EQUIPMENT

Linda T. and John A. Mellowes Center for Genomic Sciences and Precision Medicine (Mellowes Center)
Dr. Raul Urrutia, Director

These facilities have modern design, state-of-the-art equipment, and expert personnel to allow the efficient implementation of next-generation sequence methodologies to Cancer Genomics, Non-Cancer Clinical Genomics, Pharmacogenomics, Epigenomics, Molecular Pathology, and Rare Diseases. The high-throughput sequencing capabilities include the NovaSeq 6000, Oxford Nanopore's GridION and P2 Solo, and NanoString panel based transcriptomics. To aid in efficiency and reproducibility, robotic equipment is available for nucleic acid extraction, library preparation, chromatin fractionation, ChIP-based methodologies, and 10x Genomics single cell and Visium CytAssist spatial processing workflows. For quantification, quality control, and fragment analysis, the Center has a Nanodrop 2000, Agilent BioTek Synergy LX, and the Agilent Fragment Analyzer.
The Mellowes Center's Bioinformatics Unit, which can perform primary, secondary, and tertiary analyses of the 'Omics methodologies described within the proposal, as well as high-level integrative modeling of multiparametric data, using mathematical and statistical methods, including Ordinary Differential Equations, Hidden Markov Models, Monte Carlo, Random Forest, Machine Learning, and Neurolinguistics Processing approaches. In addition, the Center has various licensed suites and tools, including GeneString, Qiagen, DNA Star, Ingenuity Suite (IVA, IPA, and QCI-I), Discovery Studio, as well as custom made, proprietary pipelines and tools. This software and the data generated is administered by our own research computing facility, which has high performance resources including a 360 CPU MPI cluster, NVidia DGX1 integrated GPU node, a large memory Isilon server, and a dedicated software development environment hosting a dedicated RStudio Server and RShiny nodes.

Major instrumentation, available for applications include:

Company	Equipment	Description
Agilent	Fragment Analyzer	QC, fragment analysis - 3/96 well plates
BioRad	CFX384	qRT-PCR
Diagenode	Bioruptor Plus	DNA shearing
Diagenode	Bioruptor Pico	DNA shearing
Illumina	NovaSeq 6000	Next generation sequencer, short reads
Illumina	MiSeq	Next generation sequencer, short reads
Oxford Nanopore	P2 Solo	Long read sequencer
Oxford Nanopore	GridION	Long read sequencer
NanoString	nCounter	Hybridization assays for transcriptomics, miRNA
10x Genomics	Chromium iX	Single cell transcriptomics, epigenomics
10x Genomics	Visium CytAssist	Spatial transcriptomics profiling
Agilent	BioTek Synergy LX	Multi-mode plate reader
Revvity	Zephyr	Liquid sample handling robotics
Revvity	SciClone	Liquid sample handling robotics
Revvity	Chemagic 360	DNA/RNA extractions
Promega	Maxwell RSC	DNA/RNA extractions
Thermo Scientific	Nanodrop 2000	Spectrophotometer

Illumina NovaSeq6000 and MiSeq

Oxford Nanopore GridION and P2 solo

NanoString nCounter

10x Genomics CytAssist

10x Genomics Chromium iX

Agilent Fragment Analyzer

Promega Maxwell RSC

Perkin Elmer Chemagic 360

Perkin Elmer Zephyr

Diagenode Bioruptor Plus/Nano Systems