ACADEMIC ACTIVITIES

Publication(s) of the week

1. Kuang, L., Wu, J., Su, N., Qi, H., Chen, H., Zhou, S., Xiong, Y., Du, X., Tan, Q., Yang, J., Jin, M., Luo, F., Ouyang, J., Zhang, B., Wang, Z., Jiang, W., Chen, L., Chen, S., Wang, Z., Liu, P., Yin, L., Guo, F., **Deng, C.**, Chen, D., Liu, C., Xie, Y., Ni, Z., and Chen, L. (2019) FGFR3 Deficiency Enhances CXCL12-dependent Chemotaxis of Macrophages Via Upregulating CXCR7 and Aggravates Joint Destruction in Mice. *Ann Rheum Dis* **[IF=12.692]**

2. Li, Q., Zhu, C. C., Ni, B., Zhang, Z. Z., Jiang, S. H., Hu, L. P., Wang, X., Zhang, X. X., Huang, P. Q., Yang, Q., Li, J., Gu, J. R., Xu, J., **Luo, K. Q.**, Zhao, G., and Zhang, Z. G. (2019) Lysyl Oxidase Promotes Liver Metastasis of Gastric Cancer Via Facilitating the Reciprocal Interactions between Tumor Cells and Cancer Associated Fibroblasts. *EBioMedicine* **[IF=6.486]**

3. Godoy-Parejo, C., **Deng, C.**, Zhang, Y., **Liu, W.**, and **Chen, G**. (2019) Roles of Vitamins in Stem Cells. *Cell Mol Life Sci* **[IF=6.341]**

4. Guo, M., Sinha, S., and **Wang, S. M.** (2019) Coupled Genome-Wide DNA Methylation and Transcription Analysis Identified Rich Biomarkers and Drug Targets in Triple-Negative Breast Cancer. *Cancers* **11** **[IF= 6.162]**

5. Mohamed, R., Cao, Y., Afroz, R., Xu, S., Ta, H., Barras, M., **Zheng, W.**, Little, P. J., and Kamato, D. (2019) ROS Directly Activates Transforming Growth Factor Beta Type 1 Receptor Signalling in Human Vascular Smooth Muscle Cells. *Biochim Biophys Acta Gen Subj*, 129463 **[IF=4.631]**

6. Hu, Z., Lam, K. F., and **Yuan, Z.** (2019) Effective Connectivity of the Fronto-Parietal Network During the Tangram Task in a Natural Environment. *Neuroscience* **[IF=3.504]**

7. Zeng, L. N., Yang, Y., Wang, C., Li, X. H., Xiang, Y. F., Hall, B. J., Ungvari, G. S., Li, C. Y., Chen, C., Chen, L. G., Cui, X. L., An, F. R., and **Xiang, Y. T.** (2019) Prevalence of Poor Sleep Quality in Nursing Staff: A Meta-Analysis of Observational Studies. *Behav Sleep Med*, 1-14 **[IF=3.162]**

8. Zheng, W., Cai, D. B., Yang, X. H., Ungvari, G. S., Ng, C. H., Shi, Z. M., Hu, M. L., Ning, Y. P., and **Xiang, Y. T.** (2019) Adjunctive Aripiprazole for Antipsychotic-Related Hyperprolactinaemia in Patients with First-Episode Schizophrenia: A Meta-Analysis. *Gen Psychiatr* **32**, e100091 **[IF= N/A]**

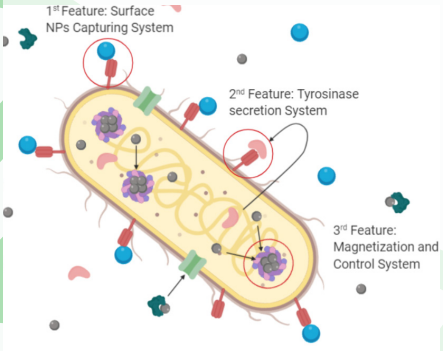
健康科學學院
Faculdade de Ciências da Saúde
Faculty of Health Sciences

NEWSLETTER ISSUE 44
4 - 8 NOVEMBER 2019

FHS Students Win Gold Prize at iGEM for Engineering Waste Water Purifying Organism

FHS students achieved a great achievement in an international competition, the International Genetically Modified Machine (iGEM). The iGEM team from University of Macau (UM_Macau) won a gold medal in the competition and their project was also nominated as one of the top five teams out of the 198 participating teams in the "Best Part Collection" award. The "Best Part Collection" award is given to a team which has gernerated a new group of basic and composite plasmids with well proven function in the project, and the plasmids are useful for future iGEM teams. This success of our UM_Macau team exemplifies the high quality of our students. It also lays an important foundation to the future iGEM team.

Since 2004, iGEM became an international event that gathered enthusiastic and talented students from worldwide to share their creativity in synthetic biology. This is first ever for University of Macau and ever Macau to take part in this synthetic biology competition. The Giant Jamboree is the highlight of the competition that all iGEM teams present to showcase their synthetic biology projects and compete for the awards and prizes. This year, the Giant Jamboree was held from October 31 to November 4 in Boston. There were 344 teams from high schools, colleges, and universities, with over 7500 students from more than 45 countries were gathered to participate in these four days of the Jamboree for exchanging their experience and celebration of team achievement.



With the pollution brought by nanoparticles in the water system becoming an unneglectable issue facing global ecosystem and threating human health, UM_Macau team was motivated to apply synthetic biology to the society to establish an effective nanoparticle removing model named Self-Activating Nanoparticles Collecting *E. coli* (SANCE). This is achieved by engineering a controllable nanoparticle collector microorganism that could effectively capture various nanopollutants. This system has three features to help deal with nanoparticle pollution. First, an engineered sticky protein is expressed on the membrane surface which could bind to a wide range of nanoparticle. Second, a secretable tyrosinase expression system is created by using a NSP4 signal peptide. The secreted tyrosinase is an important part to convert the tyrosine residues of the sticky protein into the active form. Lastly, the third feature aims to overexpress ferritin to accumulate ferric ions and give the *E. coli* paramagnetic properties to allow effective capturing of the bacteria/nanoparticle complexes via magnet. The success of this project provided a cheap and renewable nanopollutant removal model that can be applied in the wastewater treatment of many countries, especially developing countries and even third-world countries, helping people free from potential adverse health effects brought by nanopollutants.

Our UM_Macau team is excited with the success and appreciates the support from FHS, as mentioned by the team captain Jiaying NG, “Our team is very exhilarated and honoured to be able to get the gold medal, despite being the first time joining the iGEM competition. The success of the team was mainly due to the extreme support that we have received from our faculty and most especially our supervisors and advisers. Couple that with the amazing team members that we had, all of which had strengths at specific areas, our team was set for success.”

In addition to UM_Macau team achieving great success, FHS has also mentored the PuiChing School team in the iGEM competition in which they won another gold medal in the High School category. The project of PuiChing team is “The development of a sustainable cyanobacteria system for endocrine disrupting compounds”. This project is also one of the popular science projects from Macao Base for Primary & Secondary STEM Education (UM STEM Education) and is funded by FDCT (Project #0025/2019/PS). The high school students who participated in the project has begun to conceive and discuss the topic since the end of 2018. Under the leadership of the FHS advisors and UM_Macau team, they completed their experiments in the FHS for the iGEM competition.

(Photos of UM_Macau and PuiChing_Macau team)

Seminar Series
Transdifferentiation, a Novel Mechanism in Vascular Regeneration – Prof. Shu MENG

Prof. Shu MENG, Research Assistant Professor of Houston Methodist Research Institute (HMRI) and Assistant Professor of Weill Cornell Medical College, presented “Transdifferentiation, a Novel Mechanism in Vascular Regeneration” on 5 November.

Prof. MENG reported that the angiogenic response to ischemia restores perfusion can preserve tissue structure and function. The complex process is known to involve capillary sprouting, pericyte recruitment, and circulating angiogenic cells in response to angiogenic signals generated by the ischemic tissue. A role for transdifferentiation of fibroblasts to endothelial cells in the angiogenic response is still controversial. Therefore, Prof. MENG used a murine model of hindlimb ischemia, and *in vivo* matrigel plug assay together with fibroblast lineage tracing studies and single cell RNA-sequencing (sc-RNAseq) to examine the transcriptional and functional changes in fibroblasts in response to ischemia, and then she has identified a small subset of YFP+ CD144+ CD11b- cells that expressed endothelial cell genes. Prof. MENG claimed that sc-RNAseq studies uncovered the existence of eight discrete clusters of cells at baseline, of which two clusters also expressed some EC genes. Suppression of inflammatory signaling abolished the generation of YFP+ CD144+ CD11b- cells, impaired perfusion recovery and increased tissue injury after femoral artery ligation.

Prof. MENG concluded that these studies indicated the presence of subpopulations of tissue fibroblasts, which seem poised to contribute to the angiogenic response. The expansion of these subpopulations with ischemia is dependent upon activation of innate immune signaling, and contributes to recovery of perfusion and preservation of ischemic tissue.

Seminar Series
Why Lysine Has So Many PTMs? – Prof. Y. Eugene CHIN

Prof. Y. Eugene CHIN, Professor and Dean of Soochow University Medical College, presented “Why Lysine Has So Many PTMs?” on 6 November.

Prof. CHIN claimed that lysine is perhaps the most active residue in terms of post-translational modifications. It can be neutralized by acetylation or maintains its positive charge by methylation. Therefore, Prof. CHIN has been working on the post-translational modifications. He presented that lysine can undergo acetylation, 4HNE and carbamylation modifications. The carbamylation modification was involved in T cell activation. Prof. CHIN concluded that CAB is the enzyme responsible for carbamylation whereas DCAB is for its decarbylation. Prof. CHIN also reported his clinical treatment cases in the seminar.

Seminar Series

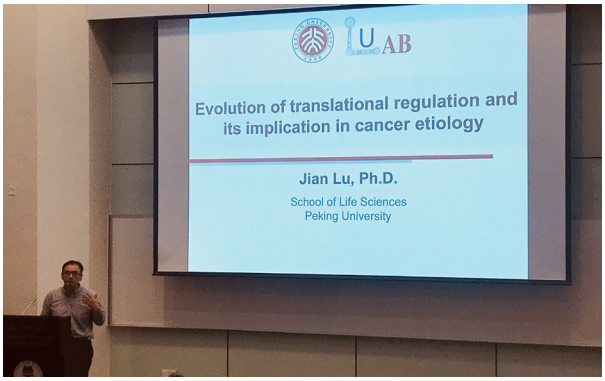
Evolution of Translational Regulation and its Implication in Cancer Etiology – Prof. Jian LU

Prof. Jian LU, Principal Investigator of School of Life Sciences, Peking University, presented "Evolution of Translational Regulation and its Implication in Cancer Etiology" on 6 November.

Prof. LU presented that the eukaryotic mRNA translation is a fundamental stage of gene expression and is highly regulated to control cellular protein homeostasis. Any dysregulation of mRNA translation often causes human diseases. Prof. LU claimed that his team has made significant discoveries on the function and evolution of cis-regulatory elements and trans-regulatory factors in mRNA translation from different aspects.

Prof. LU presented his research work which encompasses three mechanisms of translational regulation at the RNA level: 1) inhibition by upstream open reading frames, 2) A-to-I RNA editing causing ribosome stalling and 3) inhibition by small RNAs including microRNAs. Prof. LU's research allowed them to gain unique insights into the role translational regulation plays in cancer cell evolution. The biosynthetic cost of amino acid varies widely. They demonstrated that the biosynthetic cost of amino acid affects global mRNA translation and the fitness of a cell. They quantitatively characterized the use of 20 aminoacids during protein synthesis in human cells with the ECPAcell (Energy Cost Per Amino Acid) metric and found that cancer cells evolved to utilize amino acids more economically by optimizing the global mRNA expression profiles in multiple cancer types.

Prof. LU concluded that the results indicated that tumors with lower ECPAcell tend to be more aggressive, and patients with such tumors have shorter survival times across a broad range of cancer types. The results also highlighted the feasibility of ECPAcell as a potential prognostic marker for patient stratification. Prof. LU claimed that his study is fundamentally novel to the field and represents a substantive departure from the status quo, namely, gene-based analyses. His study emphasized on the importance of holism in understanding cancer evolution and improving cancer medicine.



Seminar Series

Endosome-associated Actin Dynamics during Endocytic Recycling, From TRP to TMC, the Molecular Mechanisms Underlying Mechanosensation in *C. elegans*, and The Generation and Function of risiRNA in *Caenorhabditis elegans* – Prof. Anbing SHI, Prof. Lijun KANG and Prof. Shouhong GUANG

On 8 November, Prof. Anbing SHI, Professor of Huazhong University of Science and Technology, Prof. Lijun KANG, Professor of Department of Neurobiology, Institute of Neuroscience, Key Laboratory of Medical Neurobiology of the Ministry of Health of China, Zhejiang University School of Medicine, and Prof. Shouhong GUANG, Professor of University of Science and Technology of China, visited FHS and gave a joint seminar. They presented "Endosome-associated Actin Dynamics during Endocytic Recycling", "From TRP to TMC, the Molecular Mechanisms Underlying Mechanosensation in *C. elegans*", and "The Generation and Function of risiRNA in *C. elegans*" respectively.

Prof. SHI claimed that cargo sorting and membrane carrier initiation in recycling endosomes require appropriately coordinated actin dynamics. However, the mechanism underlying the regulation of actin organization during recycling transport remains elusive. He reported that the loss of PTRN-1 stalled actin exchange and diminished the cytosolic actin structures. His team found that PTRN-1 is required for the recycling of clathrin-independent cargo hTAC-GFP. The N-terminal calponin homology (CH) domain and central coiled-coils (CC) region of PTRN-1 can synergistically sustain the flow of hTAC-GFP. They identified CYK-1/formin as a binding partner of PTRN-1. The N-terminal GTPase binding domain (GBD) of CYK-1 serves as the binding interface for the PTRN-1 CH domain.

Prof. KANG introduced that animals have many modes of sensation such as hearing, touch and proprioception medicated by the mechanosensitive channels. Neurons transduce mechanical stimuli into electrical impulses through mechanosensitive channels within the molecular conformation of their plasma membranes, and then they pass the signal of the sensory system to the downstream. In metazoan, there are few mechnosensitive channel confirmed, therefore finding the new mechnosensitive channel is an important question and Prof. KANG has been working on this for years. Using combinatorial techniques including molecular genetics, electrophysiology, functional imaging, opto-genetics and behavioral tracking, Prof. KANG and his team have been addressing how putative mechanosensitive channels such as TRP and TMC channels process sensory cues to encode behavioral outputs. Prof. KANG thought that their work may provide valuable insights regarding the molecular mechanisms of mechnotransdcution, and has the potential to develop possible diagnostic tools and treatments for the degradation of mechanosensation.

Moreover, Prof. GUANG presented that the mechanisms of modulating the process of ribosome biogenesis driving the cell growth and proliferation remain poorly understood. He claimed that small rRNA sequences have been widely treated as non-specific degradation products and neglected as garbage sequences for a long time. Prof. GUANG and his team have identified a new class of antisense ribosomal siRNAs (risiRNAs) that downregulate pre-rRNA through the nuclear RNAi pathway in C. elegans. He showed and reported that the generation, function, and mechanism of this new class of small interfering RNAs.

Technical Seminar Series
Deep Characterisation of Immune Microenvironment – Bio-Gene Technology Limited

Two field application specialists of Bio-Gene Technology Limited, Mr. Boon-Eng THE and Mr. Qianjun ZHANG, presented "Deep Characterisation of Immune Microenvironment" on 6 November.

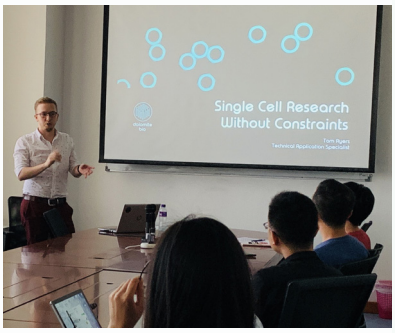
They introduced how Mass Cytometry (MC) uses CyTOF® technology to enable researchers to perform comprehensive profiling of cell phenotypes and signaling pathways. They reported that more than 50 different markers simultaneously at single cell resolution in a single tube could be routinely measured by using antibodies tagged with stable metal isotopes of defined mass to stain cells in suspension. Besides, they also introduced the Imaging Mass Cytometry (IMC), which allows highly multiplexed imaging of up to 37 protein markers simultaneously in a single scan and single stain. They also presented the technology overview of MC and IMC with applications into Immuno-Oncology, Translational and Clinical Research.

Technical Seminar Series
Acceleration of Translational & Regenerative medicines by Flow Cytometry – Ms. Susanna LI

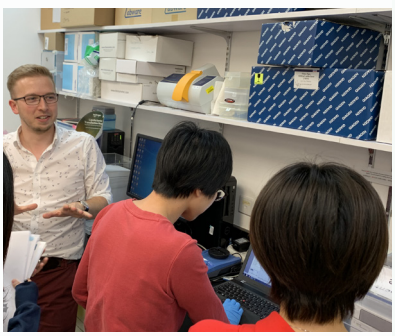
Ms. Susanna LI, Senior Application Specialist of Beckman Coulter Hong Kong Ltd., presented "Acceleration of Translational & Regenerative medicines by Flow Cytometry" on 7 November.

Ms. LI presented the application technologies and overview knowledge of the flow cytometry to the participants. Analysis tips were distributed in the seminar also.

Technical Seminar Series
Single Cell Research without Contraints - Dr. Thomas AYERS



The Genomics, Bioinformatics and Single Cell Analysis Core has invited Dr. Thomas AYERS, the Technical Applications Specialist of Dolomite Bio, to host a two-day training in using *Nadia* instrument to generate single cells RNA sequencing (scRNA-Seq) data.



On 7 November, Dr. AYERS gave a seminar talk titled "Single Cell Research without Contraints". He presented the background of Drop-Seq technology on *Nadia*. *Nadia* uses a microfluidics system to automatically encapsulate individual cells and barcoded beads in oil droplets. By analyzing transcriptomes in single cell level, this offers vital information and data for users to understand tumor heterogeneity, identify cell types as well as complex tissues. This method is a key to understand many disease and immunity. He emphasized that this scRNA-Seq technique is cost saving while producing high gene capture rates and quality data. Throughout the two-day training, Dr. AYERS also guided our PhD students step by step to set up their sample run and answered with their experimental enquiries. The end result of collecting cDNA from cells and tissue samples with the *Nadia* was successful.

Admission Talk to Escola Xin Hua

Prof. Chris WONG paid a visit to Escola Xin Hua for conducting an admission talk on 5 November.

Prof. WONG shared the updated faculty development, the student life, the curriculum structure of the programmes, career prospects and the different learning opportunities offered by the Faculty with the Secondary 5 students. Upon the enquiries of some students about pursuing a bachelor degree of clinical medicine, Prof. Wong introduced the '4+X' programme in collaboration with University of Toronto (UofT). UM graduates who meet the criteria may be recommended for admission to UofT's Faculty of Medicine for further studies on clinical medicine.

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UPCOMING

November

Mon	Tues	Wed	Thurs	Fri
11	**12** **Seminar Series** Ovarian Cancer in an Era of Precision Medicine: From Mechanisms to Opportunities for New Diagnosis and Therapy Speaker: Prof. Benjamin K. TSANG Host: Prof. Lijun DI Time: 15:00 - 16:00 Venue: N22-G002	**13** **Seminar Series** ELISA Principles and Troubleshooting Speaker: Mr. Michael WONG Host: Professional Health Trading Company Ltd. and Abcam (Hong Kong) Limited Time: 15:30 - 16:30 Venue: N22-G002 **Oral Defense** Zuxianglan ZHAO Supervisor : Prof. Edwin Chong Wing CHEUNG Time: 16:30 Venue: N6-2022 **B-CAT Meeting #20** Speaker: Prof. Wenhua ZHENG Time: 17:00 Venue: E12-G004	**14** **Seminar Series** A Pandas Complex Adapted for piRNA-guided Transcriptional Silencing and Heterochromatin Formation Speaker: Prof. Yang YU Host: Prof. Gang LI Time: 11:00 - 12:00 Venue: N22-G002 **FHS Postdoc/ Student Seminar** Field: Bioimaging Host: Prof. Zhen YUAN and Prof. Greta MOK Time: 17:00-18:00 Venue: N22-G002	**15** **Seminar Series** Gene Editing Approaches for Correcting Genetic Airway Diseases Speaker: Prof. Jim HU Host: Prof. Wenhua ZHENG Time: 10:00 - 11:00 Venue: E12-G004
18	**19** **Oral Defense** Jie LIU Supervisor : Prof. Qi ZHAO Time: 11:00 Venue: N6-G010 **Oral Defense** Nana AI Supervisor : Prof. Wei GE Time: 15:00 Venue: N6-G010	**20**	**21**	**22**
25 **Seminar Series** Translation Research of Alzheimer's Disease: From Basic Study to Long-term Care Speaker: Prof. Yuan-Han YANG Host: Prof. Wenhua ZHENG Time: 09:00 - 10:00 Venue: E12-G003	**26**	**27** **Seminar Series** Constitutive Androstane Receptor (CAR) Activation and Regulatory Mechanisms Speaker: Dr. Masahiko NEGISHI Host: Garry WONG Time: 11:00 - 12:00 Venue: N22-G002 **Oral Defense** Jingyun TAN Supervisor : Prof. Xuanjun ZHANG Time: 15:00 Venue: N6-2022 **B-CAT Meeting #21** Speaker: Dr. Kaeling TAN Time: 17:00 Venue: E12-G004	**28** **Oral Defense** Gang FENG Supervisor : Prof. Xuanjun ZHANG Time: 10:00 Venue: N6-G010 **FHS Postdoc/ Student Seminar** Field: Chemistry Host: Prof. Yunlu DAI and Prof. Xuanjun ZHANG Time: 17:00-18:00 Venue: N22-G002	**29**

For more information or submission of articles to be featured, please contact Ms. Mathilde CHEANG at mathildec@um.edu.mo or 8822 4909.