

FACILITIES AND RESOURCES – Molecular Genomics Core

The USC Norris Molecular Genomics Core (MGC) is a service facility that houses state of the art equipment and cutting-edge technologies. Located within the Norris Research Tower (NRT) at the University of Southern California Health Science Campus, the MGC is a Norris Comprehensive Cancer Center subsidized core facility, allowing discounts to cancer center members. MGC served as the only data production site for DNA methylation assays for The Cancer Genome Atlas (TCGA), and one of the largest Illumina single nucleotide polymorphism (SNP) and DNA methylation array production sites in the US.

Laboratory: The Molecular Genomics Core Facility occupies ~3,000 sq.ft of space within NRT. The MGC houses a microarray production Illumina BeadLab System, including a BeadExpress Reader, with automation equipment (including two Tecan Evo robotic workstations), iScan Readers and GenomeStudio data analysis software for the generation of millions of genotypes per day or hundreds of thousands of gene expression profiles. All samples are tracked using an integrated Genologics Geneus Laboratory Information Management System (LIMS). For genomic profiling, the core facility houses two Illumina NextSeq500 and two Illumina MiSeq sequencers. DNA samples for next-generation sequencing are sheared using a Covaris S2 adaptive focused acoustic platform. The core facility also has a NanoString nCounter system, and a ThermoFisher QuantStudio 7 System for assaying smaller panels of DNA methylation, gene expression, or SNP features, as well as for quality control testing after bisulfite conversion. In addition, the core has a 10X Genomics Chromium system for single-cell library construction and a NanoString GeoMX system for digital spatial profiling. Additionally, the core has several liquid handling robots, including a Beckman MultiMek and a Tecan Freedom Evo-100 liquid handler. The facility houses one ThermoFisher SimpliAmp thermal cycler, one Bio-Rad C1000 thermal cycler and one Eppendorf multiblock PCR system. Finally, the Core houses two Agilent BioAnalyzers and two Agilent TapeStations for library and sample QC, and several general bench-top items of laboratory equipment. The MGC includes appropriate sample storage systems including two 4°C refrigerators, two -20°C freezers, a large capacity -80°C freezer, and a liquid nitrogen tank for storing chemical reagents, biospecimens, and cell lines. These freezer systems are managed by a departmental alarm system.

Computational Resources: Computers are on the USC medical network, which has special security provisions for patient privacy, anti-virus software, and appropriate firewalls. Computational resources are deployed in a two-tiered structure with equipment located both onsite and at through the USC Advanced Research Computing services.

Resources on-site at the NRT building are primarily used for data acquisition and image processing comprises a hybrid of dedicated HPC integrated to leverage and access cloud-based environments, e.g., Amazon and Google through 10Gbit connectivity. Dedicated computing consists of six (6) 64-bit Dell Xeon dual core processing workstations and a Puget Systems Peak Dual Xeon 8-core tower running Linux Ubuntu operating system. Finally, the core utilizes Synology 84Tb redundant storage for project data.

Other:

Library: Large and diverse libraries exist at USC and are accessible by high-speed Internet connections. All project investigators have inter-library privileges, so rapid access to timely journals and scientific information is readily available.

CHLA CAP/CLIA Certified Services: The Molecular Genomics Core's CAP/CLIA certified service environment is housed within the Molecular Pathology Genomics Core located within Children's Hospital Los Angeles' Department of Pathology and Laboratory Medicine and Center of Personalized Medicine. Please see the CHLA Genomics Core Resources page for more specifics.

Keck Genomics Platform: The Molecular Genomics Core coordinates closely with the Keck Genomics Platform when a project scope requires sequencing on the NovaSeq platform. KGP is located within the same NRT building as the MGC facility. Please see the Keck Genomics Platform Resources page for more specifics.

Equipment:

- 10X Genomics Chromium
- Agilent Tape Station 4200 (2)
- Biomek 3000
- BioMicroLab XL20 Tube Sorter
- Centrifuge:
 - DNA 120 SpeedVac Concentrator
 - Eppendorf 5430
 - Eppendorf 5810R (2)
 - Qiagen 4-16 System
- Covaris Ultra Sonicator S2
- DNA/RNA Extraction:
 - Promega Maxwell 16 DNA extraction System
 - Qiagen QIAcube
- DNA/RNA Quantitation:
 - Nanodrop ND8000
- Molecular Devices Spectramax Gemini PicoGreen DNA
- Qubit 2.0
- Electrophoresis:
 - Bio-Rad Experion Electrophoresis Station
 - Bio-Rad Experion Priming Station
- Fluidigm BioMark Microfluidics System
- Freezers (two -80 C freezers, six -40 C freezers)
- Hybex Microarray Incubation System
- Hybex Microsample Incubator
- Incubators/Ovens:
 - Constant Temperature Oven, DKN 600
 - I 24 Incubator Shaker Series, New Brunswick Scientific
- Steri-Cycle CO2 incubator
- Illumina iScan
- Autoloader
- Reader
- Illumina LIMS
- Labnet S2056-A
- Liquid Handlers:
 - Tecan Freedom Evo 150 Illumina Liquid Handler Span-8 Workstation SingleArm Robot
 - Tecan, Freedom Evo 150, Liquid Handler Span-8 Arm
 - Tecan, Freedom Evo 96-well head
 - Tecan, Freedom Evo ROMA
 - Tecan, Genesis 150 Robot
 - Tecan, infinite F200 PRO
- NanoString nCounter
- NanoString GeoMX Spatial Genomics System
- PCR Systems:
 - Bio-Rad S1000 PCR system
 - Eppendorf Mastercycler Nexus, flexlid
- Eppendorf Mastercycler pro, vapo.protect
- ThermoFisher GeneAmp 9700 PCR system (2)
- ThermoFisher MiniAmp Plus (2)
- ThermoFisher Quant Studio 7 Flex Real-time PCR system
- PerfectSpin P
- RC 10.10
- Sequencers:

- Illumina HiSeq 2000 Sequencer
- Illumina MiSeq sequencer (2)
- Illumina NextSeq 500 sequencer (2)
- Illumina cBot Library Preparation System
- Super Sealer
- Tru Temp DNA Microheating System