The iGE3 Genomics Platform

Cutting-edge Genomic Technologies to support research

The iGE3 (**i**nstitute of **G**enetics and **G**enomics of **G**eneva) genomics platform of the University of Geneva provides access to a wide array of state of the art technologies ranging from high-throughput genomics to very targeted analysis. Established in 2002 as the "Frontiers-in-Genetics" genomics platform of the Swiss National Centers of Competence in Research (NCCR), its services were initially restricted to the research groups of the NCCR consortium. It rapidly became a reference laboratory in the genomics field and access was extended to all laboratories, including the private sector. In 2012, the platform joined the newly created interdisciplinary iGE3 consortium.

Photo: Brice Petit/Brice Petit Photography

Dr Mylène Docquier

years ago) the nCounter analysis system (nanoString Technologies); iGE3 is the third site in Europe to offer this technology. The nCounter allows digital counting of individual molecules using molecular barcodes with very high dynamic range, reproducibility and specificity, and with no enzymatic reaction.

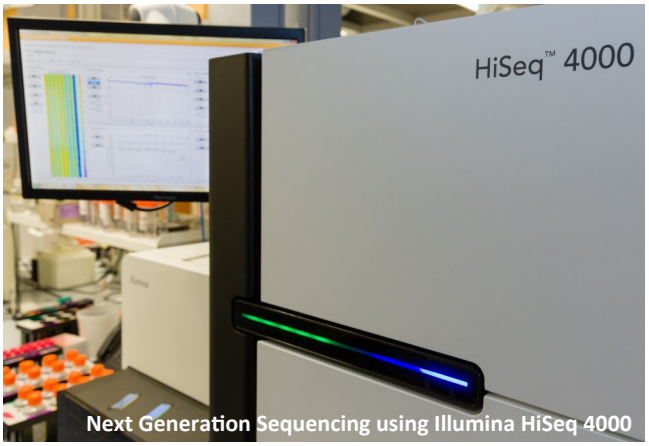

Photo: Brice Petit / Brice Petit Photography

Next Generation Sequencing using Illumina HiSeq 4000

The main activity of the iGE3 genomics facility is Next Generation Sequencing (NGS). Illumina HiSeq 4000, 2500 and MiSeq sequencers allow sequencing of whole genomes, exomes and transcriptomes as well as more targeted sequencing (of enriched regions). The laboratory has also implemented a single-cell NGS approach using the Fluidigm C1 prep station, which enables high parallel (800 single cells at a time) transcriptome analysis or targeted DNA sequencing. The applications of this high throughput single-cell technology include cell classification (Telley L. et al. 2016, data illustrated in the Figure below), tissue heterogeneity studies and CRISPR-Cas9 screening.

The platform is also equipped with Illumina and Affymetrix microarray technologies for Single Nucleotide Polymorphism (SNP) analysis (Genome-wide association studies and cytogenetics), DNA copy number profiling, DNA methylation status and expression profiling, including miRNA.

For projects requiring expression analysis of smaller gene sets, or specific metabolic pathway genes, the platform offers (since 8

For targeted expression analysis, the facility proposes the widely used real-time PCR technology. In response to growing interest in digital PCR, the platform has also implemented the QuantStudio3D digital PCR system (Thermo Fisher Scientific) for rare variant detection, absolute quantification, biomarker analysis and viral or bacterial detection.

All data generated by the platform can be further analysed by the bioinformatics team. Particular attention is given to understanding the projects and needs of each individual user in order to optimise the analysis pipeline, and new tools are developed as needed. For users who want to analyse their data themselves, guidelines and informatics tools are available.

The provision of proximity services is another of the strengths of the iGE3 platform. Every project and experimental design is directly discussed with the users. Additionally, in order to adapt platform capacity to match demand, continuous efforts are made to optimise protocols and develop and implement new technologies.

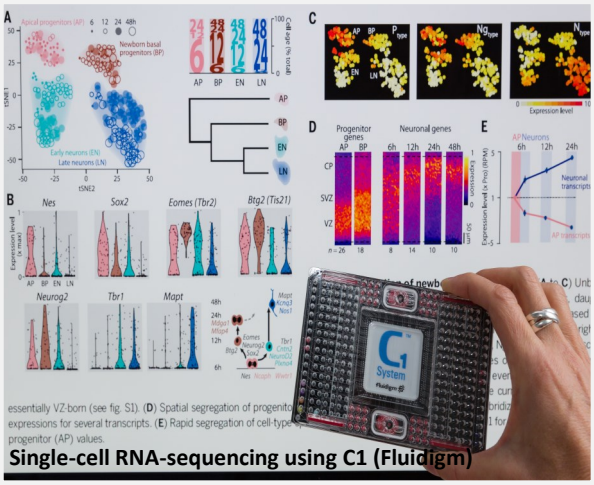

Photo: Brice Petit / Brice Petit Photography

Single-cell RNA-sequencing using C1 (Fluidigm)

ID Card:

Analytical platform type:
Genomics

Main techniques proposed:
-Next Generation Sequencing (RNA, DNA, exome-seq…)
-Microarrays (SNP, CNV, methylation, expression)
-nCounter (nanoString)
-q- and d-PCR

Capacity:
Several hundred NGS libraries and arrays per week

Delay to start:
None

Duration of experiment:
Depends on the request (maximum 1.5 months including the analysis)

Intercomparison exercise proposed:
Illumina Phix quality
Affymetrix spikes

Training proposed:
On request

Address:
University of Geneva
CMU 6 - laboratory A06.2707
Rue Michel Servet, 1
CH-1211 Geneva 4
Switzerland

Access:
Free

Internet link:
https://ige3.genomics.unige.ch

Contact:
Mylène Docquier
mylene.docquier@unige.ch
+41 22 379 50 31

Related to:
MELODI

Metagenomics analysis of red blood cell and fresh-frozen plasma units, Lau P., Cordey S., Brito F., Tirefort D., Petty T. J., Turin L., Guichebaron A., Docquier M. et al. (2017), Transfusion, 57 (7) , 1787-1800
Sequential transcriptional waves direct the differentiation of newborn neurons in the mouse neocortex, Telley L., Govindan S., Prados J., Stevant I., Nef S., Dermitzakis E., Dayer A., Jabaudon D. (2016), Science, 351 (6280), 1443-1446