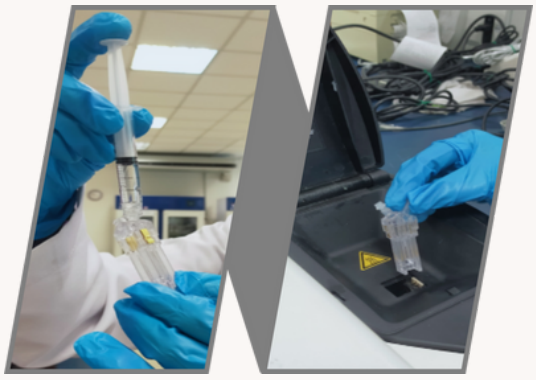
Dr. Nor Khaizan Anuar, Dr. Nadia Jalaludin
Faculty of Pharmacy, UiTM

DEPARTMENT OF PHARMACEUTICS: INNOVATING IDEAS INTO INVENTION

Pharmaceutics is a branch of pharmacy that focuses on the formulation, development, and optimization of active pharmaceutical ingredients (API) to ensure their safe effective use by consumers. For instance, while consuming sweet wormwood plants directly to obtain their antimalarial properties may result in an unpleasant experience, opting for artemisinin in pill form is a more feasible and tolerable alternative. Extracting the artemisinin from Artemisia and turning it into edible dosage form is an example of how advancements in pharmaceutics have facilitated improvements in our quality of life. Moreover, this advancement ensured that consumers are required to ingest only a minimal quantity of these pills, thanks to ongoing research in this field. If you have a promising idea for a pharmaceutical product, you will need the proper equipment to develop it. At the Department of Pharmaceutics, we provide the necessary tools and support to help you transform your concept into reality.

ZETASIZER

Zetasizer is a popular laboratory appliance among users. It is used to measure the particle and molecular size of colloidal molecules in a solution. It operates on the principle of dynamic light scattering (DLS) to measure the particles' size. Take two balls as an example, a small ball and a large ball, and use the same force to let them roll in front of a white screen. At the same time, rapidly flash a light beam to both balls for 20 intervals and observe the formation of shadows on the wall. In the end, you will see that larger shadows will have a higher correlation between time intervals, that is the shadow positions are close to each other, in contrast to the shadows of the small ball. Then, these correlation data of fluctuating light are used by Zetasizer to deduce the size of the balls.



Left: A laboratory staff demonstrating accurate way of filling the Zetasizer cuvette with sample. The cuvette can be bought from the laboratory at a reasonable price.
Right: Loading of the cuvette into the Zetasizer. The solution's particle size and zeta potential will be measured on operator's click.

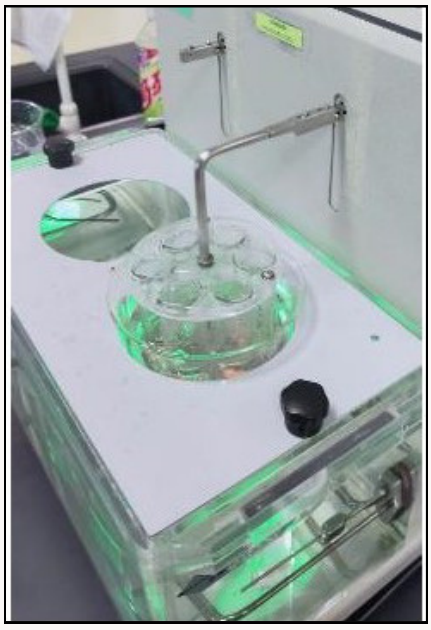
Now, you've understood the "sizer" part but how about the "Zeta" aspect of the equipment? Zeta potential is a measure of the magnitude of electrostatic repulsion between particles, which influences the stability of colloidal dispersions. The quantified inter-particle parameter will give you an idea of whether the particles tend to aggregate or disperse throughout the solution. Using the principle of electrophoretic light scattering (ELS), an electrical field is applied to the sample and Zetasizer will measure the particles' velocity in the same way it detects the balls' movement from our previous example. Colloids with high zeta potential, either positive or negative, are more stable and will maintain their dispersion while colloids with low zeta potential tend to coagulate among themselves. From this important information, you can assess not just the stability of your formulation but how well the active compounds will be absorbed through a permeable layer.

Feel free to contact our technical staff Ms. Noor Meliza Jamil at 03 – 3258 4682 for consultation on the equipment and sample preparation or visit our Biopharmaceutical and Pharmacokinetics Laboratory.

DISSOLUTION TESTER, DISINTEGRATION TESTER, FRIABILITY TESTER, AND HARDNESS TESTER

The next equipment are Dissolution Tester, Disintegration Tester, Friability Tester, and Hardness Tester. This equipment is indeed crucial in the development and quality control of pharmaceutical products, particularly in assessing the physical properties of a product.

Tablets or capsules are one of the most effective dosage forms to administer an API to a patient. The effectiveness of such a method relies on the drug dissolution while it is in the stomach and its rate of absorption to the bloodstream. The Dissolution Tester evaluates and optimizes the bioavailability of a dosage form. The principle is rather straightforward. You will need to dissolve the tablets or capsules in a solvent (usually a buffered solution like phosphate buffer or even dilute hydrochloric acid to mimic the stomach environment) and sample the solution at determined time intervals. Downstream experiments are then conducted to assess the amount of API that is available in your samples. If your dosage form releases the API too slowly, the treatment will be less effective for the patient. If it releases too much in a short period, patients might risk an overdose which could give adverse effects instead. That's why this parameter needs to be controlled so that the product will give a favourable outcome.

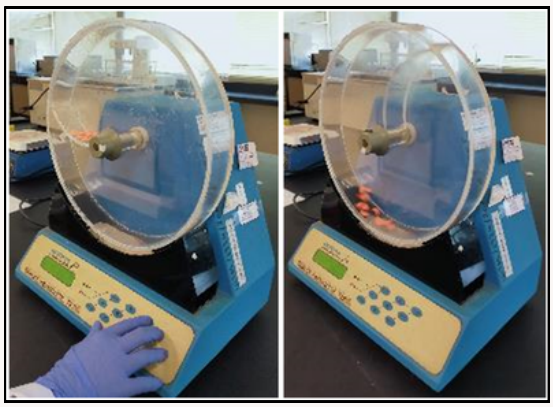


In disintegration test, the basket holds six tablets with each tablet placed in every cells. The basket will be raised and lowered into a beaker with solution. The surrounding water bath ensures the desired temperature of the test solution is maintained throughout the test.

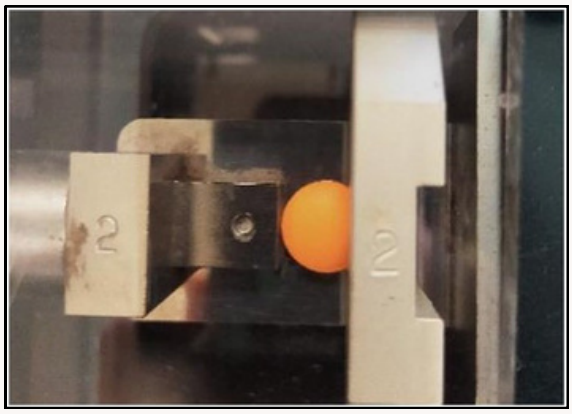
Disintegration Tester measures the time taken for the tablets or capsules to disintegrate. Precisely, it determines the time for a tablet or capsule to break down into smaller particles when placed in a liquid medium at a specific temperature. It goes hand in hand with the Dissolution Test as the ability to break into smaller particles allows for higher surface area contact and as a result, the rate of drug release. If the tablets or capsules are made too hard, you will find that the Dissolution Test for the product yielded a low bioavailability in general and vice versa. The test is done by placing tablets or capsules into the Disintegration Tester and noting the time for them to be completely removed from the basket rack as the dosage form disintegrates into the temperature-controlled solvent. The product should be formulated in such a way that its disintegration time complies with current international standards.

The Friability Tester and Hardness Tester are two pieces of equipment that are designed to test the mechanical strength of tablets, in particular. Ultimately, it ensures that the tablets can maintain their physical integrity and withstand mechanical shocks due to routine handling that comes from manufacturing and logistical processes such as tablet press, packaging, and transportation. To conduct a friability test, tablets of known mass are inserted into a drum which will spin to tumble the sample.

Then, the tablets will be collected and re-weighted to calculate the percentage of weight loss due to the process, reflecting on how friable the tablets are. Hardness testing (or more accurately breaking force testing as preferred by US Pharmacopoeia) is done by placing a tablet between anvils, of which one is fixed to a load cell while the other one is attached to a motor. The motorized jaw will slowly and steadily apply an increasing force as it pushes the tablet to the fixed jaw until it breaks, giving a tablet hardness reading as the maximum force applied immediately before the tablet breaks.



All these tests are requirements as stipulated by many pharmacopeial standards and each parameter has its acceptance criterion to comply with. More than just for cosmetic finishing purposes, a chipped or malformed tablet will contain less dosage of the intended API thus, will not provide an optimal therapeutic effect.



Left: The motorized anvil will push the tablet through a tunnel (to ensure acceptable tablet thickness) until the sample reaches the fixed wall. Later, gradual force is exerted to break the tablets. Right: The anvil will return to its position once a breakage or crack is detected.

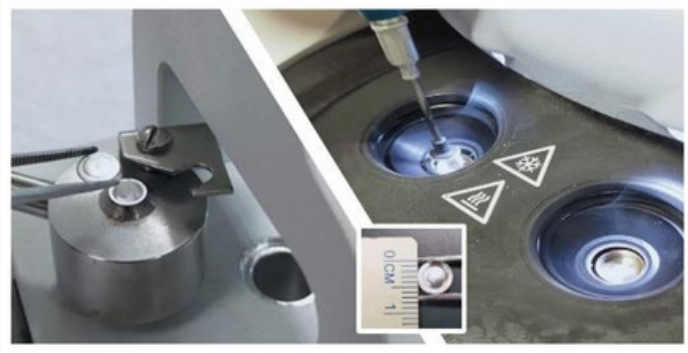
Feel free to contact our staff
Ms. Nor Hidayah Mohamed Mobin at 03 – 3258 4800 or
Ms. Nor Zaleha Ishak at 03 – 3258 4810 for consultation.

Differential Scanning Calorimetry

The next equipment, Differential Scanning Calorimetry (DSC) is also popular among the users, and it operates on the principle of heat. Pharmaceutical products do not necessarily exist or derive chemically, and some products are biological in nature. Proteins, DNA- or RNA-based therapeutics, or even lipid carriers are examples of biological pharmaceutical products, which make them more sensitive to temperature. By using DSC, researchers can study the biomolecule sample's denaturation and thermal stability. Take a protein formulation as an example. A sample consisting of protein-buffer solution will be heated up in a pan together with a reference of buffer-only solution in a separate pan. As both samples are heated, the protein-buffer mix will require more temperature to reach a volatile phase as proteins themselves will absorb more heat to denature due to the existence of intramolecular bonds. The difference between the two temperatures from the two pans is used to determine the thermal transition temperature (TM) of the proteins in the buffer solution. This allows researchers to screen for more stable, high TM biological molecules to be used in their pharmaceutical product development.

While the example given revolves around biologics, the DSC is applicable to vast research methodologies involving thermal analysis. The sample could be polymers, metals, or liquids. **Kindly contact Ms. Siti Hanim Mohd Noor at 03 – 3258 4795** for booking and technical advice.

Our laboratory equipment is not limited to this equipment. Those listed are among the most popular among users due to affordable and competitive prices.



Left: Sample is placed inside the pan and covered with a lid before it is sealed through mechanical clamping. Middle box: A sealed DSC pan. The single use pan and lid can be bought from the laboratory at a very reasonable price.
Right: Sealed pan with sample to be tested is placed on its dock and a reference blank is placed on another dock. Both pans are heated under same parameters simultaneously to generate sample's heat profile.

If you are seeking different equipment, all you need to do is simply scan the attached QR code for an exhaustive list of laboratories and services available at the Faculty of Pharmacy or go to the website for further information. We also invite requests for technical consultations from our experts, as well as opportunities for research collaborations.

SERVICES & RATES

Mr. Ahmad Assakir Ahmad Shukri
Faculty of Pharmacy, UiTM

A DAY IN THE LIFE OF A CLINICAL PHARMACIST

Sharing experiences from alumni

My journey as a pharmacist began at University of Manchester, United Kingdom back in 2002. After four exhilarating years, I graduated with a Master of Pharmacy (Hons). Soon after, I started working as a Provisional Registered Pharmacist in Hospital Tg. Ampuan Afzan, Pahang. Fast forward 10 years, I then had the desire to further my studies. I obtained Master of Clinical Pharmacy from Universiti Teknologi MARA (UiTM) in 2016. Those 18 months of study at UiTM were indeed memorable and instrumental in preparing me for where I am now.

I have the incredible honor of serving as one of the clinical pharmacists in the 60-bed Neonatal Intensive Care Unit (NICU) and Special Care Nursery (SCN) of Hospital Putrajaya since 2018. I work alongside a great and highly committed team that cares for neonates who were born prematurely with complications, malformations, or other medical issues. These neonates deserve to be given the utmost care before continuing their journey outside the hospital doors or receiving the final caring touch before their last breath.

On a typical day, I arrive at the hospital around 7.30 a.m. As I am also the Head of the Unit of Ward Pharmacy and Clinical Pharmacokinetics, I carry out administrative work in the morning. I will never know how the day will unfold in the NICU. I begin reviewing the overnight notes, and these will usually indicate whether things are off to a peaceful start or shaping up to be a hectic day.

Shortly by 9 a.m., I start following rounds with the NICU team which includes the neonatologist, specialists, medical officers, nurses, and medical assistants. My biggest responsibility as a NICU pharmacist is the provision of medication information to ensure optimal pharmaceutical care for the patients. My role is to tailor the therapy to the needs of the individual neonates. I ensure the dose, route, and dosing interval are appropriate according to the patient's weight, age, surface area, and organ functions. With good communication in place with the team, any issues that hinder the achievement of optimal therapy will be assessed and solved. In addition, I provide information on parenteral nutrition for the neonates, therapeutic drug monitoring, identification of adverse drug reactions, polypharmacy, and medication safety. The rounds usually take up most of my mornings. Shortly after the rounds, I will brief the nurses on any changes in the patients' medications. Any drug dilutions and drug administration issues will be discussed with the nurses to avoid possible errors.

In the afternoon, I work closely with the Inpatient Pharmacy to ensure the appropriate medicines are supplied to the wards in a timely manner. Along with the clinical role, I too have specific ward 'house-keeping' responsibilities i.e. ensuring appropriate distribution and storage of medication, keeping the stocks checked and balanced whilst monitoring the drug usage.

Being a mother of four myself, I understand the anxiety and worry of caring for small unwell children. The parents of these neonates need reassurance, guidance, and confidence in using medications for their children. Mothers who are on medications also require counseling on the safety of those medications during breastfeeding. I usually spend the afternoon informing and counseling them on the indications for therapy, the risks and benefits, and possible adverse reactions throughout the hospital stay and upon hospital discharge.

My workday usually ends at around 5.30 p.m., but of course, as a clinical pharmacist in a hospital environment, my clinical role is an all-day responsibility where I have to monitor or attend to any enquiries from either the NICU team or pharmacy staff throughout the day.

I am tremendously humbled and grateful for all the experiences. Working in NICU will always hold a special place in my heart. NICU is a place where God's best works are, where impossible little tiny humans do mighty great things. I see tears and sorrow, but I also get to see unimaginable miracles and profound happiness. I remember the challenging days more often because they are the memories that remind me to cherish the good. I truly believe that our shared hope is for our patients to continue to thrive, grow and live the best life outside the hospital doors.

Yours truly, the invisible white coat of NICU Hospital Putrajaya.
Mdm. Nurniza Nisbar
NICU Pharmacist UF54, Hospital Putrajaya
Master of Clinical Pharmacy (2016), Faculty of Pharmacy UiTM

CONGRATULATIONS

Congratulations to all faculty members for the exceptional achievements! May the accomplishments serve as a beacon of inspiration for future endeavors.

CONGRATULATIONS

UPCOMING EVENTS

Save the date!

Majlis Amanat Dekan Fakulti Farmasi 2024

Date: 28 February 2024 (Wednesday)
Time: 9.00 am
Venue: DK9, UiTM Selangor Branch Puncak Alam Campus

UPCOMING EVENTS

Save the date!

1

2

WEBINAR GUT HEALTH AND AGING: UNDERSTANDING THE ROLES OF PROBIOTICS, PREBIOTICS AND SYNBIOTICS FOR ENHANCED WELL-BEING OF THE OLDER ADULTS

13 March 2024

3 pm - 3.30 pm

Online platform (Link TBC)

Prof. Dr. Kalavathy Ramasamy

UPCOMING EVENTS

Save the date!

Know Your Medicines Campaign at Karnival Perpaduan Eristana

24 February 2024

8 am - 5 pm

Perkarangan Eristana Townhouse, Seri Pristana, Sungai Buloh

ALUMNI SHOPPE

Dr. Hasbullani bin Zakaria

Alumni: Doctor of Philosophy (Pharmacology) - (PH966, 2019)

Chief Technology Officer, Biomics Solution Sdn Bhd

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Mdm. Nur Sabiha Md Hussin
Faculty of Pharmacy, UiTM

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Latest news and updates from the Faculty of Pharmacy

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