

NDIIF IN VIVO IMAGING CORE USER GUIDE

Active Instrument Infrastructure & Standard Operating Guidelines

Notre Dame Integrated Imaging Facility (NDIIF) • Core Reference Guide

CURRENT FACILITY INSTRUMENTATION & SOPs

This reference document reflects the current active suite of instrumentation and operating procedures within the **NDIIF In Vivo Imaging Core**. Outdated instruments (including IVIS Lumina and Kodak Xtreme) have been fully retired and replaced by our advanced optical and structural modalities.

1. Active In Vivo Imaging Core Instruments

Instrument	Core Modality & Function	Key Capabilities & Environment
Advanced Molecular Imaging HT Instrument (AMI HT)	2D Optical Imaging (Bioluminescence & Fluorescence)	High-throughput 5-mouse platform with automated filter/field-of-view selection, broad-field lens, and absolute CCD calibration.
Albira Imaging Station (Carestream)	Nuclear & Anatomical Imaging (PET / SPECT / CT)	High-resolution trimodal scanner [cite: 3]. Shielded shell (≤ 50 kVp), ~ 1 rad dose [cite: 3] with temperature-controlled chamber and gas anesthesia transport [cite: 3].
ICON MRI (1 Tesla Desktop MRI)	Magnetic Resonance Imaging	Cryogen-free permanent magnet bench-top 1T MRI dedicated to anatomical, cancer, and neurological rodent imaging.
MARS Medipix Spectral X-ray CT	Multi-Energy / Spectral CT	3D spectral X-ray scanning for concurrent atomic/molecular quantification and high-definition structural identification.
Scanco VivaCT 80 Micro X-ray CT	High-Resolution MicroCT	In vivo microCT scanner providing a broad 80 mm field of view and high spatial resolution ($5\text{ }\mu\text{m}$).
STELLARIS 8 DIVE	Multiphoton / Intravital Microscopy	Provides flexible multicolor imaging beyond 1 mm depth for deep tissue intravital live animal research.
EchoMRI	Body Composition Analysis	Rapid non-invasive body composition measurement of fat, lean mass, free water, and total body water in live rodents.

2. Standard Animal Anesthesia & Protocol Guidelines

In Vivo Operating Rules & Anesthesia (SOP):

- Gas Anesthesia:** Isoflurane induction (5% , 5 min) [cite: 3] followed by delivery via integrated nose-cone manifolds in the AMI HT, Albira, and CT systems [cite: 3]. Waste isoflurane is trapped via commercial scavenging filters monitored by weight [cite: 3].
- Injection Limits:** Intravenous probe administration via tail vein or retro-orbital routes must not exceed **100 μL for mice** or **200 μL for rats** [cite: 3].
- Infection / Longitudinal Protocols:** Tail-vein injections of fluorescent or radioisotope probes ($75\text{ }\mu\text{L}$) [cite: 3] imaged across intervals ($0, 3, 6, 12, 18, 24$ h) [cite: 3] for session durations ≤ 10 min per subject [cite: 3]. Sanitization with 70% ethanol or Clidox required between runs [cite: 3].
- Radioisotope Safety:** Tracers (^{18}F -FDG, ^{18}F -NaF, ^{18}F -FLT, ^{111}In , $^{99\text{m}}\text{Tc}$, ^{64}Cu) [cite: 3] capped at $<500\text{ }\mu\text{Ci}$ (infection) [cite: 3] or 1 mCi (max dose) [cite: 3]. Subjects remain behind lead shielding in Friemann (24 h) until radiation reaches background levels (<0.1 mR/hr) [cite: 3].