

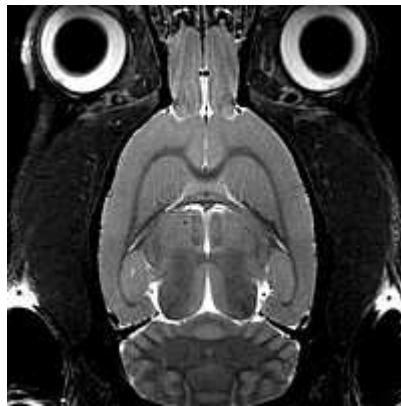
Small Animal MRI at Ultra-High Fields of 11.7 T

CICbiomaGune is currently installing an ultra-high field 11.7T MRI system, unique in its capabilities in Spain to study disease models in small rodents. This state of the art MRI system consists of an 11.7T 16cm magnet that weights 8800kg and is ultra-shielded and refrigerated, needing small floor space and long service intervals.



Bruker Biospec 117/16 USR Magnet

It possesses a modern water cooled integrated gradient and shim system with high slew rates (6600T/m/s), gradient strengths (>750mT/m) and high duty cycle to overcome high field challenges. It has 4 radio frequency transmitters and 8 receivers, enabling novel parallel imaging and heteronuclear techniques to be developed and applied in pre-clinical studies. A variety of radiofrequency transmit/receive coil setups ensures that data acquisition can be specifically adapted to different parts in the body of the mouse or rat. This is important to optimize imaging methods to yield the best information about morphological, pathophysiological or functional alterations in disease models of oncology, neurosciences or cardiology. For example, the high field strength paired with a dedicated rat head coil enables the visualization of the brain neuroanatomy in great detail in a living rat:



MR method: Fast Spin Echo with 68 x 68 μm^2 in plane resolution, 0.5 mm slice thickness (adapted from www.bruker.com)

The MRI scanner will be interfaced to an animal monitoring system to ensure animal welfare during anaesthesia by measuring physiological parameters. This allows also the acquisition of motion free images using respiratory and/or ECG gated MRI or MRS methods. The non-invasive nature of the MRI examinations is ideally suited to perform studies longitudinally within the same animal, hence, resulting in a refined study design and an overall reduction of animals used in research (e.g. disease evolution in oncology, diabetes, neurosciences or phenotyping of transgenic mice).

The MRI research will be lead by Dr. Torsten Reese, who has more than 15 years experience in this field. The research will mainly focus on the advancement of the technology to understand the functioning of the brain, *in vivo* MR imaging and spectroscopy method development and its application to pre-clinical animal models, data analysis and the *in vivo* characterization of novel biomaterials, especially MRI contrast agents or new drugs.

The MRI is only one unique part of the 900m² state of the art pre-clinical Molecular Imaging Unit at CIC biomaGUNE. A dedicated animal facility to foster external collaborations with regional, national and international researchers is currently being build. The integrated unit will be completed within 2009 with the installation of two additional complementary imaging systems, a SPECT/CT and PET/CT system for small animals. A potent 18MeV IBA cyclotron for the creation of radioisotopes is awaiting commissioning. Additionally, utterly important for the research advances in nuclear medicine, a modern radiochemistry laboratory is in construction. The radiochemistry group is headed by Dr. Jordi Llop Roig, expert in radiochemistry. His research lines extend beyond the development and characterization of novel radiotracer for the disease understanding and diagnostic of various diseases like cancer, Alzheimer's and Parkinson. Recruitment for technicians, PhD students and Postdoctoral researchers for the different groups within the Molecular Imaging Unit is ongoing.

The creation of the pre-clinical Molecular Imaging Unit is perfectly aligned with the overall scientific strategy of the center (directed by Prof. Manuel Martín Lomas) to perform studies in the broad field of biomaterials. The integrated unit extends the capabilities of the two previous established units of "Biosurfaces" and "Biofunctional Nanomaterials" towards *in vivo* studies while promoting scientific research and technological innovations at the highest level in the Basque Country.