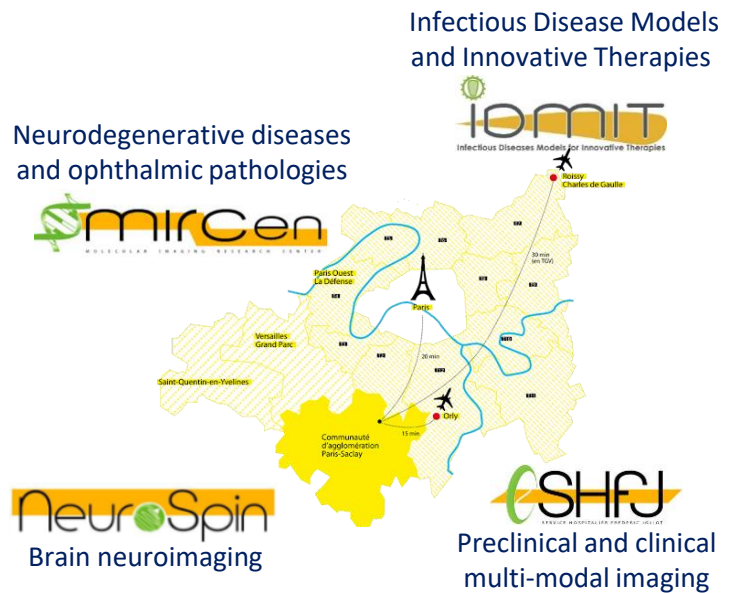


State-of-the-art *in vivo* imaging

MRI ASSETS

A SYNERGY OF IN VIVO IMAGING EXPERTISE & TECHNOLOGIES TO SUPPORT INNOVATIVE PROJECTS

Four complementary and multidisciplinary centers (IDMIT, MIRCen, SHFJ and NeuroSpin) contributing to major advances in various research fields



From preclinical POC to drug development in patients



PET, MRI, ultrasound, multimodal imaging and radiopharmaceutical production

Expertise and state-of-the-art translational in vivo imaging platforms:

- * 4 medical research imaging centers
- * 34 technological platforms for preclinical and clinical research
- * 10 research laboratories

An access to a full range of scientific and technological solutions through one-stop shop and a dedicated project manager to support partner innovative developments from preclinical (rodents and non-human primates) to clinical stages

PRECLINICAL MRI

OUR ACTIVITY

- ✓ High and ultrahigh MRI on rodents and non-human primates
- ✓ Multimodal imaging: PET/MRI – MRI/US
- ✓ Metabolic imaging (^1H or ^{31}P MR Spectroscopy, Chemical Exchange Saturation Transfer for Glutamate, Glucose, Creatine)
- ✓ Diffusion weighted imaging, anatomical connectivity
- ✓ T1, T2, T2* and susceptibility weighted imaging, parametric imaging
- ✓ Functional MRI (task and resting state)
- ✓ Optimized sequences for brain spectroscopy ^1H , ^{13}C and ^{31}P
- ✓ ZTE imaging for ^{17}O
- ✓ BSL 1 to 3 environment
- ✓ Complementary assets: animal housing, histology, immunohistochemistry

THERAPEUTICAL FIELDS

- ✓ Infectious diseases
- ✓ Neurodegenerative diseases
- ✓ Oncology
- ✓ Ophthalmology

EXPERTISE

- ✓ Research of new contrast agents
- ✓ Animal model validation
- ✓ Evaluation of new therapies
- ✓ Anatomic and functional imaging
- ✓ Co-registration of reconstructed 3D-histological volumes of multimodal data acquired in vivo and/or ex vivo imaging

OUR STRENGTH

- ✓ Long-standing experience in multimodal imaging processing on rodents and non-human primates
- ✓ Complementary experts: biologists, physicists, pharmacologists, radiochemists, radiopharmacists, nuclear doctors, physicians
- ✓ Well-established partnerships with public and industrial players

PRECLINICAL MRI

RODENTS & NON-HUMAN PRIMATES (NHP)

APPLICATIONS

❖ Therapeutic fields

- ✓ Neurodegenerative diseases
- ✓ Oncology
- ✓ Psychiatric diseases
- ✓ Neurovascular diseases

❖ Expertise

- ✓ Animal model validation
- ✓ Evaluation of new therapies
- ✓ Study of drug-target interactions
- ✓ Pharmacokinetics study

EQUIPMENT

For rodents

MRI 1.5T	Achieva (whole-body)	Philips
MRI 7T	Varian	Agilent
MRI 7T	Biospec, Avance III	Bruker BioSpin
MRI 11.7 T	Biospec, Avance III	Bruker BioSpin
MRI 17.2 T	Biospec, Avance NEO	Bruker BioSpin

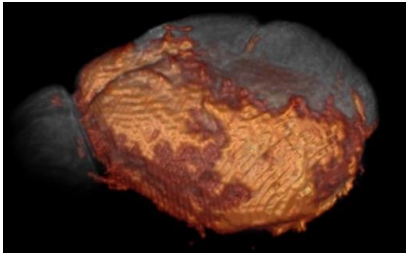
For NHP

MRI 3T	Cima.X	Siemens
MRI 7T	Terra.X	Siemens
MRI 11.7T	ISEULT Project	CEA/GE Healthcare/Siemens
PET/MRI 3T	SIGNA	GE

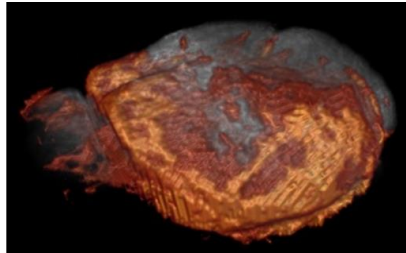
PRECLINICAL CASE STUDIES

Manganese Enhanced MRI

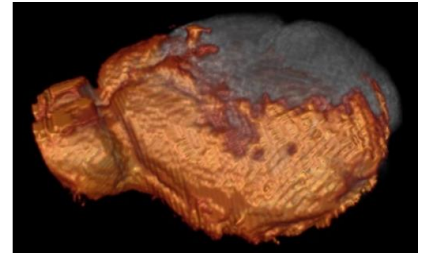
TR1



TR2

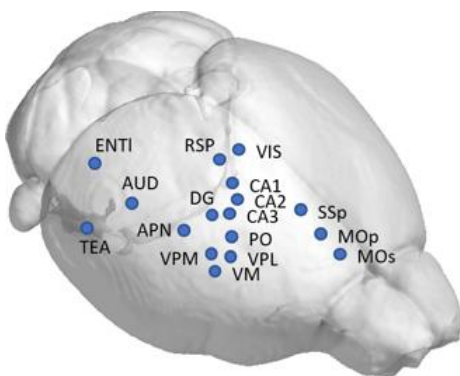


TR3

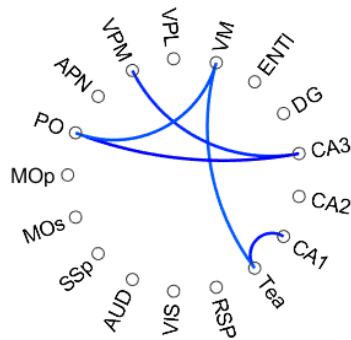


Drug effects on functional neuroimaging
(Droguerre et al, Sci Rep. 2019)

Resting state functional MRI biomarkers in neurodegenerative diseases

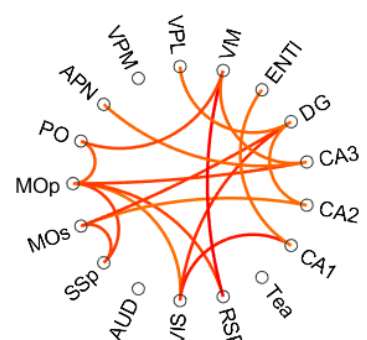


6M

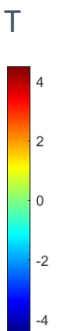


hypoconnectivity

12M



hyperconnectivity



Connectivity differences in AD vs WT
(Droguerre et al., Proceedings of the ESMRMB Meeting, 20202020)

CLINICAL MRI

APPLICATIONS

❖ Therapeutic fields

- ✓ Infectious diseases
- ✓ Neurodegenerative diseases
- ✓ Oncology
- ✓ Psychiatric diseases
- ✓ Pediatric diseases
- ✓ Neurovascular diseases

❖ Expertise

- ✓ Biomedical research protocol management
- ✓ Recruitment of healthy volunteers,
- ✓ Acquisition of in vivo brain imaging data from healthy or diseased humans
- ✓ In vitro acquisition of anatomical parts
- ✓ Development and implementation of MRI sequences (anatomy, diffusion, functional MRI, NMR spectroscopy)
- ✓ Imaging data analysis and processing

EQUIPMENT

MRI 0,55T
MRI 3T
PET/MRI 3T
MRI 3T
MRI 7T

Magnetom Free Max
Magnetom Prisma fit
SIGNA
Cima.X
Terra.X

Siemens Healthineers
Siemens
GE
Siemens
Siemens

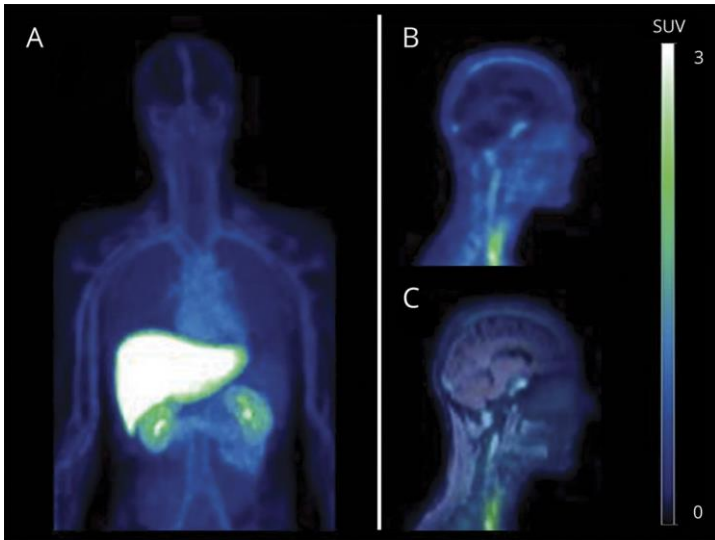
MRI 7T
MRI 11.7T

Magnetom 7T
ISEULT Project

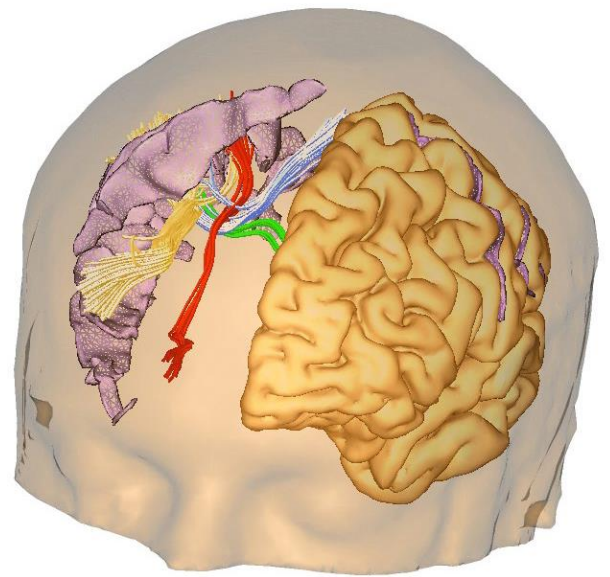
Siemens
CEA/GE Healthcare/Siemens

CLINICAL CASE STUDIES

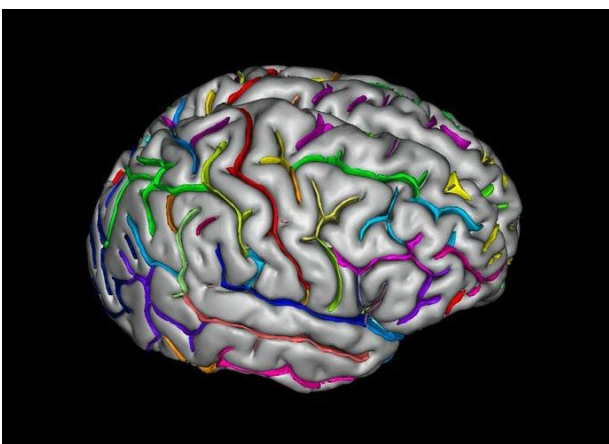
PET/MRI



Biodistribution of marketed drug using
PET / MRI microdosing
(Marie et al., 2019)



Diffusion MRI image
© J-F.Mangin / V El Kouby /
M.Perrin / Y. C.



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imagerie



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bd@pasrel-imagerie.com



PASREL-Imagerie
CEA - Service Hospitalier Frédéric Joliot
4 Pl. du Général Leclerc - 91401 ORSAY Cedex