Nanotecnología en el CNIC: búsqueda de soluciones para el diagnóstico por imagen en CVD

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Jefe Unidad de Imagen Avanzada

23 de octubre de 2012

CNIC mission & vision

EXCELENCIA
SEVERO
OCHOA

CNIC: Public-State Foundation: Spanish Government, through the ISCIII, and the **FundaciónPro CNIC**.

28,144 m^2 for research. Equipped with the most advanced technology at an international level.

Distinguished with the “Severo Ochoa” prize.

The CNIC is a young center: more than three-quarters of the researchers have been recruited since 2007.

MISSION AND GLOBAL STRATEGY

Mission

Improve Cardiovascular Health

Main Strategies

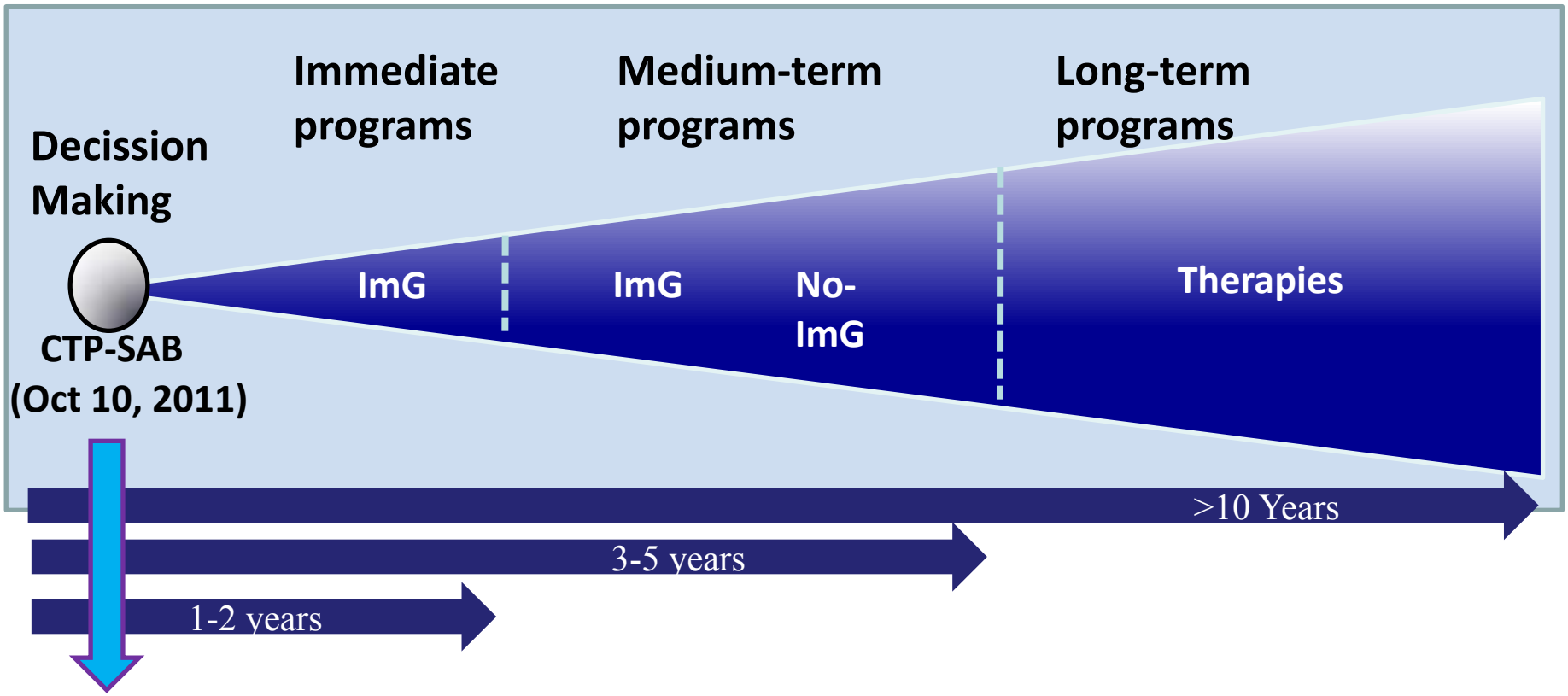
- **Education**
- **Quality Research**
- **Efficient Translation**

TRANSLATIONAL PLATFORM

Main Focus in two axes

- **Vascular Biology** → **Atherosclerosis**
- **Development** → **Cardiovascular Repair**

CNIC Translational strategy



Medical indication

Decision target level

- *Ttissue*
- *Cellular*
- *Molecular*

Image Candidate programs

Non.Image Candidate programs

Non-invasive imaging at CNIC

ADVANCED IMAGING UNITS

This laboratory's lines of imaging research are being developed in cooperation with "Phillips Healthcare" (Andover, Minnesota) and (Aachen, Germany), divisions of "Phillips Electronics North America Corporation". A Master Research Cooperation Agreement was signed in 2010 (2010-2019) under a Public Procurement Agreement.

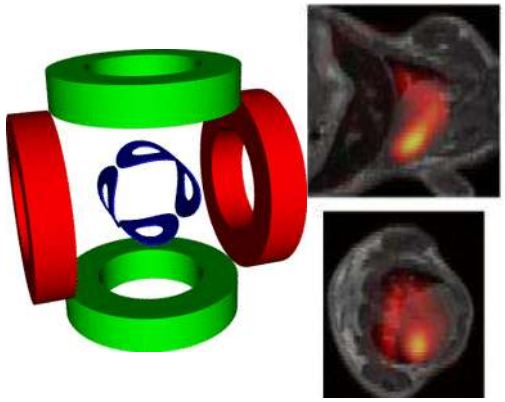
PHILIPS

ADVANCED IMAGING UNITS

Small Animal Imaging – level -3 , South Wing

EQUIPMENTS

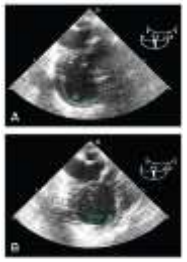
NanoPET/CT
7 Tesla MRI
IVIS (3D imagine system)
Ecocardiograph VEVO2100
FMT (in-vivo fluorescence)
New MPI



ADVANCED IMAGING UNITS

Pig Imaging – Ground Floor, South Wing

450 m^2



EQUIPMENTS

- 3 Tesla MRI
- PET/CT (Multidetectors CT)
- Mobile Rx catheterization

PET/CT

PET/CT

HEMODYNAMICS LAB

ADVANCED IMAGING UNITS

Human Studies– Hospital Carlos III

“Laboratorio de Investigación de Imagen Cardiovascular”

730 m²

Multidetector CT
“Next Generation” iCT

EQUIPMENTS

- PET/MRI 3 Tesla
- Multidetector CT
- Echocardiography equipment
- Exercise and stress tests

Hybrid equipment
PET/MRI 3 Tesla

Magnetic nanosensors.
MMP quantification and blood pool imaging probe

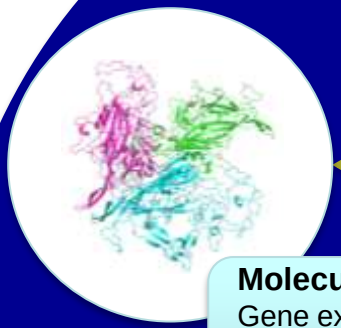
Patent Application No.: P201231038

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

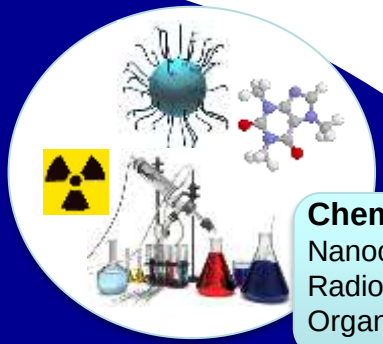
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD
Fundaciónprocnic
cnic

MOLECULAR IMAGING @ CNIC

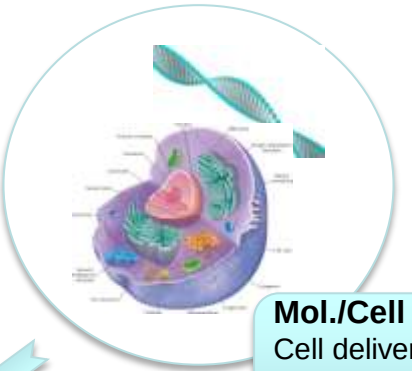
Advanced Imaging Unit



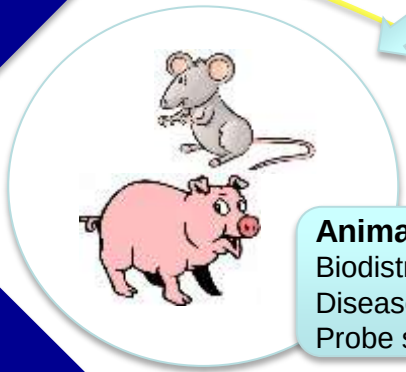
Molecular Targets
Gene expression profiling
Proteomics
Metabolobics



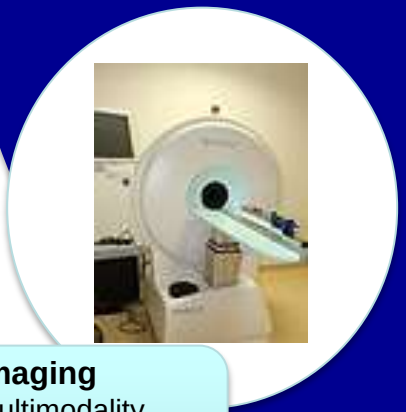
Chemistry
Nanochemistry
Radiochemistry
Organic Chemistry



Mol./Cell Biology
Cell delivery
Cell-Cell interaction
Cell tracking

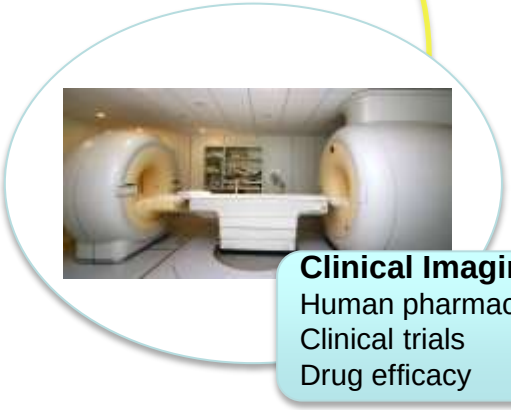


Animal models
Biodistribution
Disease Models
Probe stability



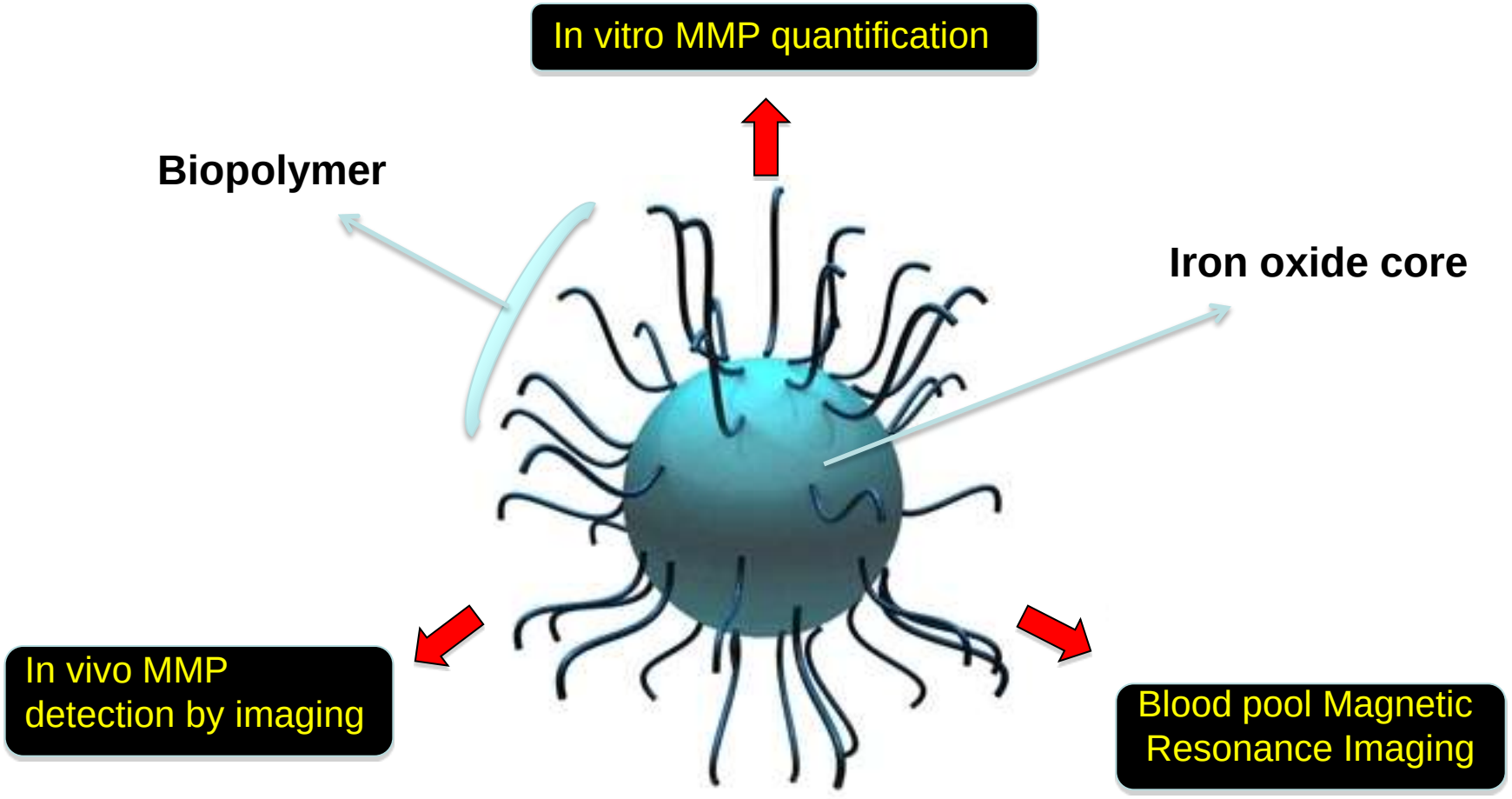
Imaging
Multimodality
Pharmacokinetics
Time-activity curves

Computer Modeling
Reconstruction
Mathematical modeling
Statistical Analysis



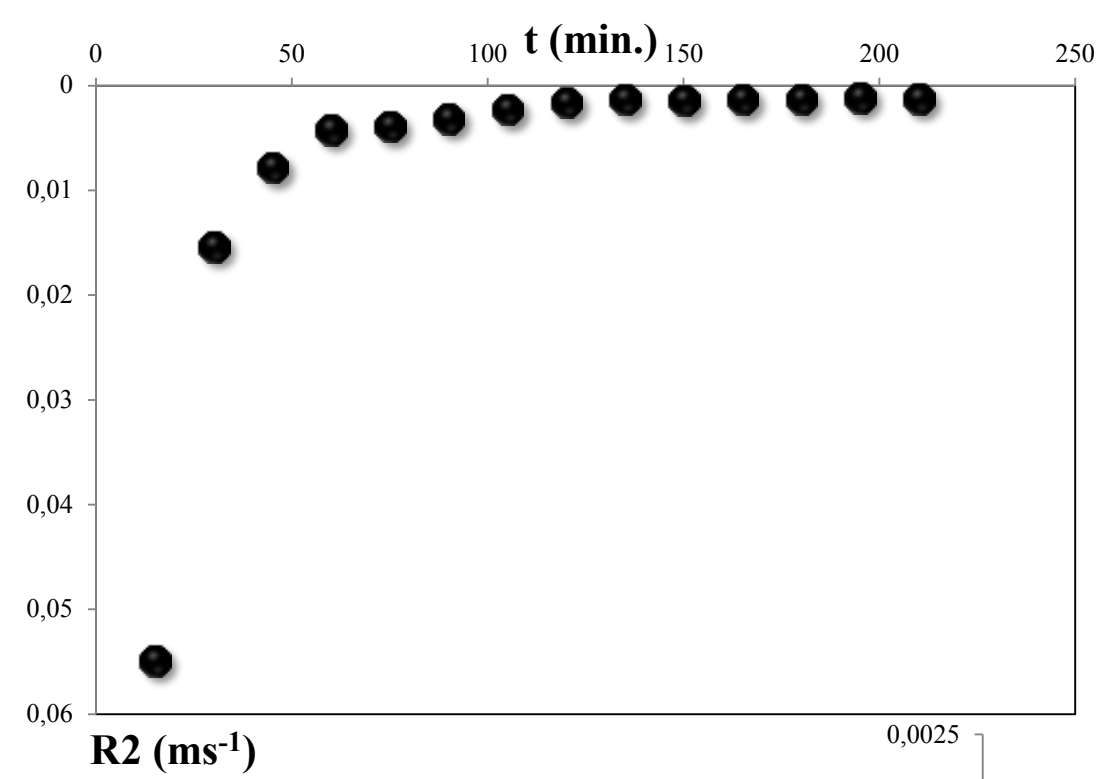
Clinical Imaging
Human pharmacokinetics
Clinical trials
Drug efficacy

MAGNETIC NANOSENSOR
MMP QUANTIFICATION AND BLOOD POOL IMAGING PROBE

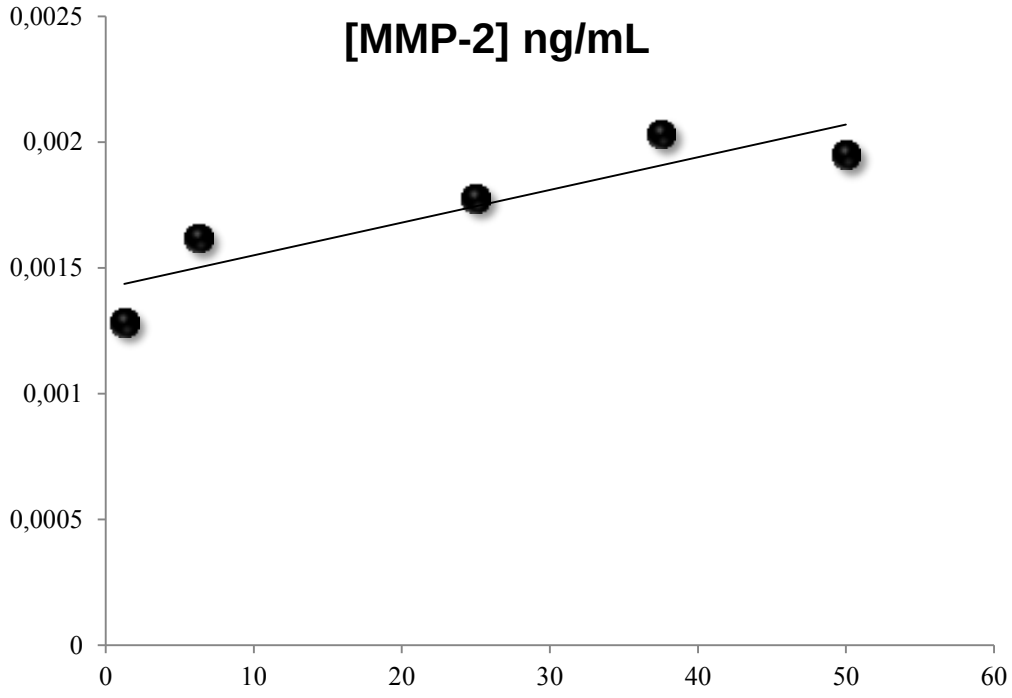


NEW NON-TOXIC MAGNETIC NANOSENSOR

Aggregation change after MMP-2 activation → R2 change → *in vitro* and *in vivo* detection

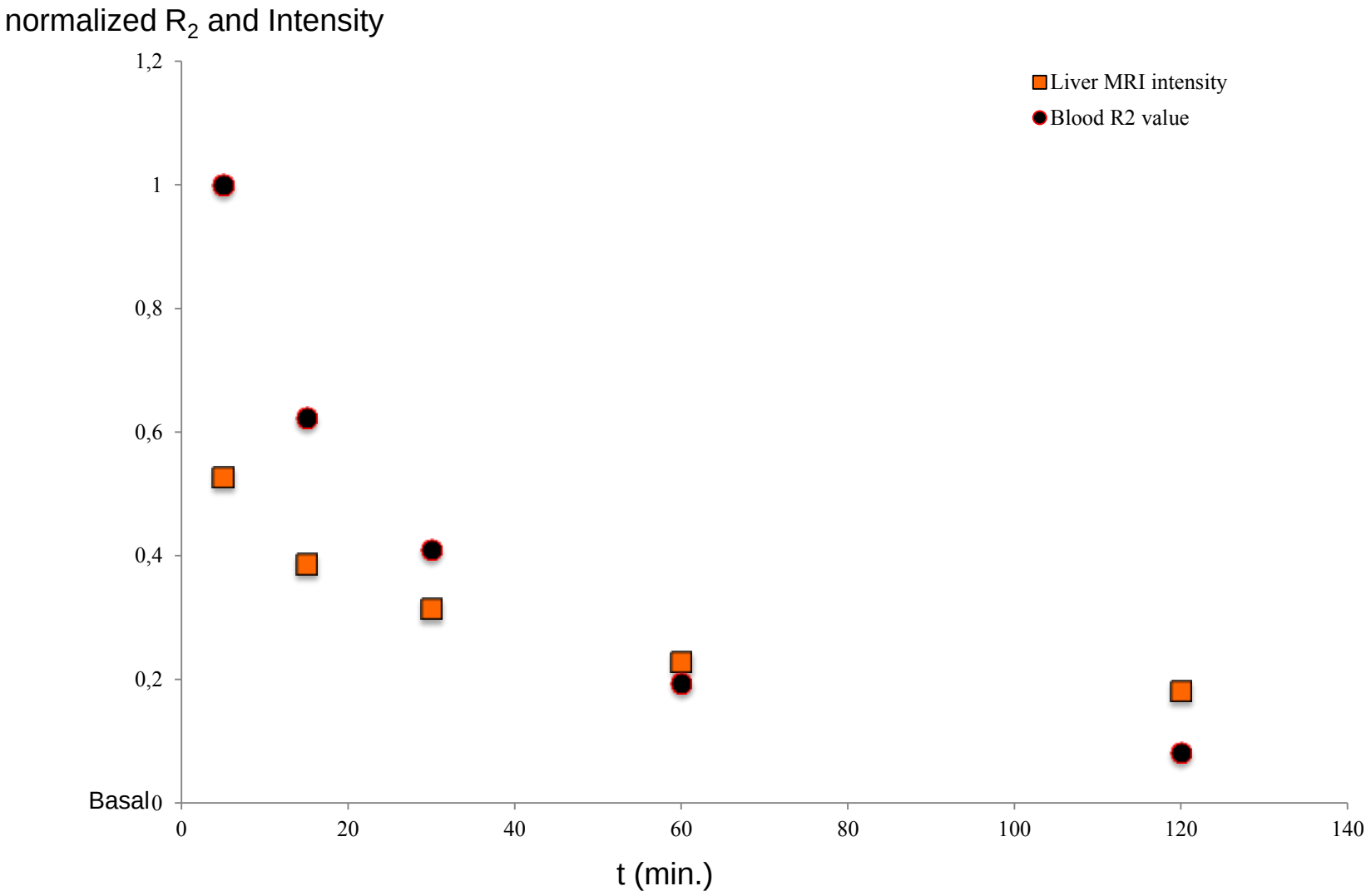


Signal max. after 2 h incubation



Linear behaviour from 1 ng/mL to 60 ng/mL

In vivo


normalized R_2 and Intensity
1,2
1
0,8
0,6
0,4
0,2
Basal 0
0
20
40
60
80
100
120
140
t (min.)
Liver MRI intensity
Blood R2 value