

Publication(s)

- Guo, S., Huang, Q., Chen, Y., Wei, J., Zheng, J., Wang, L., Wang, Y., and Wang, R. (2020) Synthesis and Bioactivity of Guanidinium-Functionalized Pillar[5]Arene as a Biofilm Disruptor. *Angew Chem Int Ed Engl* [2019 IF = 12.959]
- Hwang, H. Y., Shim, J. S., Kim, D., and Kwon, H. J. (2020) Antidepressant Drug Sertraline Modulates AMPK-MTOR Signaling-Mediated Autophagy via Targeting Mitochondrial VDAC1 Protein. *Autophagy* [5yr IF = 11.966]
- Men, X., Chen, H., Sun, C., Liu, Y., Wang, R., Zhang, X., Wu, C., and Yuan, Z. (2020) Thermosensitive Polymer Dot Nanocomposites for Trimodal Computed Tomography/Photoacoustic/Fluorescence Imaging-Guided Synergistic Chemo-Photothermal Therapy. ACS Appl Mater Interfaces [5yr IF = 8.901]
- Zhou, Y., Wang, J., Chang, Y., Li, R., Sun, X., Peng, L., Zheng, W., and Qiu, W. (2020) Caffeic Acid Phenethyl Ester Protects against Experimental Autoimmune Encephalomyelitis by Regulating T Cell Activities. *Oxid Med Cell Longev* 2020, 7274342 [5yr IF = 5.608]
- 5. Yang, Y., and Li, G. (2020) Post-Translational Modifications of PRC2: Signals Directing Its Activity. *Epigenetics Chromatin* **13** (1), 47 [5yr IF = **4.763**]

BCAT Meeting

In the BCAT Meeting on 4 November, Prof. Douglas ZHANG reported the recent biostatistics/ bioinformatics research conducted in his lab. The research lies on three major areas: bioinformatics/ genomics analysis, biostatistics/epidemiology analysis and statistical methodology development.

For bioinformatics/genomics analysis, Prof. Zhang presented their conservation analysis of SARS-CoV-2 spike. The current COVID-19 pandemic, caused by SARS-CoV-2, has become the most devastating public health emergency in the twenty-first century and one of the most influential plagues in history. Studies on the origin of SARS-CoV-2 have generally agreed that the virus probably comes from bat, closely related to a bat CoV named BCoV-RaTG13 taken from horseshoe bat, with Malayan pangolin being a plausible intermediate host. However, due to the relatively low number of SARS-CoV-2 related strains available in public domain, the evolutionary history remains unclear. To address this, 995 coronavirus sequences from NCBI Genbank and GISAID were obtained and multiple sequence alignment was carried out to categorize SARS-CoV-2 related groups. Spike sequences were analyzed using similarity analysis and conservation analyses. Mutation analysis was used to identify variations within receptor-binding domain in spike for SARS-CoV-2 related strains. Prof. Zhang's lab identified a family of SARS-CoV-2 related strains, including the closest relatives, bat CoV RaTG13 and pangolin CoV strains. Sequence similarity analysis and conservation analysis on spike sequence identified that N-terminal domain, receptor binding domain (RBD) and S2 subunit display different degrees of conservation with several coronavirus strains. Mutation analysis on contact sites in SARS-CoV-2 RBD reveals that human-susceptibility probably emerges in pangolin. This research has been accepted for publication in *Evolution, Medicine and* Public Health.

For biostatistics/epidemiology analysis, Prof. Zhang reported a study on the prevalence of allergens. Although many studies have been published on the prevalence of allergens, there are still limited studies on the geographic distribution of allergens in China. Prof. Zhang and his team conducted a large multicenter study on the prevalence patterns of serum allergen-specific IgE (sIgE) sensitization to the four most common food allergens and five aeroallergens among 44,156 patients



with allergic symptoms in 52 cities from 26 provinces of all the seven geographical regions in China in 4 years. This was the first large study to investigate the difference in the prevalence and patterns of allergen sensitization in patients with allergic symptoms across all of the seven regions in China. It revealed the distinctive patterns in the prevalence of allergen sensitization among regions, gender, age groups and seasons in China in more detailed geography. This is the first study to reveal that (1) the peak of prevalence of house dust mite, German cockroach, tree pollen mix, dog dander, crab and shrimp moved roughly from late teenage to early teenage age when middle/high slgE classes instead of all classes were considered and (2) the peak of prevalence in October for all slgE positive classes disappeared in that for middle/high classes in China. These findings may help clinicians find effective individualized treatments for unique patient groups and direct researchers to conduct further studies on the epidemiology of allergic diseases. This research has been accepted for publication in *ALLERGY* which is ranked as the second best journal in allergy by Clarivate Analytics.

Finally, Prof. Zhang briefly reported a research on developing statistical methods for quality control in high-throughput screening studies. High throughput screening (HTS) is a vital automation technology in biomedical research in both industry and academia. The well-known z-factor has been widely used as a gatekeeper to assure assay quality in an HTS study. The paper for introducing z-factor has been cited for more than 6,000 times. However, many researchers and users may not have realized that z-factor has major issues theoretically in statistics. Prof. Zhang's lab, collaborating with Prof. Heping ZHANG in Yale University, explored four major issues inherent in the z-factor statistically, proposed an approach with new criteria for quality control to avoid these issues, implemented this approach in an R package qcSSMDhomo (https://github.com/Karena6688/ qcSSMDhomo) and demonstrated its utility in an HTS study. A manuscript on this research is currently under revision in *Bioinformatics*, one of the top journals for bioinformatics original research.

PhD Oral Defence PhD Oral Defences by Xiaowen GUAN of Prof. Gang LI's group and Xiaoxiao ZHOU of Prof. Guokai CHEN's group

Ms. Xiaowen GUAN supervised by Prof. Gang LI and Ms. Xiaoxiao ZHOU supervised by Prof. Guokai CHEN completed their PhD oral defences on 3 and 7 November respectively. Their thesis titles are "Investigating a New Mechanism of EHZ2 Overexpression Promotes Tumorigenesis in Breast Cancer and a Novel Therapeutic Strategy for Treating Glioblastoma Harboring H3.3K27M Mutation" and "Insulin and eIF4A Mediated Translational Regulation in Human Embryonic Stem Cell".



Ms. Guan reported that she has developed an approach to identify the trans-acting factors regulating the EZH2 expression and revealed the reciprocal regulation of EGR1 and EZH2. She has demonstrated that EHZ2 repressed EGR1 expression through a silencer downstream of the EGR1 gene. Deletion of the EGR1 silencer could reduce cell growth, invasion and tumorigenicity. Moreover, she has screened an epigenetic library using two glioma cell lines carrying H3.3K27M to identify the synthetic lethality drugs targeting pediatric gliomas harboring H3.3K27M mutation. She found that PARP1 inhibitor was effective against

the SF188 cells harboring H3.3K27M, but not against Res259 cells bearing the same mutation. She concluded that the whole exome sequencing and RNA-seq analysis revealed that Res259 and SF188 had different genetic makeup and PALB2 knockout could make the PARP inhibitor-insensitive RES259-H3.3K27M cells sensitive.





Ms. Zhou claimed that translation initiation is a rate-limiting step in gene expression but it is unclear in human embryonic stem cells (hESCs). She reported her research work that the eIF4A1 inhibitor silvestrol decreased the protein synthesis in key pluripotency genes such as NANOG and AMD1, while it stimulated the production of GADD45G protein that leads to stem cell specific cell death. Moreover, she has found that insulin removal induced the mRNA translation of pro-apoptotic PMAIP1 and the subsequent cell death. She concluded that the rapamycin-associated translation inhibition induced a paused

pluripotent state which could help the stem cell applications. Her studies elucidated that translation initiation was regulated through multiple mechanisms to regulate fundamental activities in hESCs.

FHS Community Story iGEM Series III - iGEM Competition Exalts UM Students in Different Aspects

The UM team has been devoting to the preparation for the 2020 International Genetically Engineered Machine (iGEM) competition since April this year. The students are excited to meet over 240 iGEM teams worldwide to present their project and share ideas in iGEM Giant Jamboree which will be held from 14 to 22 November 2020 in a virtual format due to the COVID-19 pandemic. The students all recognized the benefits brought to them during their preparation for the competition.

Being the team leader, FHS Year 3 student Yuzhao FENG is responsible for scheduling and organizing the iGEM project scheme to ensure all works are performed well and on time. She had to engage in most of the tasks in sub-groups to keep the project moving along. She admitted that it was challenging to foster collaboration and teamwork but she was glad to improve her interpersonal skills when communicating with her team members. She learnt that a good plan was important for balancing the workload of the project and the studies of the team members particularly during the midterm and exam periods.

FHS Year 3 students Shuyao XIE and Chat Tat LEONG who are the members of the wet laboratory team have been working hard with the research experiments. The arrangement of laboratory works for teammates was much tougher than their expectations. They have been trying their best to listen to and communicate with their teammates to bring the best from them for betterment of the project. When facing repeated experimental failure, they had to motivate the teammates who were depressed and directionless.



Sun DI, FST Year 3 student, is responsible for designing the iGEM team wikipedia pages and writing codes. He has also built the mathematical 2D and 3D model for simulating the situation if the engineered bacteria are added to the aquarium, and discussed the modeling with Tsinghua University which is also one of the members of the Anti-Biofilm Community. He reflected that iGEM competition has provided an opportunity for him to gain experiences in mathematical model for improving simulation models in the future.



In addition to the enhancement of the academic knowledge, FHS Year 3 students Hoi Chen LEONG, Xuemeng LI and FHS Year 4 student Changchen LU who assist in promoting their project via various media for the team have also enhanced their soft skills. They have learnt to use design software and video editor for setting up the team's web page. "After finishing each task, I got a sense of accomplishment," with satisfaction said Hoi Chen LEONG. She has also worked with her teammate, Hengyi FU, another FHS Year 3 student, for the arrangement of the outreach activities, the high school talk, end-user interviews and the Conference of China iGEMer Community. Both of them valued the advantages brought by the competition, "The iGEM competition helps us in developing soft skills outside the classroom."

Chengzong HOU, Huichao ZHAO and Changchen LU, FHS Year 4 students, found it hard to balance the time between their final year project and their iGEM works. Chengzong HOU admitted that connection was not strong enough among the sub-groups of the team at the beginning. Yet, they overcame the communication barriers and cooperated to finish the task eventually.

Lu Rochelle YU, FHS Year 3 student, is proud to be a member of the UM iGEM team. She mentioned, "The competition fostered our friendship and connection, and helped me identify my strengths and weaknesses." Lesi CHAN, FHS Year 3 student, has taken up the secretarial role to handle the documentary work of the team. She was given an opportunity to try something new, "Secretarial work is interesting, and I am able to know more about the project and different works accomplished by different sub-groups. Trying new things helps me expand my perspective on life."

The students are all grateful for the advice and support from the members of the UM iGEM team last year and the project advisors, FHS Assistant Professor Leo Tsz On LEE, Associate Professors Ruiyu XIE and Tzu-Ming LIU. They acknowledge the positive impact of the competition which is conducive to their development, both academically and personally. They are all looking forward to interacting with the judges and other iGEMers in the upcoming iGEM Giant Jamboree at a scale never before experienced.





UPCOMING

NOV / DEC				
Mon	Tue	Wed	Thu	Fri
9	10	11	12 Qualifying Exam Siyi FU Supervisor: Prof. Ren-he XU Time: 15:00 Venue: N22-3042 FHS Postdoc/ Student Session: Cancer Research Host: Prof. Xiaoling XU and Prof. Qi ZHAO Time: 17:00-18:00 Venue: N22-G002 and Zoom	13
16	17	18	19	20
Qualifying Exam Hongmei YANG Supervisor: Prof. Kathy Qian LUO Time: 15:00 Venue: N22-4028	Qualifying Exam The Application of Multiplex Electro- chemiluminescence Immunoassay in Oncology Research Speaker: MSD Asia Pac Field Application Scientists Host: Prof. Hanming SHEN Time: 15:00-16:00 Venue: N22-G002 & ZOOM	BCAT Meeting Speaker: Prof. Edwin CHEUNG Time: 17:00-18:00 Venue: E12-G004		
23	24	25	26 <u>FHS Postdoc/ Student</u> <u>Session:</u> Cancer Research Host: Prof. Tzu-Ming LIU and Prof. Kathy Qian LUO Time: 17:00-18:00 Venue: N22-G002 and Zoom	27
30	DEC 1	2 BCAT Meeting Speaker: Prof. Guokai CHEN Time: 17:00-18:00 Venue: E12-G004	3	4

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