EXPERIMENTAL 7T MRI CORE FACILITY

IDIBAPS

**Institut
D'Investigacions
Biomèdiques
August Pi i Sunyer**

MRI is a diagnostic and prognostic tool widely used in patients, and in clinical research, and is applied with the same technical characteristics in animal models of any field of research, from neurology to oncology, and including metabolic or neurodegenerative diseases.

The **Experimental 7T MRI Platform is unique in the city of Barcelona** and can help you in your basic research. It adds value to your experiments and **increases the translational impact of your results**.

One of the advantages of using **MRI** in your research is the possibility of doing **longitudinal studies in the same subjects**, thus reducing the number of animals and the variability.

The **MRI7T platform of IDIBAPS** has an annexed animal housing room to accommodate rats and mice during the entire experimental design.

Image: Anaesthesized rat with fixed head for brain imaging.
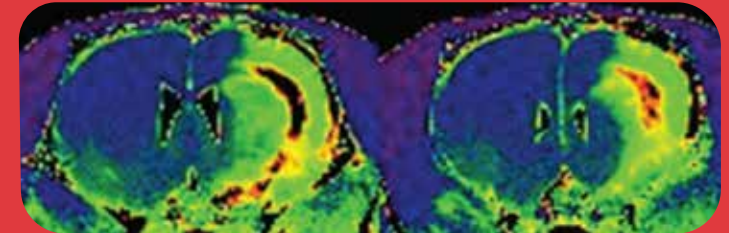

Biospec 70/30 System (Bruker)

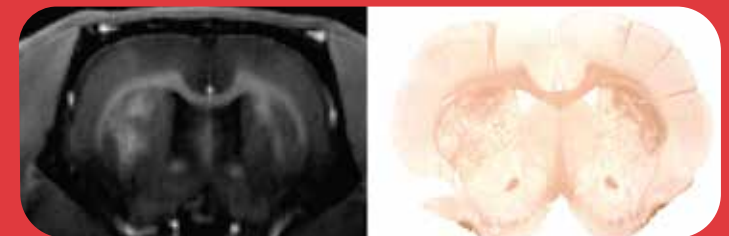*Isolated cabins for animal housing*

Anatomical imaging

>> Brain infarct volume and neuroimflammation

T2 relaxometry map of rat brain coronal slices.
The brighter area indicates post infarct oedema
allowing the volume quantification.

T1 weigthed rat brain coronal slices *(left)* showing
hyperintesities that were correlated with GFAP
immunostaining *(right)*.

>> Angiography

**Maximal intensity projection of 2 rat heads for
angiography determination**. Comparison between
a healthy animal *(left)* and a rat with 6 months of
bilateral common carotid artery occlusion *(right)*.
Note the increase in vessel tortuosity and collateral
arteries.
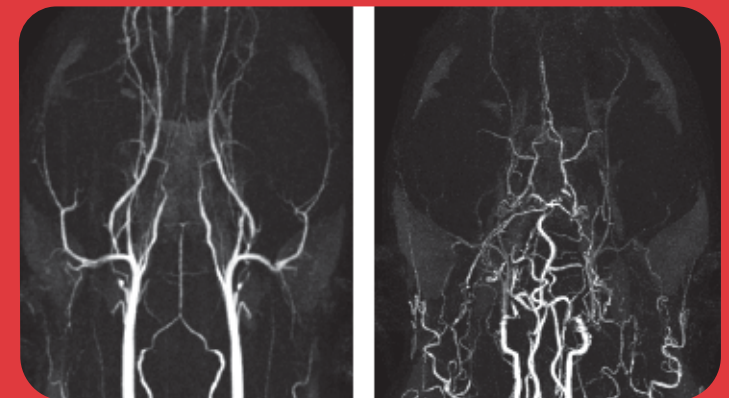
Anatomical imaging

>> Tumoural follow up

T2 weighted axial slice of a mouse thorax with 5 defined tumours in the lung *(left)* and the follow up imaging 3 months later *(right)* where the whole lung is occupied by the tumour.

2 months   *5 months*
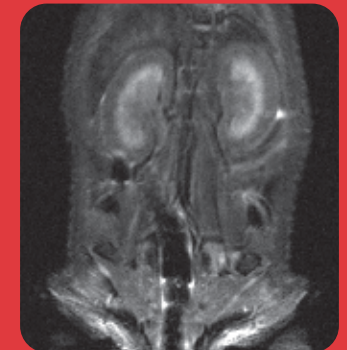
>> Developmental studies

T2 weighted coronal and axial slices of mouse embrios at E14 and E17 developmental stages. On the right, axial slice of P1 mouse for kidney studies *(image ressolution of 78x78 microns in 0.5 mm slice thickness)*.
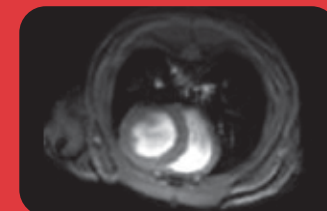

E14   *E17*   *P1*

>> Cardiac Imaging

Short axis view of mouse myocardium *(left)* for determining the ventricles volume, wall thickness and cardiac funtion. On the right, an axial view of the 4 chambers.
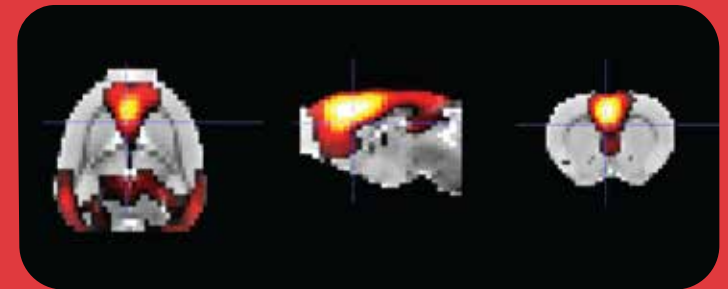
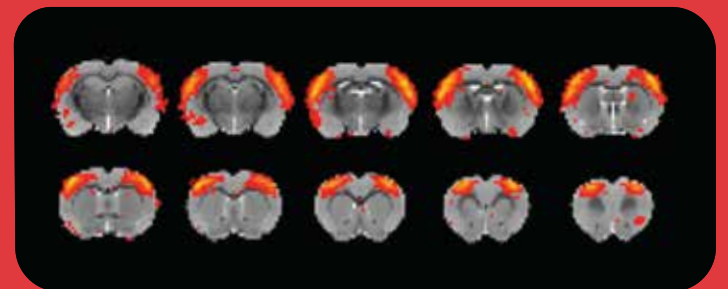# Brain functional and structural connectivity

>> Seed based analysis

Functional connectivity obtained from correlating the BOLD signal of a given region of interest with the rest of the brain, in this case the retrosplenial cortex, resulting in the default mode network.

## >> Independent component analysis

Functional networks can be automatically **extracted from resting-state functional MRI using independent component analysis (ICA)**, without any *a priori* hypothesis. In the image, the hot areas correspond to the somatosenory network.

# Brain functional and structural connectivity

>> Connectomics

Structural and functional brain networks *(or connectomes)* based on whole-brain anatomical parcellation can be estimated from diffusion and functional MRI, respectively. Graph theory is used to analyse and characterise the brain organization. The images show the streamlines reconstructed from diffusion weighted imaging *(left)*, the connectome matrix *(middle)* and a representation of the nodes and edges *(right)*.
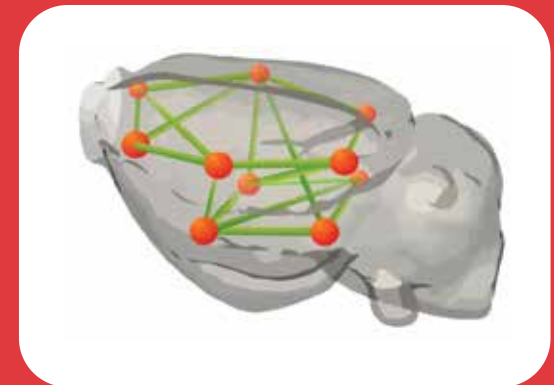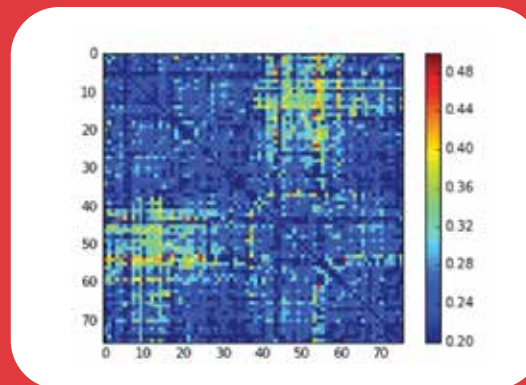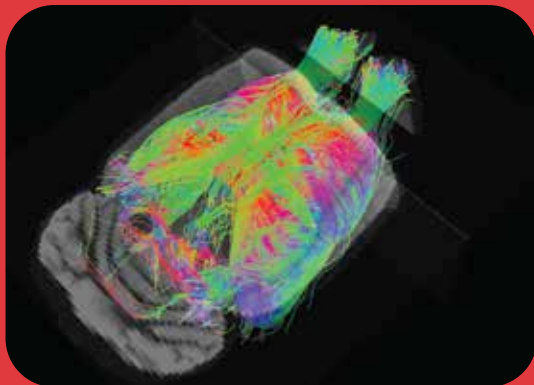
Metabollic imaging

>> In vivo 1H MR Spectroscopy

Proton spectrum from a volume of interest
corresponding to the mouse striatum.
Different metabolites can be studied *in vivo*.
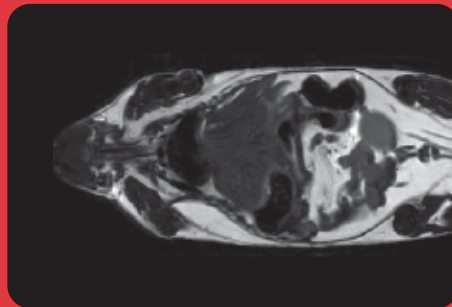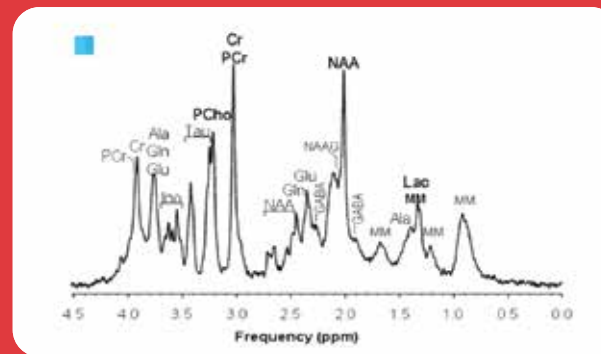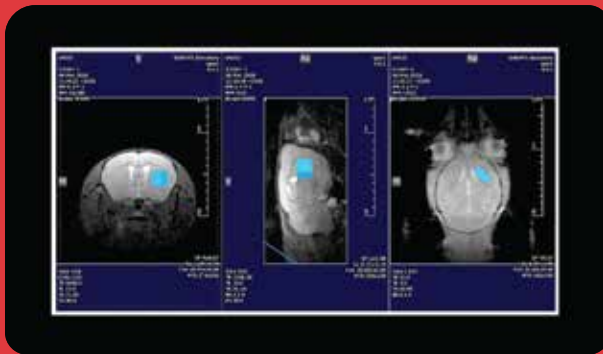
>> Fat content

T2 weighted imaging without fat suppression.
Axial slice of an obese mouse used to determine
the fat content and its distribution.

We are here.

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