EXECUTIVE SUMMARY

The TYAN-YSN International Thematic Workshop on Cancer 2018 is the second of TYAN’s series of international thematic workshops. These workshops aimed at improving knowledge in specific research areas serve as a platform to close the scientific gap between scientists in the developed and developing countries and to promote international and interdisciplinary collaborations to address global challenges. The TYAN-YSN International Thematic Workshop on Cancer 2018 was held in Malaysia from the 30th of October – 1st of November 2018 at the Higher Education Leadership Academy Malaysia. Forty-six participants (43% male, 57 female) from 14 countries (including 2 science- and technology-lagging countries) attended this cancer research-centric workshop consisting of 13 lectures, 34 poster presentations, 2 break-out session and 1 cancer research centre visit, to discuss scientific challenges and advancements in the areas of drug repurposing, precision medicine and digital technologies. We anticipate that this workshop would result in the development of meaningful collaborations that will culminate in impactful research projects that could improve global health and societal well-being.

BACKGROUND

The World Academy of Sciences (TWAS)-Young Affiliate Network (TYAN) was established in 2016 to harness the strengths of young scientists in the developing world to advance scientific knowledge and to address pertinent challenges within our communities. Working with the Young Scientist Network-Academy of Sciences Malaysia (YSN-ASM), TYAN conducted a workshop entitled “Bridging the Gap, Fostering Leadership in Cancer Research” to increase knowledge and build capacity in cancer research amongst young scientists in the Asia Pacific Region and globally.

Sixty percent of the world population resides in Asia and half of the global burden of cancer are diagnosed in this region. Due to aging and growing populations, lifestyle and socioeconomic changes, the incidence of cancer is estimated to increase from 6.1 million in 2008 to 10.6 million in 2030. The existing and emerging cancer burden in different regions of Asia call for concerted efforts to not only improve healthcare through strong policies and access to effective treatments, but also to intensify scientific research in increasing our understanding of the cancers that are most common in our region and to utilize scientific advancements such as genomics and digital technologies to build capacity in screening, diagnosis, and treatment of cancer patients.

Although the capacity for scientific knowledge advancement may vary amongst countries in this region, the aim of the workshop is to identify niche areas where there are commonalities or where there are opportunities to address scientific challenges by leveraging on the collaborative strengths of different partners in the region. In line with meeting the United Nations Sustainable Development Goals (UN SDG), the idea is to initiate a platform that enables us to maximize the creativity and intellectual skills of scientists in the region in making an impact in the issues that are most relevant to the developing world and those that are important overall for humanity.
**AIMS**

This workshop aimed to provide a platform to advance our knowledge and understanding of cancer by fostering interdisciplinary and international collaborations. The specific objectives include:

i) to provide a platform to exchange ideas and improve the scientific interactions and discourse among young scientists in the region

ii) to increase knowledge and to build capacity in specific thematic areas of cancer research

iii) to identify niche areas in cancer research that will result in strategic cross-border scientific collaborations

iv) to initiate collaborations to address regional issues particularly in the areas of the United Nations Sustainable Development Goals (UN-SDG)

**WORKSHOP ORGANIZATION**

1. Partners

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Young Scientists Network and Academy of Sciences Malaysia (YSN-ASM):</strong> Established in 2012, YSN-ASM is an organization consisting of outstanding scientists in Malaysia. YSN serves as a platform for young scientists to advance science in Malaysia and become a significant contributor to global science, engineering, technology and innovation. The TYAN-YSN International Thematic Workshop on Cancer 2018 is the second collaboration between TYAN and YSN-ASM, the first being the organization of the ASEAN Science Leadership Program in 2017. In this workshop, YSN-ASM members helped to develop the workshop program, reviewed applications and selected participants together with TYAN members. In addition, YSN-ASM members were also invited as speakers at the workshop and facilitated the break-out sessions.</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Higher Education Leadership Academy (AKEPT):</strong> The mission of AKEPT is to be recognized as the premier referral center pertaining to talent management, leadership competencies for higher education institutions. It has a role to develop higher education talent pool of balanced leaders with the relevant knowledge, competencies and culture of excellence. AKEPT co-hosted the workshop and provided accommodation and meals for all participants. Notably, AKEPT co-organized the leadership session on Day 3 by inviting 2 distinguish Professors from Malaysian research universities to share their experience in building collaborations and leadership in research. These speakers were Prof Raha Abdul Rahim (Ministry of Education) and Prof Ekhwan Toriman (Deputy Vice-Chancellor, Research and Innovation Affairs, Universiti Kebangsaan Malaysia).</td>
</tr>
<tr>
<td>3.</td>
<td><strong>Chinese Academy of Sciences (CAS):</strong> The Chinese Academy of Sciences is the linchpin of China’s drive to explore and harness high technology and the natural sciences for the benefit of China and the world. CAS brings together scientists and engineers from China and around the world to address both theoretical and</td>
</tr>
</tbody>
</table>
applied problems using world-class scientific and management approaches. The Bureau of International Cooperation, CAS assisted in inviting Professor Hongbin Ji from the Shanghai Institute of Biochemistry and Cell Biology, Chinese Academy of Sciences to speak at the workshop.

4. **UK Science & Innovation Office, British High Commission Malaysia:** The Science and Innovation Office promotes and facilitates international collaboration in research and innovation. In support of this workshop, this office supported the travel of 2 speakers from the UK – Professors Sarah Barman and Sanjeev Krishna.

5. **Cancer Research Malaysia (CRM):** CRM is an independent and non-profit cancer research organization based in Malaysia. Funded by donations and research grants, CRM conduct research in niche cancers often found in our Asian population. CRM staff worked with other partners in the organization of the workshop. CRM also hosted the laboratory visit on Day 3.

### 2. Organizing committee

The organizing committee was made out of representatives from most of the partner organizations. These included advisors from fellows of the Academy of Sciences Malaysia and AKEPT, members from TYAN YSN-ASM and CRM. The list of organizing committee members is detailed in Appendix (page 16-17).

![Organizing committee members from CRM and TYAN.](image)

### 3. Venue

The event was hosted at the Higher Education Leadership Academy Malaysia (AKEPT) situated at Lebuh Enstek, 71760 Bandar Enstek, Negeri Sembilan (25 minutes from the Kuala Lumpur International Airport). AKEPT was a very conducive environment for the workshop as it is a fully functional conference center where the workshop was held in training rooms and the leadership session was organized in its auditorium. The accommodation for all participants was also on-site.
The program consisted of 13 lectures, 2 break-out session, 1 dedicated poster session and 1 laboratory visit. The detailed program is detailed in the Appendix (pages 18-20).

1. **Thematic focus areas**
   Based on the current global advancements in cancer research and the aim to develop a platform that promotes interdisciplinary research, this workshop was conducted around 3 thematic focus areas namely 1) drug repurposing 2) precision medicine and 3) digital technologies.

2. **Setting the scene for the workshop**
   On Day 1 Dr Sok Ching Cheong introduced TYAN and YSN-ASM. She stressed on the vision and mission of these organizations where a big focus is in the development of young scientists through international co-operation and collaboration. She also talked about how the workshop came into fruition and introduced the key individuals behind the organization of the workshop. She urged the participants to participate actively, to make lasting friendships through building trust and understanding of each other’s strengths. Subsequently, each day of the workshop started with a recap of the previous day and an introduction to the program for the current day.

3. **Speakers**
   We had 13 local and international speakers across the 3 thematic focus areas. The list of speakers, their profiles and abstracts are detailed in the Appendix (pages 22-34).

Professors Hongbin Ji, Chee Onn Leong, Sanjeev Krishna, Yusuf Baran, Patricia Zancan, Sok Ching Cheong and Sarah Barman.
Participants

The call for application to join the workshop was sent out on the 14th of September 2018. Following the call, 93 scientists applied through an online application form. Of these, 24 were from science- and technology-lagging countries (SLC). Fifty-six and forty-four percent of the applicants were male and female respectively. Submission deadline was set on the 14th of October 2018. Forty-five applicants were short-listed, of these 7 were from (SLC). Finally, thirty-three participants attended the workshop. The main reduction of the number was because we were not able to secure funds from TWAS to support applicants from SLCs at the last minute. Together with the speakers, the total number of participants was 46 (43% males, 57% females) representing 14 different countries including Malaysia, Brazil, Turkey, Lebanon, United Kingdom, Japan, Indonesia, Vietnam, Thailand, Pakistan, China, Cuba, Yemen and Myanmar.
5. Lectures

Thematic focus 1: Drug development
Sessions I and II on drug development were chaired by Professor Hongbin Ji from the Chinese Academy of Sciences and Dr. Kue Peng Lim from Cancer Research Malaysia, respectively. The first speaker in this area was Professor Sanjeev Krishna, who spoke on “Drug Repurposing: a solution for cancer treatment in low- and middle-income countries (LMICs)”. During the introduction of his presentation, Prof Sanjeev made a notable statement that ‘Cancer is a neglected disease in many LMIC’. This is mainly due to the cost of treatment. Therefore, with drug repurposing initiatives, there is an opportunity to save time and cost as opposed to developing new drugs, especially for cancer treatment. In his talk, Professor Krishna focused on his work in repurposing artesunate a malaria drug for the treatment of colorectal cancer. Other topics covered in this session were cancer informatics & drug repurposing, targeting cancer metabolism, understanding multidrug resistance in cancer, cancer stem cell models, understanding inflammatory signals in gastric cancer and targeting sirtuin for the treatment of cancer.

Thematic focus 2: Precision medicine
Chaired by Professor Soo-Hwang Teo from Cancer Research Malaysia, this session focused on the use of genomics and genetics for precision medicine in treatment and screening. The first speaker Professor Hongbin Ji focused his talk on the use of genetically-engineered mouse models to dissect the molecular mechanisms of adeno-squamous transition and how these could contribute to drug resistance. Another 2 talks in this session were on the need to understand genetics amongst Asian women for breast cancer risk-stratification, and the availability of data in the public domain for cancer research which can be very useful when deriving research hypothesis or for the validation of our own results.

Thematic focus 3: Digital technologies
This session which was chaired by Professor Sanjeev Krishna aimed to expose the workshop participants to the use of artificial intelligence in medical research. In the first talk, Professor Sarah Barman presented her work on the use of computer vision and deep learning in predicting risk of vascular disease from pictures of the retina. This was followed by another talk on the application of artificial intelligence in
empowering users including clinicians. The final talk was on a mobile phone App developed to facilitate early detection of oral cancer and how deep learning could potentially be integrated to identify individuals with high-risk oral lesions and triage them automatically.

Professor Hongbin Ji, Dr. Kue Peng Lim, Professors Soo-Hwang Teo and Sanjeev Krishna chairing the respective sessions.

6. Poster session
All participants presented a poster and in total 34 posters were presented around the 3 thematic focus areas. An hour and a half were dedicated to poster presentation on the 30th of October 2018. Discussion on the posters continued throughout the workshop during the respective tea breaks. The titles and abstracts of presented posters are tabulated in the Appendix (pages 35-69).
Participants seen to be engaged with active discussion during the poster session.

7. **Break-out sessions**

There were 2 break-out sessions during the workshop and both were moderated by Dr. DeMing Chau from YSN-ASM. The participants were divided into 5 groups for a 45 minutes discussion and following this, a representative from each group presented the outcomes of the discussions. The first break-out session on the 30th of October 2018 discussed the career challenges young scientists face in their home country. Five questions were posted to the participants to guide the discussion. These were:

1. Does your research institute have particular focus areas/strengths in cancer research? If yes, what are they?
2. Does your country have a particular focus area/strength in cancer research? If yes, what are they?
3. What are the gaps of knowledge or expertise in cancer research in your research institute or country?
4. What are the existing institutional/national/regional collaboration opportunities can participants of this workshop consider?
Discussion summary: A consistent theme across all groups was the need to have top-down efforts from to consolidate research in the country based on the strengths of the country and its scientists, and allocate funding accordingly. This is particularly pertinent when the research community is small and funding is limited. This approach would help in further strengthening the science in each country which could also mean focusing the research to address issues that are most pertinent in the respective country. When research focus areas are defined clearly, this should help streamline the training of the next generation of scientists accordingly to continue to build strengths in the identified areas and be internationally competitive. Two of the five groups have highlighted that the areas of strength in the country are in natural product drug discovery and in head and neck cancer research. All teams identified the lack of platforms for the building of multi-disciplinary teams particularly for translational research as a gap that needs to be urgently addressed if the low- and middle-income countries. The building of such teams can help address some of the other gaps including the challenges in keeping up with technology where each sector can focus on its respective scientific developments and yet apply this across different cancer research areas.

The second break-out session on the 31st of October 2018 discussed what young scientists think of their role in giving back to society. Again, to guide the group discussion, Dr. Chau presented the participants with the following questions:

1. How would you define social responsibilities? What are our social responsibilities as researchers?
2. How may we contribute to improving the state of cancer in our community/country in addition to conducting our experiments?
3. What are the existing platforms, opportunities or support for us to do this? If none, how may we be proactive in creating it?
4. How may we nurture and mentor the next generation of scientists or even our close colleagues to be aware and carry out their social responsibilities?

Discussion summary: Most groups felt that the social responsibilities of scientists are to educate the public about prevention and early diagnosis of cancer and serve as advocates. These could be done through publishing articles for the lay public both on mainstream and social media, working hand-in-hand with non-governmental organizations (NGO) and running of educational workshops. The YSN-ASM and TWAS-TYAN were cited as platforms that could be leveraged on for young scientists to work together to perform their social responsibilities. Most scientists feel that the next generation of scientists should be nurtured to contribute to society as early as possible including inculcating these responsibilities during primary school days and reinforcing these in our post-graduate training. Many participants felt that mentors and bosses have a role to play in highlighting the importance of social responsibilities of scientists.

Both break-out sessions were very interactive and fruitful as all the participants were able to voice their opinions and find a common ground at the end of the session. These sessions were quite touching to some of the young scientists in the workshop as they felt for a very rare occasion that their voices were heard and together, they may be able to address some of the challenges that they are facing.
Dr. DeMing Chau moderating the break-out sessions and participants engrossed in discussions within the various groups. Participants took turns in presenting the outcome of their discussions.

8. Leadership session “How do you future-proof your career in a technologically evolving world?”
This session was chaired by Datin Paduka Professor Dr. Khatijah Yusoff from Academy of Sciences Malaysia. Professor Raha Abdul Rahim gave an overview of the performance of the universities in Malaysia and the talked about the strengths of Malaysian scientists as documented by Scopus. She also gave a very inspiring talk on her own journey in developing her career as a scientist and administrator. Notably, her message to the young scientists was that having administrative duties is not an excuse to perform poorly as a scientist. Professor Ekhwon also shared his journey as a scientist and his career development in becoming a deputy-vice chancellor of one of Malaysia's research universities.

The lectures were followed by a panel discussion that was moderated by Dr. Sok Ching Cheong. The panelist on the panel included Professor Abhimanyu Veerakumarasivam (YSN-ASM), Professor Dr Patricia Zancan (TYAN-Latin America and the Caribbean Regional Partner), Professor Yusuf Baran (TYAN-South and Central Asia Regional Partner), Professor Hongbin Ji (CAS), Professor Ekhwon Toriman (UKM) and Professor Sarah Barman (Kingston University, UK). The focus of the discussion was on the elements that could prepare scientists from low- and middle- income countries for a successful and sustainable career. The discussion started on curiosity, how this can be cultivated and sustained amongst our scientists. Professor Abhimanyu stated that every individual is born curious however, this can be dampened by the education system that may not necessarily cultivate creative thinking. This is exacerbated by rigid key performance indices that lead scientists to go for the low-hanging fruits rather than to take risks in pursuing novel ideas. Scientists who have trained in international laboratories may have an advantage in spring-boarding his/her scientific career however the panel stressed that finding a mentor that has aligned interests is more important than just looking for someone renowned to work
with. The panel however pointed out that scientists who are trained in their home country could have advantages in being more creative and resourceful as these can be cultivated out of need when working in a low-resource setting. The understanding of how to navigate the research ecosystem in this instance may give locally-trained scientists a head-start in this individual’s career. Whether a scientist is trained locally or internationally, sustainability is always at the forefront of every scientists’ mind. The panel discussed this at great length citing mentoring (as practiced in China) as an important aspect in helping to develop young scientists both intellectually and financially. Further, collaboration with more established scientists could also be useful when young scientists try to establish themselves. Professor Khatijah Yusoff brought up an important point about the social responsibility of young scientists and how this can be integrated into the work that they do on a daily basis. The panel stressed that as young scientists pursue their career, an important aspect is integrity and ethics. Scientists have a responsibility not only to push the boundaries of science but to use the knowledge that they have to develop the next generation of scientists and to educate the public. Dr. Cheong rounded-up the session by asking the panelist to share how they were able to develop their own careers and reach their set goals. Having heard from all these successful scientists, it seems that vision, team work, persistence, and hard-work got them where they are today.

Professor Raha Abdul Rahim sharing her personal career development journey and the panelists on the panel discussion.

9. Visit to Cancer Research Malaysia

Cancer Research Malaysia (CRM) is the only not-for-profit research institute dedicated to cancer research in Malaysia. On the 1st of November 2018, participants from the workshop visited CRM where they had a chance to discuss the projects that were conducted in CRM through poster presentations by scientists in CRM including CRISPR/cas9 essential screens to identify novel therapeutic targets for head and neck cancers, the development of preventative and therapeutic vaccines for head and neck cancers, genetics for risk stratification for breast cancer screening and drug repurposing using unique bioinformatics tools developed by CRM. The posters presented at CRM were:

<table>
<thead>
<tr>
<th>NO.</th>
<th>PRESENTER</th>
<th>POSTER TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Annie Wai Yeeng Chai</td>
<td>Genome-wide CRISPR-Cas9 knockout screen identifies genetic vulnerabilities of oral squamous cell carcinoma (OSCC)</td>
</tr>
<tr>
<td>2</td>
<td>Bernard Kok Bang Lee</td>
<td>Exploiting gene expression signatures to identify therapeutic agents for OSCC</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Presentation Title</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Pei Jean Tan</td>
<td>Identification and development of novel anti-lymphangiogenic compounds as cancer therapeutics</td>
</tr>
<tr>
<td>4.</td>
<td>Chai Phei Gan</td>
<td>Immunotherapy for Head and Neck Cancer Prevention and Treatment</td>
</tr>
<tr>
<td>5.</td>
<td>Dr. Lim Kue Peng</td>
<td>Immunotherapy for Head and Neck Cancer</td>
</tr>
<tr>
<td>6.</td>
<td>Dr. Pan Jia Wern</td>
<td>Broad genomic and transcriptomic profiles of Asian breast cancer</td>
</tr>
<tr>
<td>7.</td>
<td>Dr. Joanna Lim, Patsy Pei Sze Ng</td>
<td>Prevalence of germline BRCA1 and BRCA2 variants in a population-based cohort of ovarian cancer patients in Malaysia</td>
</tr>
<tr>
<td>8.</td>
<td>Dr. Muhammad Mamdulh Ahmad Zabidi</td>
<td>Prevalence of PALB2 mutations in an unselected cohort of breast cancer patients and unaffected individuals from Malaysia and Singapore</td>
</tr>
<tr>
<td>9.</td>
<td>Dr. Tan Min Min</td>
<td>Genomic Analyses of Malaysian Breast Cancers Unravel Molecular Differences from Caucasian Breast Cancers</td>
</tr>
<tr>
<td>10</td>
<td>Dr. Tan Min Min</td>
<td>Polygenic Risk Scores and Breast Cancer Screening</td>
</tr>
<tr>
<td>11</td>
<td>Nadia Rajaram</td>
<td>The feasibility of a dietary soy intervention among Malaysian women</td>
</tr>
</tbody>
</table>

Participants engaged in active discussions with scientists at Cancer Research Malaysia during the laboratory visit.
ANTICIPATED OUTCOMES

When the TYAN-YSN International Thematic Workshop on Cancer 2018 was planned, we anticipated the following outcomes:

1. **Capacity building**: We would like for participants in the region to learn about the latest developments in specific areas of cancer research. This was achieved through the lectures and discussions on the 3 thematic focus areas.

2. **Scientific niche areas**: We focused on 3 thematic areas that are pursued widely by cancer researchers globally, however, we designed these to leverage on the strengths of young scientists in the region. In the current situation where most new cancer drugs are too expensive for our patients, we focused on the opportunities and ways for which drugs approved for other indications can be repurposed for the treatment of cancer. With 60% of the world’s population residing in Asia, our session on precision medicine discussed how Asian genetics can influence cancer treatment and screening strategies. In low- and middle-income countries, where funding and clinical expertise may be limited, scientists need to leverage innovative strategies for early detection and monitoring of disease. The use of artificial intelligence in the early detection of cancer particularly for oral cancer was discussed in the 3 thematic focus on digital technologies.

3. **Scientific interactions and friendships**: Cross-disciplinary discussions are important to spark new ideas and to innovate. Most of all the workshop participants stayed on site during the workshop and therefore had a lot of time to interact. In addition, the workshop was designed to have many interactive sessions and because we intentionally kept the number of participants relatively small, we were able to have many meaningful scientific discussions.

4. **Interdisciplinary international collaborations**: While it is too early to determine the number of collaborations that will result from the interactions at this workshop, we anticipate that these will happen in due course and we will report on these in the near future.

5. **Meeting the United Nation Sustainable Development Goals (UN SDGs)**: This workshop’s main focus is on Goal 3 which is health and well-being. We anticipate that the knowledge and relationships from this workshop will contribute significantly to this goal.

VISIBILITY

The TYAN-YSN International Thematic Workshop on Cancer 2018 was featured in an article on SciDev.Net. We also posted the news and pictures in social media to increase the visibility of the workshop including in the TYAN-YSN, Cancer Research Malaysia and the Young Scientists Malaysia Facebook pages. In addition, a write up on the experience of one of the participants of the workshop is published in the Malay language in Majalah Sains.

PARTICIPANT FEEDBACK AND LESSONS LEARNED

We had extremely good engagement from the participants throughout the workshop. We received excellent feedback from the participants where 92.6% of the participants rated the workshop as *above average* and *outstanding*. The session that was rated the highest was the poster session.
The committee felt that the following factors contributed to the success of the workshop:

1. Participants had to apply to the workshop, this preselected scientists who were motivated to participate actively at the workshop.
2. Participants were selected based on their research areas and track-record, this enabled us to focus on the 3 selected thematic areas and helped us select young scientists who wanted to contribute in a wider sense to society.
3. Communications were initiated with the participants before they arrived at workshop and workshop materials were sent ahead of time, this enabled participants to prepare for the workshop and to determine who they may want to collaborate with even before they arrived.
4. Each participant presented a poster - this served as a quick way to get to know one another’s work to find possible ways of working together.
5. Involvement and engagement of various stakeholders and partners, the workshop was successfully organized because each partner brought together different strengths.

We had some issues with securing TWAS funding to enable scientists from SLCs to attend the workshop. While the application to secure this funding was submitted in May 2018, we were unsuccessful in getting this funding at the last minute and of the 7 of the shortlisted scientists from SLCs, only 2 were able to attend with their own funding. This was unfortunate as the applications were of very high quality and we could have an opportunity to promote collaborations with these countries. For future applications of the use of such funds, better clarity on how to access these funds will be necessary.
TYAN-YSN International Thematic Workshop
“Bridging the Gap, Fostering Leadership in Cancer Research”

30 Oct - 1 Nov 2018
Akademi Kepimpinan Pendidikan Tinggi (AKEPT)
Advisors:

Puan Hazami Habib
CEO, Academy of Sciences Malaysia

Datuk Prof Dr Rohana Yusof
Director, Higher Education Leadership Academy (AKEPT)

Datin Paduka Prof Khatijah Yusoff, FASc Academy of
Sciences Malaysia Universiti Putra Malaysia

Prof Soo Hwang Teo, FASc, OBE
Academy of Sciences Malaysia
CEO, Cancer Research Malaysia

Organizing Committee:

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Sok Ching Cheong</td>
<td>TWAS Young Affiliate Network (TYAN)</td>
</tr>
<tr>
<td></td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td></td>
<td>Young Scientists Network</td>
</tr>
<tr>
<td>Prof Abhimanyu Veerakumarasivam</td>
<td>Young Scientist Network</td>
</tr>
<tr>
<td></td>
<td>Sunway University, Malaysia</td>
</tr>
<tr>
<td>Prof Patricia Zancan</td>
<td>TWAS Young Affiliate Network (TYAN)</td>
</tr>
<tr>
<td></td>
<td>Federal University of Rio de Janeiro</td>
</tr>
<tr>
<td>Prof Yusuf Baran</td>
<td>TWAS Young Affiliate Network (TYAN)</td>
</tr>
<tr>
<td></td>
<td>Izmir Institute of Technology</td>
</tr>
<tr>
<td>Prof Chee Onn Leong</td>
<td>Young Scientists Network</td>
</tr>
<tr>
<td></td>
<td>International Medical University (IMU)</td>
</tr>
<tr>
<td>Dr Mohd Ghows Mohd Azzam</td>
<td>Young Scientists Network</td>
</tr>
<tr>
<td></td>
<td>Universiti Sains Malaysia (USM)</td>
</tr>
</tbody>
</table>
### Organizing Committee:

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Chern Ein Oon</td>
<td>Young Scientists Network</td>
</tr>
<tr>
<td></td>
<td>Universiti Sains Malaysia (USM)</td>
</tr>
<tr>
<td>Dr Deming Chau</td>
<td>Young Scientists Network</td>
</tr>
<tr>
<td></td>
<td>Universiti Putra Malaysia (UPM)</td>
</tr>
<tr>
<td>Dr Kue Peng Lim</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Dr Annie Chai</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Dr Pei Jean Tan</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Ms Chai Phei Gan</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Mr Bernard Kok Bang Lee</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Ms Fui Fong Yap</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Mr Azim Haris</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Mr Mohd Faeez Bin Mat Ramli</td>
<td>Cancer Research Malaysia</td>
</tr>
<tr>
<td>Ms Norazwa Musiran</td>
<td>Academy of Sciences Malaysia (ASM)</td>
</tr>
<tr>
<td>Mr Hendy Putra Herman</td>
<td>Academy of Sciences Malaysia (ASM)</td>
</tr>
<tr>
<td>Dr Wan Nur Ibtisam Bt Wan Ismail</td>
<td>Higher Education Leadership Academy (AKEPT)</td>
</tr>
<tr>
<td>Puan Kunasuntare a/p Purumal</td>
<td>Higher Education Leadership Academy (AKEPT)</td>
</tr>
<tr>
<td>Ms Nurul Nadiah Ishak</td>
<td>Higher Education Leadership Academy (AKEPT)</td>
</tr>
</tbody>
</table>
## Workshop Programme: Day 1 - Tuesday, 30th October 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>0630-0830</td>
<td>Breakfast</td>
</tr>
<tr>
<td>0830-0900</td>
<td>Introduction to TYAN and YSN by Dr Sok Ching Cheong</td>
</tr>
</tbody>
</table>

### Drug Development I: Chaired by Prof Hongbin Ji

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| 0900-1000 | Prof Sanjeev Krishna  
Drug repurposing: a solution for cancer treatment in low and middle income countries? |
| 1000-1030 | Break & Group photography                                           |
| 1030-1200 | Prof Chee Onn Leong  
Cancer Informatics and Drug Repurposing  
Prof Patricia Zancan  
Cancer Metabolism: Targets and Drugs  
Prof Yusuf Baran  
Multidrug Resistance in Cancer |
| 1200-1300 | Lunch & Poster setup                                                |

### Drug Development II: Chaired by Dr Kue Peng Lim

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| 1300-1430 | Prof Wassim Abou-Kheir  
Models for Targeting Cancer Stemness  
Dr Chern Ein Oon  
Sirtuin Inhibition in Cancer: A Therapeutic Strategy  
Associate Professor Dr Dominic Chih-Cheng Voon  
Inflammatory and Mitogenic Signals Drive IL23A Secretion Independent of IL12B in Intestinal Epithelial Cells |
<p>| 1430-1600 | Tea Break &amp; Poster session                                          |
| 1600-1800 | Break-out session 1                                                 |
| 1800-2000 | Dinner                                                              |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>0630-0900</td>
<td>Breakfast</td>
</tr>
<tr>
<td>0900-0930</td>
<td>Day 1 recap and introduction to Day 2</td>
</tr>
<tr>
<td>0930-1030</td>
<td><strong>Precision Medicine: Chaired by Prof Soo-Hwang Teo</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Prof Hongbin Ji</strong></td>
</tr>
<tr>
<td></td>
<td>Precision Medicine in Cancer Treatment – What has the Cancer Genome</td>
</tr>
<tr>
<td></td>
<td>Atlas (TCGA) Taught Us?</td>
</tr>
<tr>
<td>1030-1100</td>
<td>Break &amp; Poster session</td>
</tr>
<tr>
<td>1100-1200</td>
<td><strong>Dr Weang Kee Ho</strong></td>
</tr>
<tr>
<td></td>
<td><em>Precision Medicine in Risk Stratification – the Role of Genomics</em></td>
</tr>
<tr>
<td></td>
<td><strong>Prof Boon Peng Hoh</strong></td>
</tr>
<tr>
<td></td>
<td>Leveraging on Public Domains and Resources for Cancer Research</td>
</tr>
<tr>
<td>1200-1330</td>
<td>Lunch</td>
</tr>
<tr>
<td>1330-1430</td>
<td><strong>Digital Technologies for Cancer Control and Management:</strong></td>
</tr>
<tr>
<td></td>
<td><em>Chaired by Prof Sanjeev Krishna</em></td>
</tr>
<tr>
<td></td>
<td><strong>Prof Sarah Barman</strong></td>
</tr>
<tr>
<td></td>
<td>The Role of Artificial Intelligence (AI) in Transforming Healthcare</td>
</tr>
<tr>
<td>1430-1530</td>
<td><strong>Associate Professor Dr Chan Chee Seng</strong></td>
</tr>
<tr>
<td></td>
<td>Artificial Intelligence (AI) in Healthcare – Partnerships to make this</td>
</tr>
<tr>
<td></td>
<td>work</td>
</tr>
<tr>
<td></td>
<td><strong>Dr Sok Ching Cheong</strong></td>
</tr>
<tr>
<td></td>
<td>Mobile Health for Early Detection of Oral Cancer</td>
</tr>
<tr>
<td>1530-1600</td>
<td>Tea Break and Poster session</td>
</tr>
<tr>
<td>1600-1800</td>
<td><strong>Break-out session 2</strong></td>
</tr>
<tr>
<td>1800-2000</td>
<td>Dinner</td>
</tr>
</tbody>
</table>
## Workshop Programme: Day 3 – Thursday, 1\textsuperscript{st} November 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>0630-0900</td>
<td>Breakfast</td>
</tr>
<tr>
<td>0900-0930</td>
<td>Day 2 recap and introduction to Day 3</td>
</tr>
<tr>
<td></td>
<td><strong>How Do You Future-Proof Your Career in a Technologically Evolving</strong></td>
</tr>
<tr>
<td></td>
<td><strong>World?: Chaired by Datin Paduka Prof Dr Khatijah Yusoff</strong></td>
</tr>
<tr>
<td>0930-0945</td>
<td><strong>Welcoming Remarks from Datuk Prof Dr Rohana Yusof</strong></td>
</tr>
<tr>
<td></td>
<td>Director, AKEPT</td>
</tr>
<tr>
<td>0945-1045</td>
<td><strong>Prof Dr Raha Haji Abdul Rahim</strong></td>
</tr>
<tr>
<td></td>
<td>Leadership Excellence for Researchers</td>
</tr>
<tr>
<td>1045-1100</td>
<td>Break</td>
</tr>
<tr>
<td>1100-1200</td>
<td><strong>Prof Dr Hj Mohd Ekhwan Hj Toriman</strong></td>
</tr>
<tr>
<td></td>
<td>Leadership in Research: The Need to Be Internationally Competitive</td>
</tr>
<tr>
<td></td>
<td><strong>Panel Discussion:</strong></td>
</tr>
<tr>
<td>1200-1300</td>
<td><strong>As Technology is Advancing Rapidly, How Do Researchers Keep Abreast</strong></td>
</tr>
<tr>
<td></td>
<td>in a Low-Resource Setting?</td>
</tr>
<tr>
<td></td>
<td>Panelists from:</td>
</tr>
<tr>
<td></td>
<td>i) Kingston University, London</td>
</tr>
<tr>
<td></td>
<td>ii) Universiti Kebangsaan Malaysia</td>
</tr>
<tr>
<td></td>
<td>iii) Chinese Academy of Sciences</td>
</tr>
<tr>
<td></td>
<td>iv) Young Scientist Network Academy of Sciences (YSN-ASM)</td>
</tr>
<tr>
<td></td>
<td>v) The World Academy of Science (TWAS) Young Affiliate Network (TYAN)</td>
</tr>
<tr>
<td>1300-1400</td>
<td>Closing &amp; Lunch</td>
</tr>
<tr>
<td>1400-1500</td>
<td>Depart to Cancer Research Malaysia</td>
</tr>
<tr>
<td>1500-1730</td>
<td>Visit Cancer Research Malaysia</td>
</tr>
<tr>
<td>1730-1830</td>
<td>Depart to AKEPT</td>
</tr>
<tr>
<td>1830-2000</td>
<td>Dinner</td>
</tr>
</tbody>
</table>

## Workshop Programme: Day 4 - Friday, 2\textsuperscript{nd} November 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>0630-0900</td>
<td>Breakfast</td>
</tr>
<tr>
<td>0900-1200</td>
<td>Departure of participants</td>
</tr>
</tbody>
</table>
FOREWORD BY DR SOK CHING CHEONG
CO-CHAIR, THE WORLD ACADEMY OF SCIENCES YOUNG AFFILIATE NETWORK (TYAN)
HONORARY MEMBER, YOUNG SCIENTISTS NETWORK, ACADEMY OF SCIENCES MALAYSIA (YSN-ASM)
SENIOR GROUP LEADER, HEAD & NECK CANCER RESEARCH TEAM, CANCER RESEARCH MALAYSIA

On behalf of the organizing committee, I welcome all participants to the TYAN-YSN International Thematic Workshop on Cancer 2018. This is the second thematic workshop organized by The World Academy of Sciences Young Affiliate Network (TYAN) and the second collaborative project between TYAN and the Young Scientist Network-Academy of Sciences Malaysia (YSN-ASM).

The idea of a thematic workshop on cancer was conceptualized in Istanbul, Turkey during a TYAN executive committee meeting in May 2018. The executive committee felt strongly that the recent and ever-evolving developments in cancer research particularly in drug development, precision medicine, and digital technologies afford an abundance of opportunities for young scientists to develop their talent and to work together to address the challenges related cancer survival. I thank the TYAN executive committee members for placing their trust in Professor Patricia Zancan (Brazil), Professor Yusuf Baran (Turkey) and myself to organize this workshop here in Malaysia. I would also like to acknowledge the funding from TYAN through the support from Lenovo, China.

In Malaysia, the organization of the workshop rode on the strong track record of the Young Scientists Network-Academy of Sciences Malaysia (YSN-ASM), an organization of outstanding young scientists which has provided a platform for young scientists to contribute to the advancement of science through many avenues. I thank Professor Abhimanyu Veerakumarasivam the Chair of YSN for agreeing to co-organize this workshop without a moment’s hesitation. It has been a privilege to work with many members of YSN some of whom contributed to the organization of this workshop. I am very grateful to Puan Hazami Habib (CEO of ASM) and the fellows of the Academy of Sciences Malaysia particularly Datin Paduka Professor Dr. Khatijah Yusoff and Professor Dr. Teo Soo-Hwang OBE for their ideas, encouragement, fierce support and constant investment in young scientists. We are indeed privileged.

The TYAN-YSN International Thematic Workshop on Cancer 2018 is attended by speakers and participants from 16 countries worldwide. We are very grateful for the partnerships with the Higher Education Leadership Academy (AKEPT), Academy of Sciences Malaysia (ASM), The World Academy of Sciences (TWAS) Chinese Academy of Sciences (CAS) and the Science and Innovation Office, British High Commission Malaysia. I thank all the speakers and participants who have agreed to come and share their expertise and experience, and to learn from one another.

I thank all members of the organizing committee for their commitment and co-operation to make this workshop a success. After several months of preparations, it remains for us to welcome fellow scientists to AKEPT and to Malaysia. I wish everyone a fruitful and scientifically-enriching experience. May you enjoy the workshop and build friendships and collaborations that will make your scientific journey a successful and meaningful one.
Cancer incidence is increasing and now poses one of our biggest global healthcare challenges. Colorectal cancer is the third most common type with one million new cases and three quarters of a million deaths a year. The costs of current treatments are prohibitive for patients in most areas of the world. In any case, current management relies on complex combinations of surgery, chemotherapy and radiotherapy, commonly with poor outcomes beyond 5 years and poorly tolerated treatments. Colorectal cancer exemplifies the problems posed by our commonest cancer types. Some years ago, we turned to the concept of repurposing drugs to improve cancer treatments. Many drugs have well established indications for particular diseases. Experience with these drugs have established their safety, tolerability and also reduced their costs considerably. The challenge for repurposing drugs therefore rests on establishing their value for a new indication. Artesunate is a lifesaving class of antimalarial agent whose discovery by Chinese scientists was recognized by a Nobel Prize in 2015. There have been several hundred papers that described the anticancer effects of artemisinins in cell lines and animal models. We carried out a pilot study to test the anti-colorectal cancer properties of oral artemether when used as a neo-adjuvant treatment (PMID: 26137537) in patients for the first time. Findings from this small study were encouraging, and have also pointed to possible mechanisms of action in vivo. These have stimulated the implementation of larger randomised, double-blind, placebo-controlled studies and given impetus to repurpose artemether for other challenging malignancies. This talk will illustrate how repurposing drugs can stimulate new directions for study of their mechanisms of action as anticancer agents, new trial designs for interventions and new hope for patients.

Biosketch:
Sanjeev Krishna is Professor of Molecular Parasitology and Medicine at St George’s University of London. He completed degrees at Cambridge and Oxford, and studied malaria in Thailand and Africa. As a Wellcome Trust Senior Research Fellow in Clinical Science, he joined St George’s in 2000. He was elected a Fellow of the Academy of Medical Sciences in 2004 and awarded an ScD by Cambridge University in 2007. Professor Krishna maintains a wide-ranging programme of research. These span basic investigations into the function of Plasmodium transporters and their value as drug targets, and clinical studies to improve treatments for malaria. He has studied P. knowlesi in Malaysia, and has identified mechanisms of drug resistance and novel diagnostic approaches for parasitic and other infections. Recently he has implemented clinical studies to repurpose artemether for the management of colorectal carcinoma including in collaboration with investigators at Hospital 108 in Hanoi and in Tübingen.
The discovery of effective cancer treatments is a key goal for cancer management. However, the current efforts of bringing a cancer drug to the market is limited by progressively increasing failure rates, high cost, poor bioavailability, poor safety, limited efficacy, and a lengthy design and testing process. Despite the progress made on other cancers, the survival rate for pancreatic cancer has remained in the single digits for the past 40 years, with gemcitabine-based treatment remains the only first line therapy for advanced pancreatic cancers. It has been a neglected disease and has been chronically underfunded for decades. To overcome these challenges, repurposing established drugs for pancreatic cancer treatments offers the potential to deliver cheaper and faster drug development.

A recent study has classified pancreatic cancers into four molecular subtypes: (1) squamous, (2) immunogenic, (3) pancreatic progenitor and (4) aberrantly differentiated endocrine exocrine. Among all the subtypes, the squamous subtype has the worst prognosis. In this study, we attempted to utilize large scale genomic datasets and computational systems biology to identify potential drugs targeting the squamous subtype of pancreatic cancers through combination therapy. By using a multi-domain pharmacomodules - pharmacologically relevant sub-networks of biomolecules and/or pathways - from collection of databases by independent/simultaneous mining of multiple datasets, we identified 26 small molecules that could target specifically the squamous subtype of pancreatic cancers. Importantly, when combined with gemcitabine, these inhibitors exhibit specific synergism observed only in the squamous subtype of pancreatic cancers. In summary, we demonstrated that emerging and advanced novel computational methods and multi-domain pharmacomodules that enable the joint analysis of genomic, biomedical and pharmacological data hold the promise to facilitate informed, efficient, and systematic drug repositioning and discovery. Whether this premise expedites drug development pipelines and how much of it translates into novel therapeutic discovery and impacts public health, especially catering to unmet needs (e.g., rare and neglected diseases) positively, remains to be seen.

Biosketch:
Dr Leong has conducted multi-year research focused on drug target discovery, novel molecules development through preclinical and clinical trials, and biomarkers development for diagnosis of refractory breast cancers. He has published extensively in high impact journals, including Nature Cell Biology, Cancer Cell, PNAS, Cancer Research and etc. He has received numerous international awards including the FMD Fellowship (USA), ORS Award (UK) and the IBMS President’s Award (UK). He was a Senior Research Fellow at the Harvard Medical School and Massachusetts General Hospital, Boston, USA and is presently a Professor in Cell Biology and the Deputy Director of Research at the International Medical University, Malaysia.
Among the physiological hallmarks of cancer, altered glucose metabolism is the most common. Aerobic glycolysis is observed in 90% of human tumors and is required for new biomass formation. In fact, proliferation of cancer cells is dependent on activation of glycolysis. Moreover, glycolysis confers tumor cells with the ability to adapt to new microenvironments or cope with stress during tumor progression and metastasis. The aims of our projects are: to investigate potential targets for antitumoral therapy through the evaluation of the unique energetic metabolic profile present in cancer cells; and to evaluate the role of hormones and metabolic products of cancer cells on tumor development, metabolic phenotype and cancer progression, aiming not only to evaluate their role as local physiological mediators in the tumoral microenvironment, but as modulators of the tumor phenotype and its response to chemotherapy. Moreover, we scrutinize for novel drugs acting on metabolism and physiology of the cancer cell lines. These approaches intention the identification of more selective treatments for cancer with minimal effects over non-tumoral cells.

Biosketch:
Patricia Zancan is Associate Professor at UFRJ, Brazil since 2007. She got her MSc in 2002 and her PhD, in 2005 in Biological Chemistry in the Institute of Medical Biochemistry Leopoldo de Meis, at UFRJ. In 2008, she established a novel laboratory devoted to the study of signalling in cancer biology aimed to control the development of cancer cells. During the professional career, she has supervised Masters, PhD and post-doctoral fellows at high levels, contributing to the formation of qualified personnel. At administrative level, acted as the Head of the department of Pharmaceutical Biotechnology (2012-2014). She has authored more than 40 scientific articles in peer-reviewed journals. During 2014-2015, she was in a sabbatical period at Université Laval, Quebec, Canada, where she served as invited professor working in projects related to diabetes molecular triggers. In 2016 she was nominated as Young Affiliate of TWAS and was elected as co-chair of TYAN (TWAS Young Affiliates Network).
Chemotherapy is the most widely used treatment strategy for cancer which is the highest second reason for human being deaths after heart related diseases. However, cellular resistance mechanisms developed by cancer cells and tissues in the beginning or proceeding times to applied anticancer agents is a significant problem preventing successful therapy. Resistance developed by cancer cells to structurally and functionally different cytotoxic agents is called as multi drug resistance. The resistance can be observed in the beginning of the treatment or during the treatment known as intrinsic or acquired resistance, respectively. The resistance phenotype is associated with the tumor cells that gain a cross-resistance to large range of drugs that are structurally and functionally different. Drug resistance mechanisms have different molecular genetics and biochemical reasons depending on the applied drug and the type of cancer. Secondary genetic alterations and disorders in cancer cells may also result in drug resistance. That is why it has vital importance to study and consider all signaling pathways, in multidrug resistance of cancer. Multidrug resistance raises via many unrelated mechanisms, such as overexpression of energy-dependent efflux proteins, decrease in uptake of the agents, increase or alteration in drug targets, alterations in cell cycle checkpoints, inactivation of the agents, compartmentalization of the agents, inhibition of apoptosis, increases in DNA repair mechanisms, problems related with drug metabolism and aberrant metabolism of bioactive sphingolipids. Exact elucidation of resistance mechanisms and molecular and biochemical approaches to overcome multidrug resistance have been a major goal in cancer research. In this talk, we will explain the mechanisms contributing multidrug resistance in cancer chemotherapy and also touched on the approaches for reversing the resistance.

Biosketch:
Dr. Yusuf Baran was born in 1977. After receiving his bachelor degree in Dicle University, Department of Biology between 1994-1998, he earned his M.Sc. and Ph.D. degrees in 2002 and 2006, respectively, in the Middle East Technical University, Department of Biological Sciences. During his Ph.D. studies, he worked in the Medical University of South Carolina, Hollings Cancer Center for 6 months in 2005 and 2006. He has been working as a Professor at Izmir Institute of Technology, Department of Molecular Biology and Genetics since 2007. Dr. Yusuf Baran has been involved in more than 30 scientific research projects supported by national/international organizations. Dr. Yusuf Baran has authored or co-authored in more than 350 papers in peer-reviewed journals and abstracts. His scientific achievements has been recognized and awarded by national/international institutions holding more than 100 awards. In his research, Dr. Baran focused on molecular biology of cancer, science and technology policies.
MODELS FOR TARGETING CANCER STEMNESS

Prof Wassim Abou-Kheir
American University of Beirut, Faculty of Medicine
wa12@aub.edu.lb

Stem cells are unique cells where they can give rise to other kinds of specialized cells and at the same time maintaining their existence. This is considered a very valuable trait in our evolution and survival, where stem cells play an impactful role in healing and regeneration process. Hence, stem cells are considered the founding pillars of all organs and tissues throughout the body. Nevertheless, and upon acquiring aberrations, stem cells can become abnormal and can contribute to the etiology, pathogenesis, and progression of diseases like in cancer. In the latter, they are known as cancer stem cells (CSCs). It is widely accepted that the population of CSCs carries the treatment-resistance property of tumors and ignites tumors growth, recurrence and metastasis. Therefore, targeting and eradicating those cells becomes an utmost challenge now. In this talk, I will give an overview of the different projects ongoing in my laboratory that are all centralized around cancer stem cells. I will discuss our work on how we are trying to isolate and model cancer using conventional 2D assays and most importantly using novel 3D assays (Spheroids and Organoids) that enrich the growth and survival of CSCs in vitro. The importance of 3D assays is that they are a more physiologically-relevant assays when compared to 2D ones, and they might be a closer step to in vivo conditions. I will be sharing our work on solid tumors, including prostate, central nervous system, and bladder cancers. Most importantly, I will share new findings on how we can potentially predict treatment-response for patients with prostate cancer using the novel 3D patient-derived organoids method.

Biosketch:
After completing a PhD at Albert Einstein College of Medicine (NY, USA) and a 4-year postdoctoral fellowship at the NIH/NCI (MD, USA), I joined the Department of Anatomy, Cell Biology and Physiological Sciences in the Faculty of Medicine at the American University of Beirut (AUB) in September 2011. My research at AUB is centered on understanding normal and abnormal stem cells. One of the focuses of my research is the isolation and characterization of human cancer stem cells from solid tumors (like prostate, bladder and CNS tumors). We are doing so by using 3D assays like sphere-formation assay or organoids-formation assay. This holds a great promise for translational application in designing novel therapeutics. In addition, and as a stem cells biologist, I am actively working on modulating neural stem cells and neurogenesis, which is an essential biological process that is impaired in neurological and neuropsychiatric disorders.
SIRTIUIN INHIBITION IN CANCER:
A THERAPEUTIC STRATEGY

Dr Chern Ein Oon
Institute For Research In Molecular Medicine, USM
chern.oon@usm.my

Traditional chemotherapy functions by killing rapidly dividing cells, regardless of whether they are cancerous or not. Targeted therapy is different. It works by stopping the communication of cancerous genes thus deactivating cancerous molecular pathways to hinder the growth and spread of cancer. Sirtuins are enzymes highly expressed in many cancer types including colorectal cancer. Therefore, inhibiting sirtuin activities may be a useful strategy in colorectal cancer treatment. Compared to most commercial sirtuin inhibitors, our patent pending auto-fluorescent compound (BZD9L1) has been demonstrated to be more potent in inhibiting Sirtuins (SIRT1 and SIRT2 homologs), in addition to being more selective to colorectal cancer cells compared to healthy colon cells. We aim to develop BZD9L1 to specifically block sirtuin enzymes that are highly expressed in colon cancer cells, but to a lesser extent to none in colon epithelial cells. BZD9L1 was tested for its ability to reduce colon cancer cell viability on cancer cell lines and in colon tumour xenograft model, as a single agent or in adjunct to 5-fluorouracil chemotherapy. BZD9L1 has been demonstrated to effectively kill colon cancer cells via promotion of apoptosis, while exhibiting minimal toxicity effect on normal cells in vitro and in vivo. Our work highlights the importance of targeted therapy to induce cancer selective killing to minimize toxicity effect on healthy tissues.

Biosketch:
Dr Oon Chern Ein completed her BSc (1st Class Hons) in Biotechnology at Universiti Kebangsaan Malaysia and furthered her doctorate studies in Medical Oncology at University of Oxford, United Kingdom. She then trained at Karolinska Institutet, Sweden as a postdoctoral fellow and now serves as a lecturer at INFORMM, Universiti Sains Malaysia. Chern is a fellow of the Association of Union for International Cancer Control, an ambassador of European Association for Cancer Research and an EXCO member of the Young Scientists Network- Academy of Sciences Malaysia. In 2014, she won the Exiqon Young Scientist Award- South East Asia. Chern continues to receive numerous awards for her work on molecular targeted therapy in cancer including the prestigious L’Oreal-UNESCO for Women in Science National Fellowship in 2015, the Union for International Cancer Control ICRETT Fellowship and MAKNA Cancer Research Award in 2016. She has recently received the UK based prestigious Women of the Future Awards- South East Asia and the National Young Scientist Award.
The heterodimeric cytokine interleukin-23 (IL23A/IL12B) is produced by dendritic cells and macrophages to promote the activities of Th17 cells and innate lymphoid cells. Here, we report a strong induction of IL23A expression by TNF/NF-κB and MAPK signals in intestinal epithelial cells. Their activities were enhanced by the tumor suppressor RUNX3. Moreover, a strong crosstalk between the NF-κB and MEK pathways was observed. We confirm the secretion of endogenous IL23A by immunoprecipitation from activated CRC culture supernatants. Interestingly, the secreted IL23A could not be detected by ELISA specific for heterodimeric IL-23, owing to the absence of IL12B expression in this cell type. Subsequently, we evaluated the efficacy of NF-κB and MEK inhibitors in attenuating IL23A expression, especially in the context of MAPK pathway driver mutations in CRC cells. Accordingly, trametinib (MAPK inhibitor) and BAY 11-7082/5 (IKKα/IκB inhibitors) displayed effectiveness in human CRC lines with mutant KRAS or BRAFV600E. Together, these data demonstrate the regulation of IL23A by proinflammatory and mitogenic signals and its secretion, which could be targeted in cancer therapy.

Biosketch:
Dominic Voon is an Associate Professor at the Institute for Frontier Science Initiate, and Cancer Research Institute of Kanazawa University, Japan. Dr. Voon received his graduate training at the University of Western Australia where he studied the regulation of Lymphotoxin-beta, a TNF-related cytokine crucial for immune homing. He then studied the post-transcriptional regulation of androgen receptor at the Harry Perkins Institute for Medical Research. This was followed by a stint in the biotechnology industry where he led a team to develop commercially successful reporter vectors. Dr. Voon then joined Yoshiaki Ito at A*STAR Singapore and National University Singapore where he elucidated the tumor suppressor activities of the transcription factor RUNX3. It was there that he became interested in the contribution of epithelial-derived cytokine to inflammation and EMT-associated cellular plasticity. In 2015, Dr. Voon took up his current position and continued his investigations into inflammation and cellular plasticity during gastrointestinal carcinogenesis.
Lung cancer is notorious for high heterogeneity and strong plasticity, which might contribute to the development of drug resistance. Lineage transition from lung adenocarcinoma (ADC) to squamous cell carcinoma (SCC), as implicated by clinical observation of mixed ADC and SCC pathologies in adenosquamous cell carcinoma (Ad-SCC), reflects strong cancer plasticity and potentially links to drug resistance. Using Genetically Engineered Murine Model (GEMM), we have provided the first in vivo evidence in supporting the ADC to SCC transdifferentiation (AST): *Lkb1*-deficient mouse lung ADC transdifferentiates into SCC progressively via pathologically mixed Ad-SCC. Mechanistically, we find that down-regulation of reactive oxygen species (ROS) level through N-acetyl cysteine (NAC) treatment or NRF2 expression inhibits this transition, highlighting the functional importance of ROS in regulating cancer plasticity. Pentose phosphate pathway deregulation and impaired fatty acid oxidation collectively contribute to the redox imbalance and functionally affect the AST process. Importantly, similar tumor and redox heterogeneity are also found in human LKB1-inactivated lung cancer. In preclinical trials toward metabolic stress, Lkb1-inactivated ADC can develop drug resistance through squamous transdifferentiation. Together, these data show that the redox-controlled tumor plasticity for squamous transdifferentiation enables lung ADC with Lkb1 inactivation to progress under stress, and more importantly to escape certain treatment toward cancer metabolism. This cancer plasticity may represent as a potentially important mechanism for lung cancer metabolic adaptation and drug resistance and hold important therapeutic implications.

**Biosketch:**
Dr. Hongbin Ji is the Professor in Shanghai Institute of Biochemistry and Cell Biology, Chinese Academy of Sciences. He holds a special interest in lung cancer genomics and biology. His research focuses on deciphering the molecular mechanism involved in lung cancerogenesis with the integration of genomic analyses of human lung cancer samples and functional and mechanistic studies in cancer cell lines, animal models and clinical specimens. The long term goal is to identify potentially important targets for treatment as well as biomarkers for diagnosis and prognosis and eventually help lung cancer treatment in clinic.
The cancer burden is rising globally, approximately 9.6 millions people die from cancer in 2018, where about 70% of cancer deaths occur in developing countries. Importantly, cancer incidence is projected to double by 2035, with greatest increase expected in low and middle-income countries. The economic impact of cancer is significant, exerting strain on populations and healthcare system. While persistent effort in finding the cure for cancer patients is crucial, establishing a strong cancer control plan that emphasize on prevention and early detection is of paramount important. Advances in genomic technologies have enabled for comprehensive genetic profiling for assessing risk of cancer, particularly in hereditary cancer such as hereditary breast, prostate and ovarian cancer. Drawing from our own experience, the presentation will outline the current stage of knowledge about genetic susceptibility to breast cancer and how these information could be used to identify women who are at higher risk of developing the disease, so that disease prevention or early detection is possible.

Biosketch:

Equipped with PhD in Statistics from Newcastle University (UK), Dr. Weang-Kee Ho was a post-doctoral researcher in University of Cambridge working on genetic determinant of cardiovascular disease. Upon returning to Malaysia, she joined the University of Nottingham Malaysia and was appointed as associate professor in 2017. She is also a collaborating scientist from Cancer Research Malaysia. The main focus of her research involves identification of genetic determinants of breast cancer in Asian women, with the aim of building population-specific risk assessment model that can be used to stratify women according to the likelihood of disease. She was awarded Malaysia’s L’Oreal-UNESCO National Fellowship in 2017 and was recognised as L’Oreal-UNESCO For Women in Science International Rising Talent in 2018.
Recent advancement in genome and other ‘-omics’ technologies have accelerated the bridging of scientific research, translational study and clinical application in human diseases, of particular interest, cancers. Moving from the pre-genome-era, the one-by-one approach to examine the molecular mechanism of cancer, fellow scientists can now research systems biology of cancer from the whole genome point of view. Hundreds of large-scale cancer genome sequencing projects have been carried out, therefore resulted a great data explosion and witnessed the paradigm shifted to the era of ‘big-data’. However, effective use of massive amounts of cancer genome and other ‘-omics’ data remains a challenge without realizing the crucial needs of sharing the resources, hence the creation of open and publicly accessible data repositories and analytical tools, both for cancer and non-cancer studies is important. This presentation attempts to explore several commonly used publicly available databases and repositories for cancer research. I shall divide these resources into 5 primary categories: (i) reference populations databases and general repositories; (ii) encyclopedia and information reference resources; (iii) cancer genome browsers and repositories; (iv) online analytical tools and integrative resources. The development of science and technology has pointed us the right direction towards cancer treatment, though the journey remains long before reaching the bedside. One of the major challenges is the heterogeneity of cancer cells and the variability in the response to cancer treatment among patients with similar symptoms. The utilization of various databases and repositories has no doubt provide us rapid and reliable resources to our research, but that also means realizing the importance of data sharing. Ultimately, it is when data sharing made possible that allows science to progress in a much more rapid, comprehensive, efficient and effective way.

Biosketch:
Professor Dr Hoh Boon Peng is a population geneticist. He is currently affiliated with the Faculty of Medicine & Health Sciences, UCSI University, Kuala Lumpur Malaysia. Dr Hoh is interested in studying human genome variation and its impact to various diseases susceptibility. Dr Hoh has published more than 55 publications in peer-reviewed local and international journals, including Science, American Journal of Human Genetics, European Journal of Human Genetics, Human Genetics. He has received several fellowships and awards: (i) ASM Dr Ranjeet Bhagwan Singh International Fellowship Award, (ii) Chinese Academy of Science (CAS) Fellowship for the Visiting Scientist from the Developing Countries; (iii) Chinese Academy of Sciences (CAS) President’s International Fellowship Initiative (PIFI); (iv) 2013 JCI Ten Outstanding Young Malaysian award under the category “Academic Achievement and Accomplishment”. Dr Hoh currently serves as an Associate Editor for the journal BMC Medical Genetics.
THE ROLE OF ARTIFICIAL INTELLIGENCE (AI) IN TRANSFORMING HEALTHCARE

Prof Sarah Barman
Kingston University
s.barman@kingston.ac.uk

Many challenges currently exist in healthcare. There is increasing global demand for management of conditions that are long-term and complex in aging populations. With increasingly sophisticated monitoring and imaging devices that are enabled by digital connectivity, the amount of health data available to clinicians on which to base decisions is continually increasing. More sophisticated analysis tools are required to make sense of this data. Together with patient demand for self-monitoring systems, recent advances in technology based on artificial intelligence have been applied to enhance access to healthcare across different sectors of the population and to assist clinicians in making diagnostic decisions on large amounts of complex data.

Artificial intelligence has undergone a revolution in performance in terms of recent developments related to deep learning. The medical field, in particular, has seen significant progress related to the implementation of convolutional neural networks (CNNs) across many different clinical areas. An overview of the application of CNNs will be discussed with respect to recognition and quantification of image features. Case studies relating to the application of CNNs will be included and the application of CNNs to image processing problems will be described in addition to the application of CNNs to problems such as disease prediction and image quality assessment. Case studies will be focused on fields such as ophthalmology and oral abnormalities.

Biosketch:
Sarah Barman is Professor of Computer Vision and Director of Research and Enterprise within the School of Computer Science and Mathematics at Kingston University. Her research interests include the development of computer vision techniques, including machine learning and deep learning, applied to ophthalmic images. Professor Barman’s team has developed algorithms to detect vessel morphology and pathologies on retinal fundus images over the last ten years and previous work includes the development of ophthalmic analysis software resulting in US FDA approval. Professor Barman gained her PhD in Physics from King’s College London and she is a member of the UK Biobank Eye and Vision Consortium and a Fellow of the Institute of Physics.
As soon as it was possible to scan and load medical images into a computer, researchers have built systems for automated analysis. Initially, from the 1970s to the 1990s, medical image analysis was done with sequential application of low-level pixel processing (edge and line detector filters, region growing) and mathematical modeling (fitting lines, circles and ellipses) to construct compound rule-based systems that solved particular tasks. There is an analogy with expert systems with many if-then-else statements that were popular in artificial intelligence in the same period.

At the end of the 1990s, supervised techniques, where training data is used to develop a system, were becoming increasingly popular in medical image analysis. Examples include active shape models (for segmentation), atlas methods (where the atlases that are fit to new data form the training data), and the concept of feature extraction and use of statistical classifiers (for computer-aided detection and diagnosis). This pattern recognition or machine learning approach is still very popular and forms the basis of many successful commercially available medical image analysis systems. Thus, we have seen a shift from systems that are completely designed by humans to systems that are trained by computers using example data from which feature vectors are extracted.

Lately, deep learning algorithms, in particular convolutional networks, have rapidly become a methodology of choice for analyzing medical images. This talk will review the major deep learning concepts pertinent to medical image analysis. First, concise overviews will be provided of studies per application area: neuro, retinal, pulmonary, digital pathology, breast, cardiac, abdominal, musculoskeletal. Then this is followed a summary of the current state-of-the-art. Finally, a critical discussion of open challenges and directions for future research will be highlighted.

Biosketch:
Chee Seng received his Ph.D. from University of Portsmouth, U.K. under the supervision of Prof. Honghai Liu in 2008. Currently, he is a Associate Professor at the Department of Artificial Intelligence, Faculty of Computer Science and Information Technology, University of Malaya, Malaysia. In general, his research interests include computer vision and fuzzy set theory, particularly on image/video content analysis, that enables automatic analyzing of image/video to detect and determine spatial and temporal events. Dr. Chan was the founding Chair for the IEEE Computational Intelligence Society (CIS) Malaysia chapter, the organising chair for ACPR in 2015, and general chair for MMSP in 2019 & VCIP in 2013. He is a Senior Member of IEEE, a Chartered Engineer and a Member of IET.
MOBILE HEALTH FOR EARLY DETECTION OF ORAL CANCER

Dr Sok Ching Cheong  
*Cancer Research Malaysia*  
sokching.cheong@cancerresearch.my

As the oral cavity is easily accessible and amenable to examination, high and increasing access to mobile phones in low- and middle-income countries presents an opportunity to use telemedicine to facilitate early detection of oral cancer. The feasibility of using the mobile phone as a documentation and communication tool for early detection of high-risk oral lesions was evaluated. The concordance between evaluation of oral lesions using mobile phone-captured images and clinical oral examination was analysed using Kappa statistics. A mobile phone App named MeMoSA was developed and the App was tested during a routine oral cancer screening program in the community to determine the feasibility of integrating this tool for the documentation of oral lesions, and the communication between dentists and specialists with regards to management of these patients. The experience of dentists and specialists in using MeMoSA was determined using qualitative questionnaires. We demonstrated that the mobile phone is a sensitive and specific tool, with a sensitivity of >80% in detecting a lesion, an accuracy of 87% in categorising the type of lesion and 85% concordance in patient referral compared to clinical oral examination. Having been trained to use MeMoSA, 36/36 dentists agreed that this App could improve early detection of oral mucosal lesions. All dentists wanted to continue using the App as screening tool in the future as they believe that it could assist them in the identification of high-risk oral mucosal lesions through direct communication with specialists. MeMoSA enabled documentation of the lesion through easy photography and facilitated patient management through quick communication between dentists and specialists. Because of its ease of use MeMoSA could be useful tool in early detection of high-risk oral lesions in low-resource settings and could increase the access to healthcare in geographically hard to reach populations.

**Biosketch:**

Dr Cheong works within multi-disciplinary teams to conduct research in the area of head and neck cancer. Her team’s research has focused on the identification of novel therapeutic target through CRISPR/Cas9 essential screens, the development of cancer vaccines and drug repurposing. Dr Cheong has on-going collaborations in the area of cancer biology with many research groups in and out of Malaysia including those from University of Malaya, Ministry of Health Malaysia, Wellcome Trust Sanger Institute, University of California San Diego, University of Southampton, UK, University of Peradeniya, Sri Lanka amongst others. Dr Cheong is currently the co-chair of TYAN and an honorary member of the Young Scientist Network Academy of Sciences Malaysia.
Participants Abstracts:

MYSTERIOUS MICRONRNAS ASSOCIATION IN LIPIDS AND CANCERS

Abdul Hafeez Kandhro

1Healthcare Molecular & Diagnostic Laboratory, 2PPHI Sindh Labs
hafeezjaan77@yahoo.com

Introduction: Dyslipidemia is one of the major forms of lipid disorder, characterized by increased triglycerides (TGs), increased low-density lipoprotein-cholesterol (LDL-C), and decreased high-density lipoprotein-cholesterol (HDL-C) levels in blood. Recently, MicroRNA-33a (miRNA-33a) and miRNA-33b have been extensively identified to be involved in cholesterol and lipid homeostasis. Computational approaches including text mining have been used recently to analyze abstracts from the public databases to observe the relationships/associations between the biological molecules, miRNAs, and disease phenotypes.

Materials and Methods: In the present study, significance of text mined extracted pair associations (miRNA-lipid disease) were estimated by one-sided Fisher's exact test. The top 20 significant miRNA-disease associations were visualized on Cytoscape. The CyTargetLinker plug-in tool on Cytoscape was used to extend the network and predicts new miRNA target genes. The Biological Networks Gene Ontology (BiNGO) plug-in tool on Cytoscape was used to retrieve gene ontology (GO) annotations for the targeted genes.

Results: The top 20 significant miRNAs analysis on CyTargetLinker provides defined, predicted and validated gene targets; further targeted genes analyzed by BiNGO showed targeted genes were significantly associated with lipid, cholesterol, apolipoprotein, and fatty acids GO terms. In addition, GO terms significantly associated in cell cycle, cell differentiation, apoptosis/cell death, signaling pathways. Therefore, annotated GO terms could help in examining the relationships between the miRNAs and their targets in cancers, metabolic diseases of carbohydrate and proteins, immune diseases, and neurological diseases.

Conclusion: We are the first to provide a reliable miRNA-lipid disease association network based on text mining. However, miRNAs regulated target genes in other non-lipid disorders specially cancers, neurodegenerative disorders, metabolic disorders; and several biological, cellular, and molecular impaired functions. Therefore, for future studies annotated GO terms could help in examining the relationships between the miRNAs and their targets in cancers, metabolic diseases of carbohydrate and proteins, immune diseases and neurological diseases.

Biosketch:
Dr. Abdul Hafeez Kandhro is currently working as "Consultant Pathologist" at PPHI Sindh District Lab and Healthcare Molecular & Diagnostic Laboratory, Pakistan. He got Ph.D. in Medical Technology from Faculty of Medical Technology, Mahidol University, Thailand. He is a first Ph.D scholar of Pakistan in this field. Before Ph.D, he got Diploma, Bachelor's & Master's in Medical Technology from Baqai Medical University and M.Phil in Biochemistry from Isra University, Pakistan. He worked as Clinical Laboratory Manager in reputed organizations since 2004 till 2013. His research interests are; Medical Bioinformatics, Systems Biology, Cancer Genetics, Metabolic Syndrome, microRNAs, Thalassemias, IDA and Pharmaceutical compounds. He is medical academic writer, during & after Ph.D. in a short time he was written 02 book chapters, 06 review articles, 06 research articles, 0 letters to the Editor on various topics in international Scientific Journals. He supervised four M.Phil and three Ph.D. scholars in his laboratory.
CIGB550-E7: A NOVEL PROTEIN-BASED THERAPEUTIC VACCINE FOR THE TREATMENT OF TUMORS ASSOCIATED WITH HUMAN PAPILLOMAVIRUS TYPE 16 INFECTION

Alain B. Alfonso Chaviano
Center for Genetic Engineering and Biotechnology, The Havana, Cuba.
alain.alfonso@cigb.edu.cu

Cervical cancer is the fourth cause of death from cancer among women worldwide. The human papillomavirus (HPV) oncogenic type 16 accounts for approximately 50% of cervical cancer and has received the greatest attention. We have developed the CIGB550-E7, a fusion protein-based therapeutic vaccine that is highly immunogenic against HPV16 E7-expressing tumors. We have evaluated the capacity of CIGB550-E7 to penetrate inside the antigen presenting cells and its capacity to generate an antitumor response when administered without adjuvant or in combination with very small size proteoliposomes (VSSP) or alum [Al(OH)3] as adjuvants. We have also evaluated the immunogenicity of the preparation in the presence or absence of tumor and the contribution of lymphocyte subpopulations in the antitumor response. The immunization with CIGB550-E7 combined with VSSP or Al(OH)3 improved the antitumor response induced by the immunization with adjuvant-free CIGB550-E7. The vaccination leads to the induction of a cellular immune response based on Interferon-gamma-secreting T-cells with cytotoxic capacity. CD8+ T cells as well as CD4+ T cells play an important role in the antitumor effect mediated by the immunization. These data serve as an important foundation for the future clinical translation of this therapeutic vaccine approach.

Biosketch:
I have a Bachelor's Degree in Biochemistry and Molecular Biology in 2012. Since then, I have been working at the Center for Genetic Engineering and Biotechnology (CIGB) of Havana. I currently work at a cancer research project investigating a novel therapeutic vaccine candidate that consists in the HPV16 E7 protein fusioned to an immunostimulatory cell penetrating peptide (named CIGB550-E7). Also, I have been working in the development of a new vaccine candidate based on the HPV18 E7 protein. Reach Master's degree in 2016 at CIGB. I have presented my work in seven international events held in Cuba, in topics related to Cancer Research, Immunotherapy, Infectious Diseases, etc., and received a prize for the best Poster and another for the best SOP. My professional interest is to continue my scientific improvement, learn everything I can from the maximum exponents of cancer and contribute my bit to eliminate or control this disease.
NEAR-INFRARED FLUORESCENT PH PROBE FOR PHOTODYNAMIC THERAPY TRIGGERED BY LOW-POWER LIGHT

Anyanee Kamkaew
Suranaree University of Technology
anyanee@sut.ac.th

Compared to conventional treatments such as chemotherapy and radiotherapy, photodynamic therapy (PDT) offers minimal invasive nature, fewer side effects and less damage to marginal tissues. However, tissue penetration depth is a major challenge in practical PDT. In this work, we develop a pH dependent amino heptamethine cyanin based theranostic probe (I2-IR783-Mpip) that can be activated by a low power near infrared light, which is known for deep-tissue penetration. I2-IR783-Mpip, in acidic condition, possesses an intense, broad NIR absorption band (820-950 nm) with remarkably high singlet oxygen generation when exposed to light from a low power 850 nm LED lamp. In vitro studies showed I2-IR783-Mpip was harmful to HepG2 liver cancer cells at 20 µM (~ 40 % viability) when irradiated with 850 nm lamp, whereas the non-irradiated cells maintained full viability. Confocal microscopy confirmed internalization and singlet oxygen generation of I2-IR783-Mpip inside the cancer cells.

Biosketch:
Education:
2015  Ph.D. in Chemistry, Texas A&M University, TX, USA (Advisor: Prof. Kevin Burgess)
2008  B.Sc. in Chemistry, Silpakorn University, Thailand (Highest honors)

Work experience
Jan 2017 - Present Faculty member, School of Chemistry, Suranaree University of Technology, Thailand
July 2015 - June 2016 Postdoctoral Researcher, In Vivo Molecular Imaging and Photodynamic Therapy PI: Prof. Weibo Cai, Wcai@uwhealth.org (Radiology, Wisconsin-Madison, WI, USA)

Research Expertise & Interest
Molecular imaging is a technique to visualize, characterize and measure biological processes at the molecular and cellular levels in humans and other living systems. Understanding fundamental biology can lead to drug discovery. Thus, molecular imaging can be a powerful tool in disease diagnosis and treatment efficacy assessment. Our research is focused on synthesis of organic dyes for molecular imaging, phototherapy, and nanotechnology.
CYCLIC PEPTIDE INHIBITORS OF GPX4 AS POTENTIAL NOVEL CLASS OF ANTICANCER AGENT FOR DRUG-RESISTANT CANCER

Beow Keat Yap
School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia
beowkeat@usm.my

GPX4 (glutathione peroxidase 4) is a lipid hydroperoxidase that catalyses the reduction of hydrogen peroxide and organic hydroperoxides in the presence of glutathione as a cofactor. Knockdown of GPX4 was found to induce selective ferroptosis (an oxidative form of cell death) of RASv12-expressing cells as well as persister cancer cells in vitro and prevents tumour relapse in mice. GPX4 was also found to be important for the survival of cancer cells in high mesenchymal therapy-resistant cell state, a common state observed in persister cells derived from a wide range of cancers and drug treatments. This proposes that inhibition of GPX4 is beneficial against multiple forms of drug-resistant cancers. Recent studies have discovered a handful of irreversible small molecule inhibitors and reversible peptide inhibitors (e.g. GXpep-3) against GPX4. These compounds are however toxic, non-specific or not orally bioavailable, limiting their potential as a new class of useful anticancer drug. Therefore, in this study, novel N-methylated analogues of GXpep-3 have been designed in silico, in attempts to improve its oral bioavailability and activity. To determine the potential sites for N-methylation, molecular dynamics (MD) simulations were carried out for cyclic peptide GXpep-3 in explicit water model, both alone and in complex with GPX4 protein, using GROMACS simulation package and Gromos96 53a6 force field. Intramolecular and intermolecular hydrogen bond occupancy of all backbone amides of GXpep-3 during the period of simulations were calculated. Microsecond MD simulations of the two systems revealed a number of backbone amides on the cyclic peptide GXpep-3 that are not required for intramolecular and intermolecular hydrogen bonds - these were identified as the potential sites for N-methylation. Using this information, a potentially more potent, membrane permeable N-methylated analogue was designed. The synthesis and characterization of this promising analogue for its membrane permeability and binding to GPX4 are currently in progress.

Biosketch:
Dr Beow Keat Yap is a Pharmacy Lecturer in the School of Pharmaceutical Sciences, USM. He graduated with Bachelor of Pharmacy (Honours) from USM in 2008, obtained his Master degree by research from Universiti Malaya in 2012, and awarded with the doctorate degree by Monash University in Australia in 2016. He has won many awards including the prestigious USM Fellowship, a Gold Medal in the Malaysia Technology Expo 2010, an Early Career Researcher Award by the Peptide User Groups in Melbourne, Australia in 2014, and a Travel Award to an international conference in 2015. He has also published in various peer-reviewed research articles in high impact journals and holds an international patent. At present, he is highly engaged in research on the design and discovery of novel anti-cancer and anti-infectives agents, especially from peptides, using computer-aided approach as well as state-of-the-art biophysical tools such as NMR and SPR.
CHARACTERISATION OF DYSREGULATED MICRORNAS IN HUMAN NON-SMALL CELL LUNG CANCER AND THEIR ROLE IN TUMOUR ANGIOGENESIS AND METASTASIS

Chai San Ho
Co Author: Noor Hasima Nagoor
Centre for Research in Biotechnology for Agriculture (CEBAR), University of Malaya, Kuala Lumpur, Malaysia
deniseho@um.edu.my

Lung cancer is the most commonly diagnosed cancer worldwide and ranks third in Malaysia. This is often due to late presentation of disease at the metastatic stage. MicroRNAs, even though are small single-stranded non-coding RNAs, have been proven to be mighty micromanagers of gene expression in many biological processes including cancer metastasis and angiogenesis. They were comprehensively studied and thus proposed as potential molecular targets for cancer treatment. However, the mechanisms microRNAs used to modulate lung cancer metastasis remain unclear. High and low invasive A549 and SK-LU-1 sub-cell lines were used to analyse differentially expressed metastasis-related microRNAs. Invasive phenotype in high invasive cells was found to be accompanied by gain of miR-92b and miR-378 expressions as well as loss of miR-1827 expression. Investigation into the roles of these microRNAs in metastasis, particularly invasion, migration and angiogenesis, revealed that miR-378 functions as a cell invasion regulator while miR-1827 modulates cell migration. Both microRNAs work in opposite manner to mediate angiogenesis. MiR-92b, on the other hand, is not significant during metastasis and angiogenesis in NSCLC. Subsequently, RBX1 and CRKL were identified as new targets of miR-378 and miR-1827, respectively. Changes in cell invasion and migratory potentials were directly controlled by RBX1 and CRKL under the negative regulation of miR-378 and miR-1827, as the repressive and inductive effects of microRNA mimics and hairpin inhibitors could be rescued by RBX1/ CRKL overexpression and knockdown. Nevertheless, restoration of RBX1 and CRKL expressions only partially converted the angiogenic properties, suggesting that angiogenesis in NSCLC is not only dependent on RBX1 and CRKL. These in vitro results were also observed in vivo, where miR-378 hairpin inhibitor- and miR-1827 mimic-treated high invasive A549 cells demonstrated reduced number of metastases and ectopic vessel formation in embryonic zebrafish compared to negative controls. Collectively, these findings indicate that miR-378 and miR-1827 play important roles in metastasis and angiogenesis.

Biosketch:
I graduated from Genetics and Molecular Biology program with first class honours in 2012. I am currently a post-doctoral fellow at University of Malaya, after completing my PhD in Cancer Biology last year. For my initial project I aim to characterise a plant resistance gene in bananas, at the same time involved in research centring around miRNAs and natural compounds in different cancer types. My long-term research interests include developing a comprehensive understanding of key signaling pathways as well as how alterations in miRNA and gene expressions lead to cancer. To me, a successful research requires collaboration among people with different expertise, thus I envision myself fostering collaborations with prominent scientists to advance the technology to treat cancer.
SUNLIGHT EXPOSURE-RELATED FACTORS AND THEIR ASSOCIATION WITH URINARY 8-HYDROXYDEOXYGUANOSINE (8-OHDG) IN FEMALE YOUNG ADULTS

Cimi Ilmiawati
Co-Author: Indah Khoirunnisa, Rani Aulia Dwi Nanda, Elwitri Silvia Dept. of Pharmacology, Faculty of Medicine, Andalas University, West Sumatra, Indonesia ilmiawati@med.unand.ac.id

Background: Sunlight exposure to skin cells can cause photooxidation due to reactive oxygen species (ROS) release. ROS induces oxidative stress and the formation of 8-OHdG, a DNA damage marker. This study aimed to analyze sunlight exposure-related factors with urinary 8-OHdG levels in a homogenous group of Minangkabau female young adults.

Methods: The research was a cross-sectional study on female medical students of Andalas University selected by systematic random sampling (n=110). Ratio of sunlight-exposed skin, duration of sunlight exposure and sunscreen use were collected using questionnaire and urinary 8-OHdG was measured by ELISA. Statistical analyses were performed by using Pearson’s correlation, one way ANOVA/Kruskal-Wallis, and partial correlation.

Results: Average body surface area exposed to sunlight was 9.83±2.68%, average duration of sunlight exposure was 49.01 ± 36.96 minutes and 35.5% of the subjects regularly used sunscreen. There were significant correlations between sunlight-exposed skin area (r=0.195, p=0.021) and sunscreen use (p=0.001), however there was no significant correlation between duration of sunlight exposure (p=0.396) and urinary 8-OHdG levels. Partial correlation test showed significant correlation between sunscreen use with urinary 8-OHdG (r=-0.037, p=0.001).

Conclusion: Sunscreen use may protect the skin from sunlight-induced DNA damage in Minangkabau female young adults.

Biosketch:
Dr. Ilmiawati was trained as a primary care physician in Indonesia (graduated in 2006) followed by a four-year research training in environmental and preventive medicine in Japan (graduated in 2014). She has been appointed as a faculty member in the Department of Pharmacology Faculty of Medicine Andalas University since 2008 and currently holds a position as an assistant professor in the Division of Environmental Toxicology. Her research interests include molecular endocrinology, biomonitoring of environmental toxicants, analyzing the effects of UV-exposure, and studying the predictors of DNA damage markers in Indonesian young population. She would like to expand her research into understanding the environmental determinants of cancer. She was awarded the Takeda Science Foundation International Fellowship in 2015.
CHARACTERISATION OF NOTCH SIGNALLING IN PUTATIVE BLADDER CANCER STEM CELLS

De Ming Chau

Co-Author: 1Arcana Thirumorthy, 2Abhimanyu Veerakumarasivam,

1Faculty of Medicine and Health Sciences, Universiti Putra Malaysia 2School of Science and Technology, Sunway University, Malaysia chau.deming@gmail.com

Notch signalling is a canonical pathway which is involved in the regulation of stem-cell renewal and proliferation. This pathway has also been implicated in tumourigenesis, however, it often plays different role in different cancers. Emerging data has shown that Notch receptor mutations are associated with bladder cancer but it is unclear whether Notch signalling also plays a role in regulating putative bladder cancer stem cells (CSCs). The objective of this study is to characterise Notch signalling in putative bladder CSCs population from bladder cancer cell lines. To achieve this objective, the putative bladder CSCs were selectively enriched in 3D culture condition using low-attachment plates. We showed that the enriched spheroids express high level of stem-cell associated genes (SOX2, OCT4, and NANOG) implicating stemness in the cells. Expression level of markers described previously in other bladder CSCs studies such as CD44, CD49f and CD133 were also evaluated. We showed that the expression levels of these markers in monolayer and spheroid cells are variable, suggesting, unsurprisingly, a diversity in the signatures of these cell lines. Analysis of Notch signalling components gene showed that expression level of NOTCH2 and HES1 genes were significantly higher in the spheroid cells suggesting that these two genes could be the candidate genes that can be further explored to study the putative bladder CSCs. The inhibition of gamma-secretase enzyme, a key component of the Notch signalling using GSI-34, a small molecule compound, showed that it could reduce the proliferation of the bladder cancer spheroid though differences in response was observed across different spheroids. In summary, this study showed that Notch signalling could potentially maintain the proliferation and development of putative bladder CSCs via upregulation of both NOTCH2 and HES1 genes.

Biosketch:
Dr. Chau De Ming is a senior lecturer in the Department of Biomedical Sciences at Universiti Putra Malaysia (UPM). Before joining UPM, Dr. Chau did his PhD research at Cornell University and Memorial Sloan-Kettering Cancer Center. His current research interest in on the understanding of signaling pathway in cancer stem cells. Dr. Chau co-chairs the Science Integrity Working Group of the Young Scientists Network-Academy of Sciences Malaysia (YSN-ASM) and leads the YSN-ASM Responsible Conduct of Research (RCR) Programme. In addition to cancer research, Dr. Chau is also conducting research to understand the landscape of RCR in Malaysia.
Poly (ADP-ribose) polymerases (PARPs) play diverse roles in various cellular processes that involve DNA repair and programmed cell death. Amongst these polymerases is PARP-1, which is the key DNA damage-sensing enzyme that acts as an initiator for the DNA repair mechanism. Dihydroorotate dehydrogenase (DHODH) is an enzyme in the pyrimidine biosynthetic pathway, which is an important target for anti-hyperproliferative and anti-inflammatory drug design. Since these enzymes share a common role in the DNA replication and repair mechanisms, it may be beneficial to target both PARP-1 and DHODH in attempts to design new anti-cancer agents. Benzimidazole derivatives have shown a wide variety of pharmacological activities including PARP and DHODH inhibition. We hereby report the design, synthesis and bioactivities of a series of benzimidazole derivatives as inhibitors of both the PARP-1 and DHODH enzymes.

Biosketch:
I finished my Bachelor Degree in Applied Chemistry in UM and progressed to Ph.D in 2010. Upon graduation, I did my postdoc in Manchester Institute of Biotechnology, Manchester University for a year working on biocatalytic oxidation of ortho amino phenolic derivatives with subsequent Inverse electron demand Diels-Alder reaction. Currently, I am working as a senior lecturer teaching organic chemistry, biosynthesis and heterocyclic chemistry. My special interest is in organic synthesis, drug design on cancer targets and biocatalysis. Throughout my career, I have participated in numerous conferences and symposiums. During the Asian Core Program (ACP), I have been awarded Lecturship Award in 2016 by China and Lectureship Award in 2017 by Taiwan that enables me to give lectures of my research in their selected universities.
HEAD AND NECK CANCER OCCURRENCES AND LIFESTYLE HABITS IN TOUNGOO, MYANMAR (ESMOASIA 2017 POSTER)

Khin Khin Nwe
Co-Author: Soe Aung, Yin Yin Mon, Seinn Lei Lei Taung, Hnin Thazin Myanmar Medical Oncology Society
kkhinnwe@gmail.com

Background: Head & neck cancer was the first most common in Toungoo Hospital, Myanmar in 2016. We try to find out the life style of head and neck cancer patients, such as smoking, alcohol consumption and betel quid chewing in our region, Toungoo.

Methods: A descriptive study was conducted by retrieving and analyzing data for the year 2016 at Toungoo General Hospital.

Results: Among 307 cancer patients registered, 67 (21.8%) patients were head and neck squamous cell cancer. Male to female ratio was 1.6:1. The most common sites were oral cavity (34.3%, mean age 75.9) followed by larynx (25.4%, mean age 68.9), oropharynx (11.9%, mean age 63.5) and nasopharynx (11.9%, mean age 62.5), hypopharynx (10.4%, mean age 62.1), lip (4.5%, mean age 59.3) and nose (1.5%, mean age 68). Regarding to their habits, betel only patients were 20 (29.8%); smoking and betel, 19 (28.3%); smoking, alcohol and betel, 19 (28.3%); smoking only, 2 (3%); without documentation, 3 (4.5%); alcohol and betel 2(3%); without habit, 2 (3 %); no alcohol only and no alcohol and smoking patients. All oral cavity cancer patients were betel quid chewers, mostly smokers (47.8%) and alcoholics (43.5%). The majority (87%) of oral cancer patients had history of habitual betel quid chewing and keeping it in buccal cavity most of the time. In most cases,

Conclusions: Betel chewing was the primary contributor in head and neck cancer occurrences. This issue can be noticed for public awareness of risk habits in head and neck cancer patients and that may be a great help in cancer prevention through life style modification.

Biosketch:
She is a consultant medical oncologist at medical oncology ward of 1000 bedded Naypyitaw Hospital, Myanmar. She received her medical degree from University of Medicine 2, Myanmar and, underwent medical oncology training in University of Medicine 1 in 2005-2008. She got her MRCP(UK) in 2015 and achieved the European Certification on Medical Oncology from European Society for Medical Oncology in 2011 and 2016. Her interests include drug development and early detection of cancer to improve cancer outcomes. Her clinical interests are gastrointestinal cancer, breast cancer, head and neck cancer.
Electronic Medical Records (EMR) is a systematic collection of longitudinal patient health information in any care delivery setting. As EMR is the major carrier for conducting data-driven healthcare research, it is important to understand the information contained in the EMR. Prognosis research with clinical event prediction is gaining attention in the medical domain as the amount of data stored in the EMR system is growing. The rich longitudinal clinical data could be analysed to predict a time-dependent event of interest.

The major challenge for treating such time-to-event data is the presence of an event of interests that is not completely observed due to the dropout/losing track during the observation period and also limitations of short-term studies where some instances do not experience any event (unlabelled event) under this context. The event could be death, cancer reoccurrence, length of stay in the hospital, etc.

Machine learning techniques have the advantage of modelling the non-linear relationship and the data-driven approach has been shown to achieve good performance in overall prediction. In this study, we propose to develop a deep survival model, which incorporates a method to handle time-dependent covariates.

This project will extract clinical information for EMR through symbolic natural language processing and learning approach for name entity recognition. The proposed deep learning survival model will perform survival analysis with both structured clinical data and pathological images. It includes the implementation of non-parametric, semi-parametric and parametric approach with machine learning algorithms.

This artificial intelligent extend model algorithm can be channelled to cyber-physical system, and the creation of this cloud computing platform will revolutionize the current medical consultation approaches by patient looking for a doctor based in clinic or hospital to online consultation.

Biosketch:
Ir. Dr. Lai is currently the Head Programme MEng. and Research Coordinator at Faculty of Engineering, University Malaya. He was appointed as Senior Lecturer in Biomedical Engineering Department since 2013. Prior to that, He was affiliated to Technische Universität Ilmenau, Germany as Doctoral scholar under DAAD PhD Sandwich Programme. Ir. Dr. Lai is a registered Professional Engineer with Practicing Certificate (PEPC) at BEM, Chartered Professional Engineer (CPEng) at NER, and UK Chartered Engineer (CEng.). Meanwhile, he is serving in numerous capacities as external examiner, professional mentor and council member (IEM), external assessor (HALF), advisor of Industry Liaison Unit and Industry Advisory Panel (IAP). His research interests include computer vision, machine learning and medical imaging.
ROLE OF EOSINOPHILS IN THE TUMORIGENIC EFFECT OF BREAST CANCER IN MOUSE MODEL POST-RADIOThERAPY TREATMENT: A PRELIMINARY REPORT

Mohammad Johari Ibahim

Co-Author: Nurhaslina Hasan, Muhammad Khalis Abdul Karim, Effat Omar, Syed Baharom Syed Ahmad Fuad, Narimah Abdul Hamid Hasani Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Selangor mjohari46@gmail.com

Eosinophils are granulocytes that not only well-known for their role in parasitic infections and allergic responses, but also have shown a correlation with tumour progression. However, until now, the beneficial effects of eosinophils in tumour control remain unclear. Conventional radiotherapy is a routine treatment for up to 50% of cancer patients. Previous study has showed that genes related to eosinophils recruitment were up-regulated following radiotherapy treatment in a mouse model experiment. It is an interesting to know whether this therapy will induce eosinophils that either assisting in tumour suppression or in opposite role. The objective of this study is to investigate the recruitment of eosinophils in the tumour section and their tumorigenic activity in mice bearing tumour model post gamma-ray irradiation. In this study, Balb-c mice will be inoculated with EMT6 mouse mammary cell line at the hind leg. Mice will be treated either 2 Gy or 8 Gy gamma-ray doses in gamma cell chamber and sham group served as control. Mice will be sacrificed at 48 and 96 hours for acute study and will be monitored for up to 3 months for survival study. Tumour section will be collected for flowcytometry analysis and immunohistochemistry staining. At the moment, we have successfully developed mouse bearing tumour model and developed special lead shield for mice irradiation in gamma cell chamber. This shield enables gamma ray irradiation to the targeted tumour area in hind leg and protect healthy tissue. We hope the outcomes from this project will significantly advance the understanding of the biological mechanisms and important new knowledge on the interaction between radiotherapy and myeloid cell responses specifically towards understanding the role of eosinophils in tumour microenvironment.

Biosketch:
Mohammad Johari Ibahim is a Senior Lecturer who specializes in Biochemistry and Molecular Medicine and currently working at University Teknologi MARA. He obtained his bachelor's degree (Biomedical Science) and Master of Science (Medical Biochemistry) from University Kebangsaan Malaysia. He further his PhD study at the University of Melbourne and undertook research in cancer treatment. His research interests are to investigate the effect of radiotherapy on tumor microenvironment. Mohammad Johari has received Melbourne abroad travel scholarship during his PhD study to present his PhD outcomes at European Association Cancer Research conference in 2013. Currently, he is the Principal Investigator for 2 local research grants and supervising one PhD student. He has previously held several administrative tasks at the faculty and university levels and he is currently the Coordinator for Health and Wellbeing Community of Research, Institute For Research, Management and Innovation, Universiti Teknologi MARA for 2018-2019.
DIOSMETIN ARRESTS HCT-116 HUMAN COLORECTAL CANCER CELLS AT G2/M PHASE AND INDUCES APOPTOSIS VIA MITOTIC SLIPPAGE, INHIBITION OF CYCLIN A/B AND SUPPRESSING NF-KB ACTIVITY

Mohammed Al-Shawsh

Co-Author: Sanaz Koosha, Zahurin Mohamed, Ajantha Sinniah Department of Pharmacology, Faculty of Medicine, University of Malaya, Malaysia alshaweshmam@um.edu.my

Colorectal cancer (CRC) is the third most common type of cancer worldwide and contributes to thousands of deaths annually. Diosmetin, a bioflavonoid, has anticancer activity against different cancer cell lines including breast, liver and colon cancer. However, the underlying molecular mechanism by which diosmetin has cytotoxic effect against CRC is still unclear. Hence, this study aims to determine the mechanistic signaling pathways involved in the antiproliferative action exerted by diosmetin against HCT-116 colon cancer cells. The apoptotic and antiproliferative effects of diosmetin were investigated via proteome profiler array and NanoString technologies. Diosmetin showed potent cytotoxic effects against colorectal cancer HCT-116 cells with an IC50 = 3.6 µg/ml. Diosmetin inhibits the proliferation of HCT-116 cells through activation of apoptotic factors such as Bax and Fas as well as releasing the mitochondrial cytochrome C. In addition, diosmetin disrupts the mitosis of HCT-116 treated cells and arrests the cells at G2/M phase, which is mediated by inhibition of cyclin A/B genes that regulate the cell cycle progression. Moreover, diosmetin suppress the translocation of NF-κB to the nucleus of HCT-116 treated cells due to the overexpression of NF-κB inhibitor, namely IκBα gene. In summary, these results indicate that diosmetin has potential anti-colorectal cancer activity via suppression HCT-116 cell proliferation and induction of apoptosis. Further in vivo study in tumor xenograft animal model is essential to confirm the in vitro findings.

Biosketch:

Dr. Mohammed Alshawsh has obtained his PhD from Faculty of Medicine, University of Malaya in 2012. After his one year postdoc, he joined Department of Pharmacology, University of Malaya in 2013 and currently working as Associate Professor. His current field of research interest mainly focuses on pharmacological and toxicological evaluation of natural products for the treatment of colorectal cancer, obesity, diabetes, and fatty liver diseases via investigating the gene expression profiling to unravel the underlying molecular mechanisms involved. Dr. Alshawsh is a member of Italo-Latin American Society of Ethnomedicine, Laboratory Animal Science Association of Malaysia, and Malaysian Society of Pharmacology and Physiology. He serves as Associate Editor for the BMC Complementary and Alternative Medicine Journal. Currently, he is supervising 11 PhD students and 1 Master student. He has published over 30 papers in peer-reviewed journals and has an h-index of 11 and citations of more than 270 (Scopus).
COMBINATION OF GENOME EDITING TECHNOLOGY AND BCL-2 INHIBITORS TO DETERMINE THE SELECTIVE INDUCTION OF CELL DEATH IN NASOPHARYNGEAL CARCINOMA (NPC)

Nethia Mohana Kumaran

Universiti Sains Malaysia
nethiakumaran@usm.my

Nasopharyngeal carcinoma (NPC) is an aggressive and is a deadly form of cancer. BCL-2 family proteins are critical regulators of the intrinsic apoptosis pathway. They are up-regulated in many cancers and have become attractive therapeutic targets especially with the development of BCL-2 selective inhibitors. These selective inhibitors activate apoptosis by binding and inhibiting select anti-apoptotic proteins. Given that different cell populations may rely on different BCL-2 anti-apoptotic proteins for survival, there is a need to better understand which BCL-2 family members are required for cell survival. With this information, appropriate BCL-2 inhibitors can be employed to activate cell death. The aim of the study is to investigate the functional importance of each anti-apoptotic protein, particularly MCL-1 and BFL-1 for the survival of NPC cells using combination of the CRISPR/Cas9 technology and BCL-2 selective inhibitors.

A human apoptosis RT² Profiler PCR Array was first employed to profile the anti-apoptotic gene expressions in both the NPC cell lines. The HK1 cells expressed all the anti-apoptotic genes (MCL-1, BFL-1, BCL-2, BCL-xL, and BCL-w). On the other hand, C666-1 expressed all except for BFL-1 (undetectable level). As proof of principle BFL-1 and MCL-1 were knocked out using the CRISPR/Cas9 system. The BFL-1 or MCL-1 sgRNAs were cloned into the PX458 plasmid (pSpCas9(BB) -2A-GFP) and were transfected into the NPC cells. To this end we have generated single cell clones of the BFL-1 and MCL-1 knockout NPC cells. Parallel to this work, we used selective BCL-2 inhibitors namely ABT-199, S63845, and A-1311852 to chemically dissect the contribution of BCL-2, BCL-xL, and MCL-1, respectively for NPC cell survival using the C666-1 cell line as model. The cells were resistant to single agent treatment of these drugs. However, combined inhibition of MCL-1, plus BCL-2 or BCL-xL inhibited cell proliferation implying that BCL-2 and BCL-xL function redundantly in NPC.

Biosketch:
Nethia Mohana Kumaran graduated with BSc (Hons) Microbiology from Universiti Sains Malaysia and is the recipient of the Professor E. Balasingam Gold Medal Award. Upon completing MSc Oncology from Nottingham UK, she received a fellowship from the Ministry of Education Malaysia to pursue her doctorate in Medicine at the University of Sydney (USyd), Australia. While in Sydney, she received the prestigious New South Wales Scholar Award to continue her research work at USyd. She has published in high-impact journals such as Clinical Cancer Research, Carcinogenesis and PCMR. Nethia joined Universiti Sains Malaysia in 2013 as a senior lecturer. She has won a number of accolades for her work including the coveted L'Oreal-UNESCO for Women in Science National Fellowship, the MAKNA Cancer Research award in 2016 and the 2018 Endeavour Research Fellowship. Nethia was featured in the Asian Scientist Magazine and more recently in Nature.
Introduction: The increase of breast cancer cases in Malaysia indicates that active prevention should be given priority but fewer reports are issued on patients’ details in getting medical advice. This article presents the pattern of presentation to initial doctor after noticing symptom among breast cancer patients in Malaysia.

Methods: A retrospective cohort study was conducted at six public hospitals in Malaysia. Universal sampling was conducted where all breast cancer patients were histopathology confirmed. Time to presentation was the time interval from the point of symptom recognition until first presentation to a primary care facility. Data was collected through review of medical records and interview sessions guided by structured questionnaires.

Results: A total of 340 patients were included in this study. Median time to presentation was 2.4 months and 35% presented beyond 3 months. All patients presented with symptoms and none had been detected through screening. Majority of patients had performed breast self-examination (BSE) (65.3%) at home. The appearance of a painless breast lump (88.2%) was the most common initial symptom experienced by the patients. Other symptoms were breast pain, changes of breast shape, nipple discharge and systemic symptoms such as loss of weight and loss of appetite. Upon discovery of breast abnormalities, 86.2% of patients went to the public or private primary health care facilities rather than directly to the hospitals.

Conclusions: 35% of patients delayed their presentation to the initial doctor after noticing symptom. This highlights the need of educational programs to promote the importance of early presentation among Malaysian women.

Biosketch:
Breast cancer is the most common form of cancer among women in Malaysia. Referring to the National Cancer Registry Report, there were 18,343 new breast cancer cases with the highest incidence among Chinese (41.5%) followed by Indians (37.1%) and Malays (27.2%) (1). The incidence of breast cancer is increasing in Malaysia might be due to rapidly growing life expectancy, better socio-economic status and changes in lifestyle (2). The rampant and extensive rise of cases involving breast cancer in Malaysia is a strong indication that active prevention and cancer control strategies should be given utmost priority by all local health authorities. Malaysia has one of the lowest survival rates in Southeast Asia (3). Many studies has shown the effect of late stage and poor outcomes in Malaysia (4,5) but few report the details of patients presentation to medical advice. Therefore, this study was conducted to determine the time and pattern of presentation to primary health care after noticing symptoms among breast cancer patients in Malaysia.
PHOTODYNAMIC THERAPY FOR RECURRENT AND EARLY STAGE (STAGE I-II) HEAD AND NECK AERODIGESTIVE TRACT MUCOSAL TUMORS.

Norhafiza Mat Lazim
ORL-HNS Surgeon & Lecturer
norhafiza@usm.my

Introduction:
Photodynamic therapy has been shown to be effective for early primary head and neck aerodigestive tract mucosal tumor as well as for recurrent disease. The treatment was also used as part of palliative treatment for head and neck tumor management. Several multi-institutional clinical trials have demonstrated the efficacy of this PDT in the treatment of early primary oropharyngeal tumours and recurrent cancers as well as for palliative treatment of refractory head and neck cancers. Several literatures also found out that patient with early stage cancer and early recurrence tumor in oral cavity and larynx (Cis, T1, T2) display better prognosis with the PDT treatment. The objectives of this study is to investigate the effects of photodynamic therapy on early stage and recurrent head and neck mucosal tumors in a tertiary centre.

Planned Methodology:
This is a prospective, observational cohort study design. This study will takes place at the Otorhinolaryngology-Head and Neck Surgery Clinic, Hospital Universiti Sains Malaysia, Kota Bharu, Kelantan. All patients who diagnosed with squamous cell carcinoma of upper aerodigestive tract, who fulfil the selection criteria will be recruited in this study. Patient will be explained in details regarding the procedure and the surgery, the instruments used and the risks and complications of the study. Patients who agree for the PDT treatment will be recruited.

Expected Results:
Photodynamic therapy has been shown to be effective for early primary head and neck cancer as well as for recurrent disease. It has minimal morbidity and can be repeated in indicated cases. It offers an excellent adjuvant to the current treatment arsenals for the early small and superficial head and neck aerodigestive tract.

Biosketch:
Dr Norhafiza Mat Lazim is a consultant otorhinolaryngologist at Hospital Universiti Sains Malaysia. She obtained her MBBS from The University of Queensland, Australia in 1999. She had completed her Master of Medicine in Otorhinolaryngology – Head and Neck Surgery from Universiti Sains Malaysia in 2012. Subsequently she obtained her Clinical Fellowship in Head and Neck Surgical Oncology from Antoni van Leeuwenhoek – Netherlands Cancer Institute (AVL-NKI), Amsterdam, Netherlands in 2014. She also had completed six months of Clinical Fellowship at VUMC, Free University Hospital, in Amsterdam in 2015. She has a strong interest in head and neck surgery and head & neck oncology and had regular subspeciality and combined ORL-Oncology clinics as well as performing most of the head and neck surgery such as salivary gland surgery, thyroid surgery, oral cavity, larynx and pharyngeal surgery. She had acquired several short term grants on head and neck diseases and tumors. She is one of the co-researcher for a multi-centre clinical trial on carcinoma of the tongue that based in the United States. She has in total of 30 publications in peer reviewed journals and two book chapters. She has becomes a reviewer for multiple international journals. She also serves as an editorial board member to numerous international journals. She has presented both in oral and poster presentation internationally and locally. She is a member of the American Head and Neck Society (AHNS), European Head and Neck Society (EHNS), Asian Head and Neck Oncology (ASHNO), American Thyroid Association (ATA) and British Association Head and Neck Oncology (BAHNO). She is currently an honorary secretary of Malaysia Society of Otorhinolaryngology-Head & Neck Surgery (MSOHNS).
THE ROLE OF FIBROBLASTS ON MICRORNA REGULATION OF EPITHELIAL TO MESENCHYMAL TRANSITION-MEDIATED CISPLATIN RESISTANCE IN BLADDER CANCER

Nur Akmarina binti Mohd Said
Co-Author: Ivy Chung
University of Malaya, Kuala Lumpur, Malaysia
nur_akmarina@um.edu.my

Background: Cisplatin-based chemotherapy against bladder cancer is challenged by the ability of the cancer cells to develop resistance to it. Although there have been extensive research to encounter this, many have overlooked the role of tumor microenvironment in the development of chemoresistance. Stromal cells in the tumor microenvironment have been shown to influence cancer cell resistance against certain drugs. They secrete factors that regulate epithelial-mesenchymal transition (EMT) in tumor cells – a process by which the tumor epithelial cells gain metastatic capacity. EMT could contribute to chemoresistance progression by altering expression of miRNAs, small non-coding RNAs that negatively regulate protein expression.

Objective: We aim to investigate the miRNA regulation in the cancer cells upon the action of stromal cells secretome in mediating EMT-induced chemoresistance. The presence of the stromal cells is crucial to recapitulate the complex process in vivo.

Method: Cisplatin-resistant bladder cancer cell lines with the exposure to bladder stromal fibroblasts are developed. A differential miRNA profiling will be performed between the cisplatin-resistant and parental cell lines. The top identified miRNAs will be modulated to prevent EMT-induced chemoresistance or resensitize the resistant cancer cells towards cisplatin. Expected outcome and significance: Important miRNAs that are involved in EMT-mediated cisplatin resistance in bladder cancer cells upon secretion from the bladder stromal fibroblasts will be identified. These miRNAs are of high significance since the cell culture models closely mimic in vivo tumor microenvironment. The results from the modulation of miRNAs could be the key for more effective way to combat cisplatin resistance in bladder cancer therapy.

Biosketch:
Dr. Nur Akmarina obtained her Bachelor of Pharmacy from University of Malaya in 2006. She was awarded with scholarship from the university and Malaysian Government to pursue doctoral studies in Monash University, Australia. Her PhD thesis involved studying the mediators of cancer metastasis on a unique bladder cancer model by screening the RNAi, miRNA and kinase inhibitors libraries. Currently she is a senior lecturer in the Department of Pharmacy, University of Malaya and is part of the Metastasis & Tumour Microenvironment research group in Translational Core Laboratory, University of Malaya Medical Centre (UMMC). With a special interest in translational research programs, she is currently leading various miRNA-related studies on chemoresistance in bladder cancer and obesity related cancers, through active collaborations with surgeons and oncologists in UMMC.
THE MESENCHYMAL-LIKE PHENOTYPE OF METASTATIC BREAST CANCER IS MAINTAINED BY THE TRANSCRIPTION FACTOR RUNX1

Nur Syamimi Ariffin
Co-Author: Paul Shore

Department of Pharmacology and Chemistry, Faculty of Pharmacy, Universiti Teknologi MARA, Puncak Alam Campus, Bandar Puncak Alam, 42300 Selangor, Malaysia.
nursyamimi.ariffin@uitm.edu.my

The majority of breast cancer related deaths are due to metastatic tumour growth in distant organs. To date, there is no specific treatment available for metastatic breast cancer and patients generally die within five years after diagnosis. Therefore, there is an urgent need to develop therapies for metastatic breast cancer and identify new molecular targets for a development of new drugs would be beneficial. Recently, the transcription factor RUNX1 has been implicated in the formation and progression of human breast cancer however whether it is involved in breast cancer metastasis is unknown. Therefore, in the current study, RUNX1 was investigated for its role in breast cancer metastasis. A double nickase CRISPR-Cas9 strategy was used to target the first exon of the RUNX1 gene in the metastatic MDA-MB-231 cells to establish a RUNX1-negative breast cancer cell line. Migration and invasion capacity of the cells decreased in the absence of RUNX1 and the cells also formed spherical clusters in 3D culture, which was associated with the changes in cell morphology from stellate to round shape in the absence of RUNX1. The expression of the metastasis-related genes MMP13, MMP9, OPN and SNAI2 also decreased parallel with the loss of the mesenchymal-like phenotype whilst the expression of the epithelial markers CYTOKERATIN, DESMOPLAKIN and E-CADHERIN increased concomitantly. Data obtained also shows that RUNX1 down-regulates the expression of the EMT transcription factor SLUG, which is encoded by the SNAI2 gene. ChIP analysis demonstrated that RUNX1 was bound to the SNAI2 promoter and RUNX1 was subsequently shown to activate the SNAI2 promoter activity. Taken together, data presented in this work demonstrates that RUNX1 is required for EMT in the metastatic breast cancer cells and it is therefore a potential therapeutic target to prevent breast cancer metastasis.

Biosketch:
Dr. Nur Syamimi Ariffin obtained her PhD in Pharmacology in December 2017 from the University of Manchester, United Kingdom. During her PhD, she carried out studies on the role of the transcription factor RUNX1 as a molecular target to prevent triple-negative breast cancer cells, MDA-MB-231, from metastasising to distant organs. For this, she used a double nickase CRISPR-Cas9 strategy to establish a RUNX1 knockout cell line. She obtained her Master’s degree from the University of Otago, New Zealand in 2012 and received her first degree in Biomedical Sciences from Universiti Putra Malaysia in 2008. She works as a Senior Lecturer at the Faculty of Pharmacy, Universiti Teknologi MARA, Puncak Alam Campus, Malaysia and is currently developing her research in deciphering the transcriptional networks involving RUNX1 in her quest to find the therapeutic potential of RUNX1 and its regulated genes.
Previously we have shown that HPV16 E7 targets p130 predominantly through direct interactions via the LXCXE motif whereby HPV48 E7 disrupts p130/DREAM via CDK2 phosphorylation. From these findings, it is suggested that the proliferation of cervical cancer cells is dependent upon disruption of repressive DREAM complexes by HPV E7.

We are also aware that the current vaccines for HPV are unable to be used to treat individuals who are already infected with HPV. Therefore, we will investigate further on the possibility to block the HPV infection through HPV E7 LXCXE motif.

In this project, the HPV E7 will be the target as this is the main viral protein that binds to the p130-DREAM complex. Binding of these, triggers the degradation of p130 which causes cells to go into the S/M phase and promote cell division. Hence, a peptide/compound that can bind to the LXCXE motif within E7 may have the potential to act as a good inhibitor to prevent binding between E7 and p130. This research project aims to discover novel HPV antivirals in the form of peptides through virtual screening, followed by in vitro confirmation of their inhibitory activities. Subsequently, prospective leads will be investigated further through biological assays to determine their antiviral capacity and the mechanisms involved in the viral inhibition.

**Biosketch:**

Upon graduating M.Med.Sc from University of Malaya in 2004, Nurshamimi was awarded Malaysia-Imperial Doctoral Programme (MIDP) Split Programme at Imperial College London, UK and University of Malaya scholarship to study the role of mammalian DREAM complex in HPV-transformed cell lines at the Dept. of Virology, St. Mary’s Campus. In 2013, she started working as an academician and researcher at the Dept. of Molecular Medicine, Faculty of Medicine, UM. Nurshamimi managed to train two masters students which were already completed. She also received several travel awards from some of the world-renowned research institute including EMBO, Pasteur Institute and International of Papillomavirus Society. Along the way, Nurshamimi has some collaboration with IMR and University of Sheffield working on Dengue virus and drug development for ischaemic stroke, respectively. In addition, she is also the coordinator for Cell culture facilities and recently, she managed to write an SOP for infectious and non-infectious work to be carried out in her department.
Polyamines are vital in maintaining human health because they perform certain functions that are necessary for cell development. These biogenic amines are naturally produced by the body but may also acquire through diet. Increased in intracellular polyamine promote unwarranted cell proliferation and to a certain extent, stimulates cancer initiation. Thus, it is crucial to evaluate polyamines content in medicinal fruits that claimed to cure cancer in order to avoid these unnecessary cell growth. This study aimed to investigate polyamines as a chemopreventive agent using selected prophetic fruits on human lung adenocarcinoma cells, A549. Five prophetic fruits were selected, including Phoenix dactylifera (ajwa dates), Beta vulgaris (beetroot), Ficus auriculata (fig), Ziziphus jujube (jujube) and Vitis vinifera (raisin). Polyamines concentration in selected prophetic fruits showed significant highest in jujube while lowest in fig. MTT assay suggested IC50 was ranged from 15 mg/ml to 30 mg/ml. Growth effect analysis indicated significant reduction in cell number after 48 h of treatments while cell viability decreased following 72 post-treatment. Total elimination of intracellular spermidine and spermine were observed in treated A549 cells as well. Expression of ODC and SSAT genes indicated significant downregulation of ODC gene in cells treated with ajwa, jujube and raisins while upregulation of SSAT gene in beetroot and fig treated cells. Cell cycle profile displayed cell cycle arrest at G2/M after 48 h of treatments in all treated cells. Annexin-V results demonstrated significant increase of early apoptosis in beetroot treated cells while other fruits caused significant increase in late apoptosis at 48 h of treatments. Caspase assay revealed significant activation of caspase 3, 8 and 9 in beetroot treated cells while no caspase activation was identified in other prophetic fruits treated cells. It was concluded that nutritional cancer therapy and preventive approaches for cancer using selected prophetic medicinal fruits are promising.

Biosketch:
Radiah Abdul Ghani is appointed as Assistant Lecturer in International Islamic University Malaysia (IIUM) in 2004 before moved to University of Liverpool to undertake a MSc in Physiology. She then graduated with PhD in Pharmacology from University of Aberdeen in 2012. She studied the polyamine transport system as a potential of effective drug delivery to cancer cells using a series of drug-polyamine conjugates as in vitro model. Radiah is enthusiastically involved in research in the university which aims to facilitate scientific excellence in the discovery and understanding the alternative strategy for cancer prevention using natural product and prophetic medicine. Her research interest includes the mechanism of cell death and the role of polyamines in chemoprevention pathway. Currently she is the Principle Investigator and co-researcher for various grants awarded by Ministry of Education Malaysia. Presently, Dr Radiah is an Associate Professor and serves as Deputy Dean of Student Affairs and Alumni at Kulliyyah of Allied Health Sciences, IIUM.
THERAPEUTIC TARGETING SELF-RENEWAL MACHINERY AS A NOVEL MALIGNANT RHABDOID TUMOUR CANCER THERAPY STRATEGY

Ras Azira Bt Ramli
Co-Author: Martina A. Finetti, Matthew P. Selby, Yura Grabovska, Steven C. Clifford, Daniel Williamson

Universiti Sultan Zainal Abidin (MALAYSIA), Newcastle University (UK)
aziraramli@unisza.edu.my or r.a.b.ramli1@newcastle.ac.uk

Introduction:
Malignant Rhabdoid Tumours (MRT) are highly aggressive childhood malignancies characterized by a single mutation; biallelic inactivation of SMARCB1, a component of the SWI/SNF chromatin remodeling complex. These tumors may occur anywhere, most frequently in the brain (Atypical Teratoid/Rhabdoid Tumor, ATRT) and in the kidneys and soft tissues (Extra Cranial Rhabdoid tumor, ECRT). Despite recent advances in treating other solid tumors, treatment for MRT still remains ineffective and we hypothesized that MRT “stemness” characteristics are key to its aggressive clinical course and resistance to treatment.

Methods:
Here we catalog the expression of a program of “stemness” genes capable of driving aberrant self-renewal. Furthermore, we show by re-expression of SMARCB1 in MRT cells that several of these key “stemness” genes are aberrantly activated by SMARCB1 mutation. Top candidate of “stemness” genes were further validated for SMARCB1 dependency through cross-referencing with RNA-seq and CRISPR screening in MRT cells. One such gene, BMI1 was further demonstrated to be critical to MRTs tumorigenesis by shRNA knockout, and a novel anti-BMI1 drug, PTC209 was tested to show efficacy in MRTs.

Results:
Loss of BMI1 in MRT cells by shRNA knockdown and PTC209 treatment significantly reduced the self-renewal capability of cells (~3-22-fold reduction) as seen from the number of tumourspheres formed in limiting dilution assay (LDA) and also caused long term inhibition of self-renewing cells in colony formation assay. Interestingly, BMI1 knockdown transcriptionally activates critical genes in MRT such as CDKN2A, CDKN1A and CD44 expression and this recapitulates the expression profile seen when SMARCB1 was re-expressed into MRT cells. Importantly, knockdown of BMI1 inhibits cell propagation and induces growth arrest thus making this a potentially desirable drug target to halt MRT tumorigenesis.

Conclusion:
Here for the first time, we show that targeting BMI1, a self-renewal gene which also a component of Polycomb Group (PRC1) has a potential to be a novel therapeutic target in MRT.

Biosketch:
After completing my bachelor with hons (Biotechnology majoring in Microbiology) at University of Queensland, Australia in 2013, I worked as research assistant in Department of Hematology at Institute of Medical Research (1 year) and subsequently (in 2014) I was offered a tutor/felo position at UniSZa. I completed my PhD in 2018 at Newcastle University, UK (working on pediatrics brain tumour) and returned to Malaysia to take up a lecturer position in UniSZa. My research interests lie in the cell and molecular biology of paediatric cancer and development of new diagnostic technologies (antibodies engineering). Of particular interest is chromatin remodeling complex and how targeting this complex as potential therapeutic targets for epigenetic disease. Current research projects include targeting SMARCB1 in potential cell of origin for MRT for identification molecular factors within the cells that contribute towards disease aggressiveness.
Oxidative stress was defined as an imbalance in the biochemical process which produce reactive oxygen species (ROS). Imbalance of oxidation and reduction processes cause toxic due to a production of free radicals and peroxides (reactive oxygen material and nitrogen species) which damage the protein, lipid and DNA cell, hence leading to all sorts of degenerative diseases, as such cancer. A protective mechanism known as the antioxidant protective system helps in prevention of free radicals damaging the cells towards diseases and aging. There are several vitamins and micronutrients which are substrate and/or cofactor in the metabolic pathway that control production and repairing DNA and gene expression. Based on previous study, lack of micronutrients will cause the disturbance in genome integrity and modification in DNA in turn affecting cell growth, tissue differentiation, cancer incidence and ageing. Thus, this presentation will focus on how personalized nutrition counselling can reduce DNA damage and hence reduce the risk for developing other degenerative diseases, particularly cancer. Proof of concept for this clinic may lead for a better future in personalized nutrition based on their genome health.

Biosketch:
Dr Razinah Sharif is a passionate researcher, lecturer and young scientist working in the field of nutrition and genetics. Her first encounter with nutrition and cancer relationship is during her first postgraduate (during her Masters) where she found that local food may cause genetic damage that may in the end lead to an increase risk of initiation process in cancer carcinogenesis. 14 years in nutrition and cancer research allows her to move from various supplements, dietary practices, aspects of cancer prevention and now she is moving towards cancer survivorship. With her MyGenomSihat clinic and app in line, she will be busy dealing with how nutrition and other lifestyle practices helps in cancer prevention.
Introduction: In radiotherapy, patient’s understanding on their disease and treatment is very important in order to achieve optimum patient’s compliance during treatment, thus an accurate assessment based on timing provides a supportive measure from the patient in radiotherapy treatment. The current practice requires weekly or monthly evaluation of the patients, however there is lack of automation in the process. The purpose of this study is to determine the feasibility of analyzing patient reported symptoms via mobile device (‘apps’).

Method and materials: We have development a mobile application prototype for radiotherapy patients name as myCare360. It emphasis on all the domains in radiotherapy using questions and providing a total information about the domains. Clinicians reviewed patient-reported symptoms during weekly symptom management visits and patients completed surveys regarding perceptions of the utility of the mobile application. The primary outcome is the use of mobile technology as tool for patient to report their symptoms for better analyzation.

Results: There were 34 screens been designed in providing the additional information plus multiple questionnaire’s to validate the current practice into an automation process using myCare360 mobile app.

Conclusions: Empirically validated Evaluation Rubric for myCare360 Smartphone App Simulation will provides researchers and healthcare givers with a common system to identify best practices to leverage mobile app technology to support healthcare needs particularly in the field of radiotherapy.

Biosketch:
In radiotherapy, patient’s understanding on their disease and treatment is very important in order to achieve optimum patient’s compliance during treatment, thus an accurate assessment based on timing provides a supportive measure from the patient in radiotherapy treatment. The current practice requires weekly or monthly evaluation of the patients, however there is lack of automation in the process. Therefore, we have development a mobile application prototype for radiotherapy patients name as myCare360. It emphasis on all the domains in radiotherapy using questions and providing a total information about the domains.
ANTIPROLIFERATIVE EFFECTS OF NDC2 AND ITS ANALOGUES AGAINST HUMAN HEPATOCELLULAR CARCINOMA (HEPG2) CELL LINE

Sau Har Lee

Co-Author: Ng Chu Xin Le Cheng Foh

1School of Biosciences, Faculty of Health and Medical Sciences, Taylor’s University, Lakeside Campus, Subang Jaya, Selangor, Malaysia. 2School of Biosciences, Faculty of Science, University of Nottingham Malaysia Campus, Selangor, Malaysia

sauhar.lee@taylors.edu.my

Introduction
Liver cancer is the second most common cause of mortality from cancer worldwide, with a mortality to incidence ratio as high as 0.95. This is mainly attributed to multidrug resistance gained by liver cancer cells after conventional chemotherapies. Hence, development of therapeutic peptides as a new chemotherapeutic drug might be a promising approach. NDC2 is an Aurein 1.2-like antibacterial and antitumor peptide that was shown to display minimal cell toxicity. We selected this peptide as the template to design five synthetic analogues (ND1–ND5) to enhance its anticancer potential. Therefore, the purpose of this study is to evaluate the in vitro antiproliferative properties of NDC2 and its analogues against human hepatocellular carcinoma (HepG2) cell line.

Methods
Each ND analogue was introduced with multiple residual alterations at specific positions at the C-terminal arm. Its anticancer potentials were predicted using the AntiCP anticancer peptide prediction tool. Subsequently, MTT assay was carried out to investigate the potential cytotoxic properties of NDs against HepG2 cells, up to a concentration of 256μg/ml for 24, 48 and 72 hours.

Results
Based on AntiCP algorithm, an anticancer peptide should exhibit SVM score greater than 1.0. From our analysis, only ND1–ND4 showed SVM scores ranging from 1.43–1.78, hence indicating their higher potential as anticancer peptides. These findings were supported by MTT results that showed both ND5 and the template NDC2 do not possess antiproliferative activity against HepG2 cells. Contrarily, ND1–ND4 exhibited antiproliferative activity against HepG2 cells with IC50 values ranging from 67–108μg/mL. Among these analogues, ND3 showed the greatest antiproliferative effect on HepG2 cells, with IC50 value 67.811±3.403μg/mL.

Conclusion
The four ND1–ND4 analogues exhibited good antiproliferative activity and could represent the promising candidates for treatment against liver cancer. Hence, the anticancer mechanisms of the ND analogues should be further studied.

Biosketch:
Dr Lee Sau Har received her BSc Biomedical Science in 2009 and was conferred her PhD degree in 2013. Her PhD works focused on the anti-cancer drug discovery from natural product. With her research capacity, she was selected to attend the Nobel Laureate meeting in 2010. She was also awarded a Distinction for her PhD thesis. After that, she joined Tsinghua University, Beijing as a postdoctoral fellow, under the support of Centre for Life Sciences (CLS) Postdoctorate Fellowship. During this period, her research interest expands into the cancer stem cell field and was awarded two national grants from the China government. Her remarkable research findings on the regulation of cancer stem cells were published in the high impact journal, Cancer Research. Prior to joining Taylor’s University as a Lecturer, Dr Lee served as a Senior Research Scientist in Cell Genesis Sdn Bhd. She is currently a member of MSBMB.
GENETIC SUSCEPTIBILITY TO COLORECTAL AND CERVICAL CANCERS: CURRENT PROGRESSES

Shing Cheng Tan
UKM Medical Molecular Biology Institute, Universiti Kebangsaan Malaysia
shingchengtan@gmail.com

Genetic polymorphisms are known to account for the interindividual differences in cancer susceptibility. A number of previous works have identified several polymorphisms that may contribute to the risk of various cancers. However, these genetic associations typically occur in a population-specific manner and not many studies have been conducted to examine the association of these polymorphisms with the risk of cancers in Malaysia. My research, therefore, aims to investigate the association between these candidate polymorphisms and the risk of colorectal and cervical cancers in the Malaysian population. A case-control study was conducted for each cancer type and selected polymorphisms were genotyped on the genomic DNA of the study participants by using established PCR-based methods. Logistic regression analysis was then performed to evaluate the association between the polymorphisms and risk of the respective cancers. In colorectal cancer, a statistically significant risk association was observed for the rs28720239 polymorphism of NFKB1 gene, but not for the rs2233406 and rs3138053 polymorphisms of NFKBIA gene. On the other hand, in cervical cancer, the rs1800629 polymorphism of TNF, rs231775 polymorphism of CTLA4, rs1800682 polymorphism of FAS, rs2279744 polymorphism of MDM2 and rs9344 polymorphism of CCND1 showed a statistically significant risk association, but not the rs361525 polymorphism of TNF, rs1801275 polymorphism of IL4R, rs5742909 polymorphism of CTLA4, rs1042522 polymorphism of TP53, rs1801270 polymorphism of CDKN1A, rs1799864 polymorphism of CCR2 and rs678653 polymorphism of CCND1. In conclusion, a few polymorphisms have shown potential association with risk of colorectal and cervical cancers in Malaysia. However, ongoing efforts to discover more clinically translatable polymorphisms associated with the cancers are warranted, especially in a larger sample size and on the genome-wide scale.

Biosketch:
Dr. Shing Cheng Tan is a Research Fellow at the UKM Medical Molecular Biology Institute. He received his PhD in Human Genetics from Universiti Sains Malaysia in October 2016, specializing in molecular biology and genetic epidemiology of cancers. Over the years, Dr. Tan has worked on colorectal cancer, cervical cancer and more recently, breast cancer. In his works, Dr. Tan attempts to identify genetic variations that could influence the risk of cancers and to characterize genetic modifications (e.g. gene expression changes and copy number alterations) that occur in cancer tissues. Dr. Tan has been actively presenting his preliminary research findings in national and international conferences, where he has won two Best Oral Presentation awards and a Travel Grant award in recent years. So far, Dr. Tan has produced a total of 16 publications, which have been collectively cited 110 times.
MESENCHYMAL STEM CELLS: APPLICATIONS IN ORTHOPAEDICS

Sik Loo Tan
Co-Author: Tunku Kamarul Zaman Bin Tunku Zainol Abidin
*Tissue Engineering Group (TEG), NOCERAL, Department of Orthopaedic Surgery, Faculty of Medicine, University of Malaya,*
	tansikloo@yahoo.com, tansikloo@gmail.com, tansikloo@ummc.edu.my

Tendon degeneration and overuse are common, painful and disabling problems presenting for orthopaedic surgery and rehabilitation. One of the major contributing risk factors to these conditions is the loss of fibroblast function with age. This affects the synthesis and organization of ECM proteins as well as matrix remodeling during tendon healing. Consequently, tendon exhibits poor regenerative capacity and heals with fibrous scar tissues which compromise their function and may retear. Current tendon tissue engineering research has been focused in the investigation of intrinsic and extrinsic factors that can induce bone marrow stromal cells (MSCs) into the tenogenic lineage for use as an alternative cell source to replenish functional tendon cells at the site of tendon injury and repair.

Our studies focus on the *in vitro* and *in vivo* translational research related to tendon repair. The *in vitro* tenogenic-differentiation potential of mesenchymal stem cells (MSCs) via growth factor induction was investigated using (i) microarray gene expression profiles analysis to elucidate the signaling pathways involved in tenogenic differentiation; (ii) atomic force microscopy (AFM) imaging and laser confocal microscope imaging to evaluate the phenotypic changes in the tenogenic-MSCs. For the *in vivo* aspect, the potential applications of tenogenic-MSCs in tendon repair was evaluated in an *in vivo* rabbit model.

Osteosarcoma is the most common primary malignant bone tumor in children and young adults and accounts for 5% of all pediatric malignancies. I wish to contribute to osteosarcoma research to make a change in improving child and teen health. I hope to embark on the effect of tumor-conditioned medium (TCM) on bone marrow derived-MSCs, and the paracrine effect of MSCs on malignant osteosarcoma-initiating cells. We wish to extend our on-going MSCs study to look into the effect of MSCs secretomes on cancer cells.

Biosketch:
Dr Tan Sik Loo is currently a senior lecturer in the Department of Orthopaedic Surgery, Faculty of Medicine, University of Malaya. She was a PhD student and graduated from the same department, in 2013, working there as a post-doctoral research fellow (PDRF) soon after her PhD degree. During her career as a PDRF, she continued her work on mesenchymal stem cells (MSC) applications in tendon repair, in *in vitro* and *in vivo* models. Apart from MSC, she also embarked on Streptozotocin (STX)-induced rat model for musculoskeletal diseases (i.e. osteoarthritis and tendon degeneration) related studies, and metabolic syndrome (MetS) related musculoskeletal studies in tendon, cartilage and muscle. Dr Tan was promoted to senior lecturer two years after her PDRF training. Since then, she has been instrumental in the development of an academic programme: Master of Medical Science (Regenerative Medicine). Her work in stem cells and tissue engineering has received various local and international research awards, eg. Young Investigator Awards in Molecular Medicine, Best Poster Award in Advance Stem Cell Therapy, International Society of Stem Cell Research (ISSCR) 2009 Travel Award etc.
INVESTIGATING THE AUTOPHAGY, MICROBIOME, AND MICROBIOME-INDUCED AUTOPHAGY AS POTENTIAL BIOMARKERS IN COLORECTAL CANCER

Sin Yeang Teow  
Department of Medical Sciences, School of Healthcare and Medical Sciences,  
Sunway University  
ronaldt@sunway.edu.my

Colorectal cancer (CRC) is the third most common cancers in the world. In Malaysia, it is the second most common cancers in men and third most common in women. In the era of precision medicine or personalized therapy, the tumour molecular features of CRC such as Kirsten ras (KRAS) and epidermal growth factor receptor (EGFR) mutation, and microsatellite instability (MSI) status have significant prognostic and/or predictive values for CRC patient treatment. Cumulative evidences demonstrated that autophagy which is a cellular process that remove damaged cellular components and recycle the nutrients for own cell’s use, has been linked with the pathogenesis of CRC. In addition, gut microbiome consisting of Bacteroides, Eubacterium, Fusobacterium and so on also contribute to CRC progression and treatment outcome. Interestingly, microbiome has been shown to induce autophagy but the microbiome-induced autophagy in CRC has not been well studied. Our study focuses on studying autophagy, microbiome, and microbiome-induced autophagy in CRC using the formalin-fixed paraffin embedded (FFPE) tissues from 200 CRC patients and their potential use as predictive or prognostic markers. Complete clinicopathological data of these patients have been collected and the study is ongoing to collect the treatment and survival data of the patients as well as determining the molecular features of the tumours such as KRAS mutation and MSI status mainly by quantitative PCR and immunohistochemistry (IHC) staining. The expression of autophagy markers such as LC3A, LC3B, Beclin 1 and p62 in the CRC tissues are being evaluated and will be then associated with the clinical data of CRC patients. In the microbiome study, we are particularly interested in investigating the association between Fusobacterium nucleatum (FN) and CRC pathogenesis. This data will then be correlated with the tumour autophagy, molecular events, treatment and overall survival (OS) data.

Biosketch:
I obtained my PhD from Universiti Sains Malaysia (USM) in 2015. Back then, I worked on developing a chemically engineered therapeutic antibody against HIV-1. I joined Sunway University as a lecturer in September 2017 and mainly work on cancer research. Currently, I have three MSc and one PhD students under my supervision. My team mainly works on biomarker-related studies in colorectal and liver cancers, as well as cell biology project in nasopharyngeal cancers. We actively work together with clinicians mainly from our sister company, Sunway Medical Centre for their patients’ clinical samples in our collaborating projects. Besides that, I also co-supervise several other students from Universiti Teknologi Malaysia and Monash University Malaysia who are working on bioactive nanoparticles and hydrogels in anticancer and tissue regeneration studies. I actively review manuscripts submitting to journals such as Scientific Reports, Microbial Cell Factories, Journal of Medical Microbiology, and International Journal of Molecular Sciences.
APPLICATION OF RAMAN SPECTROSCOPY AND SAXS METHODS FOR BREAST CANCER TISSUE DIAGNOSTIC AND THEIR HISTAPATHOLOGICAL CLASSIFICATION OF EPITHELIAL-TO-MESENCHYMAL TRANSITION (EMT)

Siti Fairus Abdul Sani  
Siti Norbaini Sabtu, D.A. Bradley, L.M. Looi, Z. Osman  
Department of Physics, Faculty of Science, University of Malaya,  
50603 Kuala Lumpur, Malaysia  
s.fairus@um.edu.my

Despite reduction in mortality due to earlier diagnosis and implementation of adjuvant chemo- and hormone-therapies, breast cancer still remains the commonest cause of cancer death in women worldwide. Many factors, including genetic, are involved in the initiation of breast cancer, but mortality is due to metastatic disease. In breast cancer the presence of cells undergoing the epithelial mesenchymal transition (EMT) is indicative of metastasis progression. By means of EMT the epithelial cancer cells acquire molecular alterations that facilitate the loss of epithelial features and gain of mesenchymal phenotype. Such transformation promotes cancer cell escape from the primary tumour and dissemination into the circulation. Histopathology and biomedical imaging techniques have been used as standard procedure for breast cancer diagnosis. However, these techniques show several disadvantages; time consuming, reflects poor resolution, sensitivity and specificity, and thus leads to vague results that prone to human interpretation. Due to the non-invasive character, rapid and high specificity, Raman spectroscopy has emerged as a diagnostic tool for breast cancer and a useful technique to identify malignancy of breast cancer cell, which correlated with the EMT phenotype that profound at the molecular level. Furthermore, the detailed biochemical information of the tissue samples can also be provided from this technique. We seek to develop the instrumentation needed for rapid and accurate data collection and analysis both in vitro and in vivo. Additional investigation has been conducted for measurement of degradation of fibrillary collagen in cancerous tissue, use being made of Small Angle X-ray Scattering (SAXS) analysis. The key advantage of SAXS method, other than its generally non-destructive nature, is sensitive to the supramolecular structures of tissue to evaluate if systematic variations in structure are correlated with disease progression, and hence to improved understanding of the EMT phenomena.

Biosketch:

Education:
Ph.D. in Radiation and Medical Physics, 2015, University of Surrey, UK.  
Postgraduate Certificate in Education (PGCE), 2012, St. Mary’s University College, Twickenham London.  
BSc in Physics, 2011, University of Surrey, UK.

Research Interest:
(I) Applied Radiation and Medical Physics
Investigation of molecular classification and EMT in malignant breast tissue, using Raman spectroscopy, SAXS and XRF.

(II) Radiation Detection and Measurement
Doped silica fibres, glass beads, borosilicate glass and Carbon-Based Materials as new TLD.

(III) Applied Nuclear and Radiation Physics
(a) Enhancement of Oxygen in Internal Combustion Engine (ICE) by means of alpha irradiation.  
(b) Metal distribution in road dust samples, utilising XRF and ICPMS.  
(c) Evaluating the Effect of High Dose Radiation Sterilization on the mushroom substrate.

Awards:
1. Gold Award in 27th International Invention & Innovation Exhibition (ITEX) 2016, A New Intelligent Material for Radiation Detection.  
2. Gold Award in Malaysia Technology Expo (MTE) 2016, A New Intelligent Material for Radiation Detection.
THE EFFECT OF OLEUROPEIN ON TWO-STAGE MOUSE SKIN CARCINOGENESIS MODEL

Siti Fathiah Masre
Centre of Health and Applied Sciences, Faculty of Health Sciences, National University of Malaysia (UKM), sitifathiah@ukm.edu.my

Oleuropein is a phenolic compound which majorly found in olive leaf. It is known to have numerous pharmacological roles such as antioxidant, antibacterial, anti-inflammatory and antitumour. This study was carried out to investigate the effect of oleuropein on the two-stage mouse skin carcinogenesis model involving the initiation and promotion stages. Skin tumours were initiated by topical application of 7,12-dimethylbenz[a]anthracene (DMBA: 200nmol) and promoted by 12-O-tetradecanoylphorbol-13-acetate (TPA: 20nmol) on the shaved dorsal area of mice. Total of 30 female ICR mice was randomly divided into five groups (n=6 per group). Group I was treated with DMBA and TPA, group II as a negative control was treated with acetone (70%) alone, group III to V are treatment groups (10mg/kg): oleuropein pre-initiated group (Group III); oleuropein post-initiated group (Group IV); and oleuropein pre- and post-initiated group (Group V). After 16 weeks, group III showed a significant reduction in the percentage of mouse bearing tumour (p<0.05) and the mean number of tumour per mouse (p<0.05) as compared to group I. Based on histopathological analysis, group III prevented skin carcinogenesis with mild epidermal hyperplasia formation and a significant reduction (p<0.05) of epidermal thickness as compared to the DMBA/TPA group I. Moreover, the level of lipid peroxidation (MDA) was significantly reduced in group III compared to group I (p<0.05). The level of antioxidant superoxide dismutase (SOD) was significantly increased in group III (p<0.05), while the level of glutathione (GSH) was significantly higher in Group V (p<0.05) compared to group I. Also, group III showed a significant increase in the percentage of apoptotic cells (p<0.05), and a significant reduction of proliferation rates (p<0.05) as compared to group I. These findings indicate that oleuropein may act as a potent chemopreventive agent at the pre-initiation stage against the development of mouse skin carcinogenesis through its antioxidant pro-apoptotic and antiproliferation actions.

Biosketch:
Siti Fathiah Masre, affectionately called Fathiah, was born on July 29, 1985 in Johor Bahru, Malaysia. She completed her PhD in November 2015 at the University of Glasgow, where she specialised in the development of squamous cell carcinoma by using the transgenic mouse approach. She currently works as a lecturer at the Centre of Health and Applied Sciences, National University of Malaysia (UKM). She teaches anatomy, histology and cytology. Her research interests are in the field of multistage carcinogenesis and chemoprevention. The main focus of her research involves the usage of a natural active compound to see its potential effect on the specific stage of cancer and uncover its underlying molecular mechanisms. On another note, Fathiah is an affiliate of the YSN-ASM, a lifetime member of MyBiomed Association and a research reviewer for the Majlis Amanah Rakyat (MARA).
NEWCASTLE DISEASE VIRUS STRAIN AF2240 AS AN ONCOLYTIC VIRUS IN MALAYSIA

Suet Lin Chia
Universiti Putra Malaysia
suetlin@upm.edu.my

Newcastle disease virus (NDV) belongs to the family of Paramyxoviridae with a negative, single-stranded RNA. Although the virus is often fatal to chickens, it only causes pharyngitis, conjunctivitis, and mild flu-like symptoms in humans. In addition, NDV has the potential to be used as a therapeutic agent for cancer as it replicates naturally in human cancers with high tumour-killing ability, specificity and selectivity, and low systemic cytotoxicity. The Malaysian field isolate NDV strain AF2240 has received significant attention over the past 50 years. Initial research was focused on its molecular biology, pathogenesis and vaccine development for the disease. This strain has better oncolytic potential over several of the commonly available NDV strains. Apart from high toxicity towards cancer cells, it was also used to study the mechanism of NDV-mediated apoptosis such as Bax protein recruitment as well as death receptor engagement. Studies on its ability to selectively induce apoptosis in tumour cells resulted in a proposed p38 MAPK/NF-κB/ IκBα pathway. The immunogenicity of AF2240 was also investigated through PBMC stimulation and macrophage infection. In addition, the enhanced oncolytic ability of this strain under hypoxic condition signifies its dynamic tumour tropism. Nevertheless, persistent infection of NDV in cancer cells as well as oncolysis inefficiency in chemo-resistant cancer cells are challenges to be solved. Through reverse genetics, the viral genome is being genetically modified to enhance its oncolytic properties by introducing apoptotic and immunostimulatory transgenes as well as introducing mutations at the virulence gene to improve its safety features.

Biosketch:
I obtained my BSc, MSc, and PhD from Universiti Putra Malaysia. Currently, I’m a senior lecturer in the Department of Microbiology, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia. I have started my research since my MSc study investigating Newcastle disease virus (NDV) under the supervision of Prof. Dr. Khatijah Yusoff. Apart from studying the molecular biology of the virus, we genetically modified the virus to enhance its oncolytic activities against cancer. I was given the opportunities to work with one of the pioneers in the field of virotherapy, Prof Len Seymour from the University of Oxford for two years investigating the potential of recombinant human adenovirus in treating cancer. We worked together to apply for the Newton-Ungku Omar Fund under the UK-Malaysia Bilateral Health Research Collaboration Program and was awarded a grant to research on translational development of oncolytic NDV for treatment of colorectal cancer.
In this talk, I am going to present the idea of synthesizing medicine for cancer treatment in the form of biomaterials loading traditional drugs. Nowadays, anti-cancer drugs have to be imported from foreign countries which are highly unaffordable for people with middle and low incomes. Therefore, my proposal demonstrates a method of using medicinal compounds from snake venom in Vietnam which are cheaper than the imported drugs. These compounds are then loaded in biological carriers, tested and compared with authentic drugs to investigate their treatment effectiveness. Regarding my experience in this field, I have already researched on various types of carrier for controlled anti-cancer drug delivery such as redox-sensitive nanocarriers from mPEG end-capped porous silica, and low systemic toxicity nanocarriers from heparin-mPEG and PAMAM dendrimers. In addition, the ability of the fabricated biomaterials to inhibit the proliferation of cancer cells has been examined *in vitro*, using various cancer cell lines including Hela – cervix cancer cell line, A549 – lung cancer cell line, and MCF7 – breast cancer cell line. Furthermore, we have the laboratory for *in vivo* test with different animal models such as mice, rabbit and pig. This facilitates the experimental process by giving us the opportunities to conduct more detailed investigation about the characteristics of the biomaterials. By doing so, they can be fully optimized for application in cancer treatment and other medical fields. Finally, combining the advantages of conducting cancer research in Vietnam and my experience in this area, I desire to obtain more international and interdisciplinary collaborations so that we can work together to find novel methods for combating cancer and increasing the healthcare service for people in the near future.

**Biosketch:**

Dr. Nguyen Thi Hiep obtained her BSc from University of Science, HCMC, Vietnam, followed by MSc (2009) and PhD (2012) from Soonchunhyang University, Korea. In 2013, she established the Tissue Engineering and Regenerative Medicine (TERM) Orientation in Department of Biomedical Engineering (BME) at International University-Vietnam National University (IU-VNU). Her research interests lie in the fields of polymer chemistry, pharmaceutical science, biology, medicine, and focus on the design and preparation of biomaterials for their biological, medical, and pharmaceutical applications. Until now, Dr. Hiep has published 42 articles in ISI and Scopus system and 10 domestic papers, attended 60 international conferences in addition to 3 granted-patents. In addition, she received various professional awards and prizes such as National fellowship award from the L’Oreal UNESCO for Women Science (2016); the winner of the ASEAN-US Science Prize for Women Science (2017); and the International Rising Talent of the L’Oreal UNESCO for Women Science (2018).
Abnormal glycosylation is strongly related with carcinogenesis and provides an alternative approach in understanding the biology and possible management of cancer. The N-glycan sequencing methodology coupling HPLC analysis with mass spectrometry enables accurate quantification and identification of each N-glycn present on glycoproteins. This method was employed on a collection of breast cancer serum to search for potential biomarkers of breast cancer. The overall N-glycome of breast cancer was found to be increased in large complex structures, sialylation and fucosylation. A tri-antennary structure carrying a sialyl Lewis x epitope (A3G1F1) was found to be the single most effective marker for distinguishing not only between cancer and non-cancer but also correlated with disease progression and metastases, better than the currently clinically available markers, CEA and CA 15-3. In addition, increased A3G1F1 reflects lymph node positive status and number of circulating tumour cells. Based on these findings, a glycoproteomics approach and mass spectrometry analysis was carried out to identify serum proteins which carry A3G1F1. Three serum proteins were highlighted; a1-acid glycoprotein, a1-antichymotrypsin and haptoglobin b-chain which could serve as targets for further investigation. This study presents an example of the application of N-glycan analysis and glycoproteomics in the study of cancer biomarkers towards personalised medicine and better therapeutic targets.

Biosketch:
Umi Marshida Abd Hamid is a Senior Lecturer at the School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Malaysia. She is a trained biochemist and specialises in glycobiology, particular N-glycan sequencing and glycoproteomics. Her work on breast cancer serum glycosylation highlighted significant changes and a specific N-glycan which could serve as a biomarker for disease progression and may shed light to the underlying mechanisms involved. Her current interest is to apply glycan sequencing and glycoproteomics to understand diseases including cancer, in the quest to introduce specific markers as tools for personalised medicine. She is also working on elucidating the role of glycoproteins in biofilm formation and antibiotic resistance in bacteria, with a long term goal of developing a database for microbial glycans.
LONG-TERM MANIPULATION OF STEM CELLS AND THE RISK OF TUMORIGENIC POTENTIAL

Wan Safwani Wan Kamarul Zaman
Co-Author: Jane Ru Choi
Department of Biomedical Engineering, Faculty of Engineering, University of Malaya
wansafwani@um.edu.my

Stem cells in vitro manipulation has long been discussed but it is still not well established. The long-term in vitro manipulation of stem cells has remain a major issue with concerns of tumorigenic potential despite the amount of resources that have been used in this area of research. Reports have shown that there were cases of transformation into malignant cells and even death after clinical application. In view of the rising need for stem cells-based therapy, the need for safe and efficacious treatment is more imperative than ever. One of the method is to study or modulate the cellular microenvironment of stem cells and their molecular response as their response may have the potential to induce aberrant genetic effects which may be detrimental for clinical applications. Therefore, investigation into the safety and efficacy of stem cells should be a continuous work to safeguard the patients’ health and wellbeing. In this paper, we summarized the results obtained from long-term in vitro manipulation of human adipose-derived stem cells. These outcomes would help us to better understand the stem cells behavior which could also have an impact on the direction of stem cells research and regulation of stem cells-based therapy that needs to be put forward to ensure safe and effective therapy can be offered.

Biosketch:
Wan Safwani Binti Wan Kamarul Zaman is currently a senior lecturer in the Department of Biomedical Engineering, Faculty of Engineering, University of Malaya. She received her Master of Pharmacy (MPharm) from the University of Strathclyde in 2003. In 2006, she received her MSc in Immunopharmacology, also from the University of Strathclyde. In 2008, she was awarded the National Science Fellowship (NSF) allowing her to pursue and complete her PhD in 2012. She was also awarded the Hadiah Khalid Kadir for the best postgraduate student (PhD) in the Faculty of Medicine and Health Sciences at the Universiti Kebangsaan Malaysia. Her current research interest is on the effects of culture environment on stem cells and cancer cells to elicit their response using natural products and biomedical engineering approach. From here, the data that could be used to determine stem cells and cancer cells characteristics and their impact on cancer development and treatment.
SYNTHESIS OF BENZO-1,3,4-OXADIAZEPINE FROM N-BENZYLIDENE-2-HYDROXYBENZOHYDRAZIDES AND THEIR POTENTIAL INHIBITION AGAINST HCV PROTEASE

Yean Kee Lee

Co-Author: Chan Pei Qie, Tan Ze Kai, Gan Kin Boon and Noorsaadah Abd. Rahman

University of Malaya
yeankee@um.edu.my

A series of benzo-1,3,4-oxadiazepines were easily prepared from their corresponding Schiff bases in a one-step reaction via cyclization using Brønsted acid catalyst and acetic anhydride as acylating agents. Sulphuric acid was found to be the most effective Brønsted acid catalyst at room temperature. This reaction condition was shown to be versatile when various type of benzo-1,3,4-oxadiazepines were successfully prepared in the reasonable yield. 14 types of benzo-1,3,4-oxadiazepines were evaluated in silico for their binding against homology model of HCV protease genotype 3. Autodock Vina was used to predict their binding energy. Possible binding interactions were examined using Biovia Discovery Studio Visualizer. Comparisons of their binding energies were made between the standard HCV protease inhibitor, i.e. Simeprevir, and the ligand candidates. Benzoxadiazepine derivatives bearing the naphthyl moiety were shown to be the more promising leads for subsequent optimisation, albeit being about 1 kcal/mol weaker than Simeprevir. We also obtained good candidates of benzoxadiazepines that may possibly inhibit HCV protease. In most cases, these molecules seemed to approach the binding site at P1, P2 and P3 position, leaving P2’ and P4 unattained. The bioassays of these candidates are still being carried out.

Biosketch:

Lee Yean Kee obtained his PhD in Chemistry at University of Malaya with Professor Dr. Noorsaadah Abd. Rahman. Currently, he is a research officer of Drug Design and Development Research Group (DDDRG) in UM with a demonstrated history of working in the laboratory management and research in medicinal chemistry, as well as organic synthesis and method development. He has been working in designing inhibitors against dengue virus serine protease. His interest was also extended to flavonoid synthesis and their biological properties. In addition, research on method development to synthesise 7-membered benzoxadiazepine derivatives was adopted and subsequent development is in progress. Apart of some collaborative work that involved synthetic chemistry, such as the molecular-imprinted polymer, magnetic ion particle-immobilised organo-chiral catalyst, he has started to venture into the poly (ADP-ribose) polymerase 1 (PARP-1) inhibition with benzimidazole derivatives, which is associated with cancer-related diseases.
DISCOVERY AND DEVELOPMENT OF POTENTIAL THERAPEUTIC ANTICANCER PEPTIDES DERIVED FROM SCORPION VENOM

Yin Quan Tang

Co-Author: Soon Tsuey Ning, Teo Ting Ting, Serena Zacchigna, Dennis J. Grab

School Of Biosciences, Taylor’s University, Malaysia, ICGEB, Italy, USUHS, USA

yinquan.tang@taylors.edu.my

Due to high mortality and hard to treat, cancer has becoming one of the greatest threats to human health. Standard cancer treatments like surgery or chemo-, radiation, and hormone therapies failing patients as it’s always accompanied by undesirable side effects. Therefore, new therapeutic options for cancer treatment are highly needed. Peptide therapeutics is a promising field for emerging anticancer agents because peptides are easily synthesized in a cost-efficient manner and are flexible to modification to produce safe, highly selective and efficacious therapeutic anticancer peptides (ACPs). Animal venom (snakes, scorpions and spiders) becoming an important source for ACPs discovery and development because they have a high target specificity and selectivity, and low toxicity. Although natural ACPs have a high anticancer activity, but its long amino acid sequence increases the production costs and could limits its efficacy. We have successfully designed a series of new short ACPs from scorpion venom (Androctonus mauritanicus), through peptide modification based on amphipathicity, hydrophobicity and cationic properties. Several new ACPs were chosen to synthesis based on the prediction of their high anticancer and membrane penetration activities, and low toxicity and hemolytic properties. From the PEP-FOLD (de novo approach) analysis, all these new ACPs still retained their original alpha-helix structural after peptide modification. From our preliminary in-vitro studies, several new ACPs showed promising results with selectively kill cancer cells without interrupting normal cells. Currently, we are investigating their mechanism of cell death and anticancer (antiproliferative, antimetastasis and antiangiogenesis) activity induced by these selected new ACPs.

Biosketch:

Dr Tang Yin-Quan is a lecturer at School of Biosciences, Faculty of Health and Medical Sciences, Taylor’s University, Malaysia. Prior to joining the Faculty, he has accumulated four years of postdoctoral experience in multidisciplinary research fields (pharmacology, virology, vaccine development, regenerative medicine and cardiac angiogenesis) at different local (University of Malaya and Sunway University) and international institutions (The Johns Hopkins School of Medicine, USA and ICGEB, Italy). His research focus on the therapeutic aspect of angiogenesis including identification of potential therapeutic factors, evaluating the optimal therapeutic effects, development of animal models for cancers and vascular diseases that might more consistently predict human response to treatment with angiogenesis modulators.

Awards:

1. Travel Grant Award, First Croucher Summer Course in Precision Genome Engineering By CRISPR, The University of Hong Kong (10-15 Aug 2018)
2. IUBMB Early Career Grant, 24th IUBMB & 15th FAOBMB, Seoul, South Korea (4-8 Jun 2018)
3. Young Scientist Programme Observer Fellowship, Yonsei University, South Korea (2-4 Jun 2018)
Artesunate is an established antimalarial drug belonging to the artemisinin class of drugs with an excellent safety and tolerability profile and affordable at approximately USD1 per daily dose. In last two decades, artemisinins have shown potent and broad anticancer properties in a range of cell lines and animal models, supporting the hypothesis that artemisinins have the potential to be an effective anti-cancer therapy. Multiple potential mechanisms of action include anti-proliferative effects through cell-cycle disruption, reactive oxygen species (ROS) -induced DNA damage, induction of apoptosis, anti-angiogenesis, immunomodulation and induced radiosensitivity.

Despite a multi-modality treatment approach to colorectal cancer, 5 year overall survival does not currently exceed 60%. Neoadjuvant pre-operative therapy may be more effective at eradicating micrometastases compared to adjuvant therapy delivered following the delay and immunological stress of surgery.

The NeoART trial is a phase II multicentre randomised, double blind, placebo controlled trial (RCT) for patients undergoing primary surgery for Stage II/III colorectal cancers. Patients are randomised (1:1 ratio) to receive either a two week course of neoadjuvant artesunate 200mg once daily or matching placebo. Both patients and health care professionals are blinded to treatment allocation arm to minimise outcome-reporting bias. The primary endpoint of the trial is recurrence free survival two years after surgery. Secondary endpoints include 2 and 5 year overall survival, treatment related toxicity, tolerability and patient quality of life. A translational sub-study looking at predictive and prognostic biomarkers is also planned.

Biosketch:
I am a Clinical Oncology Research Fellow doing a PhD in artemisinin drug re-purposing for cancer at St George's University of London. I have a special interest in clinical translation research for global health, looking at novel and affordable ways of improving patient survival, care and quality of life. As part of my PhD, I lead on protocol development and clinical trial set up of NeoART – a Phase II Randomised, Double Blind, Placebo Controlled trial of Neoadjuvant Artesunate in Stage II/III Colorectal Cancer in the UK. I also assisted with training and study set up of NeoART-V, a Phase II mirror study in Vietnam. I am currently working as part of a multi-disciplinary research collaboration on mechanism of action studies of artemisinins in solid tumours and haematological malignancies. Prior to my PhD, I trained in Clinical Oncology at the Royal Marsden obtaining a Diploma in Oncology and FRCR (Fellowship of the Royal College of Radiology).
### List of Speakers:

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Organization</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prof Sanjeev Krishna</td>
<td>St George’s University of London, UK</td>
<td><a href="mailto:sgjf100@sgul.ac.uk">sgjf100@sgul.ac.uk</a></td>
</tr>
<tr>
<td>2</td>
<td>Prof Chee Onn Leong</td>
<td>International Medical University, Malaysia</td>
<td><a href="mailto:cheeonn_leong@imu.edu.my">cheeonn_leong@imu.edu.my</a></td>
</tr>
<tr>
<td>3</td>
<td>Prof Dr Patricia Zancan</td>
<td>Federal University of Rio de Janeiro, Brazil</td>
<td><a href="mailto:pzancan@me.com">pzancan@me.com</a></td>
</tr>
<tr>
<td>4</td>
<td>Prof Dr Yusuf Baran</td>
<td>Izmir Institute of Technology, Turkey</td>
<td><a href="mailto:yusufbaran@iyte.edu.tr">yusufbaran@iyte.edu.tr</a></td>
</tr>
<tr>
<td>5</td>
<td>Prof Wassim Abou-Kheir</td>
<td>American University of Beirut, Lebanon</td>
<td><a href="mailto:wa12@aub.edu.lb">wa12@aub.edu.lb</a></td>
</tr>
<tr>
<td>6</td>
<td>Dr Chern Ein Oon</td>
<td>Universiti Sains Malaysia</td>
<td><a href="mailto:chern.oon@usm.my">chern.oon@usm.my</a></td>
</tr>
<tr>
<td>7</td>
<td>AP Dr Dominic Voon</td>
<td>Kanazawa University, Japan</td>
<td><a href="mailto:dvoon@staff.kanazawa-u.ac.jp">dvoon@staff.kanazawa-u.ac.jp</a></td>
</tr>
<tr>
<td>8</td>
<td>Prof Hongbin Ji</td>
<td>Chinese Academy of Sciences, China</td>
<td><a href="mailto:hbji@sibcb.ac.cn">hbji@sibcb.ac.cn</a></td>
</tr>
<tr>
<td>9</td>
<td>Dr Weang Kee Ho</td>
<td>University of Nottingham Malaysia</td>
<td><a href="mailto:WeangKee.Ho@nottingham.edu.my">WeangKee.Ho@nottingham.edu.my</a></td>
</tr>
<tr>
<td>10</td>
<td>Prof Boon Peng Hoh</td>
<td>UCSI University, Malaysia</td>
<td><a href="mailto:hoh.boonpeng@gmail.com">hoh.boonpeng@gmail.com</a></td>
</tr>
<tr>
<td>11</td>
<td>Prof Sarah Barman</td>
<td>Kingston University, UK</td>
<td><a href="mailto:s.barman@kingston.ac.uk">s.barman@kingston.ac.uk</a></td>
</tr>
<tr>
<td>12</td>
<td>AP Dr Chee Seng Chan</td>
<td>University of Malaya, Malaysia</td>
<td><a href="mailto:cs.chan@um.edu.my">cs.chan@um.edu.my</a></td>
</tr>
<tr>
<td>13</td>
<td>Dr Sok Ching Cheong</td>
<td>Cancer Research Malaysia</td>
<td><a href="mailto:sokching.cheong@cancerresearch.my">sokching.cheong@cancerresearch.my</a></td>
</tr>
</tbody>
</table>
## List of Participants:

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Organization</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abdul Hafeez Kandhro</td>
<td>PPHI Sindh Labs, Pakistan</td>
<td><a href="mailto:hafeezjaan77@yahoo.com">hafeezjaan77@yahoo.com</a></td>
</tr>
<tr>
<td>2</td>
<td>Alain Barbaro Alfonso</td>
<td>Center for Genetic Engineering and Biotechnology, Cuba</td>
<td><a href="mailto:alain.alfonso@cigb.edu.cu">alain.alfonso@cigb.edu.cu</a></td>
</tr>
<tr>
<td>3</td>
<td>Anyanee Kamkaew</td>
<td>Suranaree University of Technology, Thailand</td>
<td><a href="mailto:akamkaew@gmail.com">akamkaew@gmail.com</a></td>
</tr>
<tr>
<td>4</td>
<td>Beow Keat Yap</td>
<td>Universiti Sains Malaysia</td>
<td><a href="mailto:beowkeat@usm.my">beowkeat@usm.my</a></td>
</tr>
<tr>
<td>5</td>
<td>Chai San Ho</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:chaisan_ho@hotmail.com">chaisan_ho@hotmail.com</a></td>
</tr>
<tr>
<td>6</td>
<td>Cimi Ilmiawati</td>
<td>Andalas University, Indonesia</td>
<td><a href="mailto:ilmiawati@med.unand.ac.id">ilmiawati@med.unand.ac.id</a></td>
</tr>
<tr>
<td>7</td>
<td>De Ming Chau</td>
<td>Universiti Putra Malaysia</td>
<td><a href="mailto:chau.deming@gmail.com">chau.deming@gmail.com</a></td>
</tr>
<tr>
<td>8</td>
<td>Iskandar Abdullah</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:Iskandar.a@um.edu.my">Iskandar.a@um.edu.my</a></td>
</tr>
<tr>
<td>9</td>
<td>Jaweed Mohammad</td>
<td>Taylor’s University, Malaysia</td>
<td><a href="mailto:Mohammad.Jaweed@taylors.edu.my">Mohammad.Jaweed@taylors.edu.my</a></td>
</tr>
<tr>
<td>10</td>
<td>Khin Khin Nwe</td>
<td>Myanmar Medical Oncology Society</td>
<td><a href="mailto:kkhinnwe@gmail.com">kkhinnwe@gmail.com</a></td>
</tr>
<tr>
<td>11</td>
<td>Khin Wee Lai</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:lai.khinwee@um.edu.my">lai.khinwee@um.edu.my</a></td>
</tr>
<tr>
<td>12</td>
<td>Mohammad Johari Ibahim</td>
<td>Universiti Teknologi MARA, Malaysia</td>
<td><a href="mailto:mjohari46@gmail.com">mjohari46@gmail.com</a></td>
</tr>
<tr>
<td>13</td>
<td>Mohammed Al-Shawsh</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:alshaweshmam@um.edu.my">alshaweshmam@um.edu.my</a></td>
</tr>
<tr>
<td>14</td>
<td>Nethia Mohana Kumaran</td>
<td>Universiti Sains Malaysia</td>
<td><a href="mailto:nethiakumaran@usm.my">nethiakumaran@usm.my</a></td>
</tr>
<tr>
<td>15</td>
<td>Noor Mastura Mohd Mujar</td>
<td>Universiti Sains Malaysia</td>
<td><a href="mailto:masturamujar@usm.my">masturamujar@usm.my</a></td>
</tr>
<tr>
<td>16</td>
<td>Norhafiza Mat Lazim</td>
<td>Universiti Sains Malaysia</td>
<td><a href="mailto:norhafiza@usm.my">norhafiza@usm.my</a></td>
</tr>
<tr>
<td>17</td>
<td>Nur Akmarina Mohd Said</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:nur_akmarina@um.edu.my">nur_akmarina@um.edu.my</a></td>
</tr>
<tr>
<td>18</td>
<td>Nur Syamimi Ariffin</td>
<td>Universiti Teknologi MARA, Malaysia</td>
<td><a href="mailto:nursyamimi.ariffin@uitm.edu.my">nursyamimi.ariffin@uitm.edu.my</a></td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Organization</td>
<td>Email</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------</td>
<td>---------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>19</td>
<td>Nurshamimi Nor Rashid</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:nurshamimi@um.edu.my">nurshamimi@um.edu.my</a></td>
</tr>
<tr>
<td>20</td>
<td>Radiah Abdul Ghani</td>
<td>International Islamic University Malaysia</td>
<td><a href="mailto:radiah@iium.edu.my">radiah@iium.edu.my</a></td>
</tr>
<tr>
<td>21</td>
<td>Ras Azira Ramli</td>
<td>Universiti Sultan Zainal Abidin, Malaysia</td>
<td><a href="mailto:r.a.b.ramli1@newcastle.ac.uk">r.a.b.ramli1@newcastle.ac.uk</a></td>
</tr>
<tr>
<td>22</td>
<td>Razinah Sharif</td>
<td>Universiti Kebangsaan Malaysia</td>
<td><a href="mailto:razinah@ukm.edu.my">razinah@ukm.edu.my</a></td>
</tr>
<tr>
<td>23</td>
<td>Rozilawati Ahmad</td>
<td>Universiti Kebangsaan Malaysia</td>
<td><a href="mailto:rozie.ahmad@ukm.edu.my">rozie.ahmad@ukm.edu.my</a></td>
</tr>
<tr>
<td>24</td>
<td>Dr Sau Har Lee</td>
<td>Taylor’s University, Malaysia</td>
<td><a href="mailto:sauhar.lee@taylors.edu.my">sauhar.lee@taylors.edu.my</a></td>
</tr>
<tr>
<td>25</td>
<td>Shing Cheng Tan</td>
<td>Universiti Kebangsaan Malaysia</td>
<td><a href="mailto:shingchptan@gmail.com">shingchptan@gmail.com</a></td>
</tr>
<tr>
<td>26</td>
<td>Sik Loo Tan</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:tansikloo@ummc.edu.my">tansikloo@ummc.edu.my</a></td>
</tr>
<tr>
<td>27</td>
<td>Dr Sin-Yeang Teow</td>
<td>Sunway University, Malaysia</td>
<td><a href="mailto:ronaldt@sunway.edu.my">ronaldt@sunway.edu.my</a></td>
</tr>
<tr>
<td>28</td>
<td>Siti Fairus Abdul Sani</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:s.fairus@um.edu.my">s.fairus@um.edu.my</a></td>
</tr>
<tr>
<td>29</td>
<td>Siti Fathiah Masre</td>
<td>Universiti Kebangsaan Malaysia</td>
<td><a href="mailto:sitifathiah@ukm.edu.my">sitifathiah@ukm.edu.my</a></td>
</tr>
<tr>
<td>30</td>
<td>Suet Lin Chia</td>
<td>Universiti Putra Malaysia</td>
<td><a href="mailto:suetlin@upm.edu.my">suetlin@upm.edu.my</a></td>
</tr>
<tr>
<td>31</td>
<td>Thi Hiep Nguyen</td>
<td>Vietnam National University, Vietnam</td>
<td><a href="mailto:nthiep@hcmiu.edu.vn">nthiep@hcmiu.edu.vn</a></td>
</tr>
<tr>
<td>32</td>
<td>Umi Marshida Abd Hamid</td>
<td>Universiti Teknologi MARA, Malaysia</td>
<td><a href="mailto:marshida@salam.uitm.edu.my">marshida@salam.uitm.edu.my</a></td>
</tr>
<tr>
<td>33</td>
<td>Wan Safwani Wan Kamarul Zaman</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:wansafwani@um.edu.my">wansafwani@um.edu.my</a></td>
</tr>
<tr>
<td>34</td>
<td>Yean Kee Lee</td>
<td>Universiti Malaya, Malaysia</td>
<td><a href="mailto:yeankee@um.edu.my">yeankee@um.edu.my</a></td>
</tr>
<tr>
<td>35</td>
<td>Dr Yin Quan Tang</td>
<td>Taylor’s University, Malaysia</td>
<td><a href="mailto:yinquan.tang@taylors.edu.my">yinquan.tang@taylors.edu.my</a></td>
</tr>
<tr>
<td>36</td>
<td>Dr Yolanda Augustin</td>
<td>St George’s University of London, UK</td>
<td><a href="mailto:yolanda_augustin04@yahoo.com">yolanda_augustin04@yahoo.com</a></td>
</tr>
</tbody>
</table>
**Cancer Research Malaysia Abstracts:**

**GENOME-WIDE CRISPR-CAS9 KNOCKOUT SCREEN IDENTIFIES GENETIC VULNERABILITIES OF ORAL SQUAMOUS CELL CARCINOMA (OSCC)**

Annie Wai Yeeng Chai  
Co-Author: Pei San Yee, Shi Mun Yee, Hui Mei Lee, Iuan Sheau Chin, Vivian Kai Hung Tiong, Stacey Price, Emanuel Goncalves’ Fiona Behan, Ultan McDermott, Mathew Garnett, and Sok Ching Cheong  
*Cancer Research Malaysia*  
annie.chai@cancerresearch.my

The CRISPR-Cas9 technology has revolutionized the genome-wide loss-of-function screen in the quest of identifying cancer dependencies. Large compendium effort of genome-wide lethality screen using CRISPR-Cas9 has shown to be successful in confirming known and identify novel gene dependencies of various cancers. Targeting these essential genes that are critical for cancer cell survival forms the basis of discovering new therapeutic opportunities. In this study, we aimed to identify genetic vulnerabilities of oral squamous cell carcinoma (OSCC) via genome-wide CRISPR-Cas9 knockout screen.

Using bioinformatic tools (CRISPRcleanR and MAGeCK), significantly depleted essential genes were identified for all the 21 OSCC cell lines screened with genome-wide CRISPR-Cas9 knockout library. After filtering out core fitness essential genes, we further subset a number of 233 essential genes that were significantly depleted in 4 to 10 OSCC cell lines. Among these genes, YAP1 and WWTR1 were found to be essential for distinct and mostly non-overlapping subset of cell lines. Co-competitive culture assays were used to validate the essentiality of YAP1 and WWTR1 in these selected subset of cell lines. YAP1 and WWTR1 are major effectors of the Hippo signaling pathway, of which its dysregulation has been implicated in oncogenesis of various malignancies, including OSCC. Hence, targeted inhibition of YAP1 or/and WWTR1 warrant further investigation for the development of targeted therapy for OSCC.

**Biosketch:**  
Dr. Annie Chai joined Cancer Research Malaysia as postdoctoral scientist after completing her PhD study at The University of Hong Kong. She obtained First Class Honor for her undergraduate study at The University of Hong Kong, double majoring in Biotechnology and Chemistry. Thereafter, she was offered the Hong Kong PhD Fellowship to pursue PhD under Professor Maria Lung, at the Faculty of Medicine, The University of Hong Kong. Her PhD work focused on functional characterization of tumor suppressor genes in nasopharyngeal carcinoma and esophageal squamous cell carcinoma. Under the supervision of Professor Cheong Sok Ching, she is working in collaboration with Professor Mathew Garnett from the Wellcome Trust Sanger Institute, to identify essential genes in oral squamous cell carcinoma via genome-wide CRISPR Cas9 essential screens. She is aspired to bring forward the outcome into the discovery of new therapeutic targets to improve the therapeutic options for oral squamous cell carcinoma.
OBJECTIVES: Precision medicine has demonstrated that genetic features of cancer cells can be used for predicting drug response, and emerging evidence suggest that dependencies of gene/drug connections could be predicted more accurately by exploring the cumulative effects of many genes compared to single genes. Therefore, the objective of this research is to identify and test new potential candidate drugs for the treatment of oral squamous cell carcinoma (OSCC) through the exploitation of global gene expression signatures of OSCC cell lines.

METHODS: Using differentially analysis of sensitive and resistant cell lines in response to 140 drugs in Genomics of Drug Sensitivity in Cancer (GDSC), a reference database was developed. A non-parametric Kolmogorov-Smirnov (KS) statistical algorithm was developed to associate RNA-seq gene expression signature of OSCC to drug response data in the built database which results in the calculation of a connectivity score. The connectivity score that indicates the connectedness between the gene expression signatures and potential drug response will result in a list of potential efficacious drugs. Cell viability assay (MTT) was used to test the efficacy of candidate drugs on OSCC cell lines.

RESULTS: Six candidate drugs were shortlisted, of which five were predicted to be sensitive and another one was used as negative control. Using a panel of OSCC cell lines, we found that four of the drugs were able to induce cytotoxicity at IC50 < 1 μM on at least 60% of the OSCC cell lines. Consistently, the drug predicted to be non-efficacious did not induce cytotoxicity in concentrations above 1 μM. This algorithm is now publicly available as an online tool for the use of cancer research community at http://design-v2.cancerresearch.my/query.

CONCLUSIONS: We have demonstrated that by leveraging of gene expression signature and drug sensitivity study, we are able to shortlist potential drug candidates for treatment of OSCC patients.

BIOSKETCH: Bernard Lee is a Research Associate with the Head and Neck Cancer Research Group at Cancer Research Malaysia. He specializes in bioinformatics analysis, develops and applies computational and statistical methods to integrate high-throughout and complex biological data sources for biomarker discovery and the identification of aberrant signaling pathways in tumors. His particular interest is in applying computational methods to identify drug candidates that could be re-purposed on other cancers. Using his drug-repurposing tool, the Head and Neck team is actively testing a few drug candidates on oral lines both in vitro and in vivo, with promising results.
IMMUNOTHERAPY FOR HEAD AND NECK CANCER PREVENTION AND TREATMENT

Chai Phei Gan
Co-Author: Chuan Wang, Thomas George Kallarakkal, Rosnah Zain, Shin Hin Lau, Hany Binti Mohd Ariffin, Natalia Savelyeva, Sok Ching Cheong and Kue Peng Lim Cancer Research Malaysia chaiphei.gan@cancerresearch.my

Most cancers are preceded by progressive premalignant conditions including cancers of the oral, skin, gastrointestinal, cervix, and lung. Surgical excision is the standard treatment for premalignant lesions (PMLs) that are at high risk of malignant transformation, but it is not effective in preventing cancer occurrence or secondary lesions. This is possibly due to the field cancerization effect with the presence of a population of cells with early genetic changes that have yet to demonstrate any phenotypically observable alterations. Moreover, PMLs that occur in multiple sites or with those arising at locations that are not amenable to surgical removal are in need of alternative prevention strategies. Recent studies demonstrated that immunotherapy in the form of cancer vaccine or immune blockade are successful in preventing disease progression. Using oral potentially malignant disorder (OPMD) as a model, whereby lesions in the oral cavity are easily accessible for clinical inspection and monitoring, we aim to develop a cancer preventative and therapeutic vaccine. We observed that the immune repertoires in OPMD lesions are similar to oral cancer in which the immune infiltration pattern can be categorized into: inflamed, excluded and deserted. Importantly, most of the OPMD lesions that are of high risk of disease progression are immune inflamed, indicating that the immune system is activated to prevent transformation. In addition, we identified that a protein from the melanoma antigen family is overexpressed in oral cancer and OPMD lesions, suggesting an oncogenic role of this gene. We further identified promiscuous epitopes from this melanoma antigen family protein for the generation of cancer vaccine using the plant viral particle (PVP) platform.

Biosketch:
Chai Phei is a senior research associate at Cancer Research Malaysia. She successfully completed her Master’s degree under the studentship program sponsored by Cancer Research Malaysia. In particular, she has 10 years of experience working on the molecular and cell biology in the area of cancer research. Chai Phei’s previous research demonstrated the over-expression of heterotrimeric G-protein alpha 12 (G12) and interferon transmembrane protein family 3 (IFITM3) promoted tumour metastasis and growth. Notably, she obtained the UICC (ICREET) grant for training attachment at the National Institute of Dental and Craniofacial Research, NIH which enabled her to lay the ground work for the establishment of mouse models for drug repurposing research in Cancer Research Malaysia. In addition, Chai Phei works extensively with the team to evaluate the efficacy of peptide vaccine and DNA vaccine for oral cancer. Currently, she is pursuing a PhD programme working on cancer immunotherapy and her interest is to develop cancer vaccine for the prevention of premalignant lesions progression into cancer.
BROAD GENOMIC AND TRANSCRIPTOMIC PROFILES OF ASIAN BREAST CANCER

Jia Wern Pan
Co-Author: Mamduh Zabidi, Patsy Ng, Mei Yee Meng and Soo Hwang Teo
Cancer Research Malaysia
jiawern.pan@cancerresearch.my

Background: Breast cancer is the second largest cause of cancer-related deaths among Asian women and incidence is projected to rise. Asian breast cancer patients are younger and have a higher prevalence of ER-negative disease, but few genomic analyses of somatic mutations and gene expression of Asian breast tumours have hitherto been described.

Methods: To characterise the molecular profiles of Asian breast tumours, we conducted whole-transcriptome sequencing (RNA-Seq) and paired tumor-normal whole-exome (WES) of 576 breast tumours from a hospital-based cohort in Malaysia. WES done on an Illumina HiSeq4000 platform to a mean depth of coverage of 80X/40X (tumor/matched normal), and RNASeq to a depth of 40X (tumor RNA). Additionally, tumor copy number variation was determined using shallow whole-genome sequencing (sWGS) at 0.1X depth of coverage. Somatic variants were identified using Mutect2 and Strelka, molecular subtypes were stratified according to PAM50 and ic10 clusters, and immune scores were generated using ESTIMATE.

Results: We show that there is an increased prevalence of TP53 somatic mutations, a higher proportion of the Her2-enriched molecular subtype, and a higher immune score in Asian breast tumours compared to the predominantly Caucasian breast tumours reported in TCGA and METABRIC. Conclusion: Our results contribute to an improved molecular understanding of Asian breast tumours, and lay the foundations for enhancing precision medicine initiatives in Asia.

Biosketch:
I obtained my Ph.D. in Biology from Duke University in 2017 and joined Cancer Research Malaysia immediately after as a postdoc. At Cancer Research Malaysia, I am part of the breast cancer research group where my role is to study the transcriptomic profiles of Asian breast tumors. I am also part of the bioinformatics team and helped to transition our bioinformatics pipelines to a cloud-based system.
PREVALENCE OF GERMLINE BRCA1 AND BRCA2 VARIANTS IN A POPULATION-BASED COHORT OF OVARIAN CANCER PATIENTS IN MALAYSIA

Joanna Lim
Co-Author: Shao Yan Lau, Kah Nyin Lai, Wei Xiong Wen, Nor Syuhada Ahmad Bashah, Daniel J. Park, Bernard J. Pope, Tú Nguyen-Dumont, Melissa C. Southey, MaGiC Investigators, Meow Keong Thong, Yin Ling Woo, Soo Hwang Teo and Sook Yee Yoon

Cancer Research Malaysia
Joanna.lim@cancerresearch.my

Background: Prevalence of germline BRCA1 and BRCA2 variants vary widely amongst ethnically different populations. In the Malaysian population, there is a paucity of ovarian cancer research as only hospital based studies have been conducted. As BRCA1 and BRCA2 carriers may benefit from risk management and personalised therapies, there is a greater need to identify carriers and attain population-based data.

Methods: From August 2016, women with non-mucinous epithelial ovarian, peritoneal or fallopian tube carcinoma are prospectively recruited to the Malaysia-wide MaGiC Observational Study. DNA from patient blood or saliva samples were tested using Hi-Plex next generation sequencing and multiplex ligation-dependent probe amplification to identify variants in the BRCA1 and BRCA2 genes.

Results: Interim results from 180 patients tested between August 2016 to August 2017 have identified 20 (11.1%) patients with deleterious variants and 30 (16.7%) patients with variants of uncertain significance.

Conclusions: To our knowledge, this is the first population-based cohort for ovarian cancer genetic research in Malaysia. Given the clinical significance of germline BRCA1 and BRCA2 deleterious variants, the data arising from this study may assist clinics and genetic counselling centres throughout Malaysia.

Biosketch:
Joanna attained a Bachelor of Science Degree with First Class Honours at the Australian Centre for Blood Diseases with her work on platelet biology. She was subsequently awarded a Ph.D. for her thesis on thymic epithelial research at Monash University, Australia.
Prior to joining Cancer Research Malaysia, Joanna was an experienced scientist in preimplantation genetic diagnosis and screening at Monash IVF, Australia. She has also engaged in clinical trial operations at Nucleus Network, Australia.
At Cancer Research Malaysia, Joanna leads a small team of scientists that aims to bridge research and clinical practice. They currently offer genetic testing for hereditary breast and ovarian cancer patients, and their families.

Qualifications
▪ Doctor of Philosophy (Stem Cell Biology and Immunology), Monash University, Australia
▪ Bachelor of Science (Honours), Monash University, Australia
IMMUNOTHERAPY FOR HEAD AND NECK CANCER

Kue Peng Lim

Co-Author: Chai Phei Gan, San Jiun Chai, Syafinaz Zainal, Natasha Zulaziz, Bryan Lye, Iuan Sheau Chin and Sok Ching Cheong

Cancer Research Malaysia
kuepeng.lim@cancerresearch.my

Head and neck cancer (HNSCC) is the third most common malignancy in Malaysia. Despite improvements in conventional therapies, the 5-year survival rate for HNSCC has remained largely unchanged for decades (~50%). Immunotherapy using immune checkpoint inhibitors is showing promising results in clinical trials, with reported response rates of around 25%. For non-responding patients, novel immunotherapeutic approaches are urgently required.

The cancer immunotherapy programme under the head and neck research group in Cancer Research Malaysia is aims to develop and evaluate novel immunotherapeutic vaccine-based vaccine for HNSCC. We have two vaccines in the pipeline namely peptide vaccine and DNA vaccine. Both shown to be immunogenic in humanized mouse model. Encouragingly, these vaccines also demonstrated tumour control capability in tumour bearing animals and prolonged the survival of these animals. We are currently working with regulatory bodies to bring our vaccine to the clinic.

Biosketch:

Dr. Lim Kue Peng leads the cancer immunotherapy team in the Head and Neck Cancer Research Programme in Cancer Research Malaysia. Dr Lim has more than 10 years of experience in the field of cancer research. Her work focuses on developing new treatments for cancer patients. One of the approaches that she is currently pursuing is to design cancer vaccines that can train the patient’s own immune system to recognize, hunt and kill the cancer cells. Her recent work demonstrated that a vaccine derived from cancer proteins can successfully induce anti-tumour response and the team is now discussing with regulatory bodies how to bring this into the clinic. Dr. Lim is the recipient of the prestigious Loreal for Women in Science Award in 2010 and has successfully received research grants both from local and international funding bodies including Ministry of Science Malaysia, The Newton-Ungku Omar Fund and the Global Challenges Research Fund from the Medical Research Council in the United Kingdom.
Breast cancer is the leading cause of cancer death among women worldwide. In Asia, breast cancer incidence shows growth over the past decades. Several appreciable differences exist between Asian and Caucasian breast cancers, for example younger age of incidence and higher prevalence of hereditary factors, hinting at crucial differences at the molecular level. We performed whole exome sequencing (WES) on 576 Malaysian breast cancers (at median coverage 75X) and their matched normal blood (40X) to detect single nucleotide variations (SNVs) and small insertions and deletions (indels). We also performed shallow whole genome sequencing (sWGS) to detect major chromosomal aberrations. We captured known copy number changes, together with major breast cancer genes and their phenotypes, for example high frequency of SNVs in hotspot regions in PIK3CA and indels in GATA3. We additionally show that Malaysian breast cancer show higher prevalence of TP53 as compared to Caucasian breast cancer cases, consistent with previous findings in Korean breast cancer samples. Together, these results underlie the molecular differences between Asian and Caucasian breast cancers.

Biosketch:
I have specific expertise in computational biology, with a broad background in biochemistry and molecular biology. Highlights from my work in genomics include

- development of computational pipeline for Self-Transcribing Active core-Promoter-sequencing (STAP-seq) that enables the quantification of an important class of genomic element (Arnold*, Zabidi* et al., Nature Biotech 2017).

Currently, as a postdoctorate scientist in Cancer Research Malaysia, my research includes interrogation of genomic lesions that are specific to Asian breast cancers. I am also responsible for organization-wide adoption of cloud technology, and managing external collaboration to develop artificial intelligence solutions based on pathological images.

Education:
BSc Biochemistry, Purdue University, USA
MSc Molecular Medicine, University Malaya, Malaysia
PhD Computational Biology, Research Institute of Molecular Pathology and University of Vienna, Austria

Awards:
- Majlis Amanah Rakyat Excellent Scholar Scheme, Malaysia
- Howard Hughes Medical Internship, USA
- VBC PhD Award, Austria
POLYGENIC RISK SCORES AND BREAST CANCER SCREENING

Min Min Tan

Co-Author: Shivaani Mariapun, Douglas Easton, Jingmei Li, Joe Dennis, Qin Wang, Manjeet Bolla, Hui Miao, Siew-Li Tan, Nasim Mavaddat, Patsy Pei-Sze Ng,
Siti Norhidayu Hasan, Sook-Yee Yoon, Daphne Shin-Chi Lee, Jacques Simard, Cheng-Har Yip,
Nur Aishah Mohd Taib, Mikael Hartman, Soo-Hwang Teo, Antonis Antoniou, Weang-Kee Ho
University of Nottingham Malaysia/Cancer Research Malaysia
minmin.tan@cancerresearch.my

Background: About 42% of breast cancer in Asia is diagnosed below age 50, and the current recommended age (50 years old) to start screening may be inadequate for early breast cancer detection in Asian women. The utility of combining multiple common breast cancer genetic susceptibility variants in risk stratification has been evaluated predominantly in European populations. It is unclear if genetic risk prediction models built on women of European descent are appropriate for Southeast Asian women.

Methods: We evaluated the utility of polygenic risk scores (PRS) developed in European populations for risk prediction in 2387 breast cancer cases and 2665 healthy women from Malaysia and Singapore. The absolute risks of developing breast cancer by percentiles of PRS distribution were calculated, and risk-based breast cancer screening was compared with age-based breast cancer screening.

Results: The association of PRS with breast cancer risk was similar between Malays and Indians (log OR per SD = 0.33, 95% confidence interval (CI) = 0.16-0.50 for Malays and log OR per SD = 0.27, 95% CI = 0.03-0.50 for Indians) but slightly lower compared to Chinese (log OR per SD = 0.40, 95% CI = 0.34-0.47). The area under the receiver operating curve (AUROC) of PRS were 0.612, 0.594 and 0.569 for Chinese, Malay and Indian, respectively. About 41% of Chinese breast cancer cases diagnosed below age 50 would reach the absolute 10-year risk threshold for screening before 50 years old.

Conclusion: Compared to European women, the PRS developed in European populations have lower discriminatory power in Southeast Asian women. The precision of risk stratification based on PRS may be further improved as additional Asian-specific breast cancer risk-associated genetic variants are identified and other breast cancer risk factors are included.

Biosketch:
Min Min had a B.S in biology from Asia-Pacific International University, Thailand, and earned a Master of Public Health from the Adventist International Institute of Advanced Studies, Philippines, followed by a PhD in Public Health from Monash University, Malaysia, where she investigated the social determinants of health and health behaviors.

Min Min is a postdoctoral research fellow at the University of Nottingham Malaysia, and joined Cancer Research Malaysia as a collaborating scientist in 2016. She is currently working on developing breast cancer risk prediction models tailored for Southeast Asian women by incorporating genetic data with epidemiological and clinical risk factors. Min Min is the recipient of the Young Investigator Award at Global Breast Cancer Conference 2017 in Jeju, Korea, and recently published a paper that identified the protective and risk factors of breast cancer among 7,663 Malaysian women.
THE FEASIBILITY OF A DIETARY SOY INTERVENTION AMONG MALAYSIAN WOMEN

Nadia Rajaram

Co-Author: Woon Ching Yee, Soma Roy Mitra, Geok Lin Khor, Cheng Har Yip, Weang Kee Ho and Soo-Hwang Teo

Cancer Research Malaysia
nadia.rajaram@cancerresearch.my

Background: The main challenge of dietary intervention studies is maintaining compliance to the study requirements. Few feasibility studies of dietary intervention show that altruism, peer/family support and engagement, and cultural sensitivity are motivators to adherence, but to date, there are no published reports of such feasibility studies in Asian populations. In this study, we aim to measure adherence and feasibility of a soy intervention protocol among postmenopausal Malaysian women who are not frequent soy consumers.

Methods: Post-menopausal Malaysian women <65 years old with no personal history of cancer were recruited from an existing screening cohort database. All participants were asked to increase their soy consumption by 100mg/day of soy isoflavones for 2 months. We conducted descriptive analyses to assess adherence and thematic analyses to assess feasibility.

Results: Of the 48 women contacted, 10 (21%) consented to participate. Prior to the study, the average soy isoflavone intake was 52.9mg/week, primarily from tofu (36.5%) and soymilk (22.3%) intake. During the study period, participants consumed 81.2mg/day of soy isoflavones over the 2 months. Soymilk was most commonly consumed (2 cups a day). Adherence was high in the first month (100.5mg/day), but it declined in the second month (median = 63.8mg/day). In this study, social influence was reported as an important motivator and barrier to participation and adherence.

Conclusion: Adherence to a dietary soy intervention is possible among Malaysian women who are not frequent soy consumers, and a long-term soy dietary intervention, at a lower soy dose, is feasible. The lessons learnt from this feasibility study can be applied to the design and implementation of a larger randomized controlled trial of dietary soy and breast cancer risk among Malaysian women.

Biosketch:
My main area of interest is in cancer epidemiology, specifically in cancer prevention and cancer outcomes. After graduating with a Masters’ in Epidemiology from Michigan State University, I returned to Malaysia to do public health research. As part of Cancer Research Malaysia for the past 3.5 years, I have been primarily involved in the study of mammographic density as a biomarker of breast cancer risk, and its’ applicability and limitations among Asian women. I am currently pursuing a PhD that focuses on breast cancer prevention among Asian women, using suitable mammographic density measurements as a biomarker of risk at the University of Nottingham Malaysian Campus.
Introduction: Rare variants such as protein truncating and splice-junction variants in PALB2 have been found to confer increased risk to breast cancer. However, previous studies have only investigated the prevalence of mutation carriers in individuals selected on the basis of earlier age of diagnosis or on family history of breast cancer.

Objective: In this study, we sought to determine the mutation prevalence of PALB2 mutations in an unselected hospital-based multi-ethnic cohort of breast cancer cases and healthy women from Malaysia and Singapore.

Method: Amplicon-based targeted sequencing of the PALB2 gene which included all coding exons and splice site junctions was performed on germline DNA of 5006 affected breast cancer patients and 5192 healthy individuals. All rare variants identified were further validated by Sanger sequencing.

Results and Discussion: Pathogenic variants in PALB2 were associated with increased risk of breast cancer with an estimated OR=7.17 (95% CI 3.24 to 15.86, p<0.0001). In total, there were 29 unique protein truncating variants identified in 55 individuals (48 cases [1.0%] and 7 controls [0.1%]). The majority of these variants were rare where 18 (62%) were found only in 1 individual. Notably, 10 of the pathogenic variants were novel as they have not been reported before. The most common variants identified in our cohort, c.2968G>T (p.Glu990Ter, rs876659036) found in 5 cases and 2 controls. The majority of mutation carriers tend to develop ER+ (59%), PR- (56%), Her2- (69%) breast cancer and least likely to develop Her2 enriched subtype.

Conclusions: We found that 1.0% of breast cancer patients and 0.1% of unaffected individuals carry a pathogenic mutation in PALB2. To the best of our knowledge, this is the first large population-based case-control study that was able to estimate the breast cancer risk associated with truncating mutations in PALB2 gene in a multi-ethnic population in South East Asia.

Biosketch:

Patsy Ng is a Senior Research Associate with the Breast Cancer Research group at Cancer Research Malaysia. She graduated from University Putra Malaysia with a degree in Bsc Biomedical Science. Patsy has previously worked in clinical laboratories of two hospitals specializing in Histopathology for 13 years before she decided to pursue her PhD.

The focus of Patsy’s PhD studies is to investigate the impact of inherited variants in TP53, PALB2, ATM and CHEK2 on breast cancer risk. Currently, the spectrum and risk profile of mutations in the 4 genes in Asian women remain largely uncharacterized due being understudied. In her research, she will be comparing the prevalence of variants in these genes in ~8,000 breast cancer patients from Malaysia and Singapore, and a matching group of ~8,000 healthy individuals using the NGS approach. By conducting this research in our own population, we aim to enable Asians to benefit from the advances in the genomics revolution.
Cancer metastasis is the leading cause of death in cancer patients as it accounts for approximately 90% of human cancer death. It is well reported that blood and/or lymphatic vessels, play key roles in cancer metastasis by providing nutrient and conduits for cancer cell dissemination. Consequently, many anti-angiogenic agents are developed and currently used in clinics. Although promising, these are nevertheless associated with side effects. Alternatively, the intimate relationship between cancer metastasis and lymphangiogenesis has stimulated researchers to seek for novel anti-lymphangiogenic drugs as therapeutic options for cancer metastasis. Though there are few anti-lymphangiogenic agents which are currently under clinical evaluation, there are still no FDA approved selective agents designed to prevent lymphatic vessel growth, highlighting an important clinical niche. In this study, we aim to identify novel anti-lymphangiogenic compounds as novel therapeutic agents for metastatic human cancer. Zebrafish is an established in vivo model for vascular biology and had contributed in identifying various novel anti-(lymph)angiogenic compounds. Here, we utilized the Tg(lymphatic vessel endothelial hyaluronic receptor 1b (lyve1b):Discosoma sp. Red fluorescent protein 2 (DsRed2))nz101 transgenic that express DsRed2 in all lymphatic/venous endothelial cells, to screen for anti-(lymph) angiogenic compounds from our compound libraries consisted natural and semi-synthetic compounds. The thoracic duct development in zebrafish was quantified using fluorescent microscope to measure lymphatic vessel development. About 300 compounds were screened and we identified 2 semi synthetic compounds which able to inhibit thoracic duct development specifically. Subsequent biochemical analysis revealed inhibition of phosphorylated ERK1/2 expression, the down-stream target of vascular endothelial growth factor (VEGF) pathway in human lymphatic endothelial cells upon compound treatments, suggesting anti-lymphangiogenic activity through inhibition of VEGF pathway. Novel anti-lymphangiogenic compounds can be identified using the zebrafish model and potential therapeutics can be developed against cancer metastasis, by targeting lymphangiogenesis.

Biosketch:
Dr Tan Pei Jean is a Senior Scientist from Cancer Research Malaysia where her research is focusing on identifying “road-block” for cancer metastasis by exploring our rich Malaysian biodiversity. Besides her expertise and competency in natural products, chromatography and spectroscopy, Dr Tan embrace the needs of multidisciplinary in research communities where she also has more than 5 years experiences in utilizing zebrafish and cancer cell lines panel as a research tools in the development of cancer pathway specific anti-cancer compounds from nature. Furthermore, she has ventured in preclinical bioanalytical evaluation of drug candidates over the past 2 years, particularly in addressing the pharmacokinetics boundaries of drug hits. Dr Tan and team have developed zebrafish and human cancer cell lines model as well as bioanalytical tools to characterize drug lead candidates identified in the laboratory and there are several interesting hits have been identified from the pipeline.
ACKNOWLEDGEMENTS

Cancer Research Malaysia

Cai Xin Ng
Mei Foong Ng
Fatin Diyanah Binti Mazlan