Universiti Kebangsaan Malaysia
*The National University of Malaysia*

# Research Profile

CENTRE FOR
**DRUG AND HERBAL DEVELOPMENT**
FACULTY OF PHARMACY

# CDHD

## Vision & Mission



## Introduction to Research at UKM

Universiti Kebangsaan Malaysia (UKM) has been recognised as one of the five research universities in Malaysia since 2006 based on its excellent record in research for 50 years. The recognition has gained further ground when the Malaysia Genome Institute (MGI) and International Institute of Global Health and United Nations University were set up within the university. The research in UKM is currently focused into eight niche areas: Challenges to Nation Building, Sustainable Territorial Development, Renewable Energy, Health and Medical Technology, Climate Change, Nanotechnology and Advanced Materials, Biological Diversity in Biotechnology Development and ICT: Content Informatics. In 2021, UKM was ranked at position 141 by the QS World University Ranking.

# Research at the Faculty of Pharmacy, UKM

The research structure in the Faculty of Pharmacy, UKM consists of three research centres that represent the core areas of research in pharmacy. Our research activities cover fundamental pharmaceutical chemistry, biopharmacy, herbal development, pharmacology, formulation science, pharmaceutical technology, clinical pharmacy and professional pharmacy practice. We have a wide range of research facilities from the latest analytical instruments to a research-based teaching hospital. The faculty has managed to attract more than RM2 million in research grants in 2019 and 2020.

Faculty of Pharmacy research centres:

- Centre for Drug and Herbal Development (CDHD)
- Centre for Drug Delivery Technology (CDDT)
- Centre for Quality Management of Medicines (CQMM)

## About Us

Research at CDHD involves all aspects of drug discovery and development of bioactive natural products with the aims to aid and advance in the area of drug discovery and development by establishing various approaches to drug discovery. The research interests range from identification of chemical leads from tropical flora and fauna for specific therapeutic efficacy to the development of new drug candidates against complex and challenging drug targets and evaluation of herbs and their products for quality, safety and efficacy as therapeutic agents. A rational approach is applied to conduct high quality, collaborative and interdisciplinary research in drug discovery and development.

# KEY RESEARCH AREAS

Various natural product research activities are ongoing at the CDHD laboratories. Among them are extraction and isolation of novel compounds, determination of various bioactivities, establishment of standardisation procedures, structure activity relationship studies, and rational modification and synthesis of active compounds.

- ❖ Drug discovery – phytochemistry, drug design and synthesis
- ❖ Bioassays – pharmaceutical biology, pharmacology, pharmacogenetics, toxicology
- ❖ Herbal analysis – pharmacognosy, development of herbal, nutraceutical and cosmeceutical products
- ❖ Halal pharmaceuticals

## ACTIVITIES

### Phytochemistry

- Isolation and determination of novel or new compounds from Malaysian plants using various chromatographic and spectroscopic techniques.

### Drug Design and Synthesis of Novel Compounds

- Design and synthesis of novel compounds targeting cancer using various molecular modelling software including homology modelling, molecular docking, pharmacophore screening, 2D- & 3D-QSAR and molecular dynamics simulation.

### Bioassays

- Extracts and isolated compounds are evaluated for their biological activities using in-house bioassays either *in vitro*, *in vivo* or *ex vivo* as well as to yield a novel mechanistic information that will drive a deeper understanding of biological functions and processes.

### Pharmacognosy

- Development of herbal monographic specifications and standardisation of herbal formulation.

### Halal Pharmaceuticals

- Quality assurance and quality control of halal pharmaceuticals.

### Pharmaceutical and Herbal Analysis

- Quality control of raw materials and finished products containing pharmaceuticals and herbals.
- Fingerprinting analysis using spectroscopic and chromatographic data and chemometrics for adulterants and counterfeit drugs detection in pharmaceutical and herbal products.

## TEACHING & TRAINING

- Bachelor of Pharmacy with Honours
- Master of Science (Pharmaceutical Analysis) by Coursework
- Master of Science by Research
- Doctor of Philosophy by Research
- Short courses in Education and Training
  - ☐ Phytochemical Screening and Extraction of Natural Products
  - ☐ Methods for Development of Malaysian Herbal Monograph (MHM)
  - ☐ Standardisation of Herbal Materials Based on Pharmacopoeial Requirement
  - ☐ Standardisation and Quality Control of Herbal Formulations
  - ☐ Computer-aided Drug Design
  - ☐ Basic Cell Culture Techniques
  - ☐ DNA and Protein Analysis
  - ☐ Animal Behaviour Tests

## SERVICES & FACILITIES

- Pharmacognosy Lab - solvent extraction, phytochemical screening, herbal quality control, bioassay-guided isolation of phytochemical compounds
- Computer-Aided Drug Design (CADD) - molecular modelling software
- Pharmacology - biological assay, *in vitro*, *in vivo* and *ex-vivo* studies
- Laboratory facilities
  - ➢ Facilities for Herbal Quality Control based on the Malaysian Herbal Monograph
  - ➢ Soxhlet Extractor
  - ➢ High-Performance Liquid Chromatography (HPLC)
  - ➢ High-performance Thin Layer Chromatography (HPTLC)
  - ➢ Preparative HPLC
  - ➢ Recycling Preparative HPLC
  - ➢ Ultraviolet-visible Spectrophotometer (UV-Vis)
  - ➢ Attenuated Total Reflectance-Fourier Transform Infrared Spectrometer (ATR-FTIR)
  - ➢ Atomic Absorption Spectrometer (AAS)
  - ➢ High-Speed Centrifuge & Ultracentrifuge
  - ➢ Freeze Dryer
  - ➢ ELISA Microplate Reader
  - ➢ Liquid Scintillation Counter
  - ➢ Cell Culture Suite

# OUR TEAM OF RESEARCHERS

**ASSOC. PROF. DR. KHAIRANA HUSAIN (Chair)**
Qualification : BSc (Hons) (UKM), MSc (UKM), PhD (UPM)
Research interest : Natural products, phytochemistry, drug discovery, anti-inflammatory, anti-allergic
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**ASSOC. PROF. DR. ENDANG KUMOLOSASI**
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# OUR TEAM OF RESEARCHERS

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**DR. CHUA ENG WEE**

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**DR. KAISAN MAHADI**

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OUR LATEST RELATED JOURNAL ARTICLES

# KEY PUBLICATIONS

## ❖ Phytochemistry

- **Juriyati Jalil**, Sakina Saadawi, Ibrahim Jantan & **Malina Jasamai** (2021). Chemical constituents and biological activities of *Mitrella Kentii* (Blume) Miq. Leaf Oil. ***Jurnal Sains Kesihatan Malaysia*** 151-159. Doi:10.17576/JSKM-2021-1901-17.
- Yuandani, Ibrahim Jantan & **Khairana Husain** (2019). Phyltetralin, 1,7,8-trihydroxy 2-naphtaldehyde, ethyl 8-hydroxy-8-methyl-tridecanoate and 1-triacontanol from *Phyllanthus amarus* Schumach. & Thonn. inhibit phagocytic activity of human leucocytes. ***Journal of Pharmacy and Pharmacology*** 71(9):1451-1457. Doi.org/10.1111/jphp.13139.

## ❖ Drug design and synthesis

- Poh Yen Khor, Mohd Fadhlizil Fasihi Mohd Aluwi, Kamal Rullah & **Kok Wai Lam** (2019). Insights on the synthesis of asymmetric curcumin derivatives and their biological activities. ***European Journal of Medicinal Chemistry*** 111704. Doi:10.1016/j.ejmech.2019.111704.
- Mohd Fadhlizil Fasihi Mohd Aluwi, Kamal Rullah, Andreas Koeberle, Oliver Werz, Nur Sakinah Abdul Razak Abdul Razak, Leong Sze Wei, Fatimah Salim, Nor Hadiani Ismail, Ibrahim Jantan & **Kok Wai Lam** (2019). Design and synthesis of a novel mPGES-1 lead inhibitor guided by 3D-QSAR CoMFA. ***Journal of Molecular Structure*** 1196: 844-850. Doi:10.1016/j.molstruc.2019.07.004.

## ❖ Anti-inflammatory

- Ali Attiq, **Juriyati Jalil**, Khairana Husain, Hazni Falina Mohamad & Abrar Ahmad (2021). Luteolin and apigenin derived glycosides from *Alphonsea elliptica* abrogate LPS-induced inflammatory responses in human plasma. ***Journal of Ethnopharmacology*** 275: 114120. Doi:10.1016/j.jep.2021.114120.
- Elysha Nur Ismail, Ibrahim Jantan, Sharmili Vidyadaran, Jamia Azdina Jamal & **Norazrina Azmi** (2020). *Phyllanthus amarus* prevents LPS-mediated BV2 microglial activation via MyD88 and NF-κB signaling pathways. ***BMC Complementary Medicine and Therapies*** 20:202. Doi:10.1186/s12906-020-02961-0.
- **Juriyati Jalil**, Ali Attiq, Chiew Chia Hui, Lui Jin Yao & Nurul Aimi Zakaria (2020). Modulation of inflammatory pathways, medicinal uses and toxicities of *Uvaria* species: potential role in the prevention and treatment of inflammation. ***Inflammopharmacology*** 28(5):1195-1218. Doi: 10.1007/s10787-020-00734-2.
- Jiah Ning Tan, Shamin Mohd Saffian, Fhataheya Buang, Zakiah Jubri, Ibrahim Jantan, Khairana Husain & **Norsyahida Mohd Fauzi** (2020). Antioxidant and anti-inflammatory effects of genus *Gynura*: a systematic review. ***Frontiers in Pharmacology*** 11:504624. Doi:10.3389/fphar.2020.504624.
- Malina Jasamai, **Juriyati Jalil**, Sakina Saadawi & Ibrahim Jantan (2020). Inhibitory effects of *Mitrella kentii* extracts on inflammatory mediators' biosynthesis and binding. ***Journal of Herbs, Spices & Medicinal Plants*** 26(1): 30-39. Doi:10.1080/10496475.2019.1663771.

- Tan Jiah Ning, Syaratul Dalina Yusoff, Zakiah Jubri, Fhataheya Buang, Tan Ze Song, Ameerah Budiono, Ibrahim Jantan, Roza Dianita, Endang Kumolosasi, Norazrina Azmi & **Norsyahida Mohd Fauzi** (2019). Inhibitory effects of *Gynura procumbens* ethanolic extract on nitric oxide production and inducible nitric oxide synthase (iNOS) protein expression in macrophages. ***Sains Malaysiana*** 48(8), 1737-1744. Doi:10.17576/jsm-2019-4808-20.
- Lee Jian Sian, **Malina Jasamai**, Nor Syafinaz Yaakob & **Norsyahida Mohd Fauzi** (**2019**). Synthetic chalcone derivatives inhibit cytokine secretionvia inhibition of ERK and JNK pathways in human U937 macrophage. ***Tropical Journal of Pharmaceutical Research*** 18 (4): 753-759. Doi:10.4314/tjpr.v18i4.11.
- Hemavathy Harikrishnan, Ibrahim Jantan, Md. Areeful Haque & **Endang Kumolosasi** (2018). Phyllanthin from *Phyllanthus amarus* inhibits LPS-induced proinflammatory responses in U937 macrophages via downregulation of NF-κB/MAPK/PI3K-Akt signaling pathways. ***Phytotherapy Research*** 32:2510–2519. Doi:10.1002/ptr.6190.
- Hemavathy Harikrishnan, Ibrahim Jantan, Md. Areeful Haque & **Endang Kumolosasi** (2018). Anti-inflammatory effects of *Phyllanthus amarus* Schum. & Thonn. through inhibition of NF-κB, MAPK, and PI3K-Akt signaling pathways in LPS-induced human macrophages, ***BMC Complementary and Alternative Medicine*** 18:224 – 237. Doi:10.1186/s12906-018-2289-3.

### ❖ Immunomodulatory

- Javaid Alam, Ibrahim Jantan, **Endang Kumolosasi**, Mohd A. Nafiah & Muhammed A. Mesaik (2018). Suppressive Effects of the Standardized Extract of *Phyllanthus amarus* on Type II Collagen-Induced Rheumatoid Arthritis in Sprague Dawley Rats. ***Current Pharmaceutical Biotechnology*** 19: 1156-1169. Doi:10.2174/1389201020666181211124954.
- Waqas Ahmad, Ibrahim Jantan, **Endang Kumolosasi**, Md Areeful Haque & Syed Nasir Abbas Bukhari (2018), Immunomodulatory effects of *Tinospora crispa* extract and its major compounds on the immune functions of RAW 264.7 macrophages. ***International Immunopharmacology*** 60: 141–151. Doi:10.1016/j.intimp.2018.04.046.

### ❖ Cardiovascular Pharmacology

- Norsyahida Mohd Fauzi, **Endang Kumolosasi**, **Malina Jasamai** & Norazrina Azmi (2019). Interaction between green tea and perindopril reduces inhibition of angiotensin-converting enzyme activity. ***Tropical Journal of Pharmaceutical Research*** 18 (6): 1185-1190. Doi:10.4314/tjpr.v18i6.6.
- **Malina Jasamai**, Nurul Hanis Samsudin, Norazrina Azmi & **Endang Kumolosasi** (2018). Effects of Durian Fruit on Blood Pressure of Spontaneously Hypertensive Rats. ***Sains Malaysiana*** 47(6): 1221–1226. Doi:10.17576/jsm-2018-4706-17.

### ❖ Antihypertensive effect

- **Endang Kumolosasi**, Cheng Chen Wei, Anis Zafiqa Abdullah, Nur Syahirah Abd Manap, Woon Lee Lee, Mohd Hanif Yusuf, Lo Shin Ying, Fhataheya Buang, Mazlina Mohd Said, Hazni Falina Mohamad & **Malina Jasamai** (2021). Antihypertensive activities of standardised *Moringa oleifera* Lam (merunggai) extracts in spontaneously hypertensive rats. ***Sains Malaysiana*** 50(3): 769-778. Doi:10.17576/jsm-2021-5003-18.

- **Malina Jasamai**, Nurul Hanis Samsudin, Norazrina Azmi & **Endang Kumolosasi** (2018). Effects of durian fruit on blood pressure of spontaneously hypertensive rats. ***Sains Malaysiana*** 47(6):1221–1226. Doi:10.17576/jsm-2018-4706-17.

## ❖ Antiallergic

- Nur Zahirah Abd Rani, Kok Wai Lam, Juriyati Jalil, Hazni Falina Mohamad, Mohd Shukri Mat Ali & **Khairana Husain** (2021). Mechanistic Studies of the Antiallergic Activity of *Phyllanthus amarus* Schum. & Thonn. and Its Compounds. ***Molecules*** 26(3): 695. Doi:10.3390/molecules26030695.
- Nur Zahirah Abd Rani, Endang Kumolosasi, Malina Jasamai, Jamia Azdina Jamal, Lam Kok Wai & **Khairana Husain** (2019). In vitro anti-allergy activity of *Moringa oleifera* Lam. extracts and their isolated compounds. ***BMC Complementary and Alternative Medicine*** 19:361. Doi:10.1186/s12906-019-2776-1.

## ❖ Antimicrobial

- Noor Safwah Damanhuri, **Endang Kumolosasi**, Marhanis Salihah Omar, Amirul Faiz Abd Razak & Ahmad Hasnan Mansor (2021). The influence of P-glycoprotein expression in the standard treatment of Helicobacter pylori infection in Sprague Dawley rats. ***DARU Journal of Pharmaceutical Sciences*** 29(1):13-22. Doi:10.1007/s40199-020-00377-2.
- Kim S. Siow, Arifah Syahirah Abdul Rahman, **Pei Yuen Ng** & Burhanuddin Y. Majlis (2020). Sulfur and nitrogen containing plasma polymers reduces bacterial attachment and growth. ***Materials Science and Engineering C: Materials for Biological Applications*** 107:110225. Doi: 10.1016/j.msec.2019.110225.
- Mahanis Salihah Omar, Nur Nadiana Adnan, **Endang Kumolosasi**, Norazrina Azmi, Noor Safwah Damanhuri & Fhataheya Buang (2020). Green Tea (*Camellia sinensis*) Extract Reduces Peptic Ulcer Induced by Helicobacter pylori in Sprague Dawley Rats. ***Sains Malaysiana*** 49(11): 2793-2800. Doi:10.17576/jsm-2020-4911-18.
- **Malina Jasamai**, Yap Wei Boon, Aurapa Sakulpanich & Azmath Jaleel (2019). Current prevention and potential treatment options for dengue infection. ***Journal of Pharmacy & Pharmaceutical Sciences*** 22: 440-456. Doi:10.18433/jpps30216.

## ❖ Gout

- Eldiza Puji Rahmi, Endang Kumolosasi, Juriyati Jalil, Khairana Husain, Fhataheya Buang, Amirul Faiz Abd Razak & **Jamia Azdina Jamal** (2020). Anti-hyperuricemic and Antiinflammatory Effects of *Marantodes pumilum* as Potential Treatment for Gout. ***Frontiers in Pharmacology***. 11:289. Doi:10.3389/fphar.2020.00289.
- Nor-Ashila Aladdin, Khairana Husain, Juriyati Jalil, Carla Wulandari Sabandar & **Jamia Azdina Jamal** (2020). Xanthine oxidase inhibitory activity of a new isocoumarin obtained from *Marantodes pumilum* var. *pumila* leaves. ***BMC Complementary Medicine and Therapies*** 20:324. Doi:10.1186/s12906-020-03119-8.

- Carla Wulandari Sabandar, **Juriyati Jalil**, Norizan Ahmat & Nor-Ashila Aladdin (2019). Assessment of antioxidant and xanthine oxidase inhibitory activity of *Triadica cochinchinensis* stem bark. ***Current Research on Biosciences and Biotechnology*** 1(1): 39-44. Doi:10.5614/crbb.2019.1.1/HZRA413.

## ❖ Oestrogenicity

- Affidah Sabran, **Endang Kumolosasi**, Ibrahim Jantan, **Jamia Azdina Jamal**, Norazrina Azmi & Malina Jasamai. (2021). Induction of cell death and modulation of Annexin A1 by phytoestrogens in human leukemic cell lines. ***Saudi Pharmaceutical Journal*** 29(1):73-84. Doi:10.1016/j.jsps.2020.12.011.
- Masyitah Hasan, **Endang Kumolosasi**, Malina Jasamai, Jamia Azdina Jamal, Norazrina Azmi & Nor Fadilah Rajab. (2020). Evaluation of phytoestrogens in inducing cell death mediated by decreasing Annexin A1 in Annexin A1-knockdown leukemia cells. ***DARU Journal of Pharmaceutical Sciences*** 1-12. Doi:10.1007/s40199-019-00320-0.
- AKM Moyeenul Huq, Lam Kok Wai, Kamal Rullah, Mohd Fadhlizil Fasihi Mohd Alwi, Johnson Stanslas & **Jamia Azdina Jamal** (2019). Oestrogenic activity of mimosine on MCF-7 breast cancer cell line through the ERa-mediated pathway. ***Chemical Biology and Drug Design*** 93(3): 222-231. Doi:10.1111/cbdd.13404.
- Haryati Ahmad Hairi, **Jamia Azdina Jamal**, Nor Ashila Aladdin, Khairana Husain, Noor Suhaili Mohd Sofi, Norazlina Mohamed, Isa Naina Mohamed & Ahmad Nazrun Shuid (2018). Demethylbelamcandaquinone B (Dmcq B) is the active compound of *Marantodes pumilum* var. *alata* (Blume) Kuntze with osteoanabolic activities. ***Molecules*** 23(7):1686-1704. Doi:10.3390/molecules23071686

## ❖ Cancer pharmacology

- Qalidah Mohamad Ali, **Endang Kumolosasi** & Mohd Makmor Bakry (2021). Effect of fresh soy milk and its compounds on apoptosis in human leukemic cells and peripheral blood mononuclear cells. ***Tropical Journal of Pharmaceutical Research*** 20 (3): 511-517. Doi:10.4314/tjpr.v20i3.10.
- Amnani Aminuddin, Pei Yuen Ng, Chee-Onn Leong & **Eng Wee Chua** (2020). Mitochondrial DNA alterations may influence the cisplatin responsiveness of oral squamous cell carcinoma. ***Scientific reports*** 10:7885. Doi:10.1038/s41598-020-64664-3.
- Affidah Sabran, **Endang Kumolosasi** & Ibrahim Jantan (2019). Effects of annexin A1 on apoptosis and cell cycle arrest in human leukemic cell lines. ***Acta Pharmaceutica*** 69:75–86. Doi:10.2478/acph-2019-0005.

## ❖ Wound healing

- Shihab Uddin Ahmad, Nor-Ashila Binti Aladdin, **Jamia Azdina Jamal**, Ahmad Nazrun Shuid & Isa Naina Mohamed (2021). Evaluation of wound-healing and antioxidant effects of *Marantodes pumilum* (Blume) Kuntze in an excision wound model. ***Molecules*** 26:1-21. Doi.org/10.3390/molecules26010228.
- Evelyn Yun Xi Loh, Mh Busra Fauzi, Min Hwei Ng, **Pei Yuen Ng**, Shiow Fern Ng, Hidayah Ariffin, and Mohd Cairul Iqbal Mohd Amin (2018). Cellular and Molecular Interaction of Human Dermal Fibroblasts with Bacterial Nanocellulose Composite Hydrogel for Tissue Regeneration. ***ACS Applied Materials & Interfaces*** 10(46):39532-39543. Doi: 10.1021/acsami.8b16645.

## ❖ Neuropharmacology

- Poh Kuan Wong, Fook Choe Cheah, Saiful Effendi Syafruddin, M. Aiman Mohtar, Norazrina Azmi, Pei Yuen Ng & **Eng Wee Chua** (2021). CRISPR gene-editing models geared toward therapy for hereditary and developmental neurological disorders. ***Frontiers in Pediatrics*** 9:592571. Doi:10.3389/fped.2021.592571.
- Chee Hooi Chung, Beatrice Bretherton, Satirah Zainalabidin, Susan A. Deuchars, Jim Deuchars & **Mohd Kaisan Mahadi** (2020)**.** Mediation of Cardiac Macrophage Activity via Auricular Vagal Nerve Stimulation Ameliorates Cardiac Ischemia/Reperfusion Injury. ***Frontiers in Neuroscience.*** 14, 906. Doi: 10.3389/fnins.2020.00906.
- Muhammad Harith Zulkifli, Praveena Viswenaden, Malina Jasamai, Norazrina Azmi & **Nor Syafinaz Yaakob** (2019). Potential roles of 5-HT3 receptor (5-HT3R) antagonists in modulating the effects of nicotine. ***Biomedicine & Pharmacotherapy*** 112. Doi:10.1016/j.biopha.2019.108630.
- **Nor Syafinaz Yaakob**, Dan-Thanh Nguyen, Betty Exintaris & Helen Ruth Irving (2018). The C and E subunits of the serotonin 5-HT3 receptor subtly modulate electrical properties of the receptor. ***Biomedicine & Pharmacotherapy*** 97:1701-1709. Doi:10.1016/j.biopha.2017.12.010.
- Manali Haniti Mohd-Zahid, Juriyati Jalil, Kok Meng Chan & **Norazrina Azmi** (2018). Neuroprotective effects of *Ocimum basilicum* extract against hydrogen peroxide-induced oxidative stress in SK-N-SH neuroblastoma cells. ***Sains Malaysiana*** 47(9): 2129–2139. Doi:10.17576/jsm-2018-4709-22.

## ❖ Pharmacology and toxicology

- **Eng Wee Chua**, Simon P. Harger & Martin A. Kennedy (2019). Metoclopramide-induced acute dystonic reactions may be associated with the CYP2D6 poor metabolizer status and pregnancy-related hormonal changes. ***Frontiers in Pharmacology***. 10:931. Doi:10.3389/fphar.2019.00931.
- **Eng Wee Chua** & Chian Siang Goh (2019). Benchmarking *in silico* tools for the functional assessment of DNA variants using a set of strictly pharmacogenetic variants. ***Sains Malaysiana*** 48(10):2151-59. Doi:10.17576/jsm-2019-4810-10.

## ❖ Quality control of drugs

- **Mazlina Mohd Said**, Simon Gibbons, Anthony Moffat & Mire Zloh (2019). Use of near infrared spectroscopy and spectral databases to assess the quality of pharmaceutical products and aid characterization of unknown components. ***Journal of Near Infrared Spectroscopy*** 27(5) 379–389. Doi: 10.1177/0967033519866009.
- Jamilu Mawaida & **Mazlina Mohd Said** (2019). Post-reconstitution Stability of Amoxicillin- Clavulanic Acid Suspensions at Tropical Room Temperature. ***Journal of the Pediatric Infectious Disease Society*** 8(4); 368–36. Doi:10.1093/jpids/piz021.
- Yew-Keong Choong, Nor Syaidatul Akmal Mohd Yousof, **Jamia Azdina Jamal** & Mohd Isa Wasiman (2019). Determination of anthocyanin content in two varieties of *Hibiscus sabdariffa* from Selangor, Malaysia using a combination of chromatography and spectroscopy. ***Journal of Plant Science and Phytopathology*** 3:67-75. Doi:10.29328/journal.jpsp.1001034.

❖ **Halal Pharmaceuticals**

- Nurul F A Razak, Roziah H Abd Karim, Jamia Azdina Jamal & Mazlina Mohd **Said** (2020). Rapid discrimination of halal and non-halal pharmaceutical excipients by Fourier transform infrared spectroscopy and chemometrics. ***Journal of Pharmacy and Bioallied Sciences*** 12, S2:752-7. https://www.jpbsonline.org/text.asp?2020/12/6/752/300000.

***For details please refer to https://ukmsarjana.ukm.my/for further information.**

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## CONTACT US

## GEOGRAPHICAL LOCATION

The CDHD Faculty of Pharmacy is located at the heart of Kuala Lumpur, Malaysia. The nearest airport for Kuala Lumpur is Kuala Lumpur International Airport (KLIA & KLIA2). The KLIA Express or Transit trains will bring you directly from the airport to the city centre (KL Sentral Station) within 30-40 minutes. From this central station you can easily access other public transport systems (the LRT and monorel) to get to the campus (Station Chow Kit).

## OUR ADDRESS

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