

(Appendix)

Available Instruments

○ Flow Cytometers

Flow cytometers can measure cell size, cell granularity, the amounts of cell components such as total DNA, RNA, proteins and lipids labeled with fluorescent probes.

- BD (Becton-Dickinson) FACSCanto II:

Laser excitation source: 488 nm, 633 nm, 405 nm

Examples of detectable fluorochromes: FITC, PE, APC, Alexa Fluor (488, 647), PerCP, Pacific Blue, Cyan, AmCyan

- BD FACSCalibur:

Laser excitation source: 488 nm, 635 nm

Examples of detectable fluorochromes: FITC, PE, APC, Alexa Fluor (488, 647), PerCP, PI

○ Cell Sorter

- BD FACSAria II:

FACSAria II is a high speed cell sorter for measuring and sorting fluorescently labelled cells. The instrument contains four lasers (488, 633, 405, and 375 nm) for excitation. The desired cells can be sorted into a tube or a multi-well plate (6, 12, 24, 48, 96, or 384 wells). Examples of detectable fluorochromes include FITC, PE, APC, Alexa Fluor (488, 647), PerCP, Pacific Blue, Cyan, AMCyan, and Hoechst Blue/Red.

○ DNA Sequencers

These instruments can automatically determine the base sequence of DNA molecules.

- ABI (Applied Biosystems) 3130: Samples must be prepared on a 96-well plate specific to the instrument.
- ABI 310: Samples must be prepared on a 96-well plate specific to the instrument.

○ Real-Time PCR Systems

A thermal cycler and a fluorescence spectrometer are combined into one in these systems. The systems can detect PCR products as they accumulate in real-time during the PCR amplification process. The resulting amplification curve allows accurate quantitative analysis from a small amount of sample before amplification began.

- StepOnePlus (ABI):

Samples must be prepared on a 96-well plate. The optical detection system is LED-based, and detectable fluorescent dyes include FAM, SYBR Green, VIC, JOE, and ROX. Gene expression profiling and SNP genotyping experiments can be conducted on this instrument.

- ABI PRISM 7900HT:

Samples must be prepared on a 384-well plate. Assays using TaqMan probes or SYBR Green can be used to quantify the gene expression level and to conduct SNP analysis.

○ **Microarray Analyzer**

- DNA Microarray Scanner G2565BA (Agilent Technologies)

This instrument comprehensively analyzes gene expression levels, and can analyze 40,000 genes at once. The fluorescence intensity of each spot on a microarray is detected and quantified. Supported fluorescent dyes are Cyanine 3 and Cyanine 5. Only Agilent arrays can be used.

○ **Bioanalyzer**

- 2100 Bioanalyzer (Agilent Technologies)

This instrument provides sizing, quantitation and quality control of DNA, RNA, proteins and cells on a single platform, providing high quality digital data.

○ **Confocal Laser Scanning Microscopes**

Fluorescent and transmitted lights from a sample excited by a laser beam are detected, and a two- or three-dimensional image of the sample is obtained. Time-lapse observation of the samples is available with FV1000-D. The obtained images can be analyzed using accompanying software.

- FluoView BX61 FV500-BX61-2chAr-HeNeG-SP (Olympus):

- Available laser wavelengths: 458 nm, 488 nm, 543 nm
- Examples of detectable fluorescent dyes: FITC, PE, APC, Alexa Fluor (488, 594), PerCP

- FluoView FV1000-D (Olympus):

- Available laser wavelengths: 405 nm, 473 nm, 559 nm, 635 nm
- Examples of detectable fluorescent dyes: DAPI, Hoechst Blue/Red, Fura Red, EYFP, Alexa Fluor (488, 647), Rhodamine, Cy5

○ **Motorized Autofocus Inverted Microscope**

- IX81-ZDC-Meta (Olympus):

This microscope can be applied to a wide variety of experimental techniques from high signal-to-noise ratio fluorescence microscopy to phase-contrast microscopy. It produces two- or three-dimensional images of the sample, and can accurately track the sample's changes over a long period of time. The obtained images can be analyzed using accompanying software.

○ **Laser Microdissection System**

- Leica LMD Microscope System

This system is used to isolate a specific region from samples such as tissue sections or chromosome spreads.

○ **Cryostat Microtome**

- Leica CM3050 S

This instrument is used to prepare frozen tissue sections for microscopic observation from larger, rapidly frozen specimens, such as organ sections.

○ **Ultracentrifuges**

- Beckman L8-80: maximum rotational speed = 80,000 rpm
- Beckman Optima TLX: maximum rotational speed = 100,000 rpm
- Himac CP 100MX (Hitachi): maximum rotational speed = 100,000 rpm

○ **Image Analysis Systems**

These systems use highly sensitive CCD image sensors for chemiluminescence, bioluminescence, fluorescence, and/or visible imaging. The data is saved onto a computer for image analysis.

- ImageQuant LAS 4000 Mini (GE Healthcare):
Imaging applications: chemiluminescence, bioluminescence, fluorescence, visible light
- FLA-3000G (Fujifilm):
Imaging applications: fluorescence, imaging plate
- LAS-1000LC (Fujifilm):
Imaging applications: chemiluminescence, bioluminescence, fluorescence, visible light

○ **Microplate Reader**

- POWERSCAN4 (DS Pharma Biomedical)

This microplate reader can accommodate 1- to 1536-well microplates, and can measure absorbance, fluorescence intensity, luminescence, time-resolved fluorescence, and fluorescence polarization.

○ Imaging Systems for Small Animal Experimentation*

• IVIS Spectrum (Xenogen):

- This in vivo imaging system can detect and image small amounts of chemiluminescence and fluorescence in mice and rats under anesthesia by using a highly sensitive, cooled CCD camera.
- Nominal pixel size: 13.5 microns
- Resolution: 20 microns
- Quantum efficiency: $\geq 85\%$ for 500-700 nm wavelengths

• LaTheta LCT-200 (Aloka):

This instrument is an X-ray CT scanner for small animals (mice, rats, and small rabbits). It can continuously acquire tomographic images at high speeds with a high resolution of 24 microns, and can construct three-dimensional images.

Typical scanning times (approximate values):

- Tomography mode (180° rotation)
 - Standard mode: 5.8 s/rotation
 - High precision mode: 11.6 s/rotation
 - Ultra high precision mode: 23.2 s/rotation
 - Integration mode: $23.2 \times N$ s/rotation
- Tomography mode (360° rotation)
 - Standard mode: 10.6 s/rotation
 - High precision mode: 21.2 s/rotation
 - Integration mode: $21.2 \times N$ s/rotation
- Digital radiography mode
 - Standard mode: 8.3 s/300 mm
 - High precision mode: 16.6 s/300 mm
 - Ultra high precision mode: 33.2 s/300 mm

○ X-Ray Irradiation System*

• MBR-1520R (Hitachi Aloka Medical):

- This instrument can be used to irradiate small animals (mice, rats) or cells with X-rays to study the effects of radiation on organisms, or to breed immunodeficient animals.
- Tube energy range: 35-150 kV (adjustable in 1 kV steps)
- Tube current: 5/10/15/20 mA

- Beam conditioning filters: 9 choices available

Authorization to use animal experimentation facilities is required to operate the instruments listed under sections marked by an asterisk (*).