

THE PHILIPPINES' FIRST SINGLE-CELL GENOMICS CORE FACILITY: ADVANCING TRANSLATIONAL RESEARCH AT THE LUNG CENTER OF THE PHILIPPINES

*By Heidie F. Cabanos, MSc, PhD**

The Lung Center of the Philippines (LCP) has reached a major milestone in biomedical research with the establishment of the Philippines' First Single-Cell Genomics Core Facility within its Clinical Research Division (CRD). The facility was established through the Department of Science and Technology – Philippine Council for Health Research and Development (DOST-PCHRD) Balik Scientist Program (BSP), with major funding support from a Department of Science and Technology – Grant-in-Aid (DOST-GIA) research project led by the Lung Center of the Philippines and institutional infrastructure support from LCP. Together, these initiatives established the country's first dedicated platform for single-cell genomics. More than a new laboratory, the facility provides the foundation for advanced genomics and clinical and translational research, bringing these technologies closer to Filipino researchers, clinicians, and ultimately, patients.

Single-cell genomics combines high-throughput single-cell or single-nucleus RNA sequencing (sc/snRNA-seq) with computational analysis to characterize the transcriptomic profiles of thousands of individual cells simultaneously (Figure 1). Unlike conventional bulk RNA sequencing, which measures average gene expression across heterogeneous tissues, single-cell approaches resolve cellular heterogeneity, identify rare cell populations, define cellular states, and reveal disease-associated molecular pathways. These capabilities have advanced biomarker discovery and precision medicine by enabling researchers to study disease at cellular resolution.

The establishment of the facility began through the DOST-PCHRD Balik Scientist Program, which introduced advanced single-cell genomics technologies to the Philippines while strengthening local genomics research capacity. Beyond establishing the country's first Single-Cell Genomics Core Facility, the initiative focused on creating a sustainable research platform through standardized workflows for clinical sample processing, biobanking and biorepository management, DNA/RNA extraction, nucleic acid quality assessment, next-generation sequencing (NGS) library preparation, REDCap-based clinical and biospecimen data management, quality management systems, and specialized technical training (Photos 1–4).

A major milestone in this effort was the Philippines' First Single-Cell Genomics Workshop, held on November 11–12, 2024, at the Lung Center of the Philippines. The workshop brought together clinicians, scientists, pathologists, medical technologists, and laboratory personnel for the country's first dedicated training activity in single-cell genomics, featuring lectures, demonstrations, and discussions on the principles and applications of single-cell transcriptomics (Photos 5–7). On November 13, 2024, the facility was publicly introduced during the National Reference Laboratory Building event at the Lung Center

of the Philippines, providing an early institutional showcase to the wider research and clinical community (Photo 8).

The facility is central to the Clinical Research Division's vision of transitioning into a Clinical and Translational Research Division (CTRD), bridging laboratory discovery and clinical practice. While its primary focus is pulmonary medicine, it is envisioned as a national genomics resource supporting multidisciplinary research on diseases of major public health importance and accelerating the translation of scientific discoveries into improved patient care.

The facility currently supports two flagship tuberculosis (TB) research programs addressing one of the Philippines' most important public health challenges. The first investigates post-tuberculosis lung disease, particularly TB-associated bronchiectasis, using single-cell RNA sequencing and complementary molecular approaches to characterize immune cell populations and molecular pathways associated with persistent inflammation, immune dysregulation, and lung injury. A complementary program focuses on TB-HIV co-infection, integrating longitudinal clinical data, biobanking, transcriptomic profiling, and advanced genomic analyses to identify molecular signatures associated with disease susceptibility, treatment response, and long-term outcomes. Together, these studies seek to improve diagnosis, guide therapeutic strategies, and advance the understanding of tuberculosis biology. Beyond tuberculosis, the facility also supports collaborative research in lung cancer, chronic respiratory diseases, infectious diseases, cardiovascular diseases, autoimmune disorders, metabolic diseases, and other conditions affecting the Filipino population.

The facility's early translational research initiatives were also presented at the 2026 Human Cell Atlas General Meeting in Boston, Massachusetts, USA, where two research posters highlighted the establishment of the

Philippines' First Single-Cell Genomics Core Facility and the Lung Center's emerging genomics research program. The meeting also provided opportunities to establish new collaborations and exchange scientific expertise (Photos 9–11).

Looking ahead, the Lung Center of the Philippines aims to further strengthen its research capabilities through expanded in-house next-generation sequencing (NGS), advanced bioinformatics and multi-omics analysis, the establishment of a Flow Cytometry Core Facility, and a cell culture laboratory capable of developing patient-derived cell lines and disease models for mechanistic studies and functional validation. These complementary platforms will expand the Lung Center's capabilities from clinical sample processing and molecular profiling to functional validation and translational research.

The establishment of the Philippines' First Single-Cell Genomics Core Facility marks an important milestone in the Lung Center of the Philippines' continuing commitment to research and innovation. By integrating advanced genomics with clinical research, the facility provides a strong foundation for generating locally relevant evidence that can improve disease prevention, diagnosis, and treatment. As the country's apex referral and premier specialty hospital for pulmonary diseases, the Lung Center of the Philippines is well positioned to lead genomics-driven clinical and translational research while fostering collaboration across institutions in the Philippines and abroad.

** About the Author. Dr. Heidie F. Cabanos is a Balik Scientist under DOST-PCHRD and Scientific Consultant to the Clinical Research Division, LCP. Through the DOST-PCHRD Balik Scientist Program, she led the establishment of the Philippines' First Single-Cell Genomics Core Facility and continues to support genomics and clinical and translational research initiatives at the Lung Center of the Philippines.*

Figure 1A

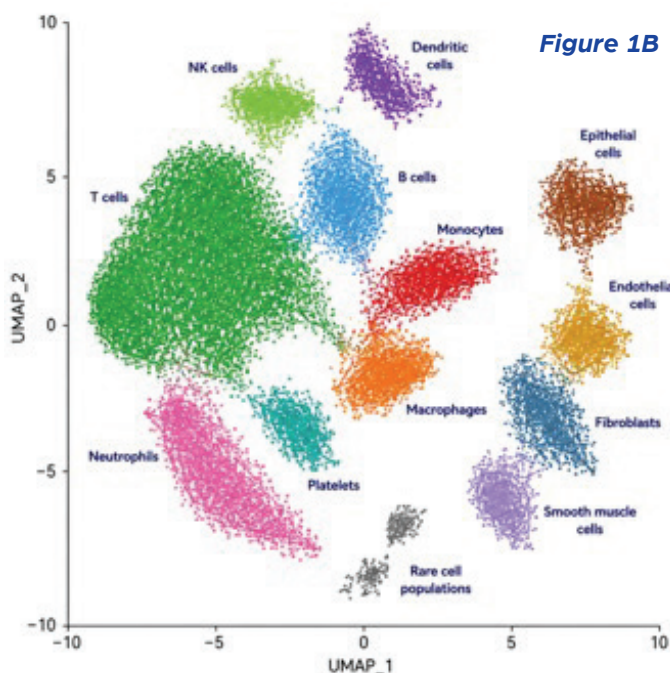
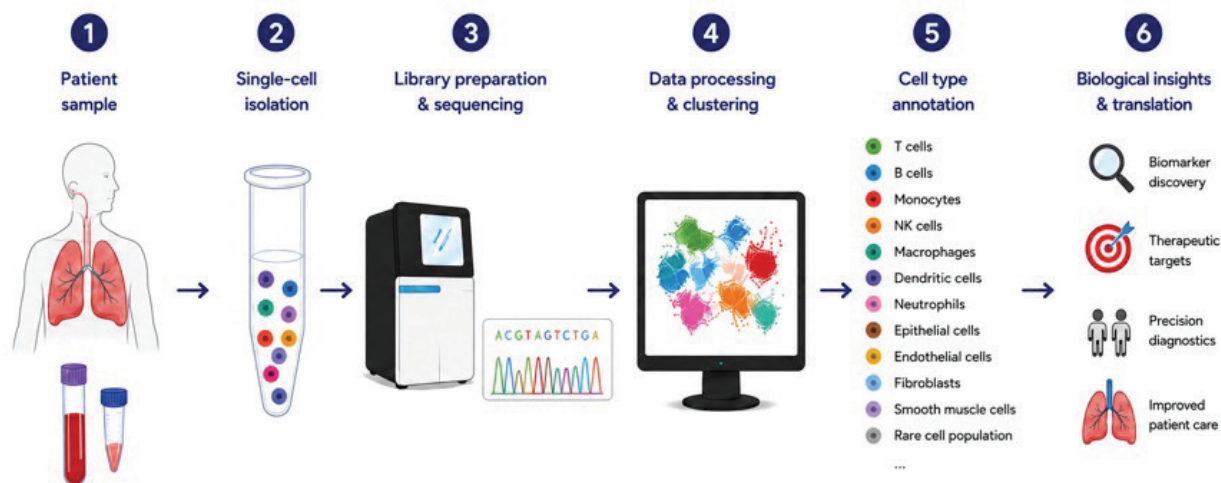


Figure 1B

Figure 1. Single-cell genomics workflow and representative single-cell transcriptomic analysis from the Lung Center of the Philippines Tuberculosis (TB) Research Program. **(A)** Patient-derived specimens undergo single-cell RNA sequencing (scRNA-seq), followed by bioinformatic processing, dimensionality reduction, clustering, and cell type annotation to identify distinct cell populations and disease-associated molecular signatures. **(B)** Representative Uniform Manifold Approximation and Projection (UMAP) illustrating the cellular heterogeneity resolved by single-cell transcriptomics. The UMAP shown is an artist's rendition based on the Lung Center of the Philippines TB Single-Cell Project and was modified for illustrative purposes to depict representative immune and non-immune cell populations while preserving the overall structure of the original dataset.



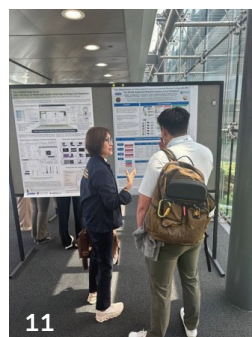
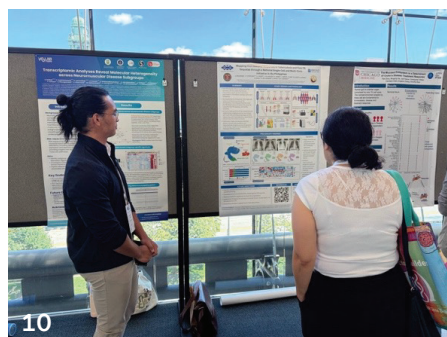
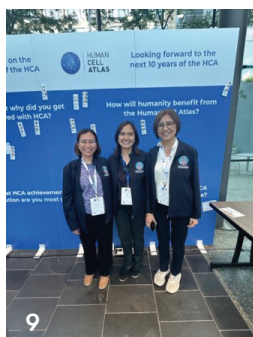
Photos 1–4. The Philippines' First Single-Cell Genomics Core Facility, Clinical Research Division, Lung Center of the Philippines, Quezon Avenue, Quezon City, Metro Manila, Philippines. The facility supports clinical sample processing, biobanking and biorepository operations, DNA/RNA extraction, nucleic acid quantification and quality assessment, cell counting and viability analysis, single-cell library preparation, and molecular genomics workflows for single-cell RNA sequencing (scRNA-seq) and other next-generation sequencing (NGS) applications. (1) Entrance signage of the facility. (2) Overview of the single-cell genomics laboratory. (3) Single-cell library preparation using the 10x Genomics Chromium platform. (4) Lab tour and visit by Lung Center of the Philippines Clinical Research Division leadership to discuss the Division's translational research roadmap and future development of the Single-Cell

Genomics Core Facility. Shown are CRD officials Dr. Virginia Delos Reyes, Dr. Raquel Ibanez, and Dr. Bernadette Asuncion, together with the Single-Cell Genomics Core Facility team led by Dr. Sullian S. Naval, with Dr. Jared L. dela Rosa, Angelo Arabit, Zion S. Bañes, and Jaz Amper.

Photos 5–8. Activities during the Philippines' First Single-Cell Genomics Workshop and the public introduction of the Philippines' First Single-Cell Genomics Core Facility. (5–7) The workshop, held on November 11–12, 2024, at the Lung Center of the Philippines, brought together clinicians, scientists, pathologists, medical technologists, and researchers for lectures, hands-on demonstrations, and discussions on the principles and applications of single-cell transcriptomics. (8) On November 13, 2024, the Single-Cell Genomics Core Facility was publicly introduced during the National Reference Laboratory (NRL) Building event at the Lung Center of the Philippines, providing the institution's first public showcase



of the facility ahead of its planned official launch. The event was attended by representatives from the Department of Science and Technology – Philippine Council for Health Research and Development (DOST-PCHRD), including Executive Director Dr. Jaime C. Montoya, together with Lung Center of the Philippines officials Dr. Vincent M. Balanag Jr., Dr. Sullian S. Naval, Dr. Norberto Francisco, and Dr. Treah S. Sayo.



Photos 9-11. Presentation of research posters highlighting the Philippines' First Single-Cell Genomics Core Facility and the Lung Center of the Philippines' early clinical and translational research initiatives at the 2026 Human Cell Atlas General Meeting, held on June 16-18, 2026, in Boston, Massachusetts, USA. The meeting provided an international

platform to showcase the Philippines' growing capabilities in single-cell genomics, share early research initiatives, engage with the global scientific community, and establish new research collaborations. Representatives from the Lung Center of the Philippines included Dr. Heidie F. Cabanos, Dr. Sullivan S. Naval, Dr. Fresthel M. Climacosa, and Dr. Jared L. dela Rosa, who were among the scientists involved in establishing the country's first Single-Cell Genomics Core Facility.

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BIOFIRE FILMARRAY **Pneumonia Panel**

SPECIMEN: Bronchoalveolar lavage (BAL), Sputum, Endotracheal aspirate

WHAT IT CAN DETECT:

VIRUSES	BACTERIA		ANTIMICROBIAL RESISTANCE GENES
Adenovirus Coronavirus Human Metapneumovirus Human Rhinovirus/Enterovirus Influenza A Influenza B Parainfluenza Virus Respiratory Syncytial Virus	Acinetobacter calcoaceticus-baumannii complex Enterobacter cloacae complex Escherichia coli Haemophilus influenzae Klebsiella aerogenes Klebsiella oxytoca Klebsiella pneumoniae group Moraxella catarrhalis Proteus spp.	Pseudomonas aeruginosa Serratia marcescens Staphylococcus aureus Streptococcus agalactiae Streptococcus pneumoniae Streptococcus pyogenes Chlamydia pneumoniae Legionella pneumophila Mycoplasma pneumoniae	Methicillin resistance: ● mecA/C and MREJ Carbapenemases: ● KPC ● NDM ● Oxa-48-like ● VIM ● IMP ESBL: ● CTX-M