

MEETING REPORT

2019 China Symposium on Single-Cell Genomics

Yinqing Li^{1,2,*}, Miaomiao Tian³

¹ School of Pharmaceutical Sciences, Tsinghua University, Beijing 100084, China

² IDG-McGovern Institute for Brain Research, Tsinghua University, Beijing 100084, China

³ Editorial Office, Quantitative Biology, Beijing 100084, China

* Correspondence: yinqingl@mail.tsinghua.edu.cn

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The China Symposium on Single-Cell Genomics was successfully held in Beijing, on May 25, 2019 (Figure 1). This conference was initiated by Tsinghua University, chaired by Prof. Xuegong Zhang, and co-organized with Illumina and 10× Genomics. The focus of the symposium was to elicit a discussion on “Building cell atlas, empowering cellular medicine” with single-cell technologies. It consisted of leading experts, 10 invited talks and a panel discussion session covering the Human Cell Atlas (HCA) project progress, the latest single-cell profiling

technology developments, medical applications, as well as standards, ethics, data sharing and global collaboration. The Symposium brought together upwards of 300 professionals and graduate students as well as over 4,000 online attendants.

THE INVITED PLENARY TALKS

The Symposium began with the keynote speech by Prof.



Figure 1. A snapshot of the Symposium.

Aviv Regev (Figure 2, left), the co-chair of the Human Cell Atlas Initiative, an elected member of the National Academy of Sciences of USA, and a faculty member at Massachusetts Institute of Technology and the Broad Institute. Prof. Regev first described their ongoing single-cell studies of colon-rectal cancers, illustrating the latest progress of single-cell genomics for “empowering cellular medicine”. She then introduced the broad vision and the current progress of the HCA project. In the same vein, Prof. Muzlifah Haniffa from Newcastle University (Figure 2, middle) showed the power of single-cell analysis for decoding the developmental trajectory of human immune system and integration of data within HCA for providing a systematic view for developmental and functional immune research. Prof. Xuegong Zhang of Tsinghua University (Figure 2, right) gave an overview of single-cell genomics studies in China mainland with an emphasis on bioinformatics, highlighting new models and tools developed to address the emerging computational challenges in the single-cell field.

In the session of Technological Development in Single-cell Profiling, Prof. Xinrong Zhang from Tsinghua University (Figure 3, left) presented their advances in single-cell metabolic analysis. His presentation spurred great interests in efforts to capture proteomics and metabolic profiles at single-cell resolution, while also exciting appreciation for technological challenges that demand breakthroughs in physical sciences. Prof. Zemin

Zhang from Peking University (Figure 3, middle) surveyed single-cell properties of tumor infiltrating lymphocytes across liver cancer, non-small cell lung cancer and colorectal cancer. Prof. Zhang showed that the cellular state of T cells in the tumor micro-environment could be vital for the cancer prognosis. Prof. Guoji Guo from Zhejiang University (Figure 3, right) introduced the Microwell-seq technology invented in his laboratory and its use to build the first mouse cell atlas.

In the session of Technological Development and Application in Medicine, Dr. Kevin Taylor from Illumina (Figure 4, left) and Dr. Jens Durruthy-Durruthy from 10× Genomics (Figure 4, middle) overviewed commercial solutions for single-cell research, ranging from droplet-based high-throughput scRNAseq/ATACseq to spatial transcriptomics. Technology advances in single-cell genomics allow clinicians to understand diseases from different perspectives, so that they may develop better diagnosis and treatment. This was concluded by Prof. Jie Qiao (Figure 4, right), the president of Peking University Third Hospital and academician of the Chinese Academy of engineering, who discussed the systematic single-cell approaches to dissect the biological fundamentals in reproductive medicine. She encouraged closer collaboration between academic researchers, technologists, and clinicians to shape the next-generation medical practices for assisted reproduction, needed by millions of families.



Figure 2. Prof. Aviv Regev (left), Prof. Muzlifah Haniffa (middle) and Prof. Xuegong Zhang (right) gave presentations.



Figure 3. Prof. Xinrong Zhang (left), Prof. Zemin Zhang (middle) and Prof. Guoji Guo (right) gave presentations.

STANDARDS, ETHICS, DATA SHARING AND GLOBAL COLLABORATION

The Symposium remained focused on issues of practical significance, covering topics in standards, ethics, data sharing and global collaboration. Dr. Jonah Cool from Chan Zuckerberg Initiative (CZI) (Figure 5, left) introduced the effort of CZI in supporting technology building and data sharing for HCA. CZI was founded in December 2015 with a vision of understanding and combating all human diseases by the end of the century and has been one of the major funding sources for HCA. Following the presentation, a panel discussion session chaired by Prof. Zemin Zhang of Peking University was held to have an open exchange of ideas on standards, ethics, and data sharing across national borders

(Figure 5, right). Panelists included Jonah Cool (CZI), Sarion Bowers (Wellcome Sanger Institute), Kristin Ardlie (Broad Institute), Yinqing Li (Tsinghua University), Michael Q. Zhang (UT Dallas and Tsinghua University), Mayumi Kusunoses (RIKEN), and Jenny Xiao (Illumina).

Prof. Li Yan from the National Health Commission (NHC) of China gave the opening remarks. He described the funding principles of NHC in supporting precision medicine research and drug discovery and encouraged highly interdisciplinary approaches involving physicians, medical researchers and scientists in basic research. Prof. Xuegong Zhang delivered the concluding remarks, envisioning greater contributions by the Chinese scientific communities to the global HCA project and the cellular medicine more broadly in the future.



Figure 4. Dr. Kevin Taylor (left), Dr. Jens Durruthy-Durruthy (middle) and Prof. Jie Qiao (right) gave presentations.



Figure 5. Dr. Jonah Cool (left) introduced CZI and panel discussion (right).