FACULTY OF HEALTH SCIENCES

2021 WEEKLY NEWSLETTER

Issue 34 | 23 - 27 August

Publication

1. Qiu, P., Hou, W., Wang, H., Lei, K. K. W., Wang, S., Chen, W., Pardeshi, L. A., Prothro, K., Shukla, Y., Su, S. S. M., Schrump, D. S., **Chen, Q.**, **Deng, C. X.#**, **Xu, X.#**, and Wang, R.# (2021) Sirt1 Deficiency Upregulates Glutathione Metabolism to Prevent Hepatocellular Carcinoma Initiation in Mice. *Oncogene* **[2020 IF = 9.867]**

2. Yang, D. X., Yang, M. J., Yin, Y., Kou, T. S., Peng, L. T., Chen, Z. G., **Zheng, J.**, and Peng, B.# (2021) Serine Metabolism Tunes Immune Responses to Promote *Oreochromis Niloticus* Survival Upon *Edwardsiella Tarda* Infection. *mSystems*, e0042621 **[5yr IF = 8.236]**

3. Zhao, S., Long, Y., Shen, X., Wang, S., Su, Y., **Zhang, X.#**, and Zhang, Z.# (2021) Regulation of Electronic Structures of MOF-Derived Carbon via Ligand Adjustment for Enhanced Fenton-Like Reactions. *Sci Total Environ* **799**, 149497 **[2020 IF = 7.963]**

4. Li, S., Jiang, Y., Xing, X., Lin, R., Li, Q., Zhou, W., Qiu, W.#, and **Zheng, W.#** (2021) Protective Mechanism of Berberine on Human Retinal Pigment Epithelial Cells against Apoptosis Induced by Hydrogen Peroxide via the Stimulation of Autophagy. *Oxid Med Cell Longev* **2021**, 7654143 **[5yr IF = 7.454]**

5. Lau, G.#, Yu, M. L.#, Wong, G., Thompson, A., Ghazinian, H., Hou, J. L., Piratvisuth, T., Jia, J. D., Mizokami, M., **Cheng, G.**, Chen, G. F., Liu, Z. W., Baatarkhuu, O., Cheng, A. L., Ng, W. L., Lau, P., Mok, T., Chang, J. M., Hamid, S., Dokmeci, A. K., Gani, R. A., Payawal, D. A., Chow, P., Park, J. W., Strasser, S. I., Mohamed, R., Win, K. M., Tawesak, T., Sarin, S. K., and Omata, M. (2021) APASL Clinical Practice Guideline on Hepatitis B Reactivation Related to the Use of Immunosuppressive Therapy. *Hepatol Int* **[2020 IF = 6.047]**

6. Bian, C., Li, R., Wen, Z., **Ge, W.#**, and Shi, Q.# (2021) Phylogenetic Analysis of Core Melanin Synthesis Genes Provides Novel Insights into the Molecular Basis of Albinism in Fish. *Front Genet* **12**, 707228 **[5yr IF = 4.888]**

7. Hu, H., Hou, X., Luo, W., Li, Y., Huang, H., Huang, X., Sun, B.#, and **Zhang, X. D.#** (2021) The Molecule Sensitized Pattern of Atopic Dermatitis Patients Who Co-Sensitized to Shrimp, Cockroaches, Crab and House Dust Mites. *J Asthma Allergy* **14**, 993-997 **[5yr IF = 4.809]**

8. **Lei, C. L.#**, and Mirams, G. R. (2021) Neural Network Differential Equations for Ion Channel Modelling. *Front Physiol* **12**, 708944 **[5yr IF = 4.804]**

 # Corresponding Author

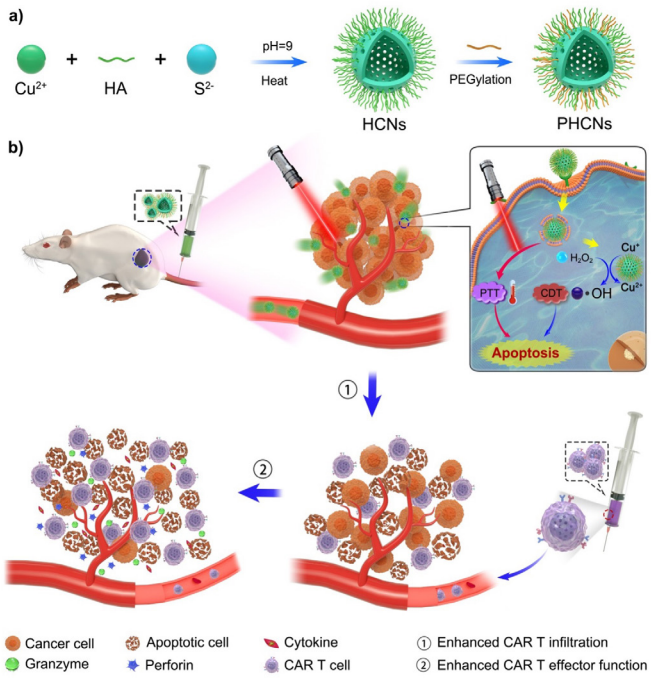
FACULTY OF HEALTH SCIENCES
2021 WEEKLY NEWSLETTER
Issue 34 | 23 - 27 August

1 Article Sharing

FHS Develops New Nanozyme Technology for Improving CAR T Cell Immunotherapy

Prof. Qi ZHAO has developed a new nanozyme technology that can enhance the anti-tumour effects of chimeric antigen receptor (CAR) T cells by reshaping the tumour microenvironment. This technology can be used to improve the ability of the patient's own immune system to fight the tumour. The study has been published in the high-impact academic journal *Small*.

Adoptive cell therapy of engineered T cells with CARs represents an attractive and innovative strategy for cancer treatment. However, in solid tumours, one major obstacle limiting CAR T cell therapy is the tumour microenvironment (TME). Previous studies have reported that B7-H3 CAR cells based on non-small cell lung cancer (NSCLC) exhibited superior anti-tumour effects and inhibited tumour growth. However, B7-H3 CAR T cells partially eradicated solid tumours.

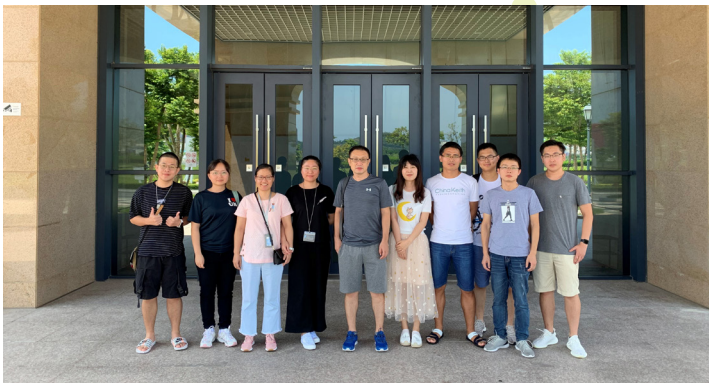


The schematic diagram of the nanozyme technology enhancing CART therapy by remodeling tumour microenvironment.

This study is a breakthrough in the treatment of solid tumours with CAR T cells. The team has found that one of the main obstacles limiting CAR T cell therapy is TME. Nanozymes exhibit merits modulating the immunosuppression of the tumour milieu. The team adopted a synergetic strategy by combining nanozymes and B7-H3 CAR T cells in solid tumours. This nanozyme with dual photothermal-nanocatalytic properties is endowed to remodel TME by destroying its compact structure. The team has discovered that the B7-H3 CAR T cells infused in mice engrafted with the NSCLC cells have superior anti-tumour activity after nanozyme ablation of the tumour. Moreover, the changes altered immune-hostile cancer environment, resulting in enhanced activation and infiltration of B7-H3 CAR T cells. This study clearly supports that the TME-immunomodulated nanozyme is a promising tool to improve the therapeutic obstacles of CAR T cells against solid tumours.

FHS's PhD student Lipeng ZHU is the first author of the paper, and Prof. Zhao is the corresponding author. FHS professors Tzu-Ming LIU and Yunlu DAI made important contributions to this study. The study was funded by the Science and Technology Development Fund (FDCT), Macao SAR (file number: 131/2016/A3 and 0015/2018/A1), National Key R&D Programme of China (file number: 2019YFA0904400), and UM (file

number: MYRG2019-00069-FHS). The full-text version of the related paper can be viewed at: https://onlinelibrary.wiley.com/doi/full/10.1002/smll.202102624



2 Academic Promotion

Series 3: Prof. Jun ZHENG Promoted to Associate Professor

FHS congratulates Prof. Jun ZHENG for his promotion to the rank of Associate Professor.

Prof. Jun ZHENG has reached several milestones in his research journey. The first milestone was the discovery and characterization of a novel secretion system – type VI secretion system. He was one of the first several scientists who discovered and studied type VI secretion system in bacteria. This secretion system now has become a hot topic for research in the bacterial field. The second milestone was the disclosure of the mechanism of action of a clinical being-used anti-tuberculosis drug (para-aminosylic acid). This finding provided novel insights into developing new drugs targeting folate pathway. The third milestone was the identification of alarmone Ap4A as one driver for bacterial death upon aminoglycoside antibiotic killing. This finding provided a new approach to enhance aminoglycoside killing potency and solve the toxicity issue of aminoglycosides. The fourth milestone is that he has identified a new type of persisters - non-walled spheroplast cells. This finding enriched the current understanding on bacterial persisters.

In addition to Prof. Zheng's devotion to the frontier research of bacterial pathogens, he has been the active reviewers for more than 20 international journals in his field. He reviewed the grant applications from many countries including France, United Kingdom and Singapore. He also served as the council member or member of several professional associations. Prof. Zheng believes that scientific literacy of students should be properly cultivated, and he always makes earnest attempts to boost students' interest in learning science.

Congratulations to Prof. Zheng's promotion and we look forward to his continuous contributions to FHS. You may learn more about Prof. Zheng via his profile page of our website. (https://fhs.um.edu.mo/en/staff/jun-zheng/)

3 PhD Oral Defence

Two Students Completed PhD Oral Defences

In this week, two FHS students completed their PhD Oral Defences.

Mr. Shigao HUANG, supervised by Prof. Qi ZHAO, presented "Combination Immunotherapy of Chimeric Antigen Receptors-engineered Natural Killer Cells as Drug Carriers" on 27 August. He claimed that Chimeric Antigen Receptor (CAR)-engineered cell immunotherapy is a promising strategy in cancer treatment. CAR-engineered natural killer (NK) cells have shown effective anti-cancer efficacy with the improved selectivity and specificity. He further introduced that the combination therapy of nanomedicine and immunotherapy has become an innovative strategy. However, the specificity and minimizing the toxicity of immunotherapy for specific cancer are challenged to be improved. He then reported a novel approach of his project to improve the immunotherapy effect via a drug delivery system with NK cells expressing CARs and carrying the photosensitization agents. Moreover, he reported that he has achieved the 3-dimensional tumour slice cultures (3D-TSCs) response to tumour tissue via the two–photon intravital image. He concluded that these findings provided an innovative approach to observe the anti-tumour dynamic effect process.

Mr. Shiyin ZHAO, supervised by Prof. Xuanjun ZHANG, presented "MOFs Based Nano-catalysts in High-efficient Contaminated Water Purification and Cleaner Energy Utilization" on 28 August. He said that water security is a critical part of health sciences. With the rapid development of life, water contamination and energy shorting has increasingly become the serious issues. Organic pollutants such as dyes, pharmaceuticals, or other kinds of pollutants in the water bodies are seriously threatening the health of the organisms. Therefore, he has designed and synthesized a series of MOFs-based nanocatalysts for wastewater purification. He has further proposed several stable removal approaches for removing the pollutants more efficiently. Moreover, he said that the DFT simulation revealed the excellent performance of the catalysts. Reasonable use of the catalysts can prevent the toxicity from harming other organisms. He concluded that the result provided great potential that MOFs-based nanocatalysts, and could be applied in high-efficient water purification and cleaner energy utilization.

UPCOMING EVENTS

August / September		
Mon	**30**	**6**
Tue	**31** **Oral Defence** Speaker: Si CHEN Supervisor: Prof. Chuxia DENG Time: 10:00 Venue: E12-1015 **Ministry of Education (MoE) Frontiers Science Center for Precision Oncology (FSCPO) Seminar Series** Title: Supramolecular Cell-hitchhiking Delivery of Nanomedicines for Targeted Therapy of Solid Tumors Speaker: Prof. Rui Bing WANG Time: 16:00 - 17:00 Venue: ZOOM	**7**
Wed	**SEP 1** **BCAT Meeting** Speaker: Prof. Vivien WANG Time: 17:00-18:00 Venue: E12-G004	**8**
Thu	**2** **FHS Postdoc/ Student Seminar** Session: Cancer Research, Precision Medicine & Aging and Developmental Biology Host: Prof. Chuxia DENG and Prof. Wakam CHANG Time: 17:00-18:00 Venue: N22-G002 and Zoom	**9**
Fri	**3**	**10**

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