Gamma MRI

The Future of Molecular Imaging

The need

Medical imaging has revolutionized Europe's healthcare, from diagnostics to treatment plans, and it is nowadays impossible to imagine a contemporary healthcare system without its benefits.

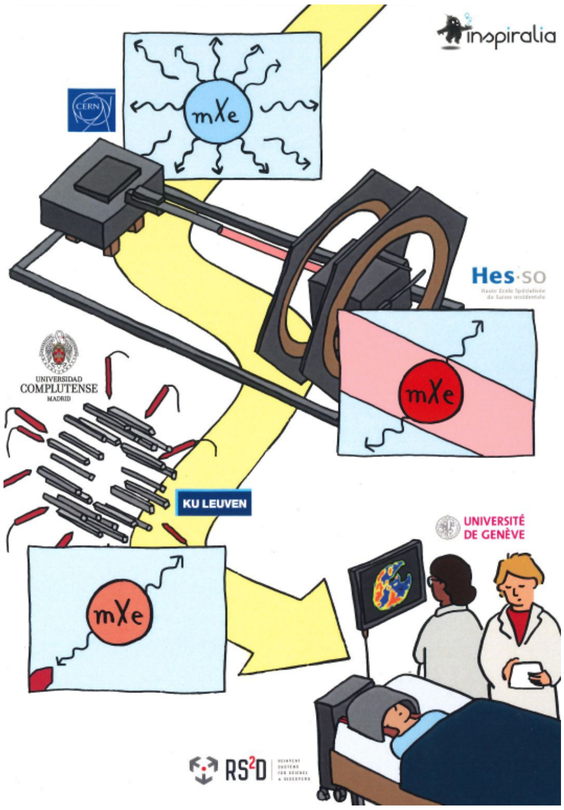
In the last decades, technological developments have been at the core of new imaging modalities by:

- driving existing modalities with known physics principles to new levels (e.g. low dose or spectral CT);
- enabling new routine clinical tools (e.g. diffusion tensor imaging);
- opening new avenues for research, diagnostic and treatment.

However, lack of sensitivity, low spatial resolution or even accessibility to devices all still hinder the applicability of medical imaging to address the major healthcare challenges of an ageing Europe.

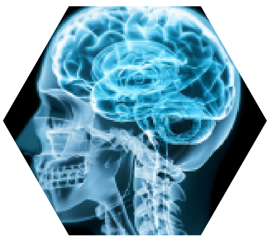
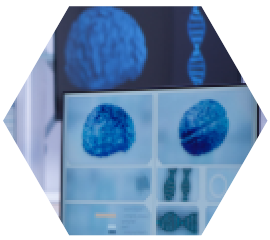
Over 165 million people in Europe are affected by at least one brain disease such as Alzheimer's, Parkinson's, dementia, stroke etc. Most neurological diseases are age sensitive and with the ongoing demographic changes, their incidence is expected to increase. This will be one of the major societal challenges in Europe and worldwide.

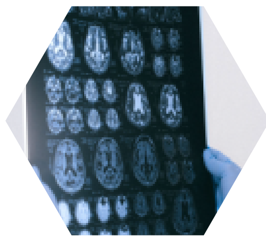
Stroke alone is the second most common cause of death and the third leading cause of disability worldwide. Nearly 85% of strokes are of the ischaemic subtype that can be treated by restoring blood flow to the ischaemic brain through thrombolysis or thrombectomy, but only within a relatively narrow time window of 4–8 hours after ischemic onset.



The Objectives

- Maintain and maximise polarisation of mXe with Spin-exchange Optical Pumping.
- Explore best K-space sampling strategies and simulate setup's response to gamma radiation.
- Define and develop the hardware and software configuration of the GAMMA-MRI prototype.
- Develop a biophysical model to perform first preclinical proof-of-principle experiment



www.gamma-mri.eu

https://cordis.europa.eu/project/id/964644

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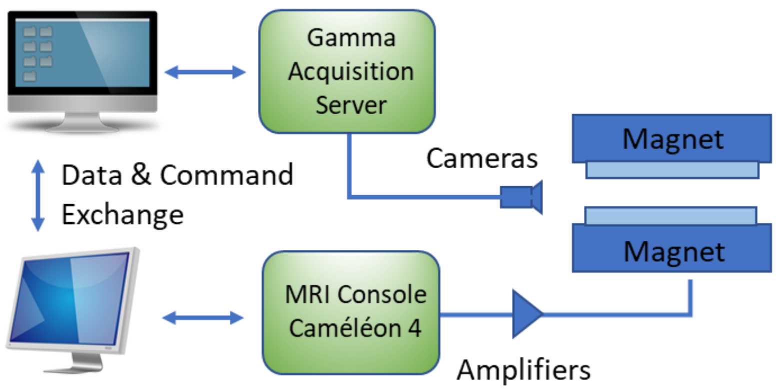
Expected Results

- Producing hyperpolarised γ-emitting xenon isomers preserving hyperpolarisation until delivery to the targeted organ.
- Developing advanced image acquisition and reconstruction techniques using physics- and artificial intelligence-based approaches.
- Designing and assembling of a first prototype with a low-field versatile magnet.
- The first preclinical proof-of-concept brain imaging experiment.



Scientific Highlights

- Develop a clinical molecular imaging device based on the physical principle of anisotropic gamma emission from hyperpolarised metastable xenon.
- Based on a revolutionary technology, allowing the simultaneous exploitation of the sensitivity of gammadetection and the spatial resolution and flexibility of MRI.

The Consortium

Hes·so

UNIVERSITÉ DE GENÈVE

UNIVERSIDAD COMPLUTENSE MADRID

RS2D REINVENT SYSTEMS FOR SCIENCE & DISCOVERY

CERN

KU LEUVEN

inspiralia

Linkedin

www.gamma-mri.eu

info@inspiralia.com