

Chapter 1

Introduction

1.1 Sungkyunkwan University, School of Pharmacy

Sungkyunkwan University (성균관대학교, SKKU) is a private research university located in Seoul and Suwon, South Korea. It traces as the oldest university in East Asia, with origins dating back to 1398 when it was established during the Joseon Dynasty, transformed into a modern institution, and granted college status in 1946. The institution is regarded as one of South Korea's most prestigious universities, ranking #6 in the country and #145 globally in the 2024 QS World University Rankings ("QS World University Rankings", 2023). On its two campuses—the Humanities and Social Sciences Campus in Seoul and the Natural Sciences Campus in Suwon—SKKU provides a wide range of academic programs in various disciplines, putting equal importance on the foundations of natural science and humanities. The institution strongly emphasizes research and development by collaborating with government organizations and high-end industrial giants Samsung and Hyundai (SKKU, n.d.). By taking on innovative and creative challenges, the university sets a vision to be a global leader that generates values for the future of society. To realize the vision, the university employs four major objectives: efforts to advance the university brand, leading research-oriented institutions, coexisting partnerships, and university education innovation.

The School of Pharmacy, located in the Natural Science Campus, was established in 1953 and has committed to developing into a research-oriented institution to create novel drugs and nurture international pharmaceutical expertise to lead the pharmaceutical sector. Dean Sangjeon Chung, Ph.D., leads the school and oversees its offerings, which include both undergraduate and graduate programs. The graduate program is further divided into two tracks: one focused on Pharmacy (comprising the Departments of Pharmacy and Pharmaceutical Sciences), and the other dedicated to professional studies (encompassing the Departments of Clinical Pharmacy and Social & Health

Pharmacy). Over the years, the school has been awarded various large-scale national projects, such as the Basic Medical Research Center (MRC), Formulation Technology Support Center (DRC), Basic Research Laboratory Project Team (BRL), and many more, highlighting its strength in the academic sector (Chung, n.d.).

1.2 Natural Product Chemical Biology Laboratory (NPCBL)

The intern worked in the Natural Product Chemical Biology Lab for graduate students pursuing M.Sc and Ph.D. Under the supervision of Prof. Dr. Chung Sub Kim as her supervisor and Minji Kim as her teaching assistant, her working schedule during the weekdays was from 9:30 AM to 5:30 PM. During the internship period, the laboratory team consisted of one postdoctoral researcher, two MS-Ph.D. integrated students, six MS students, and one fellow undergraduate intern. The lab sets interest in elucidating the structure and biosynthesis process of small molecules from the human microbiome, characterizing the small-molecule-mediated bacterial signaling system, and discovering lead compounds for new drugs from natural sources. The current projects especially focus on the structure elucidation of gut microbiota-derived metabolites, utilizing advanced analytical techniques, including liquid chromatography-mass spectrometry, high-performance liquid chromatography, high-resolution mass spectrometry, and nuclear magnetic resonance.

Understanding the structure of metabolites allows advancement in drug discovery and development, especially in optimizing its pharmacological properties, ensuring its safety and efficacy. Metabolite profiling aids in biomarker discovery for disease diagnosis and prognosis, elucidating disease mechanisms and monitoring treatment responses in improving human health. Beyond that, the findings may also be applied to agricultural, environmental, and nutritional aspects and various industries.