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|  | SOP-BCR-9.3 | Irradiation | Author: S. Clouthier  Tahra Luther Approved: M. Wicha  | Rev: 0 | Issued: 8/22/14 Revised: |
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1.0 Purpose

SOP 9.3 provides information on how to register for, train on and complete irradiation/orthovoltage on cells and mice.

2.0 Scope

SOP 9.3 is intended to cover all resources, personnel and equipment in the BCR laboratory.

3.0 Procedure

- 3.1 Contact Mary Davis at madrad@med.umich.edu and Dennis Palmieri at dapalm@umich.edu to schedule a training at NCRC, or find out when the next training at NCRC will occur. The training consists of a brief instructional presentation followed by a hands-on training in the orthovoltage room.
- 3.2 The orthovoltage core is located in B26 G11N (ground floor by the vivarium). You will receive the code to the door when you receive confirmation of completion of training. You will also receive a code to open the key lock box/black box containing the key that runs the orthovoltage machine (320).
- 3.3 **BE SURE TO SCHEDULE AHEAD OF TIME** when you need to irradiate, so the core staff knows to come warm-up the machine ahead of time, otherwise you will have to do the warm-up yourself which takes at least 45 minutes. Anytime you want to schedule time, you do so through G-mail scheduling system at google.com with login expirradcore@gmail.com, the link you will also receive in your confirmation of completion of training e-mail from orthovoltage core, along with the password to login to the scheduling system.
- 3.4 Once you enter the room, log in on the log sheet that should be up on the computer, including time used/signed up for room use, shortcode, and time actually irradiated. The cost is roughly \$35/half-hour.
- 3.5 To prepare the machine for irradiation, there are two filters, the silver (indicated by "1.5 aluminum" on the filter) which has very little filtration and is usually used for cells and whole body irradiation for mice, and the copper filter (indicated by "2.0" on the filter) used for tumors. Everything needs to fit under the cone connected to the top part of the machine; usually two T75's or 1 T150 flask will fit. Normally the 20 x 20 (50 cm FSD) cone is used.
- 3.6 If you are irradiating mice, there is a clear square contraption available that holds 12 mice at a time, however, it is not sterile. Make sure to tape it shut so mice do not get out during irradiation. There are autoclaveable mouse holding boxes for irradiation, available for purchase-get ordering information from Mary if interested.
 - Mice that have been irradiated must be housed in a specific dedicated room.
- 3.7 There is a dosimeter in the room that is sufficient per OSEH Radiation Safety to monitor the irradiation exposure, individual dosimeters do not need to be worn.
- 3.8 To calculate the dose needed to irradiate, there is a chart on the wall by the keypad of the orthovoltage machine, which shows different dose rates depending on the plate or flask or tube, etc. that you are irradiating, and you calculate by: dose/dose rate = time and add 4 seconds to this total.
 - For localized tumor irradiation in mice, you can contact Mary for help for the dose rate calculation, and to help set up the proper shielding for the rest of the mouse (with lead) so it is not whole-body irradiated. She can help you customize the

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shielding for this, using a smaller applicator and cone (30 cm FSD and 6x 8). You can call her at 734-615-7713 or 734-764-3324.

- 3.9 On the orthovoltage machine, click on "Table" on the touch screen to set the calculated measurements based on the dose rate, and irradiate. Remain at least 6 feet away from orthovoltage machine when it is active/on (as indicated on the sign attached at the top which will light up when active/running), although the shielded door is made of lead.
- 3.10 When done irradiating, do NOT turn off the machine, just use the key to turn to stand-by. It needs 10 minutes to cool down before being turned off. When done, put the key back in the black box.
- 3.11 Some SAFETY TIPS/FACTS: Higher energy X-rays penetrate deeper than surface skin.
 - A physicist checks once or twice a year to ensure that the tubes aren't decaying, even though X-ray tubes don't usually decay.
 - All orthovoltage machines must be labeled with warning labels, such as "CAUTION RADIATION" so let Mary know if there are no labels present.
 - More required postings are registration certificate, notice to employees, operating procedures including emergency and safety procedures, and MDCH regulations.
 - 100 rad (rad measures absorbed dose) = 1 Gy
 - If there is an emergency issue, call OSEH/RSS at 734-764-4420 or UM Public Safety at 734-763-1131 or 911 from the room phone; if you dial 911 from your cell phone, it will dispatch to state police and will take them longer to figure out where you are.

4.0 Applicable References

- 4.1 Michelle Paulsen (orthovoltage technician) 734-763-0448, located in 1410 B520 NCRC

5.0 Change Description

| Revision | Date | Reference | Description of Change |
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