CNUCOP SUMMER RESEARCH FELLOWSHIP PROGRAM

The CNUCOP faculty is again offering a summer research fellowship program, which is designed to encourage current students to engage in research/scholarship under the direction of a CNUCOP faculty member. This is the third year for our CNUCOP fellowship program.

Fellowship Program Overview

The College of Pharmacy will offer a total of **three Summer Research Fellowships**, under the following categories.

1) **One or two basic science oriented research fellowship(s)**, which would be under the direction of a faculty member in the Department of Pharmaceutical & Biomedical Sciences.

2) **One or two clinical science oriented research fellowship(s)**, which would be under the direction of a faculty member in the Clinical & Administrative Sciences Department, or the Experiential Education Department.

A student selected to participate in any of these fellowships will have successfully demonstrated an excellent academic record. The student should also be interested in seriously pursuing a career involving a research component, upon completion of their PharmD degree (i.e., post-PharmD). This summer fellowship opportunity is for current first and second year students in the CNUCOP program.

A stipend of $4800 will be paid for 8 weeks (40 hours per week) of full time work. The **start date is June 1 and the completion date is July 27**.

These summer research fellowships are primarily intended for students who have a serious interest in PharmD related research as a possible career path. Such career paths could include, but are not limited to: **1)** Post-PharmD internships and fellowships, **2)** Future PharmD faculty positions, **3)** PharmD careers in the pharmaceutical industry. However, students who accept a summer research fellowship are not obligated to a particular career path after obtaining their PharmD degree.

An **application form** is being provided as a separate document. Completed applications should be submitted electronically to Dr. Fitzpatrick **by 5 PM (PST) on Wednesday March 21, 2018**. The email address is: lfitzpatrick@cnsu.edu

The selection of summer fellowship awardees will be made by Assistant Dean Fitzpatrick, in conjunction with the CNUCOP research committee. The fellowship award winners will be based on the student's academic record, personal statement, letter of

recommendation, as well as overall motivation and interest in research/scholarship. Dr. Fitzpatrick will notify awardees by April 16, 2018.Student Awardees are expected to present a summary of their research findings to the CNUCOP faculty, as well as do a podium presentation at the annual CNU Research Day event. **Acceptance of a CNUCOP summer research fellowship precludes work on another research fellowship during the same time period.**

If you have any further questions, please contact Dr. Fitzpatrick. The pertinent contact information is shown here.

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APPLICATION FOR THE CNUCOP SUMMER RESEARCH FELLOWSHIP PROGRAM

Please submit the information requested below (pages 3 to 5) and required reference letter only. Utilize the space according to your specific application. If you need more space than provided, use no more than one extra page when submitting the application.

Name: _____

E-Mail:_____

Mailing Address: _____

City/State: _____

Phone: _____

PharmD Class (P1 or P2): _____

Faculty Advisor: _____

Personal Statement - Please answer the following questions:

1. Why is this research fellowship program attractive to you? Would it affect your choice of a career after receiving your PharmD degree?

2. Provide any general evidence you can that shows your interest in research/scholarship. If you had previous research experience, indicate the professor or person with whom you worked and their institutional affiliation.

3. Describe your previous research experience (if applicable), including any presentations or publications.

4. Describe your educational background (past and current University/College attendance). Comment on your academic progress at CNUCOP.

Letter of Reference: One letter of reference is required. Please obtain this letter from someone qualified to assess your qualifications for this summer fellowship program and have the letter submitted confidentially to Dr. Leo Fitzpatrick (Assistant Dean of Research). The email address is: lfitzpatrick@cnsu.edu.

Interest Areas. If you were to be selected for this program, under which professor's guidance would you wish to work? Explain your choice and answer.

Have you discussed your interest and the possibility of summer work with the professor?

Yes _____ No _____

Student Agreement. I certify that the above statements are true. I further state that if I am selected for this program; I agree and to provide a brief written progress report (≥ 2 pages) of my research work prior to the third week of the fall 2018 semester.

Student Name _____ Date: _____

CNUCOP SUMMER RESEARCH FELLOWSHIP PROGRAM

2017 AWARD WINNERS (Jessica Dallalzadeh & Vinna Nam)

Summer Research Fellow: Jessica Dallalzadeh [P3 Student]

Faculty Mentor: Dr. Zhuqiu (James) Jin

Project: A novel mechanism underlies reversal of myofibroblast differentiation by phorbol 12-myristate 13-acetate

Project Summary

Fibrosis often results in organ dysfunction and failure in diseases, such as: chronic heart failure, hepatic cirrhosis, pulmonary fibrosis, and end-stage renal disease. The differentiation of fibroblasts into myofibroblasts results in the secretion of collagens and other extracellular matrix proteins that limit organ function and underlie the fundamental basis of fibrosis. TGF-β1 induces the differentiation of α-SMA-expressing myofibroblasts from fibroblasts. However, the mechanism to induce reversal of myofibroblast differentiation remains elusive. Phorbol 12-myristate 13-acetate (PMA) has been used for the stimulation of lymphocytes and splenocytes. It is also involved in multiple cellular functions by potently activating protein kinase C (PKC). Nevertheless, the effect of PMA on the formation of myofibroblasts is unknown.

The pertinent results indicate that some myofibroblasts are derived from fibroblasts under basic culture conditions. PMA induces reversal of myofibroblast differentiation via a PKC-independent mechanism.

Summer Research Fellow: Vinna Nam [P3 student]

Faculty Mentor: Dr. Eugene Kreys

Project: Trends of Hospitalizations as a Result of Infectious Causes in Patients with Autoimmune Diseases

Project Summary

The advent of biologics has led to a meaningful improvement of treatment of various autoimmune diseases. Unfortunately biologics may increase the risk of certain infections, which are one of the leading causes of death for patients with autoimmune diseases. It is critical to determine how the introduction of biologics has changed infection risk over time.

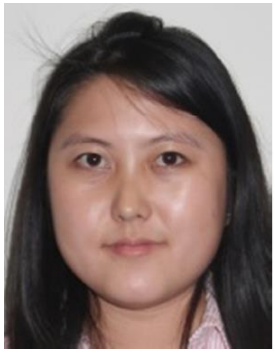
A retrospective cohort study was performed with IBM® SPSS® Statistics 22. The data was derived from National Hospital Discharge Survey (NHDS) and from 1965 to 2010 Using ICD-9 diagnosis codes, this study identified subjects with the three autoimmune diseases which were chosen based on frequent use of biologic drugs as the treatment: multiple sclerosis, Crohn's disease and rheumatoid arthritis The infections of focus were candidiasis clostridium difficile, pneumonia and influenza

Among the national cohort of autoimmune patients, there is a significant increase in the number of hospitalization as well as mortality due to the infections over time. This suggests the need for closer monitoring for infections in these patient populations and a possible reevaluation of the risk/benefit profile of biologics for certain high risk subgroups.

CNUCOP SUMMER RESEARCH FELLOWSHIP PROGRAM

2016 AWARD WINNERS (Pachai Moua & Michael Yadao)

Summer Research Fellow: Pachai Moua [P4 Student]



Faculty Mentor: Dr. John Cusick

Project: HIC (MDFIC) is a protein that interacts and co-localizes with the RELT family of TNFRs

Project Summary

Receptor Expressed in Lymphoid Tissues (RELT) is a human Tumor Necrosis Factor Receptor (TNFR) that is expressed most prominently in cells and tissues of the hematopoietic system. RELT has two identified homologous binding partners RELL1 and RELL2. This study sought to further elucidate the function of RELT by identifying novel protein interactions with RELT family members.

Co-immunoprecipitation experiments indicated that regions of RELT proximal to the plasma membrane are sufficient for physical interaction with HIC. Deletion mutants of RELT were also utilized to determine regions of RELT required for the activation of p38 and induction of apoptosis in HEK-293 cells, two previously described functions of RELT. Overexpression of RELT induces cleavage of PARP and Caspase-3 as determined by western blotting. Interestingly, induction of apoptotic morphology by RELT overexpression was not prevented if signaling by FADD or Caspase-8 was blocked, indicating RELT induces apoptosis by a pathway distinct from death-domain containing TNFRs such as TNFR1. Finally, the actin-binding protein Filamin was also identified as a RELL1 binding partner in the genetic screen. RELL1 was shown to physically interact with Filamin by in vitro co-immunoprecipitation. Filamin was shown to co-localize with RELT in intracellular compartments and co-localize with RELL1 at the plasma membrane.

Summer Research Fellow: Michael Yadao [P3 Student]

Faculty Mentor: Dr. Eugene Kreys

Project: Trends in Hospitalizations as a Result of Chemotherapy-Induced Adverse Effects

Project Summary

Chemotherapy often causes severe complications that may lead to hospitalizations and negatively affect clinical outcomes. Over time new treatments have been developed and guidelines have been updated to limit the negative impact of these complications.

We evaluated the incidence and trends of hospitalizations as a result of certain chemotherapy-induced adverse effects among cancer patients. This was a retrospective cohort study that utilized the National Inpatient Sample database, within the Healthcare Cost and Utilization Project, to evaluate hospitalizations of cancer patients from 1997 to 2010. Hospitalizations were selected using ICD-9 diagnosis codes for aplastic anemia, neutropenia, nausea and vomiting and pneumocystis. Cancer prevalence data, from the Surveillance, Epidemiology, and End Results program, were used to derive the incidence of hospitalizations due to chemotherapy induced adverse effects per 100,000 cancer patients.

Among this national cohort of cancer patients hospitalized due to chemotherapy induced adverse effects, small but statistically significant decreases in hospitalization incidence and mortality may suggest that newer treatment strategies and practices may reduce adverse effects and their impact.

Notable Achievements of CNUCOP Research Fellows

Pachai Moua

Pachai received a podium presentation award (second place) at the 2017 CNU Research Day Event.

Pachai was the first author on a peer reviewed publication. The citation for this publication is shown here.

P. Moua, M. Checketts, L.G. Xu et al. RELT family members activate p38 and induce apoptosis by a mechanism distinct from TNFR1. *Biochem. Biophys. Res. Commun*. 491:25-32, 2017.

Jessica Dallalzadeh

Jessica was awarded a summer internship (August 2018) at Bristol-Myers Squibb (BMS). Her rotation will be in Policy and Advocacy. Jessica's preceptor is the Director of Oncology Advocacy and Policy at BMS.

Michael Yadao

Michael did a poster presentation at the Annual Conference of the Hematology/Oncology Pharmacy Association, Anaheim CA, March 2017. The citation is shown below.

Yadao MA, Kreys ED, Phung O. Trends in hospitalizations as a result of chemotherapy-induced adverse effects.

Vinna Nam

Vinna (Principal Author) was awarded a $500 grant from Christian Pharmacists Fellowship International (CPFI) In October of 2017.

Jessica Dallalzadeh: CNU Research Day 2018 Podium Presentation

QUOTES FROM STUDENT SUMMER FELLOWSHIP AWARDEES

"I was able to further my knowledge in cardiovascular disease from a research perspective. I am forever grateful to have had this opportunity." Jessica Dallalzadeh

"I would like to thank CNUCOP for having and sponsoring this great fellowship available for students and I hope CNUCOP will expand the fellowship opportunities to more students in the future." Vinna Nam

"The summer research fellowship provided me an opportunity to continue pursuing my research passion with enthusiastic mentors. The summer fellowship is a great stepping stone to delve into pharmacy-related research." Pachai Moua

"The Summer Fellowship research program has been a very rewarding experience that has granted me the opportunity to present my work at the Hematology/Oncology Pharmacy Association conference." Michael Yadao