

STEM CELLS AND TISSUE REGENERATION

(Stem Cell and Vascular Regeneration)



Principal Investigators

Professor Kathy Lui

Team

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Research Progress Summary

In the past year, Professor Kathy Lui and her team studied the role of hyperglycemia on prenatal heart development by recapitulation with human pluripotent stem cells both *in vitro* and *in vivo* with a particular focus on development of the second heart field progenitors. The group has also developed an *in vivo* transplantation protocol for inducing immune tolerance to human pluripotent stem cell-derived tissues in xenogeneic mice including the diabetic mouse models (US non-provisional patent app 15/360,347). Therefore, they are able to trace the development of human heart progenitors in hyperglycemic environment *in vivo* following transplantation by virtue of the lineage tracing human pluripotent stem cell derived heart progenitors now. They have also generated some preliminary data on driving cardiovascular regeneration in diabetic mouse models by targeting the host immune system. The team is at the stage of wrapping up these stories for publications.



Prof. Kathy Lui received Croucher Innovation Award

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Recognitions

Awards and Fellowships

Member's Full Name	Details
Kathy Lui	Faculty Innovation Award 2016
Kathy Lui	Croucher Innovation Award 2017
Kathy Lui	Visiting Professor, Shanghai East International Medical Center, Tongji University, Shanghai, China
Sarah Cheung	Research Fellowship Scheme 2016

Grants and Consultancy

Full Name of PI	Project Title	Funding Source	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Amount (HK\$)
Kathy Lui	Unraveling the Impact of Hyperglycemia on Survival and Cell Fate Commitment of the Human Multipotent ISL1+ Heart Progenitors.	Research Grants Council – General Research Fund	2017	2018	902,460
Kathy Lui	Driving Vascular Regeneration Against Diabetic Endothelial Dysfunction with Immune Intervention.	Food and Health Bureau – Health and Medical Research Fund	2017	2018	1,198,752
Kathy Lui	Modelling Human Congenital Heart Disease in Diabetes Using the ISL1-Cre Lineage Tracing Human Pluripotent Stem Cells	Faculty of Medicine, CUHK – Faculty Innovation Award	2017	2021	2,500,000
Kathy Lui (Co-PI)	A Multi-disciplinary Study on the Beneficial Effects of PPAR δ in Physical Exercise Against Diabetic Vascular Complications: Cellular Crosstalk and Energy Metabolism.	Research Grants Council – Collaborative Research Fund	2017	2020	6,817,834

Publications

A. Journal Papers

1. Yu W, Huang X, Tian X, Zhang H, He L, Wang Y, Nie Y, Hu S, Lin Z, Zhou B, Pu W, Lui KO, Zhou B. Gata4 regulates Fgf16 to promote heart repair after injury. *Development*. 2016; 143(6):936-49.
2. Lu S, Chow CL, Zhou J, Leung PS, Tsui SK, Lui KO. Genetic modification of human pancreatic progenitor cells through modified mRNA. *Methods in Molecular Biology*. 2016; 1428:307-17. (Protocol)
3. Leung OM, Zhou B, Lui KO. Vascular development and regeneration in the mammalian heart. *Journal of Cardiovascular Development and Disease*. 2016; 3(2):23.
4. Chen Y, Liu X, Zhang Y, Wang H, Ying H, Liu M, Li D, Lui KO, Ding Q. A self-restricted CRISPR system to reduce off-target effects. *Molecular Therapy*. 2016; 24(9):1508-10.
5. Pu W, Zhang H, Huang X, Tian X, He L, Wang Y, Zhang L, Liu Q, Li Y, Li Y, Zhao H, Liu K, Lu J, Zhou Y, Huang P, Nie Y, Yan Y, Hui L, Lui KO, Zhou B. Mfsd2a+ hepatocytes repopulate the liver during injury and regeneration. *Nature Communications*. 2016; 7:13369.
6. Leung CS, Lu S, Li J, Wu WK, Lui KO. Deciphering the role of microRNAs in regulation of immune surveillance, self-tolerance and allograft transplantation. *Current Stem Cell Research and Therapy*. 2016. (in press)

B. Others

1. US non-provisional patent app. 15/360347
"Induction of Immunotolerance"

