



SOP FOR CT AND X-RAY TREATMENT WITH SKYSCAN 1276 and SARRP SYSTEM

Overview/Purpose

The objective of this SOP is to describe the procedure for conducting CT (computer tomography) with microCT system (SkyScan 1276, Bruker or SARRP, XSTRAHL) located in TMRF 190 and X-ray treatment with cabinet type irradiator (SARRP, XSTRAHL) located in BRT 0020.

Owner of SOP and Responsibilities: Kimerly Powell is responsible for ensuring that the SOP is followed, updated as needed (including personnel changes) and that personnel conducting the procedures are appropriately trained.

Species – Mice and rats

Agent Administration

Agent Name	Vehicle	Dose	Route	Volume	Frequency
Isoflurane	O ₂ /air/ 95% O ₂ +5% CO ₂	0.5-5%	Inhalation	as needed	during treatment
Depilatory cream	none	as needed	Topical	as needed	1x/imaging
Omnipaque,	sterile saline	50 microL – 1.5 ml	Intravenous	as needed, respectively to size of animal	1-2x/image
CT (X-ray low dose)	n/a	< 0.5 Gy	Total body	n/a	1-2x/imaging
X-ray	n/a	< 15 Gy total body	Total body or specific tissue delivery	n/a	1 to multiple fractions; 1x dose a day;
Heparin	Sterile Saline or water	10-100 U/ml	Intravenous	As needed	1x/imaging

Procedure

- Animals will be anesthetized prior to imaging, placed on the holder and positioned as needed. Depth of anesthesia will be monitored by lack of response to noxious stimuli, such as toe pinch, and loss of spontaneous movement, and adjusted accordingly. Isoflurane anesthesia will always be maintained using a precision vaporizer.
- Fur may be removed, prior to imaging, over appropriate part of animal body
Details of hair removal:
 - Animals will be kept under isoflurane anesthesia for this procedure. Hair will be removed using an electrical animal shaver and/or depilatory cream (e. g. Nair®). After 30 to 90 seconds, the depilatory cream will be wiped off and any remaining agent will be thoroughly removed using wet tissue to prevent burns.

3. A CT scan will be performed to ensure the correct position of animals and **focal delivery** of X-ray to the region of interest. Typical time of CT and X-ray treatment is 10-30 min.
4. **Whole body radiation**, without prior CT, can also be performed, which takes 1-10 min. The whole body irradiation can be performed with or without anesthesia. If x-ray delivery is performed without anesthesia animals will be placed with open lid box or in a closed container with openings allowing enough air to be exchanged during the procedure.
5. Physiological monitoring during X-ray procedure is as follows:
 - Respiration will be monitored during all imaging sessions through the glass window of the system or small animal monitoring system (Small Animals Instruments, Inc. Stony Brook, NY) and with a pneumatic pillow.
6. Placement of I.V. catheter may be required to deliver Omnipaque during CT to visualize organs of interest.
 - Sterile tubing and needle of required size (e.g. PE10 for mice) will be used for tail vein catheterization and secured in place. Tubing will be sterilized prior to use according to ULAR veterinary recommendation (i.e. autoclave or gas sterilization)
 - Heparinized saline (0.1-1 ml heparin [1,000 USP units/ml] in 10 ml of sterile saline) will be used as an anticoagulant agent.
 - Tail will be cleaned with 70% alcohol prep pad and slightly warmed up using the warm pad.
7. Following imaging, animals will be monitored until fully recovered from anesthesia (walking, active, etc.) prior to return to routine husbandry/housing.

Personnel conducting procedure (must be up to date on all IACUC study team requirements). Personnel not associated with an active protocol must create a profile that is up to date on IACUC study team requirements including a training narrative providing detail on experience for the techniques described in the SOP.

1. Kimerly Powell
2. Anna Bratasz
3. Michelle Williams
4. Katie Gallagher
5. Personnel listed on protocols referencing this SOP may perform this activity.

Potential adverse effects

Adverse events following X-ray exposure can range from dermal irritation to ulcerative lesions and are strain and dose dependent. Management and removal criteria related to such presentations must be clearly addressed in the investigator's protocol.

Early Removal Criteria

In case of unexpected issues with animals at any time the PI/study team will be notified by the core staff and will be responsible for further animal monitoring, treatment or euthanasia as per the IACUC protocol.

Any unusual/unexpected symptoms or anesthetic deaths will be reported to the ULAR veterinary staff for consultation.

History of Revisions

402-00 - new SOP approved by IACUC on 08/17/18

402-01 – updated to allow personnel listed on protocol following training 03/15/19

402-02 – updated to add new location for the new system, microCT Skyscan 1276; approved by IACUC on 06/07/19