2024 UMSAEP UM-UWC Academic Exchange Program Report

Anti-biofilm discovery and development using cheminformatic and biological approaches And Precision Medicine Research

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1 Introduction

The University of Missouri (UM) System has had a partnership with the University of the Western Cape (UWC) for over 34 years. There have been over 900 faculty exchanges between the twouniversities and countless research collaborations across academic disciplines. Many of these collaborations have led to publications and external funding. Prof Rodney, Director of the University Missouri South African Education Program (UMSAEP), connected me with Prof. Sun, Department of Medicine, UM. In addition, he connected Dr Sun and I with UMKC's Dr. Jerry Wyckoff who is the Chair of the Division of Pharmacology and Pharmaceutical Sciences in the UMKC School of Pharmacy.

2 Collaborative Projects

During my first trip to MU in 2022, I initiated the research on anti-biofilm discovery and development with Prof Sun and Prof Wyckoff. This continued throughout 2023 with very good results from the experiments conducted by Prof Sun. Our initial attempt to apply for funding was not successful mainly because the pathogen organism for our research was not a priority for the Europe-based funding body called "Pathways to Antimicrobial Clinical Efficacy. Nonetheless, we got very useful feedback that informed our next set of experiments. In addition to the ongoing collaborative project that set out to develop a novel platform to develop anti-biofilm agents, we set out to develop the Precision Cancer Drug Discovery Profiler (PCDDP), cancer genomic landscape-hit compound prediction deep learning algorithm, that can efficiently account for tumour heterogeneity at pre-clinical stages of anticancer drug discovery and clinical stage of anticancer drug development. This is in line with the vision of the "NextGen" Precision Health to accelerate innovations in precision health that improve health outcomes for the world.

3 Implementation and Outcomes

3.1 What were the objectives of your visit?

The objectives of the visit were:

- To discuss the progress made on and next step for the "antibiofilm project"
- To initiate the process of writing a proposal for a NIH R01 grant for the "antibiofilm project".
- To initiate the "precision medicine project" with Prof Wyckoff.

3.2 To what do you ascribe your success and challenges?

The success of my trip can be attributed to the good planning of the flight and decent accommodation at UMKC. In addition, Prof Wyckoff was available for meetings in spite of his tight schedule. Finally, Prof Sun conducted experiments that yielded valuable results that informed our hypothesis for the next step of the "Antibiofilm project". The only challenge was that my visit coincided with the very busy examination and graduation sessions in UMKC.

3.3 What changes and improvements do you recommend?

I will plan my visit time to be at a time when the faculty will be less busy.

3.4 **How do you locate the value of the UM / UWC Exchange Programme within the goals of your department / faculty and subsequent work? How will your visit contribute to strengthening and improving your research / teaching at UWC?**

The UM / UWC Exchange Programme has given me the opportunity to have a new perspective to research as conducted in a highly prestigious university like UMKC. In addition, it has enhanced and encourage my professional development through the stimulus of and exposure to different research ideas. My department at UWC will benefit from the wealth of research knowledge and skills as well as access to high-tech equipment and computational resources at UMKC. Overall, the exchange programme will assist in the transformative internationalization of UWC.

3.5 **What has been the most rewarding about the programme?**

The most rewarding part of this mobility programme has been the fact that it allowed me to move beyond the assumptions and preconceptions of international research to insights into the personalities and passions as well as the behind-the-scenes details that drive the cutting-edge research at UMKC and MU.

3.6 **What are your future goals, following this mobility?**

I will continue to apply for this opportunity until I get a NIH R01 grant in collaboration with UMKC and MU.

4 Sights and Places

Figure 1. My host institution for my visit. A beautiful building with a great view.

Figure 2. The famous Children's Mercy Hospital. Children's Mercy is recognized as one of America's best *children's hospitals* by U.S. News and World Report, ranking in 9 of 10 pediatric specialties**.**

Figure 3. Zoom meetings with Prof Sun in MU to discuss current results, plan next experiments and proposal for NIH R01 grant application.

Figure 4. A tour of the lab to see cutting-edge laboratory equipment. The LCMS-9030 quadrupole time-of-flight (Q-TOF) mass spectrometer is a powerful instrument that integrates the world's fastest and most sensitive quadrupole technology with TOF capabilities for accurate mass measurement. We intend to use the equipment for our metabolomics experiments.

Figure 5. A visit to the famous “crown Centre” and a taste of the famous Kansas City BBQ.

Figure 6. I made a quick dash to Columbia, MO over the weekend during my visit. Thank you so much Prof Sun for the consistent hard work.