**Use of the Experimental Room at DCPT**

This document describes the experimental facilities, setup and standard operating procedures for planning, booking and performing experiments in the Experimental Room of the DCPT.

**1. Description of rooms and equipment**

*The Experimental Room at Plan 2 of DCPT is equipped with:*

* Horizontal Varian ProBeam beamline for proton pencil beam scanning with the same nozzle and beam quality as in the three clinical gantry rooms (energy range: 70-244 MeV, fixed angle: 90°, beam current range on target: 0.5-15 nA, max. field: 30x40 cm2, max dose rate: 106 MU/min, SAD: 228 cm, slots for range shifters)
* Movable couch (size = 53×193 cm2) on robotic arm
* 5 m distance between the nozzle and the end wall for experimental setup
* Room lasers marking the beam isocenter
* Gasmixer for (vacuum/O2) anesthesia and oxygen modifications

In particular cases, depending on the Application, gantry rooms at DCPT might be occasionally available for the researchers as well.

*Additional equipment and software at DCPT*

* Varian’s ECLIPSE treatment planning system
* Solid water plates (area: 30×30 and 20×20 cm2, thickness: 0.2, 0.5, 1, 2, and 5 cm)
* EPDMk2+ electronic personal dosimeters
* RadEye B20-ER multi-purpose survey meter

*The in vivo facility at Plan 1 of DCPT is equipped with:*

* Two scanclime racks, which can fit 60 cages, and house 200 mice at the time (cages are available)
* Flowbench for animal handling
* Gasmixer for (vacuum/O2) anesthesia and oxygen modifications
* Refrigerator and freezer

*The In vitro facility at Plan 1 of DCPT is equipped with:*

* Two CO2 incubators (medium sized)
* Two laminar cabinets
* Microscopes
* Gasmixer for modifications of gas levels

**2. Contact Details**

A Local Contact at DCPT will be assigned to the Applicant by contacting the research director at DCPT, Professor Cai Grau (**cai.grau@rm.dk**).

Applicant’s Team is requested to contact their assigned Local Contact at DCPT prior to the experiment for:

* Submission of applications (see Section 4),
* Booking the experimental time (see Section 5),
* Daily preparation and performing the irradiations (see Section 8).

Some of these activities might be performed by another authorized person (after consulting with the local contact).

Users are encouraged to contact the DCPT contact in case of any questions regarding the research work in the Experimental Room and the Animal Facility at DCPT.

**3. Handling of experimental animals and equipment**

*Internal experiments*

For internal experiments from Experimental Clinical Oncology, Department of Oncology (ECO), animals will be prepared at either ECO´s animal facility, or at the DCPT animal facility for temporary housing. The animals will be transported in closed boxes from ECO to the preparation table adjacent to the control room at the experimental room at DCPT.

*For in vivo experiments:*

All users are responsible for obtaining license for the animal experiment by the Animal Experiments Inspectorate.

This must be in place before the beam room can be booked. Only animals with a clean health status are permitted in DCPT (both in the Experimental Room and in the gantry rooms). This requires that animals are clean from pathogens specified by Felasa and health certificate must be provided (<http://www.felasa.eu/working-groups/recommendation/recommendations-for-health-monitoring-of-rodent-and-rabbit-colonies/>).

The animals can be brought to DCPT up to 7 days before experimental start to allow acclimatization.

During animal housing in the in vivo facility, local animal caretakers are responsible for caretaking of animals. Individual needs are to be discussed in advance, and if necessary, an animal caretaker from the visiting group can be involved.

When animals are leaving DCPT, a veterinarian inspection and documentation for the well-being of the animals can be necessary. This is the case if the animals are to be transported outside Denmark or on longer distances inside Denmark. The charge from this will be on the visiting group.

If a veterinarian consultation is needed during the stay, the charge from this will be on the visiting group.

All utensils for the animals must be brought by the visiting group.

A time gap of two weeks will as minimum be planned between visiting animals.

The in vivo facility is licensed for GMO animals.

*For external In vitro experiments:*

All utensils must be brought by the visiting group (pipettes, flasks, media, PBS).

 **4. Process for application and granting of beam time**

Both external and internal users of the Experimental Room must prepare an Application Form (Appendix 1) describing the proposal for an experimental project. The Application Form must be submitted to the Institutional Experimental Review Board (IERB) of DCPT through the Local Contact. The IERB consists of the chief physicist, the medical director, the research director and core representatives of the research groups at AU/AUH within the field of experimental radiotherapy. The IERB will evaluate the proposal and will aim to answer within a few weeks.

The Local Contact is responsible for contacting IERB and proposing the optimal evaluation procedure of each allocated project. The evaluation procedure might vary depending on the Application. In certain cases, a short discussion during one of the weekly meetings might suffice. In other cases, an additional interview with the Applicant might be requested.

The IERB will review, approve and prioritize the proposal, and grant the beamtime. Projects relevant for the clinical and scientific profile of DCPT, preferably with a local PI and/or internal DCPT collaborators will be prioritized above external or commercial projects and work for hire.

**5. Booking and calendar**

Applicant’s Team is requested to contact their Local Contact who arranges the availability of the Experimental Room for each day of the experiment. The date and time of the irradiations will depend on:

1. the clinical work at DCPT (which has the priority) - after consulting with the clinics at DCPT,
2. timing preference of the experiment - after consulting with Applicant’s Team,
3. cyclotron and beamline maintenance schedule - after consulting with the Varian Team.

Usually, the beamtime for research in the Experimental Room will be scheduled for the afternoon, evening, or weekends (outside the clinical hours and cyclotron maintenance). After consulting with the clinics, it might be possible to perform irradiations also during the day, between the patients.

Researchers are requested to take into account possible delays in the experimental work which might occur due to technical issues or delays in clinical work.

**6. Economic considerations**

The room and the installed equipment and software tools are available for approved projects at no costs for scientific investigator-initiated projects originating from Danish university hospitals and universities, provided that DCPT is actively involved in the project. Commercially sponsored projects will be charged a fee per day or hour, reflecting the actual costs plus an overhead as per institution rules.

**7. Pre-approval and procedure for letters of support**

A study planned to be conducted at the DCPT may be pre-approved while it is still in a planning phase. The application (Section 4) with a description of the study should be submitted for pre-evaluation in the IERB, under the same terms as stated under Section 4. If granted, the chairman of the committee will express the committees’ conditional approval in a letter of support that may be used for application for funding of the study. At the time of the actual experiments, a final approval must be applied for.

**8. Experimental work-flow**

This section describes the daily workflow of preparation and performing the irradiations at the Experimental Room. These steps are coordinated between the Applicant’s Team and the assigned Local Contact from DCPT.

Some of these activities might be performed by another authorized person (after consulting with the Local Contact).

Before the experiment:

* The Local Contact will consult the experimental setup and plans for radiation with qualified medical physicist and a radiation protection officer at DCPT to validate them before the experiment.
* The Local Contact will equip visitors with the electronic personal dosimeters which are to be used during the whole experiment.

During the experiment:

* The Local Contact will accompany the Applicant’s Team during the set-up preparation in the Experimental Room as well as during each irradiation.
* The Local Contact will operate the beam delivery and consult any problems with the Varian team.
* It is possible to modify the in-room set-up in-between the irradiation. The Local Contact will always monitor the radioactivity level. Users are requested to adhere to The Local Contact’s instructions regarding approaching the radioactive set-up. Radiation level during the set-up manipulation should be kept As Low As Reasonably Achievable.

After the experiment:

* The Local Contact will collect the dosimeters from the visitors and note down the dose readout in the DCPT notebook.
* All used equipment will be checked separately for the activation level.
* It might be possible to mark and leave other equipment or radioactive waste at DCPT for short-term storage after consulting with the Local Contact. The visitors have the full responsibility and obligation to ship activated parts from DCPT after the experiment.
* Users should consult their activity at the Experimental Room after the irradiation with the Local Contact.

**Appendix 1**

**Application Form**

Please email completed form (2 page maximum) to the Local Contact (see Section 2)

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| --- |
| **Group Leader’s (Applicant) details** |
| *Name:* |  |
| *Current role:* |  |
| *Organisation:* |  |
| *Address:* |  |
| *Telephone number:* |  |
| *Email:* |  |

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| **Members of the Applicant’s Team** |
| *Name:* | *Organization:* | *Email:* |
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| --- |
| **Details of the project** |
| *Title:* |  |
| *Objectives and background:* |  |
| *Methods and materials used:* |  |
| *Expected outcomes:* |  |
| *Impact and use of results:* |  |

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| **Realization at DCPT** |
| *Overall time period of the experiment:* |  |
| *Total hours required for access to the Experimental Room:* |  |
| *Requested access and time to additional facilities/devices at DCPT (animal facility, in vitro facility, ionization chambers, scanner, etc):* |  |
| *Notes and special requests (calculations after the irradiation, waste management, etc):* |  |