

# Synthesis

EXPLORING RESEARCH • INSPIRING INNOVATION

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## CLIMATE CHANGE & DISEASE SHIFT IN MALAYSIA

- Optical Fibre Sensor for the Detection of Dengue
- Young Doctor's Day Programme for School Kids
- Universiti Putra Malaysia's Teaching Hospital (HPUPM)

A Comprehensive Fundamental,  
Clinical and Public Health Approaches

RESEARCH PERSONALITY

Prof. Datin Dr. Sherina Mohd Sidik

Coronavirus

Water Pollution: Public Awareness

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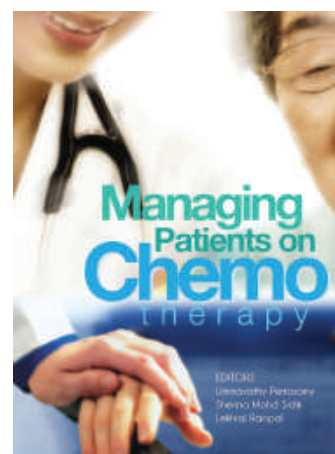
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**B**iomedical and health sciences research has always been the centre of focus in many countries for centuries. In fact, a portion of the tax-money has been allocated to research and development (R&D) in the country to improve the health and well-being of the people. The importance of R&D can be seen with the recent pandemic of COVID-19, which has swept the world with fear of the disease. Many parties are working together to curb the outbreak; healthcare providers nursing and treating the patients, scientists developing the virus detection system and vaccines, engineers creating tools for temperature detection and surface sanitising machine, and many more. All this expertise and creativity come from years of experience and hard work in R&D to create a better future for the nation and mankind.

Universiti Putra Malaysia is committed to making meaningful contributions towards wealth creation, nation-building and universal human advancement through exploration and dissemination of knowledge. Malaysia One Health University Network (MyOHUN) was established since 2012 to connect relevant agencies, including universities and government, to fight against infectious and zoonotic diseases such as COVID-19, dengue, malaria and leptospirosis. The R&D on Leptospirosis, ranging from fundamental to clinical studies, has been investigated extensively by the researchers in UPM. Besides, continuous technology development for the detection of dengue virus is also ongoing to improve the specificity and accuracy.

Health and well-being of the nation has become a key niche area of research in the university. Factors affecting the health of the community, particularly non-communicable diseases such as obesity and diabetes, are stealing the

**Hospital Pengajar UPM (HPUPM), a teaching hospital of UPM was recently established to serve as a multi-speciality centre in pioneering research and medical treatments.**

limelight. Not surprisingly, Malaysia has been crowned the fattest nation of the South-East Asia countries. In lieu, UPM has taken a step further, and the ongoing research on the gut microbiota and short-chain fatty acids profile could shed light to answer why our nation is generally overweight. Social scientists are also analysing the socio-demographic factors of this issue, especially in the welfare home. Other issues such as polluted drinking water by pharmaceutical residue could also pose a threat to the health and well-being of the nation. Researchers in UPM also work on prevention and treatment for diseases such as the usage of SAWDA™, a premium Herbatus Sauda oil that has enormous health benefits, and a new formulation of wound treatment for diabetic patients. Hospital Pengajar UPM (HPUPM), a teaching hospital of UPM was recently established to serve as a multi-speciality centre in pioneering research and medical treatments.

Disseminating knowledge not only to the students but to the general public is also one of the core values in UPM researchers. Several books, such as educating the public on how to manage patients who are on chemotherapy and educating university and college peers on HIV/AIDS prevention have been published. Researchers also conducted some programs such as Young Doctor Day to inspire school kids to be involved in health sciences in the future. In addition, occupational health and safety program was also conducted to educate the public their rights when it comes to health and safety at the workplace.

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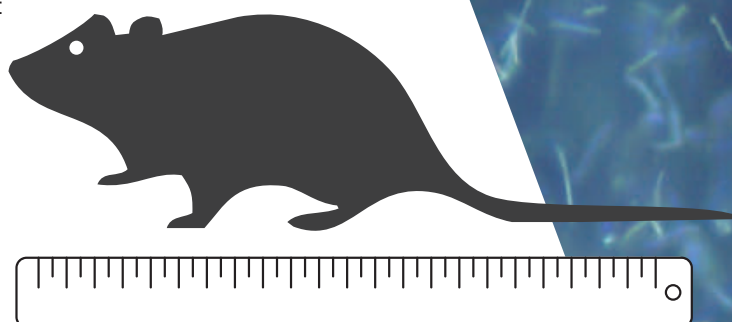
## Cover Story

“This year’s flood is extraordinary and scary”, cried one of the victims of a massive flood in Kelantan back in 2014. The flood caused an outbreak of leptospirosis or more popularly known as the ‘rat urine disease’ among the community there. Due to sporadic leptospirosis cases happening throughout the whole country compounded with hygienic issues with rats in our eateries and problems related to inaccurate diagnosis, the need to alleviate and reduce the disease mortality was strong. This was how our research group known as the Malaysia Leptospirosis Research Network (MyLepto) was born.

# Strategic Integrated Measures on Tackling Human Leptospirosis

## A Comprehensive Fundamental, Clinical and Public Health Approaches

MyLepto is a loose multidisciplinary research network of Malaysian researchers from various background who are actively involved in leptospirosis research. It is a platform where researchers come together and share knowledge and experiences in offering solutions to overcome the zoonotic disease. Prior to the formation of this research network, we applied for the Long-Term Research Grant (LRGS), a multidisciplinary and multi-institutional research grant offered by the Ministry of Higher Education (MOHE) Malaysia. The grant application was successful, and we were awarded close to RM4.7 million for a research duration of three years from 2015 to 2018. The objectives of the grant include searching for leptospirosis disease biomarkers and developing leptospirosis detection methods. Epidemiology and seroprevalence of the disease were also our focus. As the grant was multidisciplinary, it also





covered research activities such as gauging community knowledge, attitude and practices on leptospirosis, and investigate other lesser-known animal carriers of the spirochete leptospires which may transmit the disease.

Many outcomes and impact have been achieved and made from this strategic research collaboration. Among them are:

1. Leptospirosis knowledge, attitude, practice (KAP) of local communities in Selangor and Kelantan:
  - i. Proper integration of knowledge and attitude into forming an acceptable practice to reduce the transmission of *Leptospira* is important among the urban population in Malaysia.

- i. The potential use of lipopolysaccharide (LPS)-binding protein (LBP) as a diagnostic marker in differentiating leptospirosis patients from dengue patients.
- ii. Cytokines IL-6, IL-17a, and IL-22 can be used as prognostic markers for fatal leptospirosis.



- ii. Two documents on leptospirosis intervention module and questionnaire have been developed namely 'Modul Intervensi Promosi Kesihatan Leptospirosis' and 'Borang Soal Selidik Kajian Pengetahuan, Sikap, Kepercayaan dan Amalan Terhadap Penyakit Kencing Tikus Dalam Kalangan Masyarakat Bandar dan Luar Bandar Di Malaysia'.



2. Seroprevalence of leptospirosis: High seropositivity of leptospiral antibodies among healthy market workers indicates multiple past exposures. Wet markets and food premises may pose risk to marketgoers especially those who have never been exposed to leptospirosis.
3. Economic benefit of leptospirosis prevention: Health policies on prevention of leptospirosis should be made to save healthcare costs.
4. Diagnostic and prognostic biomarkers discovery for leptospirosis.
5. Clinical predictors for leptospirosis: Hypocalcemia, hypochloremia, and eosinopenia can be used as predictors in the absence of leptospirosis confirmatory tests.
6. Most common species of *Leptospira* infecting human in Central Peninsular Malaysia (Perak and Selangor) are *Leptospira interrogans* and *Leptospira kirschneri*.
7. New *Leptospira* species discovered
  - i. Knowledge on new potentially infectious *Leptospira* species i.e. *Leptospira putramalaysiae* (named after UPM) for human and animal health.



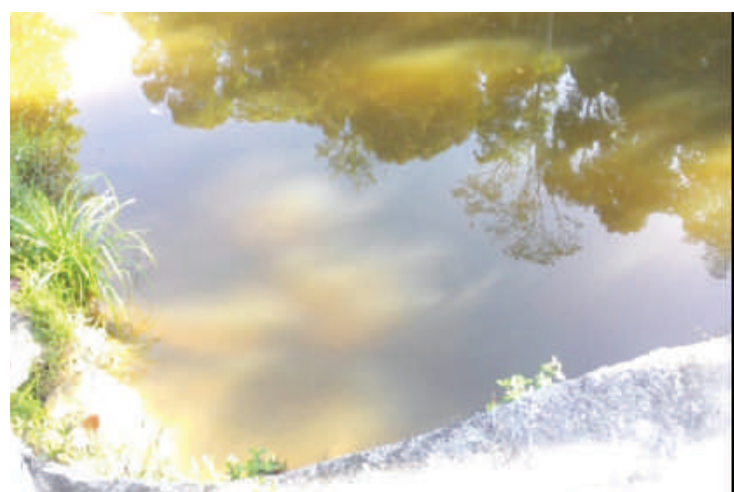
- ii. Diagnostic tools of leptospirosis will need to consider these new species.
- 8. New rapid detection method: A rapid, sensitive and specific loop-mediated isothermal amplification (LAMP) leptospirosis detection method that assists in the rapid diagnosis of leptospirosis by reducing turn-around-time (TAT).
- 9. Small mammals carrying leptospire
  - i. Leptospirosis control should be focusing more on recreational forests and urban environment.
  - ii. Awareness of reducing or eliminating rubbish quantity can assist in lowering the number of leptospirosis cases.
  - iii. Publication of guidelines, “Leptospirosis: Epidemiologi, diagnostik dan ekologi vektor”.

Throughout the three years of the project, we have collaborated with some notable international institutions such as WHO Leptospirosis Reference Lab in Amsterdam, Pasteur Institute in Paris, Global Leptospirosis Environmental Action Network (GLEAN), University of Cambridge and National University of Singapore (NUS). An international meeting cum workshop called GLEAN-MyLepto 2016 was held for the purpose of capacity building among personnel from around the Southeast Asia region on laboratory diagnosis of leptospirosis. Besides, research output among researchers were presented. The meeting has successfully galvanised a close working relationship among those present.

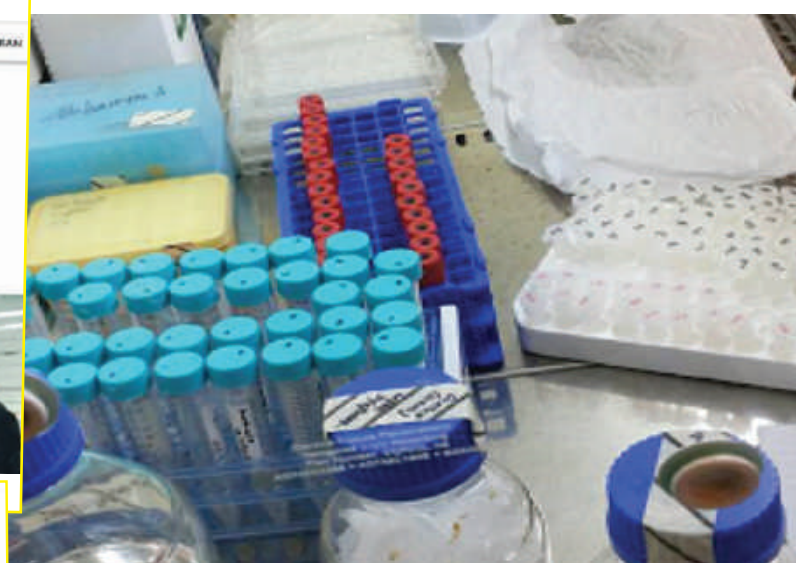
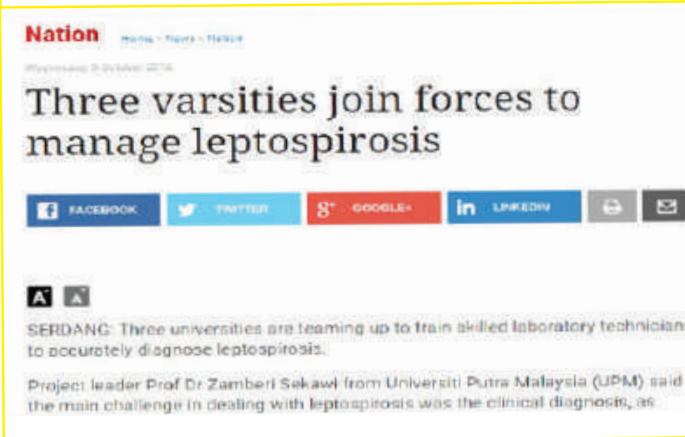
Furthermore, a few of our group members were given awards i.e. PECIPTA 2019 and Selangor R&D and Innovation Expo as well as research grants i.e. MRUN, PRGS, FRGS-RACER and UPM internal grants. New research questions and hypotheses generated from our previous LRGS research program can further be answered with these new research grants.

Also in line with our aspiration, we now have a fully functional laboratory that offers diagnostic service; the diagnostic test that we carry out include microscopic agglutination test (MAT) which is the gold standard diagnostic method and real-time PCR. This laboratory can function to meet the demand for fast and accurate lab results for early intervention of leptospirosis cases.

In the long run, leptospirosis vaccine and accurate point-of-care testing are needed to control and prevent the disease. To do this, we need to strengthen our current foundation work. More work is needed to study the clinical pathogenesis, in particular, studying the host-pathogen interactions. Surveillance on the pathogenic strains will be continued to ensure accurate epidemiology for the purpose of interventions in the future.







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# Malaysia One Health University Network (MyOHUN)

**Malaysia One Health University Network (MyOHUN)** was initiated in 2011 as part of the Southeast Asia One Health University Network (SEAOHUN) to promote the philosophy and spirit of One Health in working together to respond to new and emerging diseases. Under the Emerging Pandemic Threat and One Health Workforce (OHW) (2013-2019) project, MyOHUN is tasked to improve human capacity to detect, respond, and prevent the threat of infectious diseases in Malaysia through education and training of students and in-service officers. The United States Agency for International Development's (USAID) Emerging Pandemic Threat (EPT) program has been funding the aforementioned projects and will continue to provide funds for OHW-NG (Next Generation) from 2020 till 2024. The secretariat of MyOHUN, which is the National Coordinating Office, is located in the Faculty of Veterinary Medicine, Universiti Putra Malaysia. MyOHUN was chaired by Prof. Dato' Dr. Mohd Hair Bejo (2013-2019) and is currently chaired by Prof. Dr. Abdul Rahman Omar, whilst the National Coordinating Office is headed by Prof. Dr. Latiffah Hassan, who is also the Coordinator of MyOHUN (2013-current).

One Health is a concept and approach that helps people understand and address health challenges arising from the fact that people, animals, and our environment are inextricably linked and that a threat to one poses a threat to all. Through the philosophy of One Health, MyOHUN's transdisciplinary training approach instils and nurtures the skill of collaboration and partnership amongst people of different backgrounds. Collaborations between member universities, ministries, government agencies, and communities create synergies that allow MyOHUN to develop and execute some of the most unique training activities among member universities and ministries. These trainings are all targeted to the vision and mission of MyOHUN which is to create a network of social and intellectual excellence on One Health against infectious and zoonotic diseases of national and global concern as well as to link and enables universities,

government, and relevant agencies to generate social and intellectual capital on One Health against infectious and zoonotic diseases.

MyOHUN has formulated and executed more than 90 national-level training since 2013. Our workforce pool has reached more than 2300 among ministerial officers, academicians, researchers, and students from multiple disciplines and fields. Some of our most creatively designed training includes field simulations, tabletop exercises, national workshops, seminars, and forums and field-based SCL activities.

MyOHUN strives to maintain mainstream and current to the most updated global health concerns and issues. For example, since 2016, MyOHUN has been actively involved in national efforts to provide training platforms that improve awareness and understanding of antimicrobial resistance (AMR) in both animals and human health locally and regionally. Moreover, in the face of emerging zoonotic disease events, MyOHUN has actively collaborated with the ministries to organise annual field exercises and simulations for diseases such as avian influenza and rabies. These field activities have incorporated academicians from UPM and other universities as observers (or actors), which led to an added dimension of learning among the academicians that have been brought into their classroom to benefit students. MyOHUN's training on One Health for the future workforce includes exciting interdisciplinary training programs for postgraduate education on experiential field learning and table-top exercise for disease outbreaks, undergraduate community extension education for marginalised communities, ecosystem health, In-Situ problem-based learning, and One Health young leader and communicator. These student-level training programmes situate young individuals from multiple universities and of various backgrounds to enable them to work together for a common objective.





MyOHUN has successfully published three books; *A Problem-Based Learning Approach: One Health Cases, One Health Manual on Handling Disease Outbreak in Malaysia*, and *The Manual for Laboratory Diagnosis of Leptospirosis: One Health Approach*. MyOHUN is finalising the publication of *Protecting First Responders Against Zoonoses During Disaster Management Module, A Problem-Based Learning Approach: One Health Cases Book II, Field Epidemiology Teaching Module, and Module for Community Education and Field Training on Zoonotic Disease Introduction, Transmission, and Prevention for Orang Asli School Children*.

On top of all of the above, MyOHUN has funded 20 researches through our seed funds for community-based extension projects. MyOHUN members have successfully published 15 journal papers since 2013, most of which are in reputable journals. These research papers are products of collaborations between ministerial officers, academicians, and post-graduate students from multidisciplinary backgrounds.

### Current Project

MyOHUN will continue its effort in a newly funded program called One Health Workforce-Next Generation (OHW-NG). OHW-NG involves the United States-based consortium comprising of universities and agencies led by the University of California Davis. Other members of

this consortium include the University of Columbia, University of New Mexico, University of California Berkeley, University of California Irvine, EcoHealth Alliance, Sandia National Laboratories, and Ata Health Strategies. Consortium members have long-established collaborations, including current joint programs in global health security strengthening, especially for zoonotic disease surveillance, biothreat preparedness, and community engagement. Working together with the consortium and led in the region by SEAHOUN, MyOHUN will work harder to facilitate the transformation of the Malaysian workforce to be more effectively engaged across sectors to prepare the current and future One Health workers to prevent, detect, and respond to emerging disease threats.



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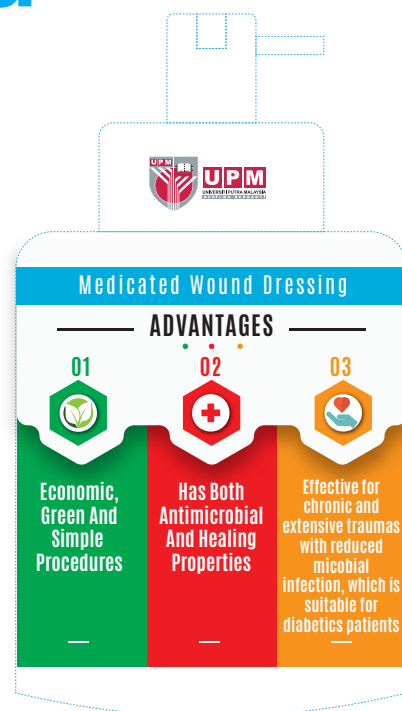
# MEDICATED WOUND DRESSING

The technology highlights an effective bacterial nanocellulose preparation, which was locally isolated from rotten fruits and incorporated to the nanomaterial synthesised by a green method to produce green nanocomposite wound dressing. It focuses on the fabrication of wound dressings with efficient antimicrobial activities accompanied with healing-promoting biomaterials by a green and economical process to treat chronic and extensive traumas.

It discloses the use of a green wound dressing for healing minor and intensive injuries in diabetic patients. The dressing comprises of bacterial nanocellulose and at least one green synthesised inorganic nanoparticle.

### Market Potential

The ageing population is one of the major drivers of advanced wound care markets worldwide. The rate of diabetes mellitus is rapidly increasing on the back of an ageing population and lifestyle choices. It is estimated that about 617 million people are aged 65 or more at present, worldwide. By 2050, this number is expected to jump to 1.6 billion. Malaysia has around 3 million diabetic population. Therefore, there is a need for developing bacterial nanocellulose composite wound dressings with antimicrobial, high healing properties and greener methods of preparation. It has a great potential application to be used in the wound care industry and end-users.



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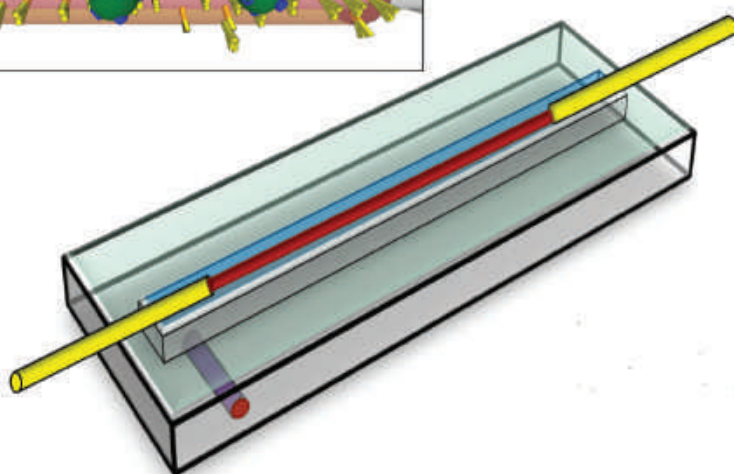
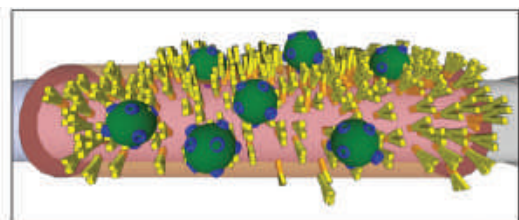
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# Optical Fibre Sensor for the Detection of Dengue (DENV II E Protein)

## Technology Description

This technology is an optical sensor for the detection of DENV II E protein and to monitor dengue infection and progression. This technology utilises a label-free DENV II detection using a single-mode tapered fibre of which its surface has been modified to specifically interact with the DENV II E proteins. The technology allows quantitative measurements of DENV II E protein with a low detection limit. A concentration of 1pM is sufficient for detection within the first few hours after infection occurs. This technology allows rapid detection and takes only 15 minutes. It functions well at room temperature and produces highly reproducible results.



## ADVANTAGES

Accurate detection of the virus



Precise monitoring of viral infection and its progress



A tool that would lead to a better clinical management of the infection



High sensitivity



Compact size



Simple testing procedure



## Market Potential

The sensor can be utilised by healthcare providers and research institutes for diagnostics and monitoring of infections as well as observation of the virus physiological effects.



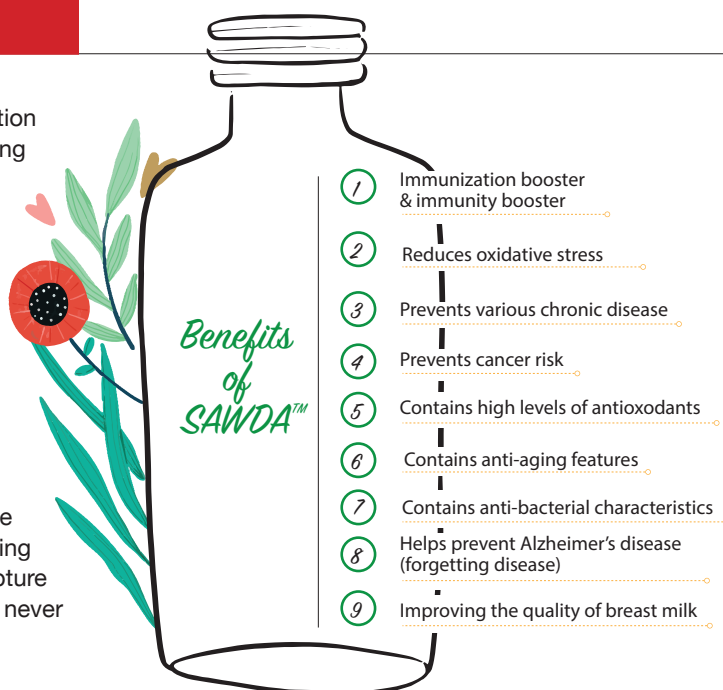
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The development of Thymoquinone Rich Fraction (TQRF) that has begun years ago and is still ongoing is primarily done to discover the potential of thymoquinone from habbatus sauda (*Nigella sativa*). The yield extracted through this green platform technology, Supercritical Fluid Extraction has shown potential in treating ailments such as cardiovascular disease (CVD), Alzheimer's disease, and cancer. It has the capability to slow down the ageing process, reduce post-menopausal syndrome and treat high-cholesterol in blood.

TQRF in the form of oil, SAWDA™ is positioned as a high-end supplement product with a competitive price. It allows consumers to experience the healing effects of TQRF. The competitive price is going to capture the intended market with all the benefits that one can never imagine.



# SAWDA™

## Premium Herbatus Sauda Oil



SAWDA is a food category and 100% Rich Fraction Extract using Supercritical Fluid Extract System from Universiti Putra Malaysia (UPM).

### The Technology Behind SAWDA™

SAWDA™ is an extract from *Nigella sativa* seeds (Habbatus sauda or black seeds) obtained by Supercritical Fluid technology. This patented technology is able to trap and concentrate more thymoquinone as the major active component of SAWDA™ compared to conventional methods. It is an efficient process for preparing thymoquinone-rich fraction (TQRF). SAWDA™ can be used as an excellent ingredient in various industries e.g. pharmaceutical, cosmetic and health industries. It is scientifically proven to have high antioxidant activity, anti-aging and cardioprotective properties and aids the prevention of Alzheimer's disease.

### Applications of SAWDA™

**Antioxidant – SAWDA™** acts as an antioxidant which helps to relieve oxidative stress involved in many different diseases and aging.

**Nutraceutical- SAWDA™** can be incorporated into functional food products for the prevention of diseases.

#### Health Benefit – Research Fellow

show that SAWDA™ is effective in the prevention of chronic diseases such as cancer, diabetes, Alzheimer, colon cancer and have cardioprotective properties.

**Cosmetic - SAWDA™** antioxidant properties serve as an excellent anti-aging and skin whitening agent, making it an ideal base ingredients for cosmetic products.

**Environmentally Friendly –** This extraction technology using SFE is environmentally friendly and non-toxic compared to conventional extraction using hexane.

SAWDA™ is also effective for external use

- Deep cut wounds
- Chest for cough
- Nose for colds and sinuses
- Toothache and gums
- Sweep your head for fever
- Body skin for eczema and inflammation



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