ACADEMIC ACTIVITIES

Publication(s) of the week

1. Li, S., Zhao, X., Lazarovici, P., and **Zheng, W.** (2019) Artemether Activation of Ampk/Gsk3beta (Ser9)/Nrf2 Signaling Confers Neuroprotection Towards Beta-Amyloid-Induced Neurotoxicity in 3xtg Alzheimer's Mouse Model. *Oxid Med Cell Longev* **2019**, 1862437 **[5yr IF=5.392]**

2. Cheng, X., Jiang, X., **Tam, K. Y.**, **Li, G.**, **Zheng, J.**, and **Zhang, H.** (2019) Sphingolipidomic Analysis of C. Elegans Reveals Development- and Environment-Dependent Metabolic Features. *Int J Biol Sci* **15**, 2897-2910 **[5yr IF=4.306]**

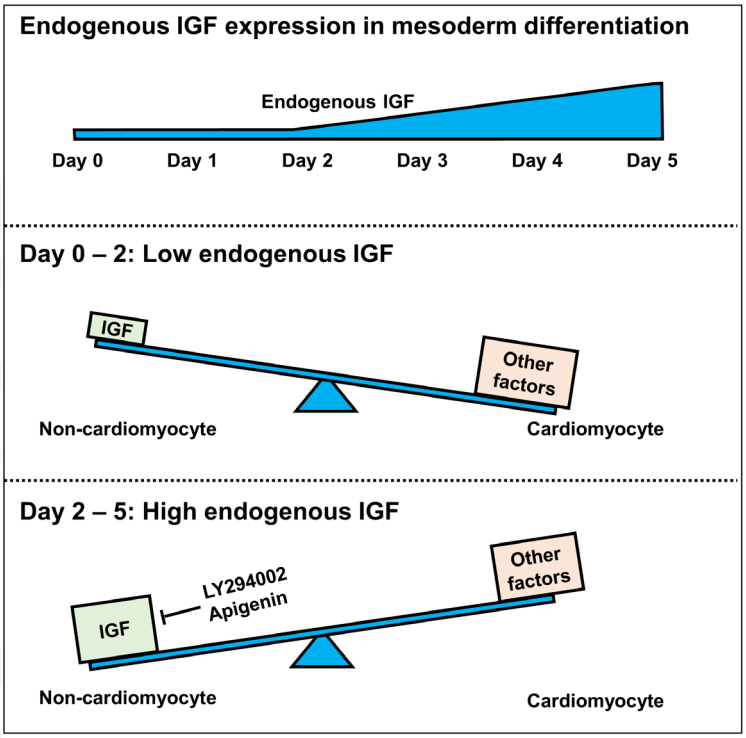
3. Gong, Q., Yang, D., Jiang, M., **Zheng, J.**, and Peng, B. (2019) L-Aspartic Acid Promotes Fish Survival against Vibrio Alginolyticus Infection through Nitric Oxide-Induced Phagocytosis. *Fish Shellfish Immunol* **[5yr IF=3.55]**

FHS invents new methods to generate heart muscle cells

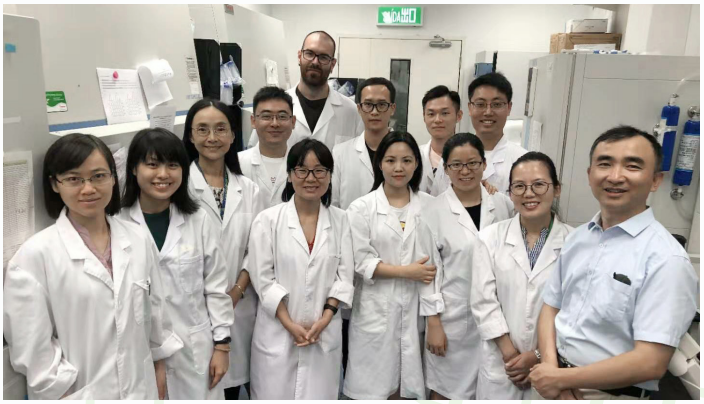
FHS has invented two new methods to produce heart cells from human embryonic stem cells and induced pluripotent stem cells. We also reveal a novel molecular regulation by insulin-like growth factor (IGF) pathway in embryogenesis and heart development. The study has been published in the renowned journal *Cell Reports* (impact factor 8.652).

The study titled "Endogenous IGF Signaling Directs Heterogeneous Mesoderm Differentiation in Human Embryonic Stem Cells", was conducted by Prof. Guokai CHEN, Interim Associate Dean (Teaching) of FHS, along with his PhD students Yang YANG, Zhili REN *et al*, in collaboration with Prof. Wei GE, Prof. Qi ZHAO and Dr. Weiwei LIU from the Bioimaging and Stem Cell Core Facility. Additional collaborators included Dr. Jiaxian WANG from the First Affiliated Hospital of Nanjing Medical University, Nanjing HELP Stem Cell Innovations Ltd. Co. and Guangzhou FulenGen Ltd. Co.

IGF is well known for its role in stem cell survival and bone growth, but its role in cell fate determination was not cleared. Prof. CHEN's team has found that the IGF signal influences the potential to generate different mesodermal and endodermal cell types from human embryonic stem cells (hESCs). At early stages of hESC differentiation, IGF promotes liver and endothelial cell types, but prevents cardiac differentiation. The delicate balance of IGF signal is critical for various cell types to emerge simultaneously during embryogenesis. When the endogenous IGF pathway is suppressed, heart cells are induced from hESCs.



At present, WNT inhibition is a common modulation used *in vitro* to generate heart cells. However, the regulation is much more complicated *in vivo* during embryogenesis. This study reveals an important regulatory mechanism in heart cell differentiation, which leads to the development of two new methods to produce heart cells, through IGF pathway inhibition and CK2 kinase inhibition. Findings from this study not only provide alternative ways for the *in vitro* production of cardiomyocytes, but also improve our understanding of cell fate diversity in early embryogenesis and allow researchers to guide cell fate specification toward target cell types based on the new knowledge.



By using IGF inhibition or combining IGF inhibition with WNT inhibition, the researchers were able to produce heart cells *in vitro* with high consistency and quality, without using expensive and complicated supplements. This is a key step toward the generation of heart cells for cell therapy and drug screening.

This project was funded by UM and the Macao Science and Technology Development Fund. A patent application for the technology has been filed. For more information, please visit FHS website: https://fhs.umac.mo/.

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UPCOMING

December / January 2020

Mon	Tues	Wed	Thurs	Fri
30	31 Holiday (afternoon) New Year's Eve	January 2020 1 Holiday New Year's Day	2 **Oral Defence** Kun WU Supervisor : Prof. Wei GE Time: 10:00 Venue: N6-2022 **Oral Defence** Jiuling WANG Supervisor : Prof. Zhen YUAN Time: 15:00 Venue: N6-2022	3
6	7	8 **B-CAT Meeting #23** Speaker: Prof. Jun ZHENG Time: 17:00 Venue: E12-G004	9	10
13	14	15	16	17

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