BioSpectrum the business of Bio & Health Sciences ASIA EDITION

Singapore inaugurates Single-Cell Omics Center

April 16, 2013 | News | By BioSpectrum Bureau



Singapore: Singapore has inaugurated Single-Cell Omics Centre (SCOC), the first research centre in Asia exclusively dedicated to accelerating the understanding of how individual cells work, and how diagnosis and treatment might be enhanced through insight derived from single cells. This centre will be an important resource for both academic and industry researchers in Singapore and the region, who are keen to access integrated analytics for single-cell genomic applications.

Single-cell genomics is one of the hottest emerging areas of study in life sciences research. It is poised to help solve some of the most fundamental biological mysteries of our time and could lead to new ways to diagnose, treat and prevent diseases such as cancer (breast, prostate, leukemia, etc.), diabetes, memory loss, heart disease and more. For example, scientists now know that the loss of sight (macular degeneration), the biology of aging, and the spreading of infectious diseases all involve important single-cell phenomena that need to be studied.

Single-Cell Omics Centre is a collaboration between the Genome Institute of Singapore (GIS), an institute under the umbrella of the Agency for Science, Technology and Research (A*STAR), and Fluidigm Corporation, an industry leader in single-cell genomics. Fluidigm became the first biochip company to set up shop in Singapore in 2005.

"The opening of the Single-Cell Omics Centre today is a perfect example of public-private partnership under an open innovation framework. By encouraging multi-disciplinary collaborations, this centre will further enhance Singapore's R&D capabilities and scientific know-how. It may also lead to new, potentially life-saving applications in the biomedical sector," said Lim Chuan Poh, chairman, A*STAR.

The SCOC is a dedicated 25 square-meter laboratory in GIS facilities in Biopolis, Singapore. It features advanced next generation genomic equipment and sequencing technologies. This includes the Fluidigm C1 Single-Cell Auto Prep System, which automatically isolates individual cells from small tissue quantities or larger cell populations. This installation of a C1 system was one of the first in the world. The centre also houses two Fluidigm BioMark HD Systems that perform single-cell

gene expression analytics and validation. These instruments were manufactured at Fluidigm's factory in Singapore.

The SCOC expects to attract top researchers from Asia to conduct single-cell experimentation for foundational research. Scientists from various fields of biology can band together at the SCOC to learn how stem cells might be re-programmed for therapeutic treatments in the future, or to discover how various diseases work so they can develop new drugs or treatments to cure the sickly, or how to personalize medical care so it can meet the need of each patient.

Initially the SCOC is focusing on single-cell analysis of cancer, looking at lung and colon cancers in solid and circulating tumour cell (CTC) forms. CTCs are cells that have shed from the tumour and are circulating in the bloodstream, seeding growth of additional tumours in other organs in the body. Currently samples from solid tumours are studied in aggregate, grouping all the cells together in a mish-mashed genomic stew. The SCOC expects to develop a method where the cells of solid tumours can be easily converted into cells floating in a liquid solution. Then the C1 Single-Cell Auto Prep System will be used to individually isolate and prepare each cell for complete study and sequencing. This will allow researchers to understand -- for the first time -- what is happening in each cancer cell and also be able to study a thousand different cells individually from a tumour.

The center will compare cells taken directly from the solid tumour and those circulating cells from the same tumour to analyse them for commonalities or differences. If it turns out that CTCs closely correlate with cells from the solid tumour, it could eliminate the need for surgery to get samples from the tumour and allow the disease to be monitored by capturing CTCs from blood, a liquid biopsy.

One of the SCOC's anticipated follow-on projects will involve the development of methods to compare cells treated with a drug against cells that have not been exposed to the drug in order to measure how differently the cells react. These measurements can then be used to find more effective treatments of disease.

"Single-cell genomics provides researchers with an opportunity for extraordinary scientific discovery. Individual cells, even from the same tissue, do not function identically. These differences can be the key to crucial biological insights, including the diagnosis and treatment of critical diseases. We expect the combination of rich application diversity, groundbreaking science and the endorsement from key opinion leaders throughout Asia to make this centre one of the leaders of single-cell innovation in the world," said Gajus Worthington, Fluidigm President and Chief Executive Officer.

GIS executive director Prof Ng Huck Hui said, "GIS has identified Single-Cell Genomics as one of our new research frontiers. We are set up to build a repertoire of new research capabilities for single-cell analyses. Our initial collaboration with Fluidigm has borne fruit with the publication of a landmark paper by Dr. Paul Robson. This larger and very important collaboration will see an even greater synergy between the technologies from GIS and Fluidigm."