

BIC Resources 2019

Genomics

1. Gene-Forge 3900 and Applied Biosystems 3900: two DNA synthesizers, each capable of producing 48 oligos in one run. These synthesize primers from 20 bases up to 100 bases long for use in cloning, mutation detection and gene expression experiments.
2. ABI 3500xl Genetic Analyzer – high sensitivity analysis of oligonucleotide sequences for use in clone screening, genotyping, inheritable disease, mutation detection, and protein expression experiments.
3. Bio-Rad QX200 Digital Droplet PCR (ddPCR) system – provides absolute quantification of target single DNA or RNA molecules with capacity to partition each sample at least 20,000-fold. Can be used for rare DNA target identification and quantification, pathogen detection, absolute quantification of sequencing libraries, digital gene expression analysis, genotyping and copy number variation detection, next generation sequencing (NGS), single cell mRNA analysis, etc.
4. Roche LightCycler 480 – high-throughput real-time PCR system for gene scanning assay, gene expression detection and genotyping.
5. Agilent 1200 HPLC – used in conjunction with DNA synthesis to check the quality of oligonucleotides and to purify the DNA as needed for special applications.
6. U-3000 Thermo Fisher Scientific HPLC – used in conjunction with DNA synthesis to check the quality of oligonucleotides and to purify the DNA as needed for special applications.

Structural Biology/Proteomics

1. AB Sciex 4000 QTRAP Mass Spectrometer – identification and quantitation of low molecular weight proteins and lipids from mixed samples.
2. Agilent 1200 HPLC –used in conjunction with the QTRAP to separate proteins from a mixed sample.
3. GE Healthcare Biacore 3000 Surface Plasmon Resonance instrument – for measuring kinetic rate constants (association and dissociation) and binding affinities for biomolecular interactions.
4. Wyatt Technologies Dynamic Light Scattering (DLS) instrument – for determining the aggregation state (monomer, dimer, multimer, aggregates) of solutions of biomolecules.
5. Virtis Lyophilizer – for freeze drying biological samples (purified proteins, culture media (w/ excreted metabolizes/molecules of interest), etc.).

For Support of Structural Biology (Protein Structure Determination with X-ray Crystallography):

6. JanSci Fluorescence Microscope – for identifying crystals containing proteins via tryptophan emission.

7. Crystallization Robot – for assaying multiple crystallization conditions in order to identify optimum conditions for crystal growth.

Flow Cytometry

1. BD LSR II Flow Cytometer (two instruments are on site) allows multi parameter (up to 14 fluorescence detectors) analysis of cells and microscopic particles to determine cell phenotype, DNA content, and biochemical properties. A High Throughput Sampler (HTS) can be attached to accommodate 96-well plates.
2. BD FACSAria IIIu and BD FACSAria Fusion are high-speed multi-parameter cell sorters that allow separation of cell populations and can be used for multiple applications. Cell sorters are able to perform sterile cell sorting into tubes, slides, 96, and 384-well plates.
3. Amnis ImageStream Mark II is an imaging flow cytometer. It combines the detailed imaging capability of microscopy with high throughput power of flow cytometry. It is capable of producing detailed brightfield, darkfield, and fluorescent imagery for a wide range of quantitative, statistically robust image-based assays.
4. Bio-Plex 200 is a multi-analyte bioassay detection system capable of performing up to 100 assays simultaneously in a single microtiter plate well. It is used for multiplexed immunoassays, and other assays based on nucleic acids, enzyme function, and receptor-ligand interactions.
5. Agilent Seahorse XPe96 Analyzer provides a tool for a non-invasive metabolic activity measurement in 96 well plates. It measures oxygen consumption rate and extracellular acidification rate.

Microscopic Imaging

1. Zeiss 700 confocal laser microscope – 3D imaging of fluorescently labeled live and fixed cells and tissues.
2. Zeiss 710 inverted multi-photon confocal laser microscope with Becker & Hickl FLIM Attachment – 3D imaging of fluorescently labeled live and fixed cells for a wide variety of scientific applications.
3. Zeiss 7MP upright multi-photon confocal laser microscope with electrophysiology system – 3D imaging and electrochemical analysis of live cells and tissues.
4. Zeiss Elyra.PS1 super-resolution system – imaging of fluorescently labeled cells and tissues with techniques that allow for resolution of up to 10x greater than that achieved with standard confocal.
5. Zeiss AxioScan slide scanner – can be used to digitize cells or tissues on slides in brightfield or fluorescence mode. Can scan up to 100 slides per session.
6. Zeiss AxioImager.M2 upright epifluorescent microscope with MicroBrightfield stereology system – allows for quantitation of various features in cells in tissue sections in brightfield or fluorescence.

7. Leica AF6000 time-lapse imaging system – imaging of bright field or fluorescently-labeled fixed or live cells and tissues with temperature and environmental control.
8. JEOL JEM 1011 transmission electron microscope (TEM) – examination of cells, tissues, and macromolecules at the ultrastructural level.
9. Leica UC6 ultramicrotome with FC6 cryo Attachment - used to prepare high- quality tissue sections for examination under the electron microscope.
10. Leica EM AC20 grid stainer – automated staining of samples for electron microscopy.

Histopathology

1. Leica Autostainer XL – automated chemical staining of fixed tissue samples.
2. Leica CV5030 Robotic Coverslipper – used in conjunction with the Autostainer to generate histology slides.
3. Sakura Tissue-Tek VIP Tissue Processor – automated processing of fixed tissue samples.
4. Sakura Tissue-Tek TEC Tissue Embedder – paraffin embedding of fixed tissue samples.
5. Leica CM3050 S Cryostat – precision tissue sections for neuroscience applications.
6. Microm HM325 Microtome – cuts sections from paraffin-embedded tissue samples.