



## Dr. Chi Bun Chan

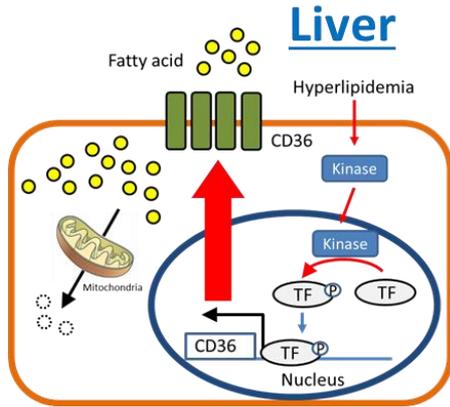
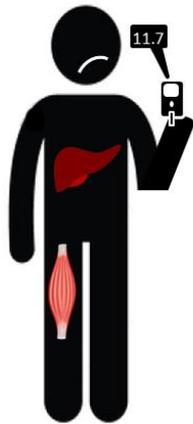
- Energy metabolism
- Obesity and diabetes
- Novel drug development

## Current Grants

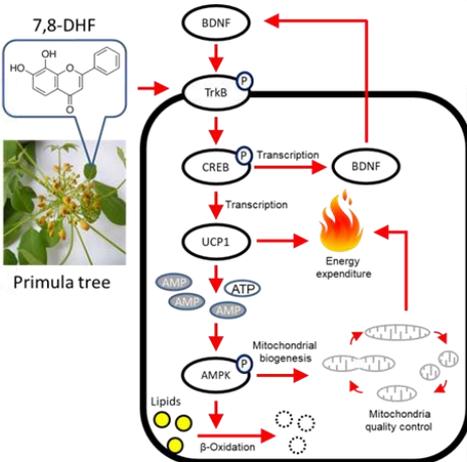
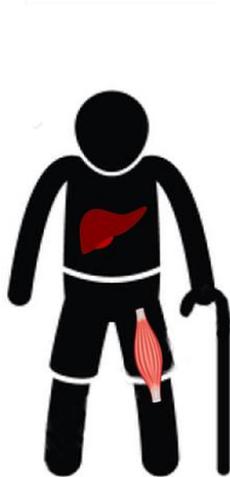
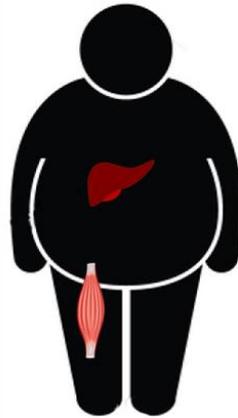
- ECS 2016 (\$1.43M)
- GRF 2017 (\$1.27M)
- GRF 2018 (\$0.88M)
- URC 2018 (\$0.99M)
- HMRP 2019 (\$1.49M)



### Diabetes



### Obesity



### Muscle

### Aging

### Exercise

# Energy metabolism – physiological regulation and translational potential

ANALYSIS

Drug discovery and development

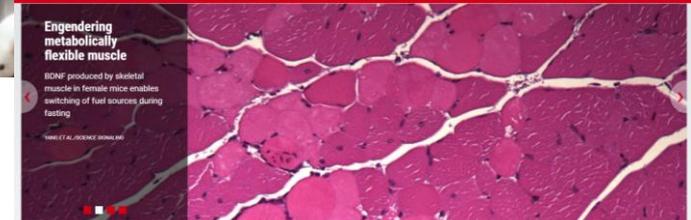
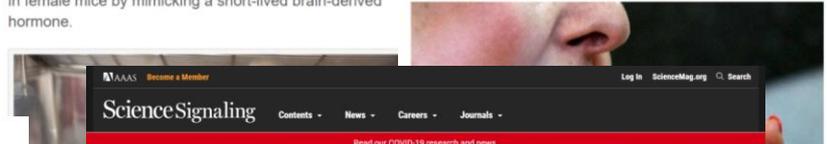
Antioxidant prevents weight gain but effect in mice only seen in females

The Pharmaceutical Journal | 10 MAR 2015 | By Vijay Shankar Balareshnan

7,8-DHF, a natural antioxidant, helps maintain body weight in female mice by mimicking a short-lived brain-derived hormone.

Los Angeles Times

Potential weight-loss agent from a tree is almost too good to be true



Contents 13 AUGUST 2019 VOL. 12, ISSUE 324

MORE FROM SCIENCE SIGNALING

- Current Table of Contents
- First Release

- Chan *et al.* Chem Biol 2015 22: 355-368
- Tse *et al.* Diabetes 2017 66: 1858-1870
- Wood *et al.* Metabolism 2018 87: 113-122
- Yang *et al.* Cell Physiol Biochem 2018 50: 1574-158
- Yang *et al.* Sci Signal 2019 12: eaau1468



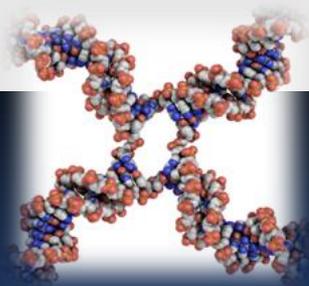
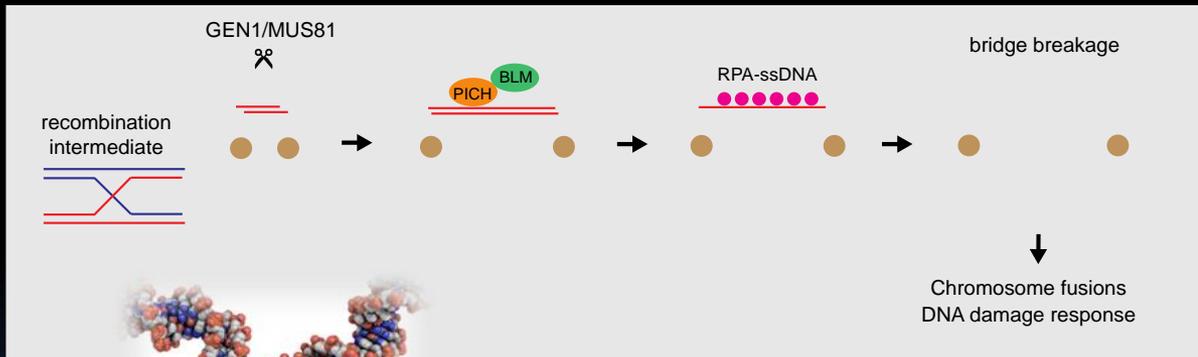
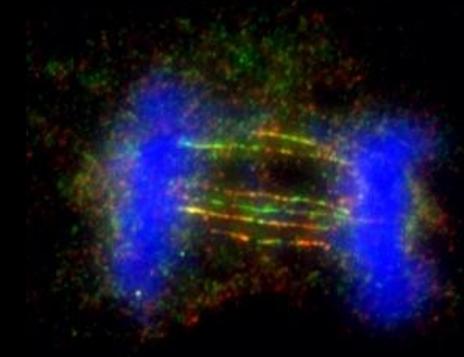
- ECS 2020 (\$0.98M)
- GD-NSF 2019 (\$100K)



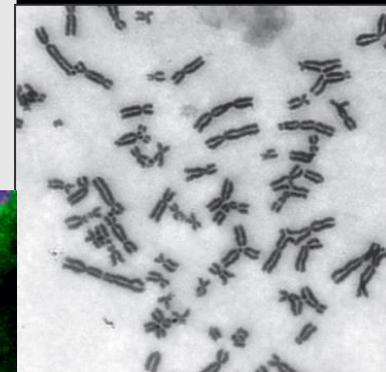
## Recombination and Chromosome Segregation Laboratory

- Mechanism of nucleases involved in DNA repair and segregation
- Interplay between DNA repair, chromosome segregation and genome instability
- How the formation and resolution of anaphase bridges influence genome stability

Ultrafine anaphase bridges

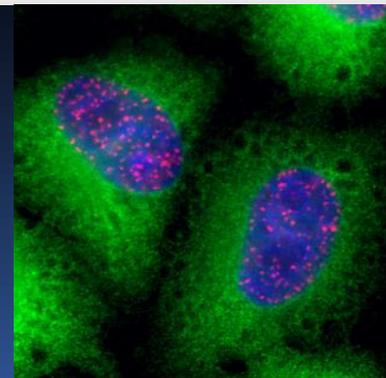


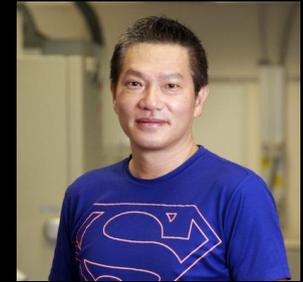
Sister chromatids can be connected by Holliday junction



Unable to resolve anaphase bridges can lead to DNA damage (left) and chromosome fusions (upper)

Chan et al. 2018 Nature Cell Biology  
Chan and West. 2019 Cell Cycle  
Chan and West. 2015 Nucleic Acid Research

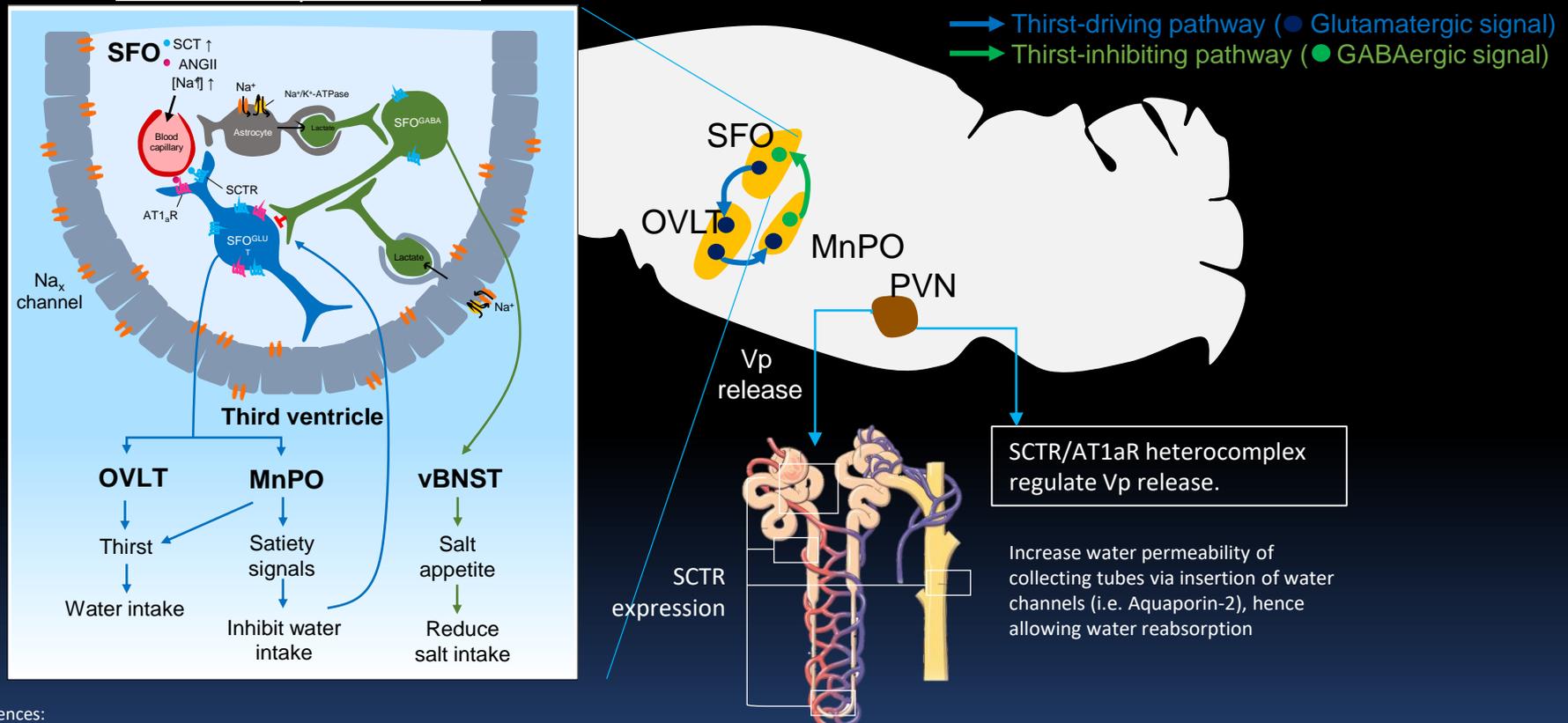




- GPCR screening
  - Secretin Receptor
  - Novel drug development
- Current grants:**
  - GRF2018 (882K)
  - GRF2019 (971K)
  - GRF2021 (1.19M)

## Dissect the role of Secretin in the regulation of thirst and salt appetite

Under Water deprived condition



**References:**

1. Phenotypes developed in secretin receptor-null mice indicated a role for secretin in regulating renal water reabsorption. *Molecular and cellular biology* **27**, 2499-2511 (2007).
2. Secretin as a neurohypophysial factor regulating body water homeostasis. *PNAS* **106**, 15961 (2009).
3. An indispensable role of secretin in mediating the osmoregulatory functions of angiotensin II. *Faseb j* **24**, 5024-5032 (2010).
4. Transmembrane peptides as unique tools to demonstrate the in vivo action of a cross-class GPCR heterocomplex. *Faseb j* **28**, 2632-2644 (2014).
5. In vivo actions of SCTR/AT1aR heteromer in controlling Vp expression and release via cFos/cAMP/CREB pathway in magnocellular neurons of PVN. *Faseb j* **33**, 5389-5398 (2019).

# Plant Biotechnology

**Mee-Len Chye**  
*Wilson & Amelia Wong Professor in Plant Biotechnology*

**Top 1% scholars @ HKU**

**HKU press releases:**

- HKU identifies a new strategy to protect flowers from freezing stress (Press Release [9/6/14](#))
- HKU scientists discover a drought tolerance gene that may help plants survive global warming (Press Release [22/11/15](#))
- Enhancing drought tolerance in plants: Nikkei Asia Review ([13/1/16](#))
- HKU researchers generate tomatoes with enhanced antioxidant properties by genetic engineering (Press Release [9/11/17](#))
- HKU Plant Scientists Identify New Strategy to Enhance Rice Grain Yield (Press release [1/12/19](#)) [https://www.hku.hk/press/news\\_detail\\_20327.html](https://www.hku.hk/press/news_detail_20327.html)

**HKU researchers generate tomatoes with enhanced antioxidant properties by genetic engineering**

09 Nov 2017

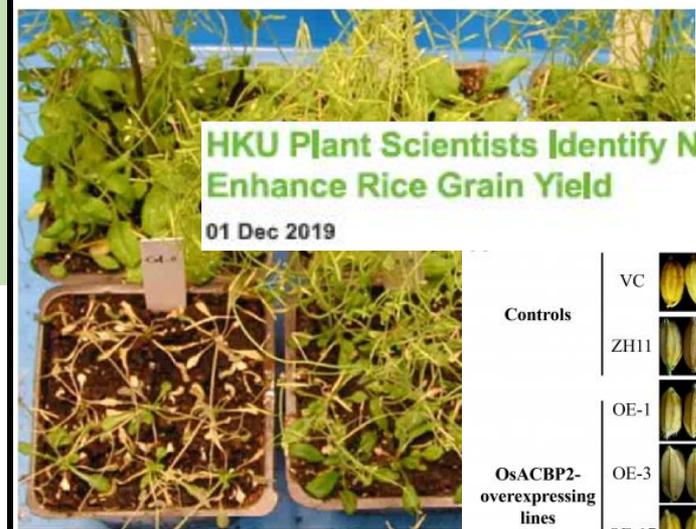


(from left) Dr Wang Mingfu, Professor Chye Mee-len and Dr Liao Pan show tubes containing carotenoid extracts from S359A tomato fruits and the control.

The School of Biological Sciences, Faculty of Science, the University of Hong Kong (HKU), in collaboration with the Institut de Biologie Moléculaire des Plantes (CNRS, Strasbourg, France), has identified a new strategy to simultaneously enhance health-promoting vitamin E by ~6-fold and double both provitamin A and lycopene contents in tomatoes, to significantly boost antioxidant properties.

**HKU scientists discover a drought tolerance gene that may help plants fight against global warming**

22 Nov 2015



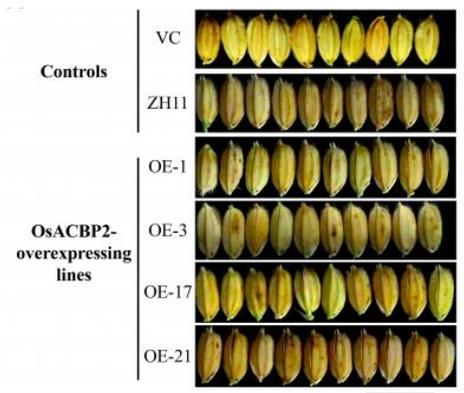
(upper panel) Arabidopsis under normal conditions are the same as plants (middle and right) with increased water availability. (lower panel) Arabidopsis under drought conditions grow much slower than plants (middle and right) with increased water availability.

Global warming increases the amount of moisture in the atmosphere, leading to drought in most parts of the world. As evapotranspiration produces periods of drought, rivers, lakes, and groundwater, and reduces soil moisture. As global temperature rises, the land mass affected by drought increases, with potentially devastating consequences:

<http://www.biosch.hku.hk/staff/mlc/mlc.html>

**HKU identifies a new strategy to protect flowers from freezing stress**

09 Jun 2014



Wilson and Amelia Wong Endowment Fund at the Faculty of Science, the University of Hong Kong, to protect flowers from freezing stress. An estimated 10% of crop plants is expected to benefit agriculture by genetic engineering to resist spells that kill flowers and adversely affect fruit.

## Hong Kong scientists engineer plants for a warmer planet

SARAH LAZARUS, Contributing writer  
January 13, 2016 19:00 JST





elnezami@hku.hk



## Probiotics modulated gut microbiota suppresses hepatocellular carcinoma growth in mice

Jun Li<sup>a,1</sup>, Cecilia Ying Ju Sung<sup>b,1</sup>, Nikki Lee<sup>c</sup>, Yueqiong Ni<sup>d</sup>, Jussi Pihlajamäki<sup>d,e</sup>, Gianni Panagiotou<sup>a,2</sup>, and Hani El-Nezami<sup>b,d,2</sup>

<sup>a</sup>Systems Biology and Bioinformatics Group, School of Biological Sciences, Faculty of Sciences, The University of Hong Kong, Hong Kong S.A.R., China; <sup>b</sup>School of Biological Sciences, Faculty of Science, The University of Hong Kong, Hong Kong S.A.R., China; <sup>c</sup>Department of Surgery, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong S.A.R., China; <sup>d</sup>Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio 70211, Finland; and <sup>e</sup>Clinical Nutrition and Obesity Center, Kuopio University Hospital, Kuopio 70211, Finland

- El-Nezami's lab research focuses on studying how dietary components (both harmful and beneficial) modulates gut microbiota and how such changes results in disease prevention and progression.
- The lab uses state of the art methods to study gut microbiota and their metabolites.
- The lab recently received US Patent (US10,016,468B2) on probiotic compositions can inhibit growth of HCC. The probiotic compositions can reduce the risk of HCC.



## Major Research Findings (2015-2020)

### 1. Development of novel tools for plant bioenergetics studies

We are the first to develop three important energy sensors (ATP, NADPH, NADH/NAD<sup>+</sup> ratio) for in planta studies ([eLife 2017](#); [PNAS 2018](#); [Nature Communications 2020](#)).

### 2. Revise our understanding of chloroplast bioenergetics ([National Science Review 2019](#))

### 3. How chloroplasts maintain energy efficiency ([Science Daily](#); [PNAS 2018](#); [Press Release](#))

### 4. Verify the flow of reducing equivalents in photosynthetic plant cells

([Science magazine](#); [Nature Communications 2020](#))

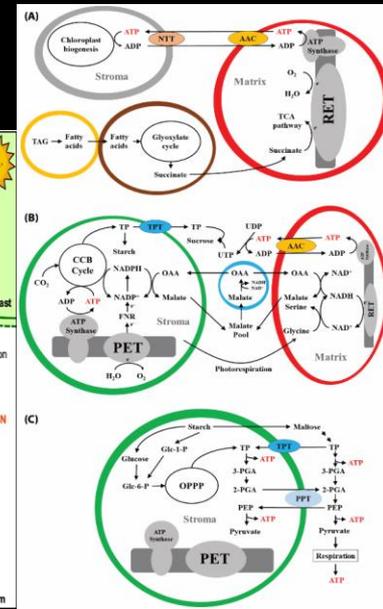
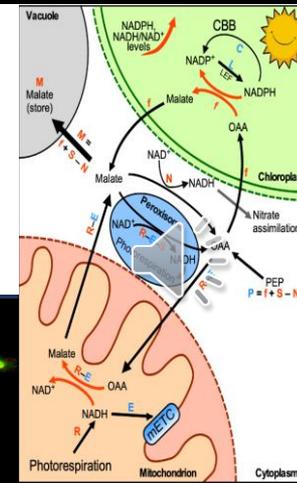
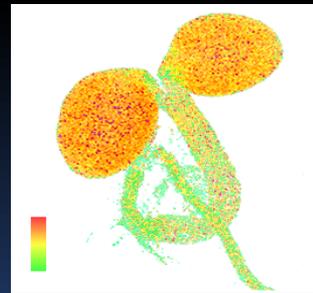
### 5. Protein import mechanisms of chloroplasts/mitochondria ([PP 2015](#); [FIPS 2018](#))

### 6. Plant growth technology ([FIPS 2015](#); [Press Release](#); [YouTube](#))

### 7. Role of FdC1 in electron flow during photosynthesis ([FIPS, 2018](#))

## Current Researches

- Guard cells
- C4 photosynthesis
- Photorespiration
- Pollen and pollen tube growth
- Plant growth





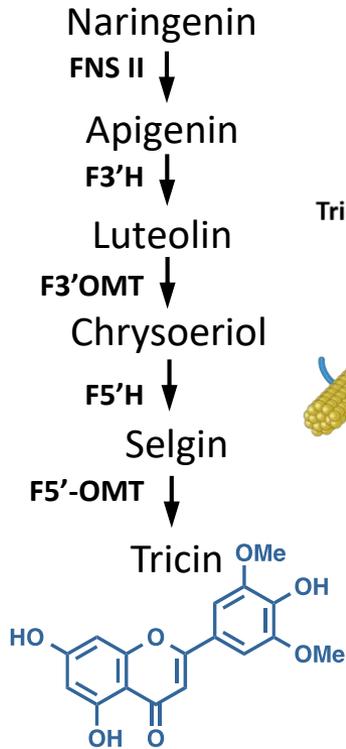
- Plant Biochemistry
- Agricultural biotechnology

- GRF 2017 (\$0.88 M)
- GRF 2018 (\$0.90 M)
- GRF 2020 (\$1.19 M)

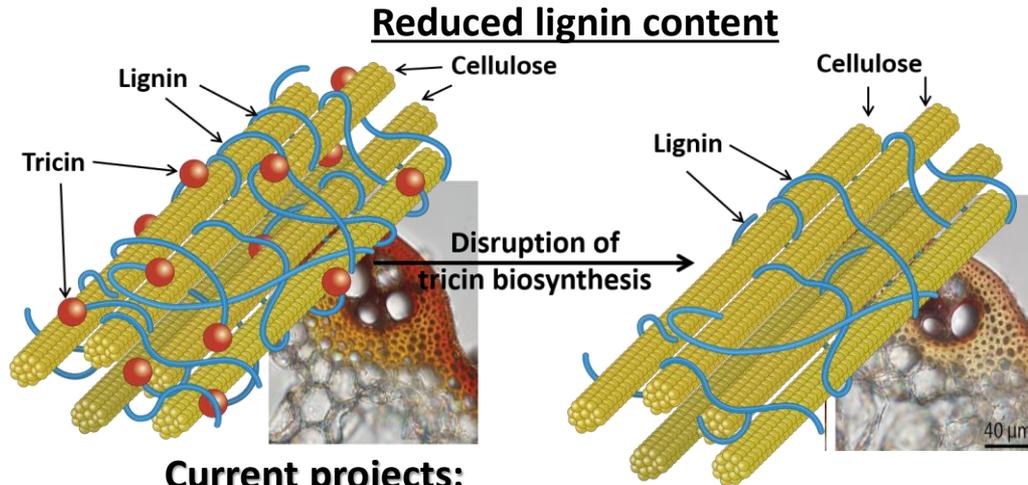


**Metabolic Engineering in Grasses**

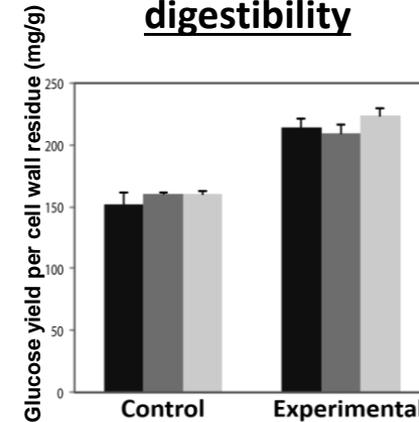
**Tricin biosynthesis pathway**



**Alteration of cell wall properties by metabolic engineering – Improved performance as feedstock for ethanol biofuel**



**Improved cellulose digestibility**



**Current projects:**

- Improvement of biomass utilization in rice through genetic manipulation of flavonoid biosynthesis pathway
- Molecular regulation of triclin biosynthesis in rice

**Collaboration:** Dr Yuki Tobimatsu (Kyoto University, Kyoto, Japan)

**Recent publications:**

Lam et al. 2015 *Plant Physiology* 168:1527-1536  
 Lam et al. 2017 *Plant Physiology* 174:972-985  
 Lam et al. 2019 *New Phytologist* 223:204-219.  
 Lui et al. 2020 *New Phytologist* (in press)  
 Wang et al. 2020 *Plant Biotechnology J* (in press)

晴報 16

4.5.2017 Thu | skypost.hk

近年以玉米、甘蔗等農作物用作為生物燃料，引起「人車爭食」爭議，並間接推高糧食價格，為人詬病。香港大學與京都大學合作研究有效提升禾稈草轉化為生物燃料效能的方法，使非食用植物部位也可轉變為能源。



禾稈變珍珠 製生物燃料 成效佳



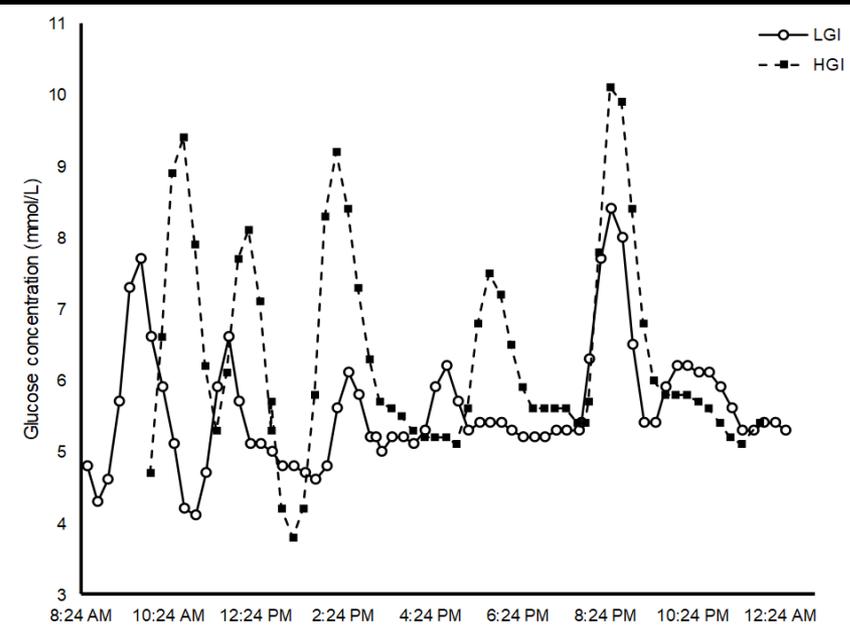
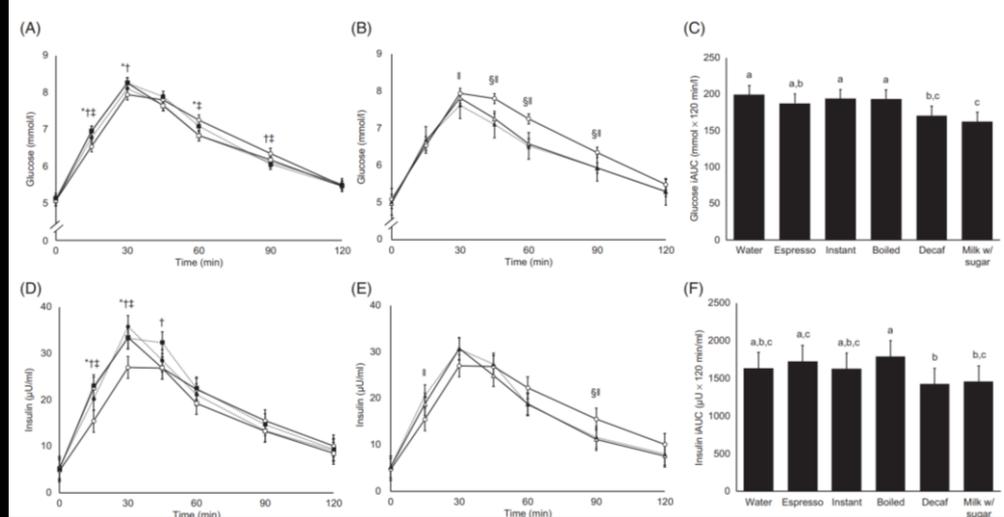
盧思聰(右)指，原本研究如何令食物產生「麥黃醇」，卻偶然促成今次研究，旁為林佩瑩。(陳靜儀攝)

## Dr Jimmy C Y Louie

- Smartphone apps in health promotion
- Carbohydrate metabolism
- Dietary management of diabetes
- Glycaemic index of foods

## Current Grant

- HMRF Research Fellowship (\$0.96M)



H-index: 29; citations: 2829 (Google Scholar)  
 ~100 published peer-reviewed articles since 2008  
 >45 publications since arrival at HKU in Dec 2015

### Selected publications:

- Diab Obes Metab.* 2020, *In Press*
- Am J Clin Nutr.* 2020, *In Press*
- Eur J Nutr.* 2020; 59: 651-9
- Am J Clin Nutr.* 2018; 107(1): 94-104
- Eur J Nutr.* 2018; 57: 2123-31
- Am J Clin Nutr.* 2017; 106(1): 189-98
- Diab Care.* 2016; 39(1): 31-8

**Dr Wing Yee Lui**

- Reproductive biology
- Cell adhesion dynamics
- Male infertility

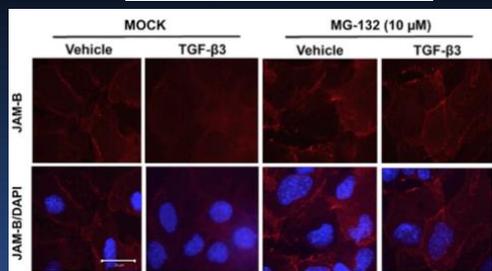
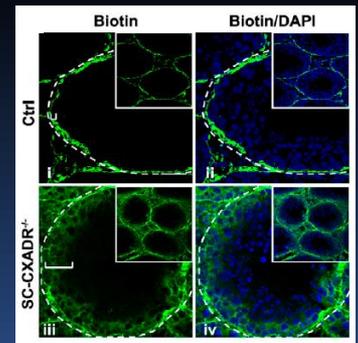
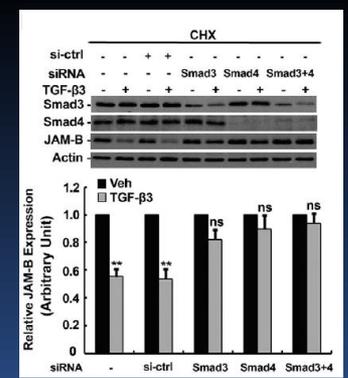
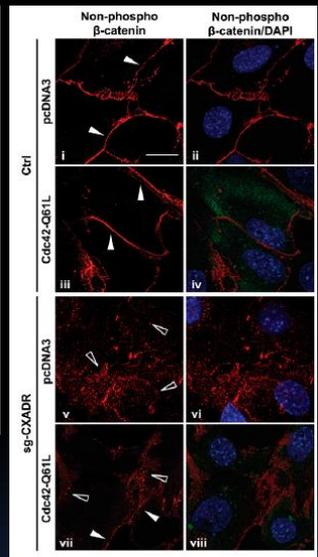
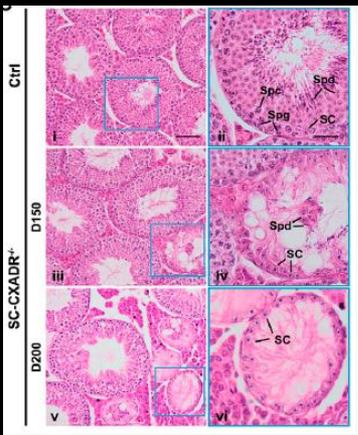
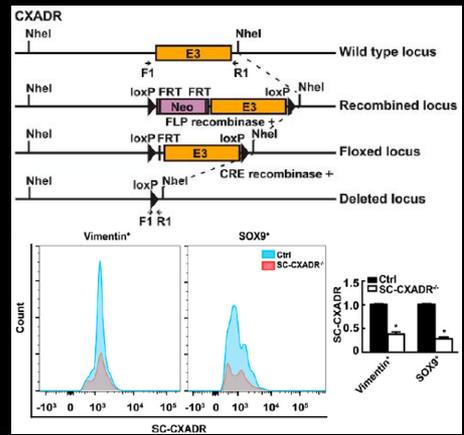
H-index: 30; citations: 3141 (Google scholar)

- Total Grants as PI
- GRF: ~\$6.5M
  - Others: \$2M

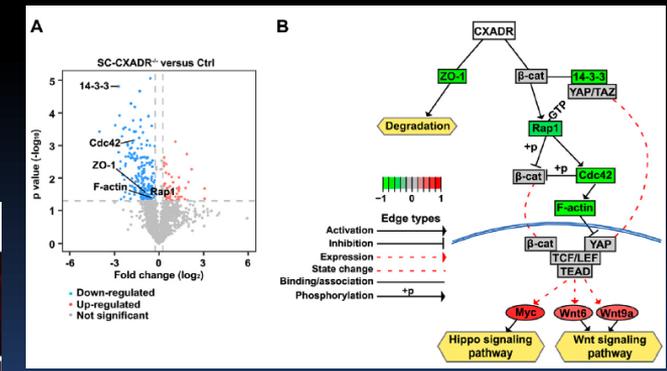
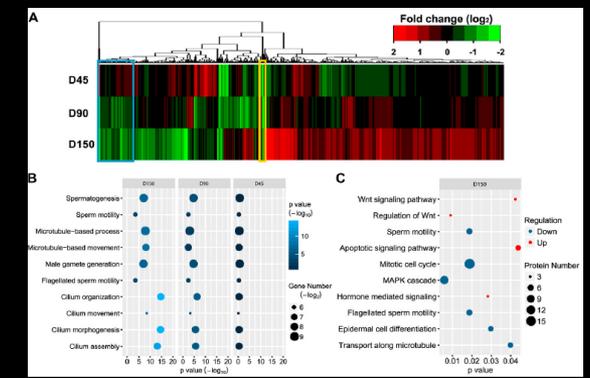


# Signaling network and molecular mechanisms in spermatogenesis and male infertility

## Knockout mice and cell culture models

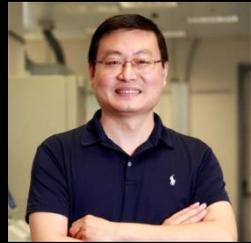


## Integrated omics approach

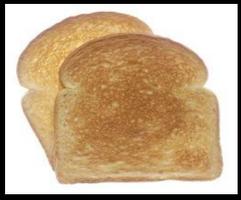
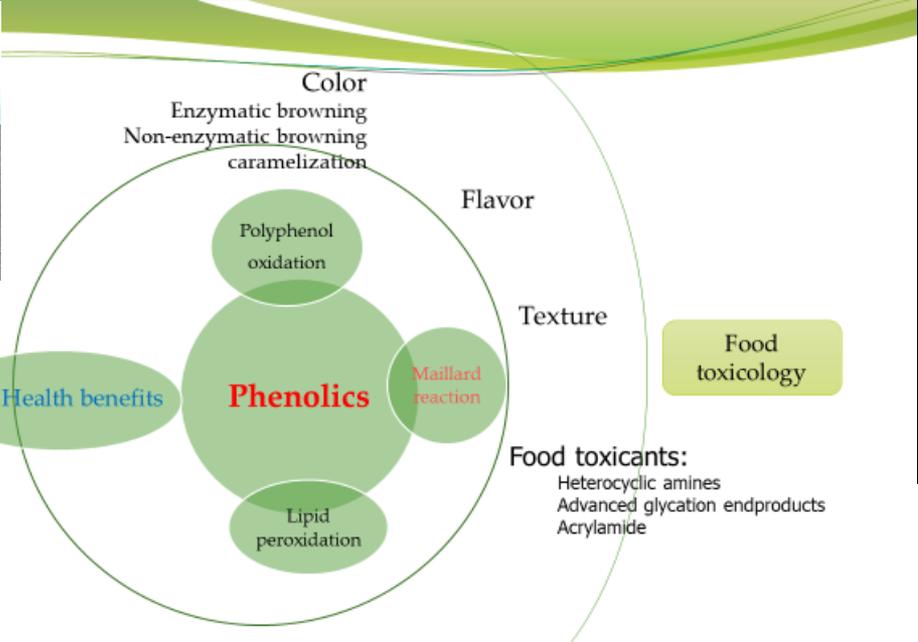


**Environmental toxicants?**  
**Testis-specific genes?**  
**Master signaling molecules? .....**

- Functional food Top 1% scholars @ HKU
- Chemical toxicology
- Molecular nutrition

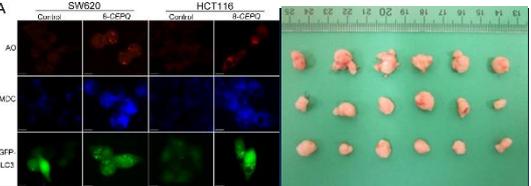
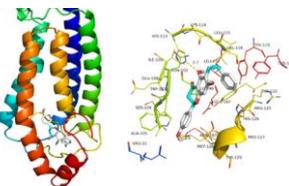
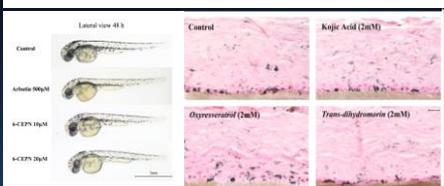
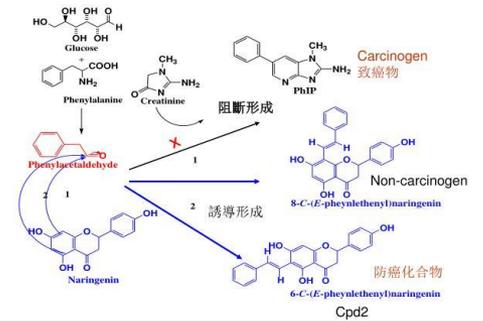


**Healthy diets**



- Skincare
- Functional Food
- Drug discovery

Postulated inhibitory mechanism of naringenin in PhIP formation



European Journal of Cancer 68: 38-50 (2016)  
Cancer Research 74: 243-252 (2014)  
H-index: 58; citations: 10756 (google scholar)

Molecular Nutrition & Food Research 61:1600437 (2017)  
Molecular Nutrition & Food Research 60: 1048-1058 (2016)  
Three USA/China patent applications  
HKU spinoff company: Skindata, **Sephora Accelerate Program in 2018**

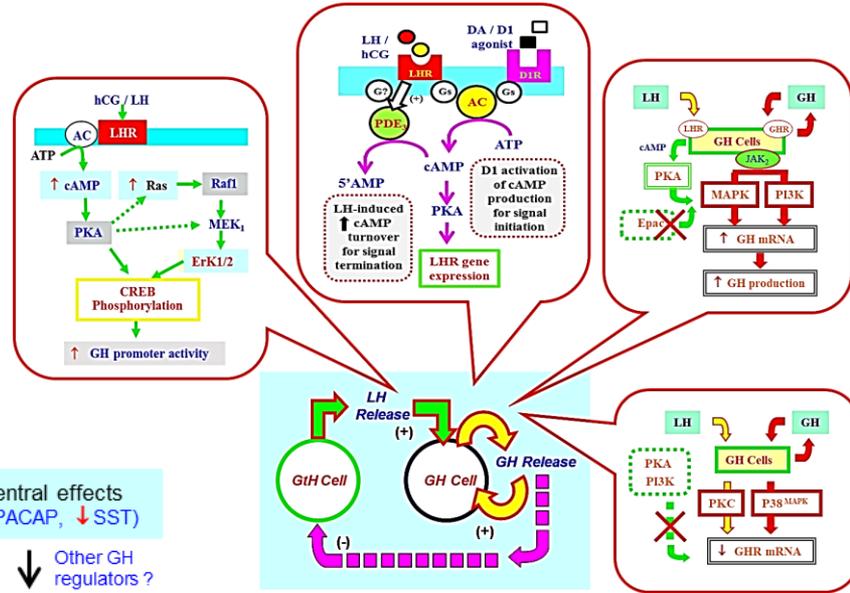
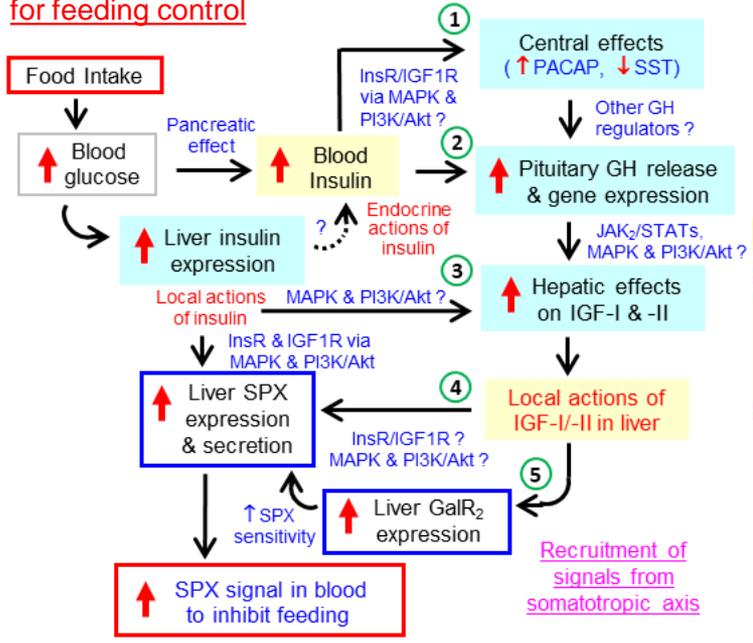
- Endocrinology & Signal Transduction
- Pituitary Hormones as intrapituitary regulators
- Crosstalk of Feeding with Pituitary Hormones



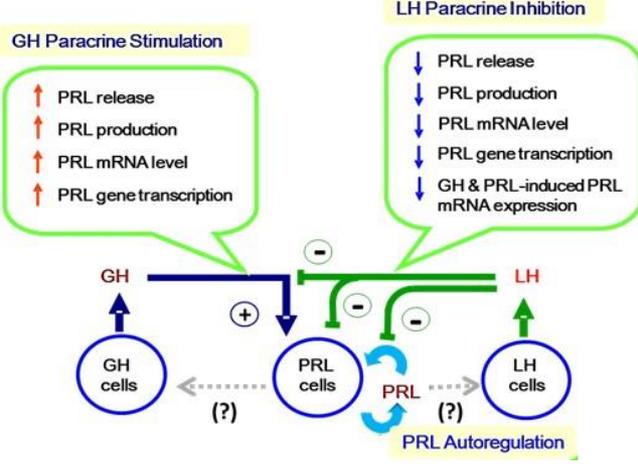
**Current Research Projects**

- Autocrine/Paracrine interactions of somatotrophs, gonadotrophs & lactotrophs in the pituitary
- Crosstalk of the GH-IGF Axis with Hepatic Regulation of the Novel Feeding Regulator Spexin

Recruitment of pituitary signal for feeding control



Intrapituitary feedback loop



**Recent Funding as PI**

- GRF 2020 (\$0.99M)
- GRF 2019 (\$1.12M)
- GRF 2018 (\$0.85M)
- GRF 2017 (\$1.12M)
- HMRF 2016 (\$1.19M)

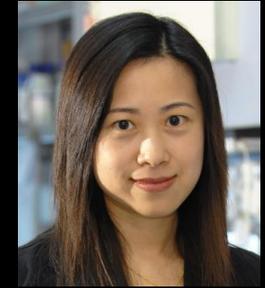
**Publications (as PI)**

H-index: 33; Citations: 3068 (google scholar)

In the past 10 years, 24 top 10% SJR journals & 7 top 5% SJR journals including Endocrinology, J Endocrinol, Am J Physiol Endo Metab, Mol Cell Endocrinol & Front Endocrinol.



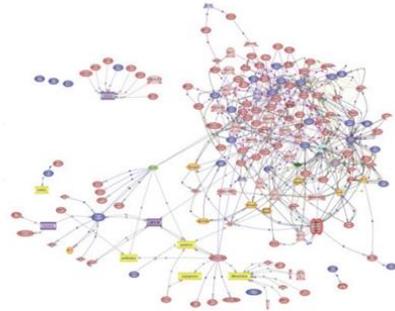
- Signal transduction
- Cell adhesion dynamics
- Tumorigenesis



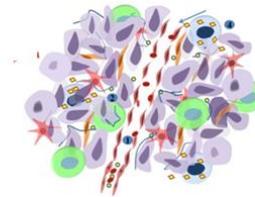
## Basic Biomolecular Science

### Signaling network

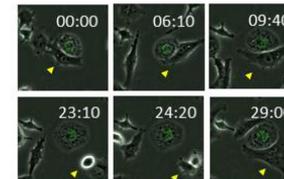
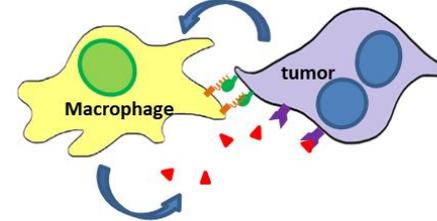
Physical and chemical factors, e.g. tumor-induced pressure, nutrient stress, metabolites



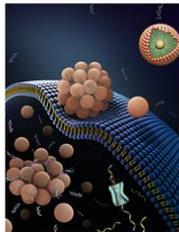
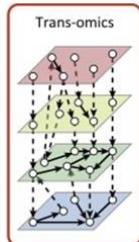
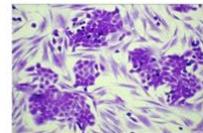
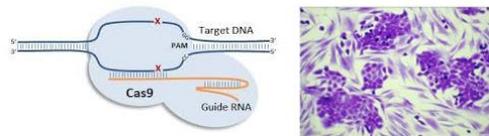
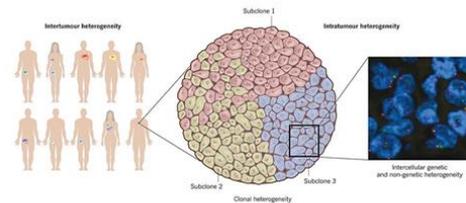
### Tumor microenvironment



Polarizing signals



### Cell heterogeneity



**Dendrimer  
nanotechnology-based  
delivery of targeted drugs**

### Current Grants as PI:

- URC (\$3M)
  - RGC GRF (\$2M)
  - NSFC/RGC (\$1.1M)
  - HMRF (\$1.03M)
- as Co-PI:**
- CRF (Co-PI; \$19M)
  - TRS (Co-PI; \$55M)

In the past 5 years, 19 top 3% SJR journals; 3 top 1% SJR journals including 2 Nat Commun  
H-index: 38; citations: 5486 (google scholar)

2013 Croucher Senior Research Fellowship  
3 US provisional/non-provisional patents  
RPG awards: RGC HKPF; Challenge Cup (National Final, Top prize and 3<sup>rd</sup> prize); Hong Kong Student Innovation and Entrepreneurship (2<sup>nd</sup> prize)





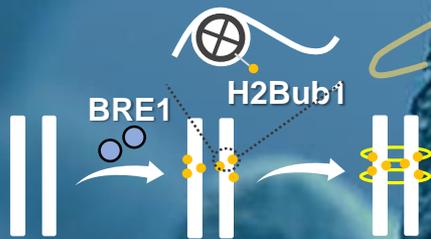
- Cell Division
- Centromere
- Epigenetics

- CRF: \$5.5M
- GRF: \$5M
- ECS: \$3M
- NSFC: \$0.3M



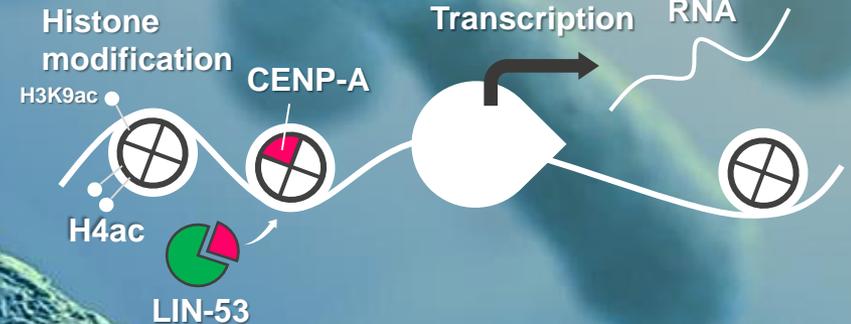
**Basic Biomolecular Science**

**Cohesion establishment**



BRE1 modifies histone H2B to establish sister chromatid cohesion  
*eLife*. 6:e28231 (2017)

**Centromere epigenetics**



LIN-53 is CENP-A chaperone for holocentromere assembly  
*Cell Reports*. 14(8):1819-1828 (2016)

Histone modification and transcription promote CENP-A loading  
*Epigenetics & Chromatin*. 11:16 (2018)

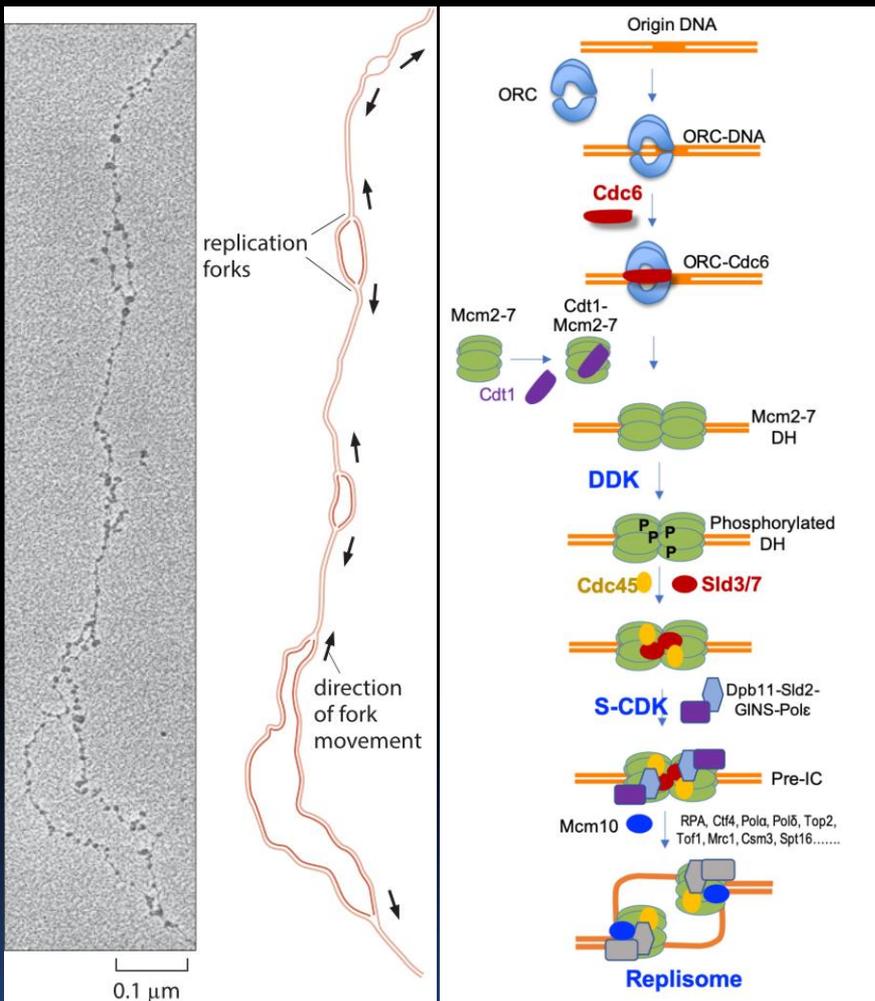
Non-coding RNA function in budding yeast centromere  
*PNAS*. 116:6270-6279 (2019)  
*F1000 Prime Article Recommendation*

Epigenetic and genetic determinants of *de novo* centromere formation for artificial chromosome engineering  
*CRF (2019) as PC*

- Eukaryotic DNA replication
- Cryo electron microscopy
- Structural Biology



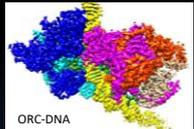
**How chromosomal DNA is replicated in eukaryotes?**



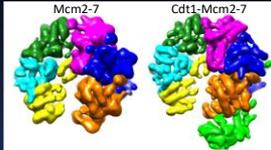
**Titan Krios 300 kV  
cryo-EM**



**Cryo-EM structures**



Cryo-EM structure of ORC  
*Nature* 2018; *Nat Comm* (In revision);  
*Cell Discovery* (In revision)



Structure of Mcm2-7 and Cdt1-Mcm2-7  
*Nat Struc Mol Biol* 2017  
*Mol Cell* 2017



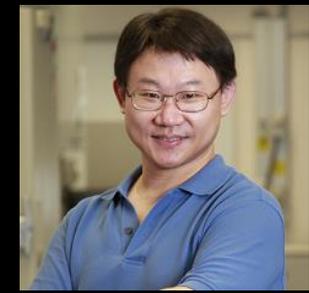
Cryo-EM structure of Mcm2-7 DH  
*Nature* 2015

**Current Grants  
as PI:**

- GRF2016 (\$1.41M)
  - GRF2017 (\$1.35M)
  - GRF2018 (\$1.31M)
  - GRF2019 (\$1.60M)
  - GRF2020 (\$0.99M)
  - NSFC/RGC (\$1.25M)
- as Co-PI:**
- CRF2019 (\$6.5M)

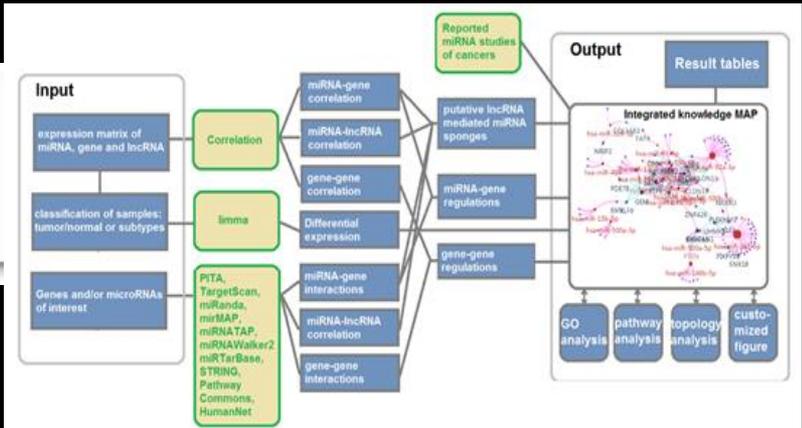
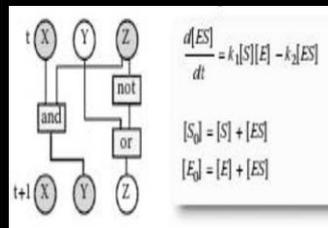
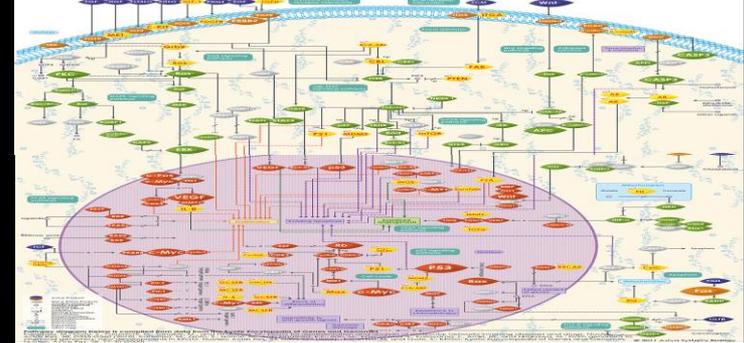
**Structure informs function**

- Bioinformatics
- Cancer Systems Biology
- Biotechnology

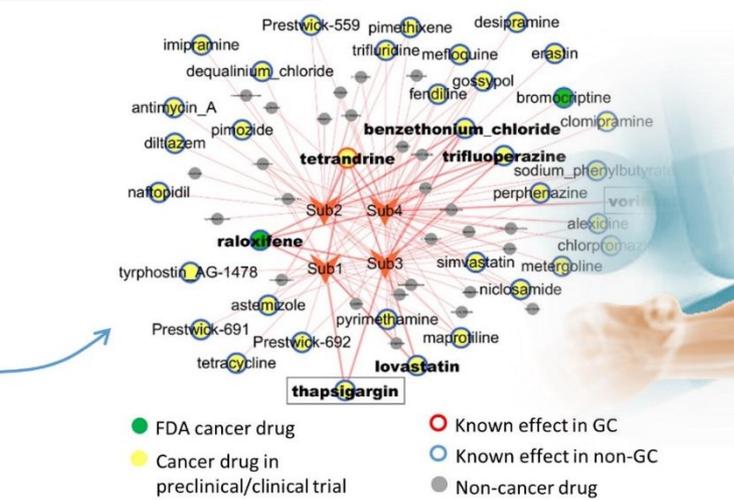
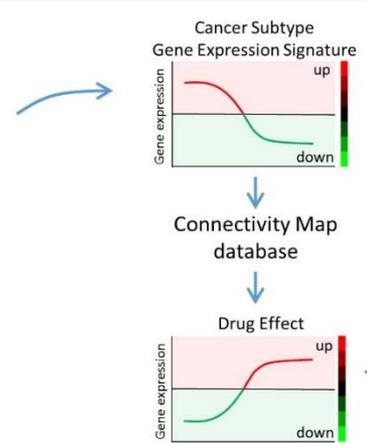
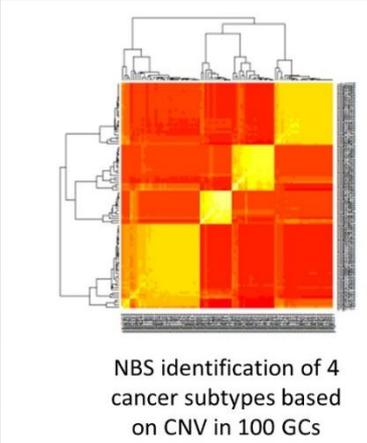


Integrate big datasets to identify cancer key alterations and oncogenic mechanism

**Basic Biomolecular Science**



Patient genomic subtypes predict responsiveness to drugs



**Current Grants as PI:**

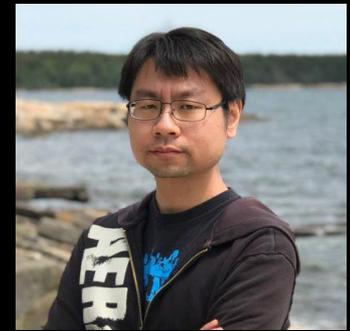
- RGC GRF (\$2M)
  - NSFC (\$0.7M)
- as Co-PI:**
- TRS (Co-PI; \$40M)

Bioinformatics. Bty658 (2018)  
 Genome Biology 19:73 (2018)  
 Bioinformatics bty320 (2018)  
 Nucleic Acids Research 46(D1):D918-D924 (2018)

Nature Genetics 50:206-18 (2017)  
 Nature Medicine 24:165-75 (2017)  
 Nature Communications 9:159 (2017)

## Dr Chaogu Zheng

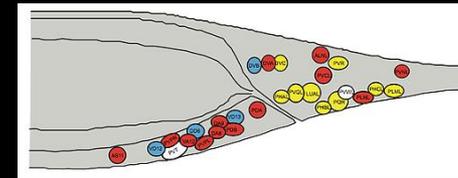
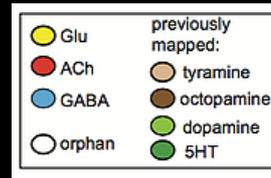
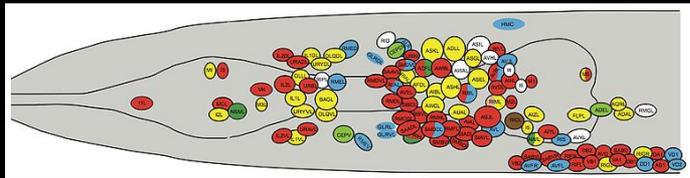
- Developmental neurobiology
- Axonal growth and regeneration
- Neurodegenerative diseases
- Genetics, Genomics, System biology



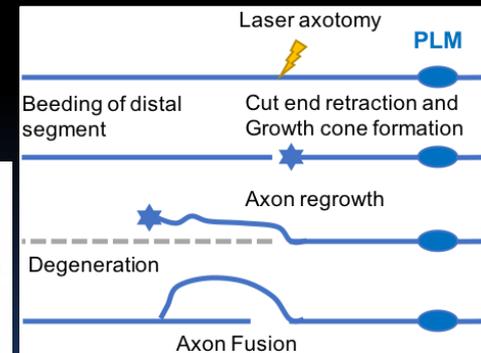
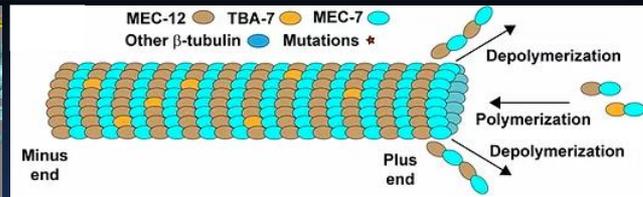
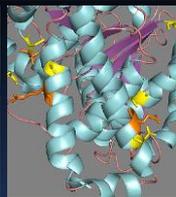
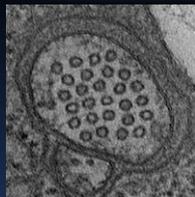
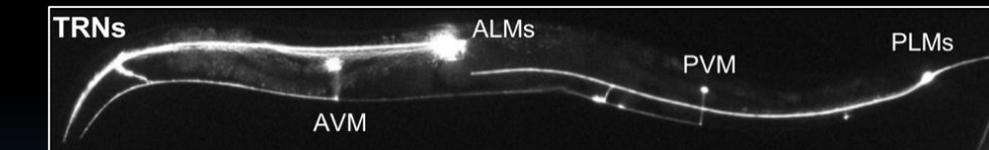
Grants: ECS (1.2 M); HMRF (1.5 M)

Four main research directions: [www.zhenglabhku.org](http://www.zhenglabhku.org)

1. Systematically map neuronal cell fate regulators for every neuron in the nervous system of the model organism *C. elegans* and understand the organizing principle of neurodifferentiation. (Neuron, 2015; Cell Reports, 2015; Curr Top Dev Biol 2016; Development, 2018)



2. Regulation of microtubule functions in axonal growth and regeneration (PNAS, 2015; PNAS, 2016; MBoC, 2017; Development, 2020) [Press release](#) [Press release](#)



3. Modeling Alzheimer's and Parkinson's disease with a focus on microbe-neuron interaction.
4. Comparative genomics to investigate the genetic basis of intra- and inter-species variation in neuronal types and counts to understand the evolutionary origin of neuronal diversity.