

User Guidelines 7T Experimental MRIs

0. Preamble

Two experimental 7 Tesla magnetic resonance imaging machines were purchased by the Center for Stroke Research CSB (Device 1) and the Cluster of Excellence NeuroCure (Device 2) with the aim of creating an experimental platform for small animal imaging. The facilities will service projects in the areas of A) Experimental Neuroimaging and B) Molecular Imaging, but projects in other fields of research are explicitly encouraged. The Core Facility is available to all public research institutions and interested industrial partners.

The User Guidelines are binding for all users of the 7T MRIs.

The following 2 devices of the Co. Bruker Biospin are available:

Device 1 7T PharmaScan (installation 03/2003; upgrade 04/2013)

Device 2 7T BioSpec (installation 08/2013)

Our service includes support from the core facility staff:

- Advice for MRI – study design, selection of the appropriate device and sequences
- Use of standard sequences with marginal modifications
- Carrying out measurements
- Performing measurements under guidance
- Training for independent MRI operation
- Advice on appropriate image analysis strategies

Extensive methodological and image analysis development will only be provided on the basis of scientific cooperation.

1. To gain access

Requests for MRI projects or single measurements have to be addressed to the scientific and the technical-operational management (TOL) (contact **Appendix 1**) which reviews and approves them. They also give advice on which device is suitable for the required examination. Bookings are made via email to the TOL by naming the device, date and attended time.

1.1. Licence for Animal Testing

At the start of an actually MRI test run an approved licence for animal testing (by the LaGeSo Berlin) with the permission for MRI under anesthesia has to be on hand. The user confirms this by his / her sign on the „User Rules“ short form.

1.2. Health proof of laboratory animals

Before the start of MRI investigation a current health certificate from the respective animal husbandry must be submitted to the TOL. Possible risks of infection between the different animal facilities must be kept low. With a negative health communication new animals must be purchased and set directly in the animal house of the house. If in doubt, consultation with the relevant animal protection officer of the Charité must be done. (<http://www.charite.de/tierschutz/intern/index-intern.html>).

1.3 Declaration of GMOs

Genetically modified animals must be reported to the S1 project manager of the facility (Susanne Mueller) before the start of the study. For this purpose, the documentation sheet for genetically modified laboratory animals (Form Z) from the animal experiment application with assignment of the project leader responsible for this according to GenTG must be deposited. Users who are appointed as project leaders in other genetic engineering facilities of the Charité must be appointed in writing as additional project leaders according to GenTG for the genetic engineering facility 495/11 before using the 7T MRTs with the use of genetically modified animals. The application for appointment as further project management must be addressed to the TOL. If the TOL agrees, it will forward the application to the Legal Affairs Division, Regulatory Affairs, for further action.

1.4. Charge

The use of the 7T MRI machines is with costs for all users. A price list can be found in **Appendix 2**. For final payment with ILV a supplying cost center must be declared. External users have to name a billing adress. If the booked measuring time is not canceled 24 h before use, the full price will be charged.

1.5. Access Authorization

Users are allowed to stay in the rooms of 7T MRIs only after safety briefing by the TOL. *Advanced Users* are entitled to independently operate the MRI machines after extensive briefing and training by the TOL. Only *Advanced Users* receive transponder access to the MRI labs (approval by the TOL). It is not allowed to pass the transponder onto third parties. The *Advanced User* has to ensure that no unauthorized persons have access to the rooms. *Basic*

			Core Facility 7T Experimentelle MRTs
			User Guidelines

Users and other members of staff are not entitled to independent operation of the MRI machines. They may participate only in the presence of an *Advanced User* or the TOL.

2. Booking Conditions

The reservation and administration of measuring periods is done by the TOL. The actual booking can be seen in the online-calendar. Bookings must be made via email to the TOL (for details **Appendix 3**). Users must adhere to the booked measurement times. Cancellations must be made no later than 24 hours prior. Otherwise, the full price will be charged for the time.

Projects under the direction of NeuroCure and CSB PIs have priority in the allocation of the MRIs. At full capacity, the following priority applies: 1. CSB / NeuroCure 2. other Charité-Scientists 3. external academic institutions 4. industrial partners.

3. Safety

No one should stay in the 7T MRI laboratories without prior safety briefing. All users and guests must be introduced to the TOL to get the safety briefing. Once each calendar year, all users must attend the MRI safety briefing. For safety reasons, in vivo measurements (in use of inhalation anesthesia) on MRI should not be performed alone, there should be two people present.

3.1. Magnetic Fields

The experimental MRI machines are superconducting actively shielded magnets with magnetic field strengths of 7 Tesla (ca 140.000 - times of the geomagnetic field). According to the safety regulations it is not permitted to take magnetic or magnetizable objects, or any technical devices, into the radio frequency (RF) cabins without consultation of the TOL.

3.2. S1-Laboratory

The safety regulations for genetic engineering work at security level 1 according to GenTSV Annex V, which can be found in the operating instructions (wall bulletins laboratories K1 010 for device 1 and E1 014 for device 2) must be attended.

4. Laboratory Regulations

The TOL takes over the technical-operative care of 7T MRI. For the proper conduct of investigations in accordance with the Animal Protection and Genetic Engineering Act and compliance with the hygiene measures each user takes own responsibility.

4.1. MRI-Operation

The MRI machines and associated equipment are to be kept in perfect condition. Technical malfunctions and / or defective equipment must be reported immediately to the TOL. A self installation or change of measuring coils may be carried out only after prior briefing by the TOL.

The displayed Workinstructions for coil installations, operation of the scanner and electronics serve as a reminder after training and must be considered in doubt.

Before every measurement, all users must read the lab book next the workstations to be up on current operational changes.

After completion of the investigation the spaces of MRIs has to be left in an orderly and sanitary condition and in accordance with the hygiene plan (**Appendix 5**). All gases must be turned off.

4.2. Consumable

The following consumables are made available:

- Examination gloves
- Tape
- For inhalation anesthesia (Isofluran, N₂O)

Other work equipment each user has to arrange for themselves.

4.3. Data

Each user is instructed to secure its data self dependent and on time. For data backup different means are available (**Appendix 4**).

Publication relevant data should be stored in the native Bruker format, they are single guaranteed.

The MRI data remain approximately ½ year on the MRI workstations. They are then archived and deleted from the TOL.

There is one lab book for each MRI machine (next the corresponding workstation) in which all users are instructed to enter their measurements, the attended time and possibly current observations, errors, defects and so on.

5. Nonwarranty

Claims for damages against the Core Facility *7T Experimental MRI* are limited to intent and gross negligence. Liability for consequential damages is excluded. The Core Facility *7T Experimental MRI* is not liable for damages resulting from the fact that the device can not be

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			User Guidelines

maintained to the intended extent or that their operation must be restricted or discontinued due to regulatory requirements.

5.1. Severability Clause

Should individual provisions of the User Guidelines be invalid, the validity of the remaining provisions shall not be affected thereby. Instead of the invalid provision shall be a provision valid that comes closest to what the Core Facility Experimental 7T MRI has willed or wanted to, if it would have been aware of the invalid provision. The same applies to any contractual gaps.

Datum, Unterschrift (wissenschaftl. Leitung)

Appendix 1 - Contact Details

The 7T experimental MRIs are located at the Campus Charité Mitte, Neurowissenschaftliches Forschungszentrum, Hufelandweg 14:

Device 1 (PharmaScan) in K1 010

Device 2 (Biopec) in E1 014 (entry through E1 017)

Scientific Guidance: Dr. Philipp Böhm-Sturm phone: 030 / 450 560 416
 email: philipp.boehm-sturm@charite.de

Support and bookings are done by the technical - operational management (TOL).

TOL: Susanne Mueller phone: 030 / 450 560 129
 email: susanne.mueller1@charite.de

Substitute: Philipp Böhm-Sturm phone: 030 / 450 560 129
 email: philipp.boehm-sturm@charite.de

Laboratory phone: Device 1 (PharmaScan) 030 / 450 530 047
 Device 2 (BioSpec) 030 / 450 560 236

Web presence: <https://neurocure.de/id-7t-animal-mri-204.html>

In the absence of the TOL and her substitution, the Bruker BioSpin hotlines can be contacted for quick help by acute problems:

Hardware hotline for:

- Hardware problems
- Spare parts delivery
- Service visits
- Magnet, periphery, and siting

Please contact mri-hardware-support@bruker.com or call **07243 7695 - 521**

Software hotline for:

- All *ParaVision*®
- No *XWIN-NMR™/TopSpin*®
- Linux®/Net configuration (Bruker PCs only!)

Please contact mri-software-support@bruker.com or call **07243 7695 - 588**

Application hotline for:

- Parameter/protocol optimization
- Image artifacts
- Animal accessories
- General system handling

Please contact mri-application-support@bruker.com or call **07243 7695 - 621**

When necessary repairs a repair order for the CFM-medical devices should be initiated in consultation with the TOL.

CFM Helpdesk 575 555

Appendix 2 - Pricing

The usage charges of 7T MRI are graduated by device and type of use. For Charité internal user and external research institutions the cost are the same. Industrial partners would pay the complete package.

Type of Use	Device 1 (PharmaScan)	Device 2 (BioSpec)
MRI autonomous	35,00 € / h bzw 0,58 € / min	44,00 € / h bzw 0,73 € / min
MRI by the CF staff	50,00 € / h bzw 0,83 € / min	71,00 € / h bzw 1,18 € / min
Complete package: MRI and data analysis by the CF staff	70,00 € / h bzw 1,17 € / min	90,00 € / h bzw 1.50 € / min
Data analysis	40,00 € / h bzw. 0,67 € / min	40,00 € / h bzw. 0,67 € / min

External users and industry partners receive an invoice from the central accounting office of the Charité for the gross price (+19% VAT).

Nutzungsart	Gerät 1 (PharmaScan) brutto	Gerät 2 (BioSpec) brutto
Eigenständiges Messen	35,00 + 6,55 = 41,55 € / h	44,00 + 8,36 = 52,36 € / h
Messung mit Hilfe des CF Personals	50,00 + 9,50 = 59,50 € / h	71,00 + 13,49 = 84,49 € / h
Komplettpaket: Messung und Datenauswertung durch das CF Personal	70,00 + 13,30 = 83,30 € / h	90,00 + 17,10 = 107,10 € / h
Datenauswertung	40,00 + 7,60 = 47,60 € / h	40,00 + 7,60 = 47,60 € / h

Appendix 3 - MRI booking / Online-Calendar

Bookings are made via email to the TOL (susanne.mueller1@charite.de) by naming the device, date and attended time.

Online - Reservation Calendar:

The reservation of both MRI devices can be seen in the online calendar. Entries can only be done by the TOL.

<http://neurocal.charite.de/mri/Web/view-schedule.php>

Appendix 4 - Practice Data-Backup

Currently, the following resources are available for data backup / data transfer:

- DICOM export
- Backup / Archiving on Server CuraSystems
- Data transfer on your own computer via SSH or WinSCP - the access should be obtained from the TOL
- USB-Stick

Appendix 5 - Hygiene Plan

5.1 Control / Preparation Rooms

Here takes place:

- Animals are brought in and out in locked cages with secure filter attachment
- Transport of animals from the cage to the scanner and back
- Preparation and / or killing of animals und ggfs. Tötung von Tieren

5.2. Scanner Room

Here takes place:

- Anesthesia of animals
- Bearing the animal on the animal bed under gas anesthesia; control of vital functions by the monitoring system. Warming blankets has to be covered with foil.
- MRI study

5.3. Disinfection and Hygiene Measure

Following measures must be done when finished the MRI study:

- The foil round the warming blanket has to be removed and cast away
- The glas for anesthesia, the animal bed, mask and toothbar must be cleaned with Descosept or Sterilium

- Disinfection / cleaning of work space with Descosept (table at the scanner, planes where cages stood and / or animals were prepared)
- Disinfection and Cleaning of hands with Sterilium / water and soap
- Computer konsole only touch with clean hands. When indicated clean konsole and computer mouse with Sterilium

5.4. Cadaver

Cadaver are packed in plastic bags and can be disposed in the collection freezer NWFZ basement room 012.

6. Revision

Abschnitt	Beschreibung der Änderung	Datum
Appendix 1	User Council: Roland Kälin has left the Charité	17.06.2014
Appendix 4	Backup on Server CuraSystems	17.06.2014
Appendix 1	Scientific Guidance new: Philipp Böhm-Sturm	22.01.2015
Access	shortened	05.07.2016
Safety	In vivo MRI should not be performed alone (instead of <i>are not allowed...</i>)	05.07.2016
Data	Entries lab book: + attended time	05.07.2016
Appendix 2	Pricing complete new	05.07.2016
Appendix 4	Data backup - burning to CD taken out	05.07.2016
all	Extensive revision for the redesign of the S1 plant	30.01.2022
Appendix 2	Pricing complete new	16.01.2023