



Summer Research Fellowship (SRF) Sharing

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2020 SRF Participant, Major in Biochemistry





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My SRF Research Project

- Investigating the impact of depression on neuroinflammation in Alzheimer's disease
- Supervised by Dr Chang, Raymond Chuen Chung



Investigating the impact of depression on neuroinflammation in Alzheimer's disease

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Summer Research Fellowship (SRF) 2020 for Science Students

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Abstract

Depression is believed to be a risk factor and early symptom for Alzheimer's disease (AD). One possible link which explains the comorbidity could be the inflammation process in both diseases. This project explores the impact of depression on neuroinflammation in AD by the administration of corticosterone in rats. It is found that 21 days of corticosterone administration leads to systemic inflammation and anxiety-like behavior, but no depressive-like behaviors and cognitive alterations were observed. Additionally, no neuroinflammation was observed. Collectively, the 21-day administration of corticosterone is insufficient to impact cognitive function in rats. The objective will be further explored by having longer periods of corticosterone injection.

Introduction

Pathology of Alzheimer's disease (AD)

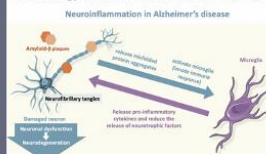


Figure 1. Neuroinflammation process in Alzheimer's disease

aggregation of β -amyloid plaque and neurofibrillary tangles

activation of innate immune response

activated microglia releases proinflammatory cytokines and induces neuroinflammation

neuronal dysfunction and death

Inflammation in Depression



Results

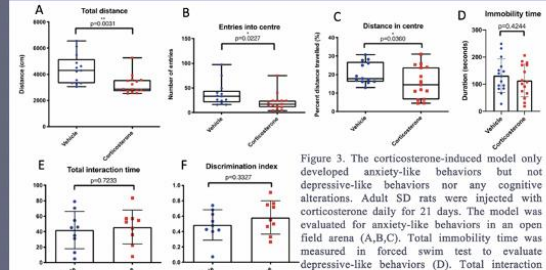
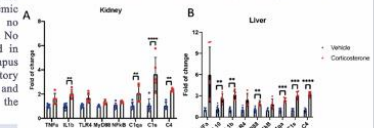


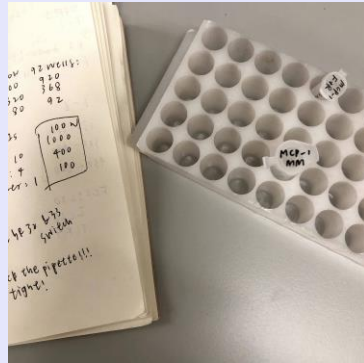
Figure 3. The corticosterone-induced model only developed anxiety-like behaviors but not depressive-like behaviors nor any cognitive alterations. Adult SD rats were injected with corticosterone daily for 21 days. The model was evaluated for anxiety-like behaviors in an open field arena (A,B,C). Total immobility time was measured in forced swim test to evaluate depressive-like behaviors (D). Total interaction time with the novel object (E) and discrimination index (F) were measured to evaluate cognitive function in the novel object recognition task.

Figure 4. Corticosterone-induced model displayed systemic inflammation but no neuroinflammation was observed. No significant change was observed in the frontal cortex and hippocampus (A,B) while some inflammatory cytokines such as IL1b, C1qa, C1s and C4 increased significantly in the kidney and liver (C,D).

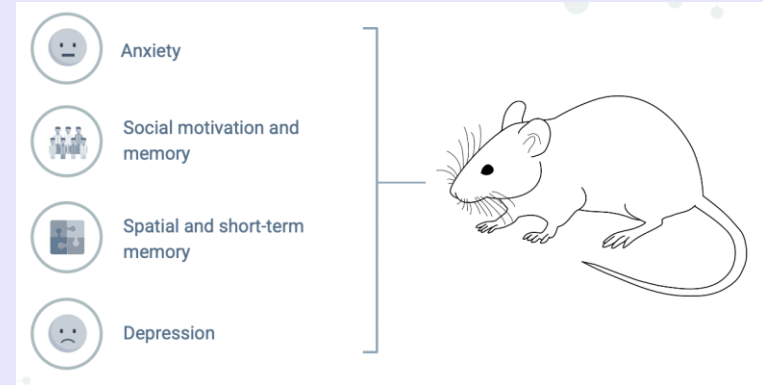


Summary

My SRF Research Project



- RNA extraction from animal tissue
- Reverse transcription
- qPCR to examine expression of different inflammatory markers



- Analysis of behavioural tests to evaluate the behavioural changes of animal



Things to consider before application

Research Interest

Or just search through school websites and have a look on their research topics!

The screenshot displays the 'Principal Investigators' and 'Our Staff' sections of the School of Biomedical Sciences website. The 'Principal Investigators' section lists three Associate Professors: Raymond Chuen Chung, Martin Chi Hang, and Yick Pang, each with a list of research interests. The 'Our Staff' section features a search filter for 'RESEARCH FACULTY' and a profile for Prof. Alice S.T. Wong, an Interim Director and Professor, with contact information and a brief description of her research.

Principal Investigators

Associate Professors

Chang, Raymond Chuen Chung

- Parkinson's disease
- Neurodegeneration
- Glioma
- Alzheimer's disease
- Chinese medicine

Cheung, Martin Chi Hang

- Genetic control of neural crest formation, delamination and migration
- Live cell imaging of neural crest migratory behavior
- Molecular mechanisms of cancer metastasis

Ching, Yick Pang

- Roles of centrosome overamplification in carcinogenesis
- Rho GTPases signalling in cancer metastasis
- Neuronal cell differentiation and migration

Our Staff

RESEARCH FACULTY **Postdoctoral Scholars**
SUPPORT STAFF

Use the Search Filter to find the various members of the Research Faculty below.

Prof. Alice S.T. Wong
INTERIM DIRECTOR AND PROFESSOR

BIOCHEMISTRY CELL BIOLOGY DEVELOPMENTAL BIOLOGY MOLECULAR BIOLOGY

Room 4S14
(852) 2299 0865
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website

Molecular and cellular mechanisms that regulate normal ovarian function and the development of ovarian cancer.

Expectation on SRF

Research experience?
Preparation for FYP?

Time commitment

Any other internship/ part-time jobs arranged in Summer?

Approaching Supervisor

Understand their research objectives

Read through their publications

1

Email them and express your interest

May also include unofficial transcript for their reference

2

Brainstorm any questions towards their research

Helpful for coming up with potential research topics

3

Meet them f2f to further discuss on potential research opportunities

May give you an idea of your research direction

4

Writing Research Proposal



- Read through **literature reviews** and give a brief background of your research topic
- Highlight the **significance** of your research topic
- Ask for your supervisor advice on the **project topic/ research direction**
- Request for **supervisor's advice** before submission

Investigating the impact of depression on tau pathology in Alzheimer's disease

Abstract

This research project aims to explore the mechanism on how depression could be the risk factor for Alzheimer's disease, by focusing on the impact of increased corticosterone on tau pathology in corticosterone-induced rats.

Introduction

Alzheimer's disease (AD) is a common devastating neurodegenerative disorders among elderly. It affects 53 million people around the globe in 2018¹. The pathological hallmarks for AD are β -amyloid plaque deposition and neurofibrillary tangles of hyperphosphorylated tau². However, the understanding on the mechanisms of initiation of AD is still limited.

Depression is believed to be a risk factor for AD and depression may be an early symptom of AD as it is highly co-morbid with AD³. The research conducted by Dr. Raymond Chang focused on the impact of depression on tau pathology.

Tau protein exerts pathological effects on cognitive functions by reducing tau affinity



Concerns on application requirements



Research topics

Just choose what you are
interested in!




For most of the time, **no prior knowledge or lab skills** are required!

You learn them during SRF!

Academic merits

To be honest, my cGPA is below 3.0 when I applied for SRF so... just try it first! XD

Having a low GPA does not mean that you are not suitable to be a researcher!



SRF: A valuable research experience

- 
- Weekly **lab meetings and journal clubs**
 - learn more about other research topics in the lab and in this field of research (neuroscience)
 - Get to know **friendly lab members** all over the world
 - provide detailed explanation on different experiments and laboratory skills
 - Learn about their life as researchers
 - **Self-improvement**
 - Conduct experiments **independently**
 - Enhanced **organizational** skills
 - Gain courage to **reach out and ask for help**
- 





Thank you & Good luck!