

UNIVERSIDAD REY JUAN CARLOS

Norberto Malpica

norberto.malpica@urjc.es

Director

Medical Image Analysis and Biometry Lab

Universidad Rey Juan Carlos



THE UNIVERSITY

Founded in **1996**

Youngest Public University in Madrid



5 Campus and 2 Headquarters

1.260.000 m2 and more than 60 buildings



SHANGHAI RANKING

SHANGHAI GLOBAL RANKING OF ACADEMIC SUBJECTS 2019:

100 - 151
ECOLOGY
TOP 200
COMMUNICATION
TOP 300
COMPUTER ENGINEERING
CHEMICAL ENGINEERING
MANAGEMENT

THE WORLD UNIVERSITY RANKINGS
2018 TOP 200
YOUNG

TOP 200

QS STARS
RATING SYSTEM

2019 ★★★★★

Internationalization

2019 ★★★★★

Employability

2019 ★★★★★

Innovation

#1 in Employability in Spain



TECHNOLOGY & HEALTH CAMPUSES



TECHNOLOGY & HEALTH CAMPUSES



STUDYING AT URJC - DEGRESS



Studies:

81 Bachelor Degrees

9 in English

80 Master Degrees

PhD Studies

-  Arts and Humanities
-  Social and Legal Sciences
-  Sciences
-  Engineering and Architecture
-  Health Sciences

www.urjc.es/estudios/grado

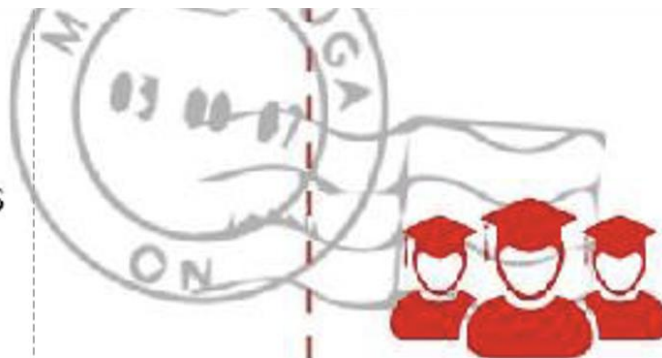


STUDYING AT URJC - STUDENTS

48 365 students

6 117 International Students
from **111** countries

#1 The Spanish University
with highest number of International Students



International Mobility



Outgoing

1 563



Incoming

1 114



UNIVERSITY HOSPITALS

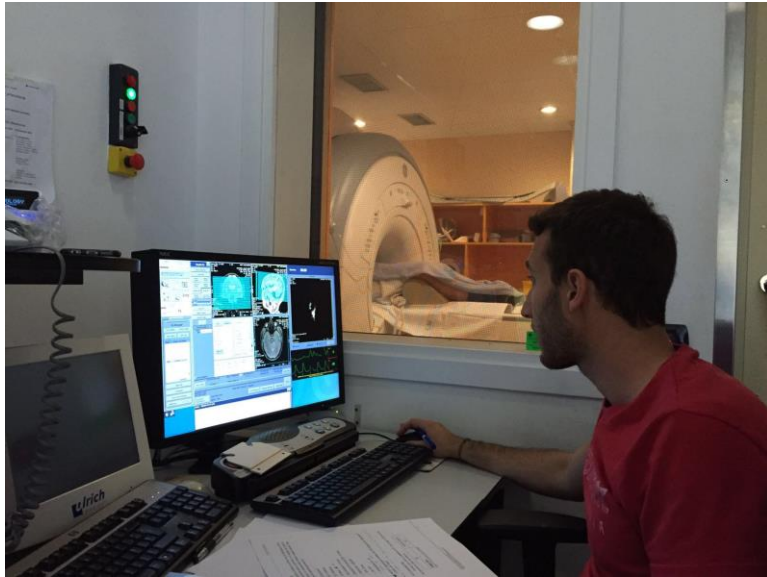


MEDICAL IMAGE ANALYSIS AND BIOMETRY LAB

LAIMBIO is:

1. A service lab funded by Comunidad de Madrid, that provides biomedical image analysis services, and design of image-based clinical or research studies
2. A research group focusind on improving the quality of multimodal image acquisition and quantification to obtain biomarkers for diagnosis and therapy

MRI IMAGE ACQUISITION

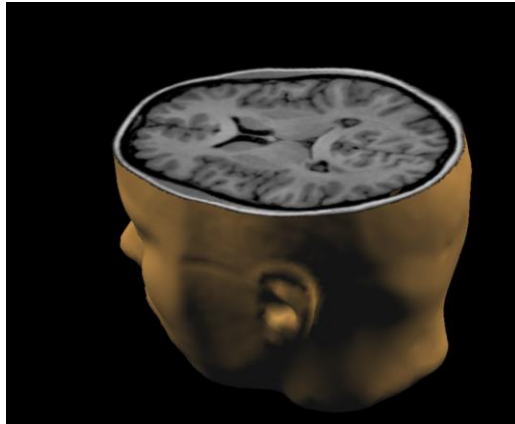


RM 3 Tesla
Hospital de Fuenlabrada

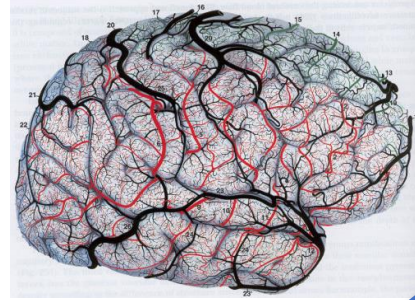


RM 3 Tesla
Quirón Pozuelo

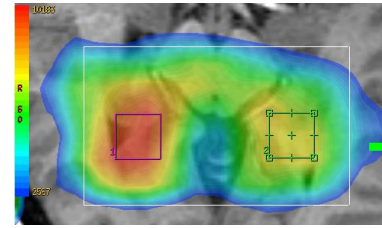
MRI BASED NEUROIMAGING



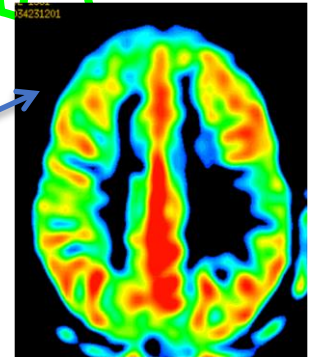
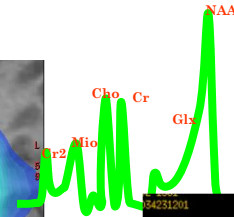
Anatomical



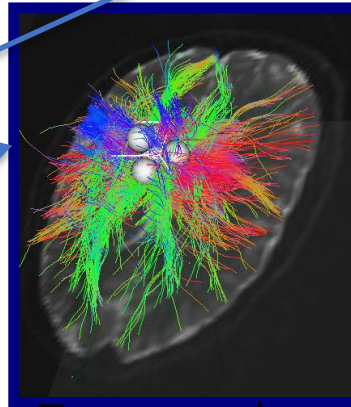
Vascular



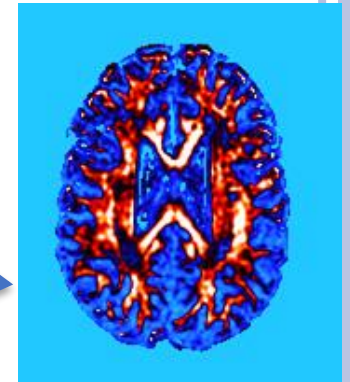
Biochemistry



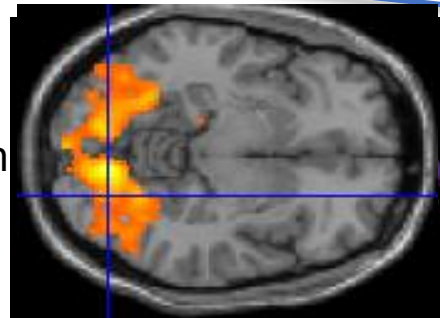
Perfusion



Tractography



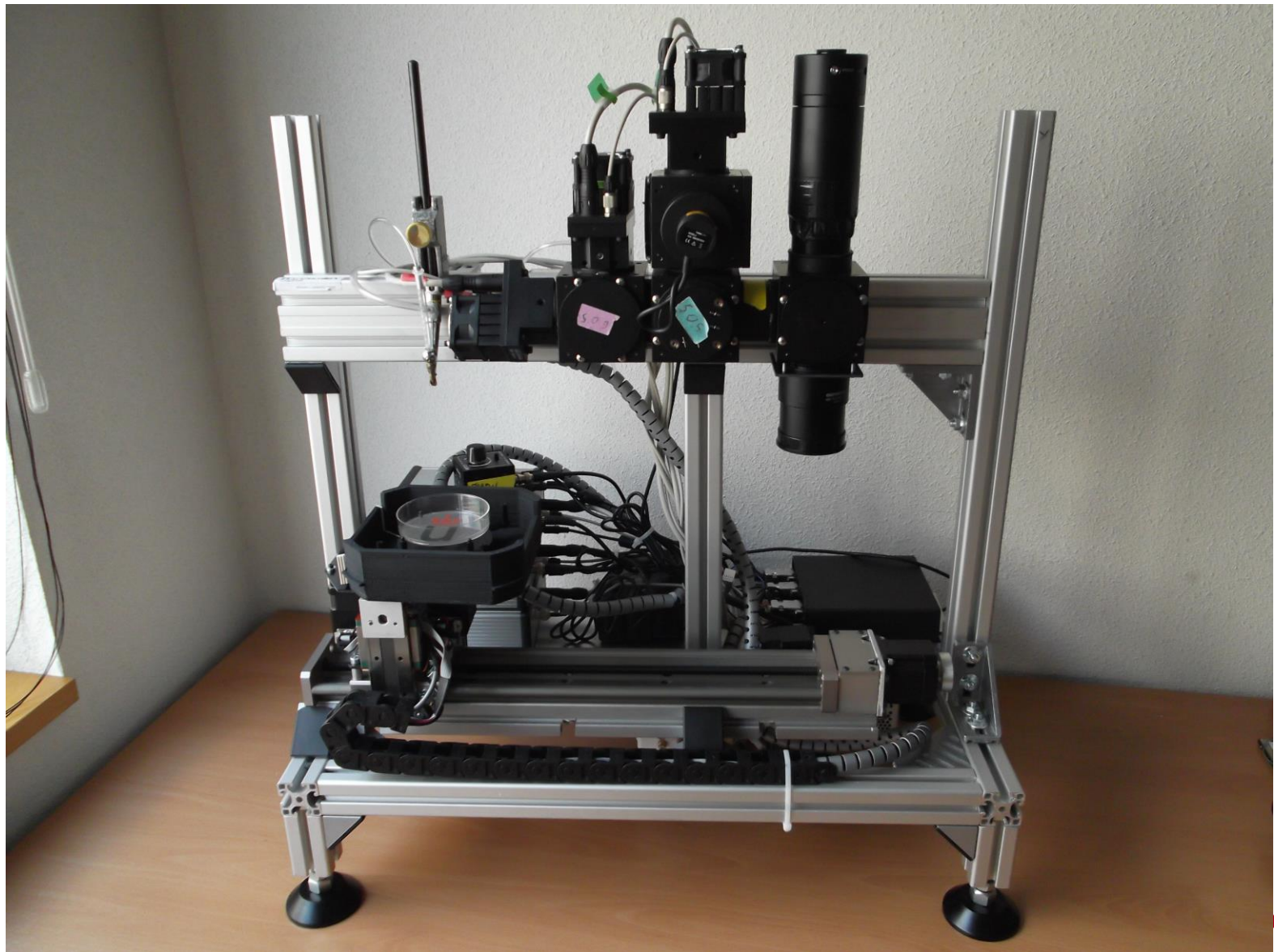
Difussion



Function



HIGH-THROUGHPUT CYTOMETRY



RESULTING IMAGES



QUANTIFICATION

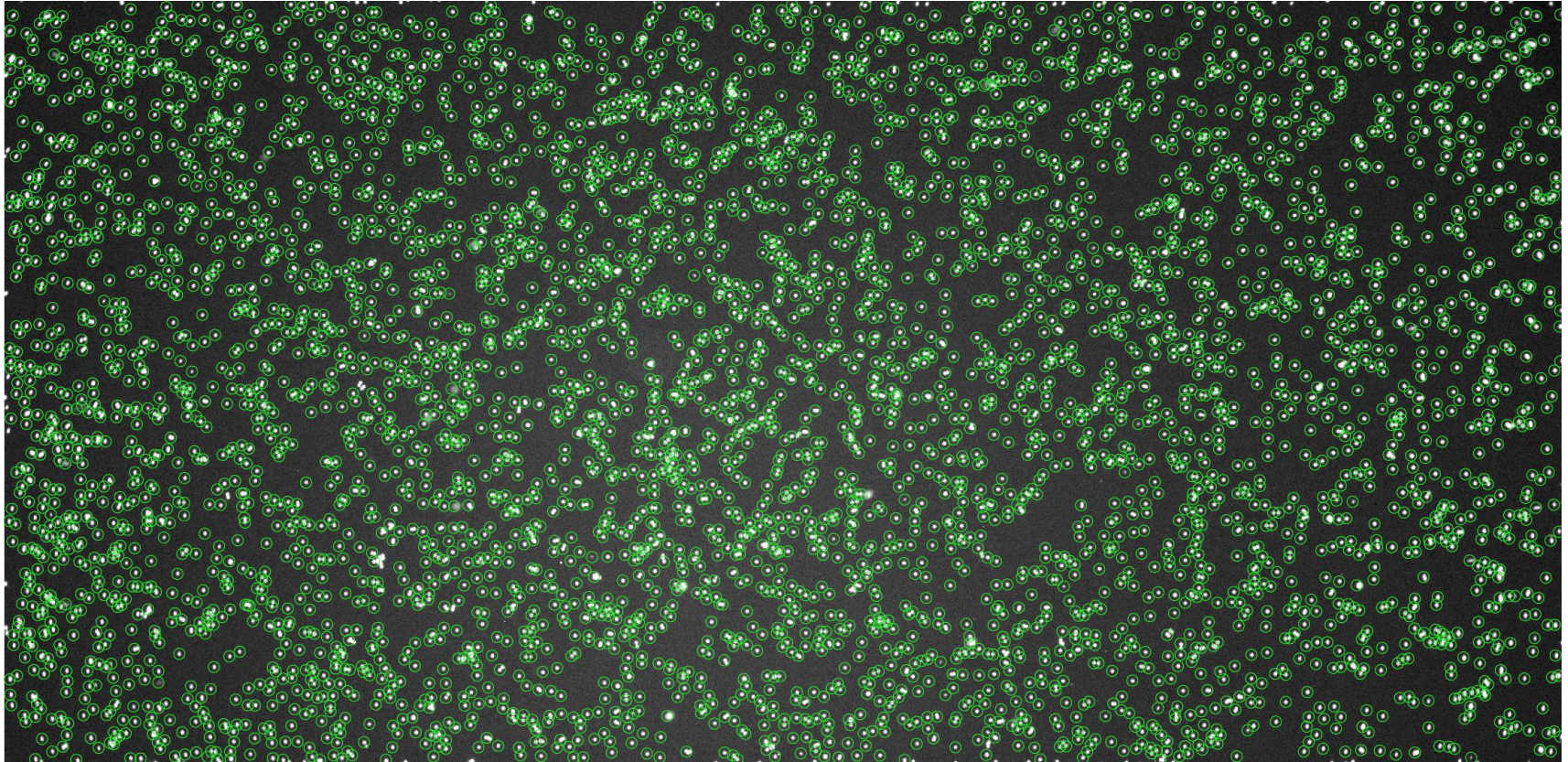
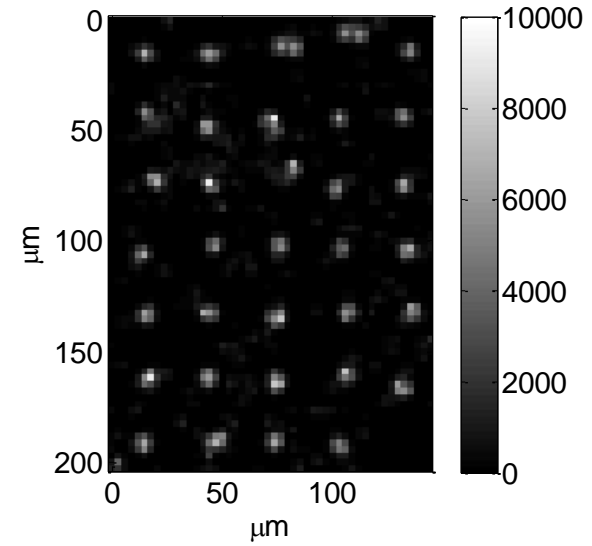
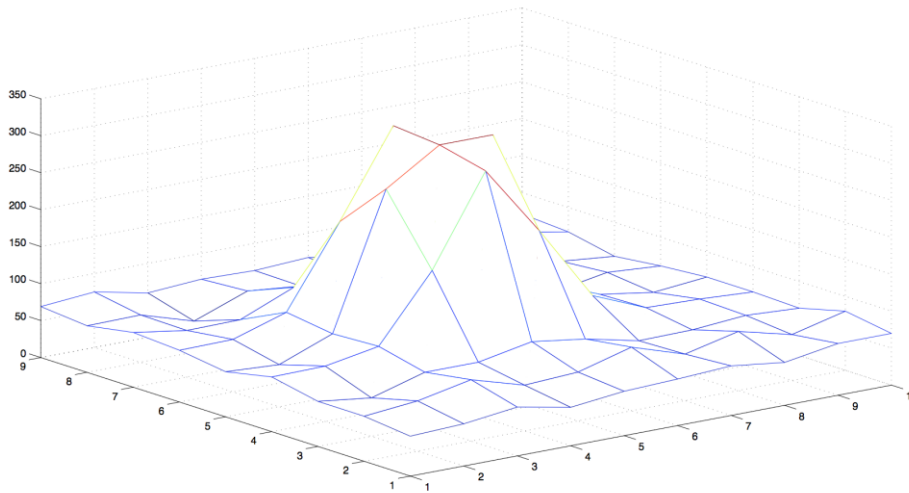
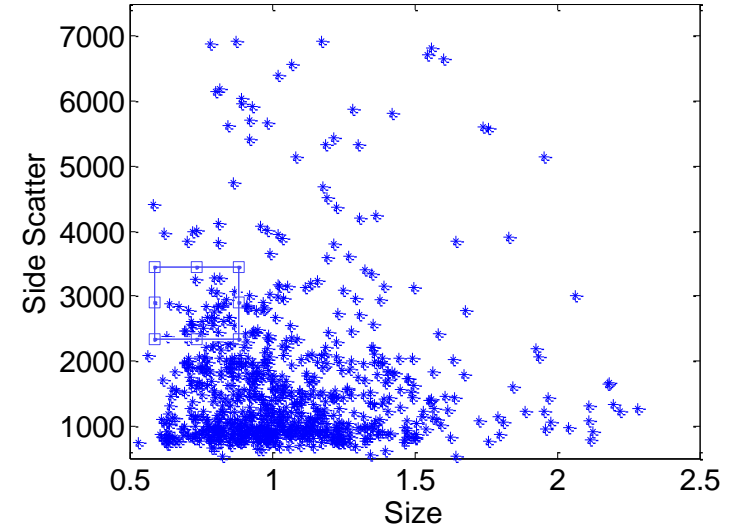
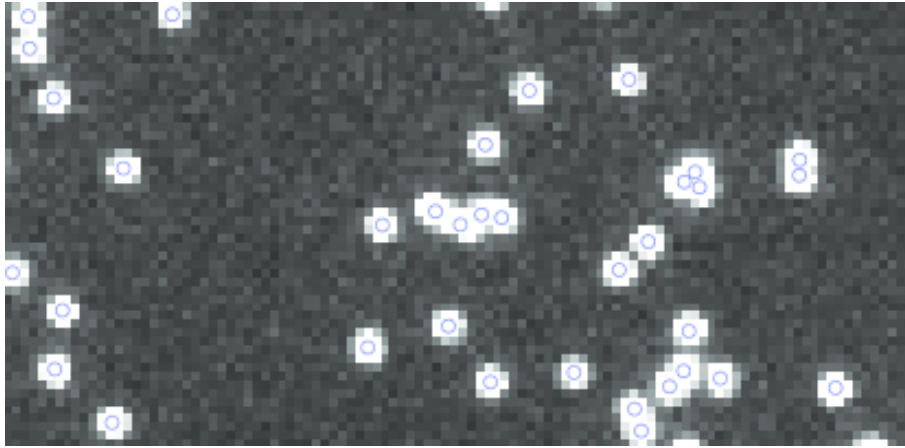
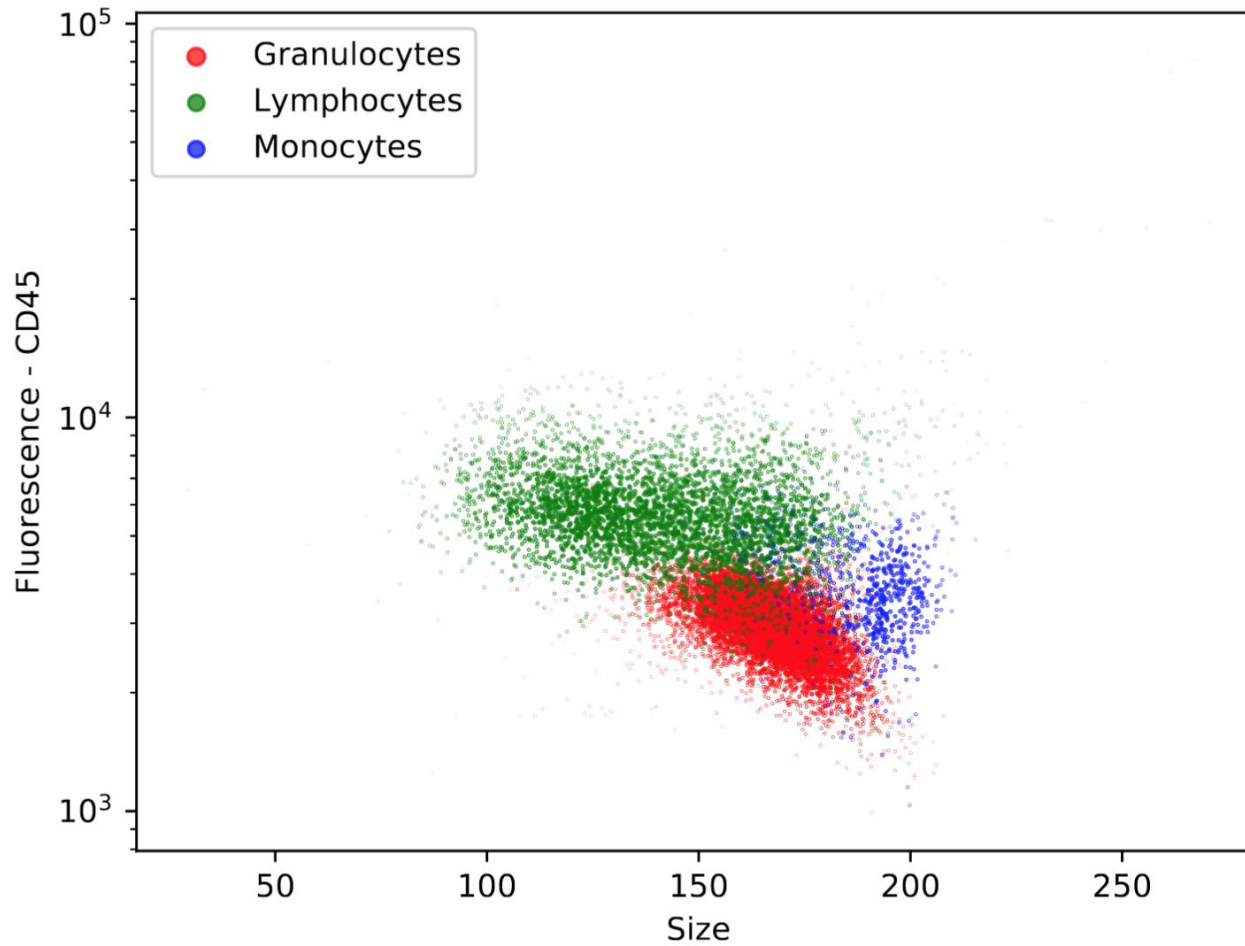


IMAGE ANALYSIS



FINAL RESULTS

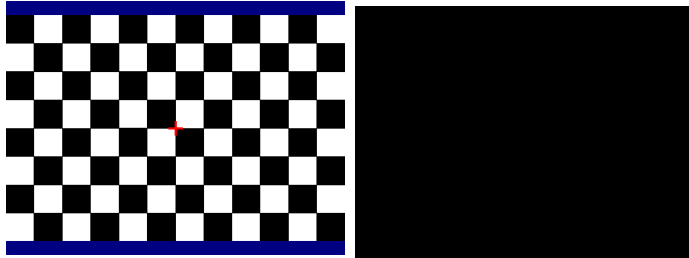
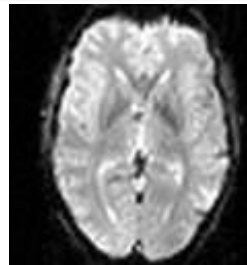


MRI DATA ANALYSIS

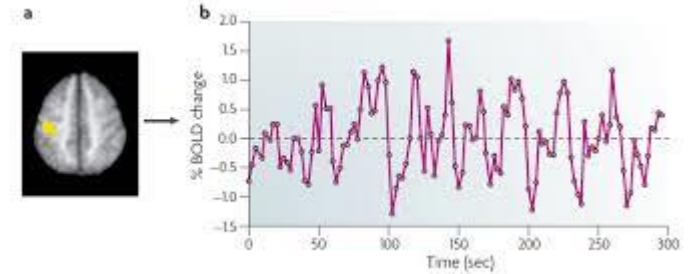
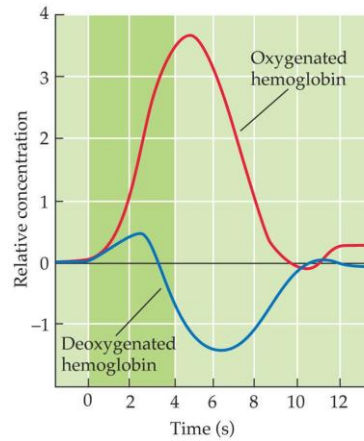
FUNCTIONAL



EPI



TASK-BASED FMRI

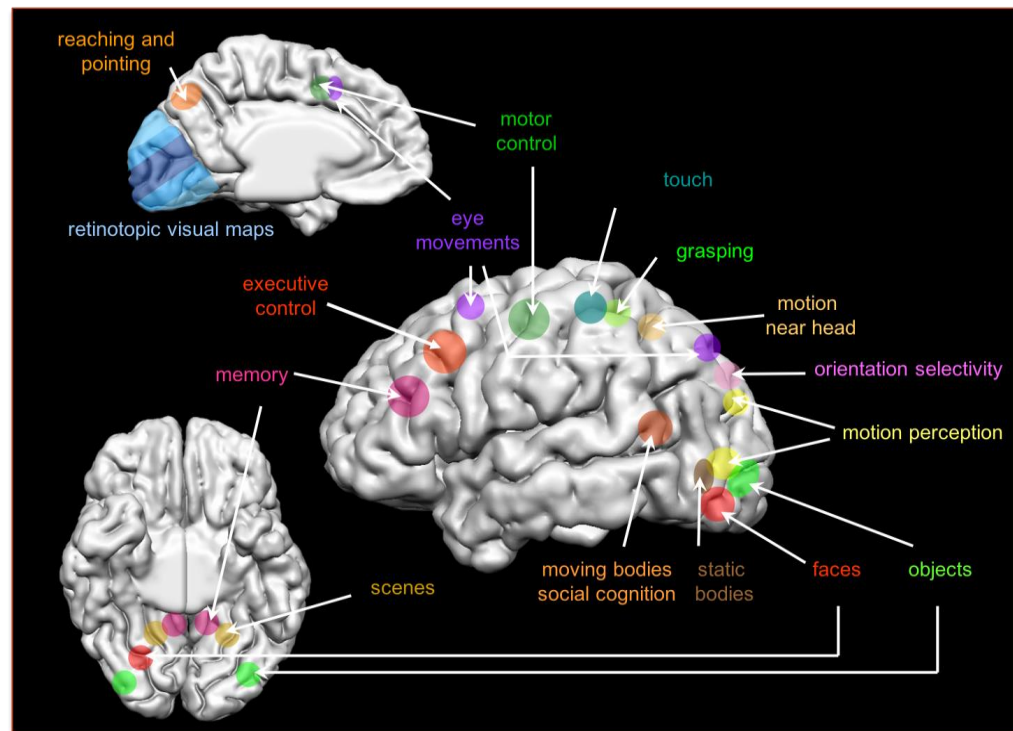
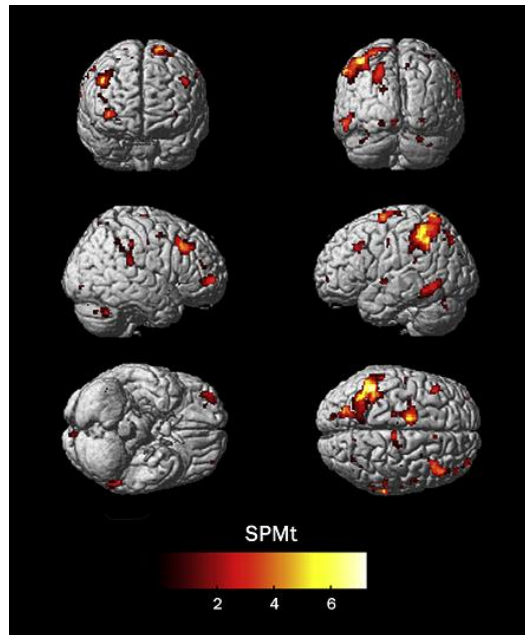


RESTING-STATE FMRI

MRI DATA ANALYSIS

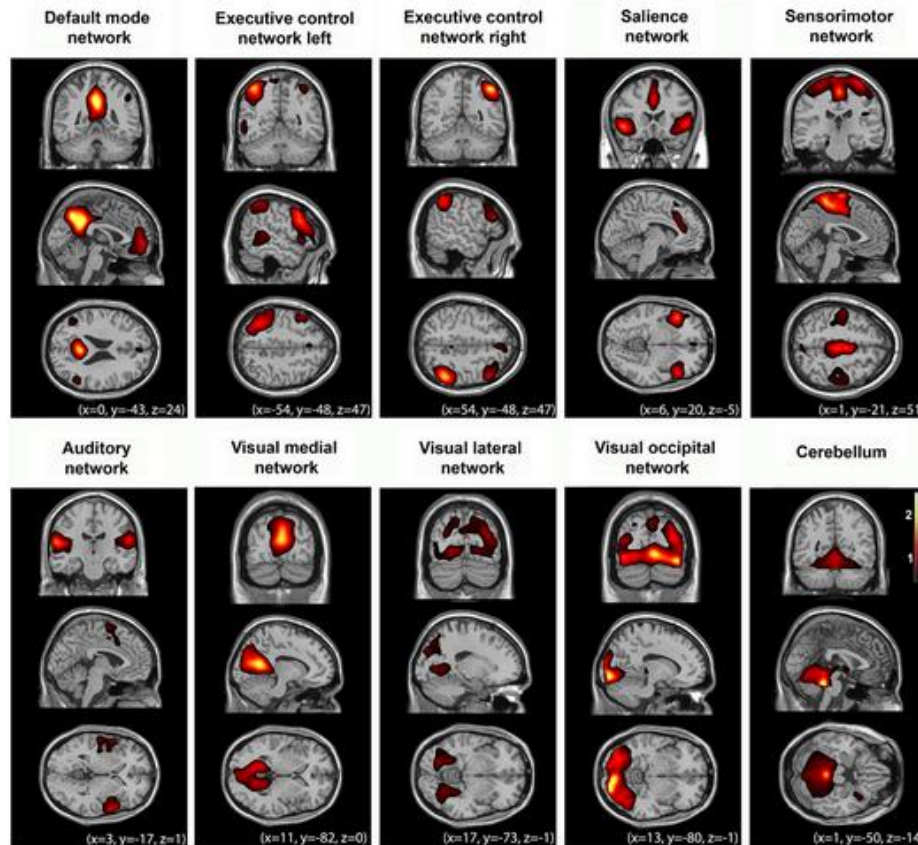
FUNCTIONAL

TASK-BASED FMRI



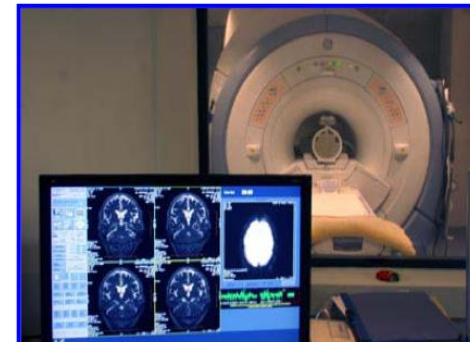
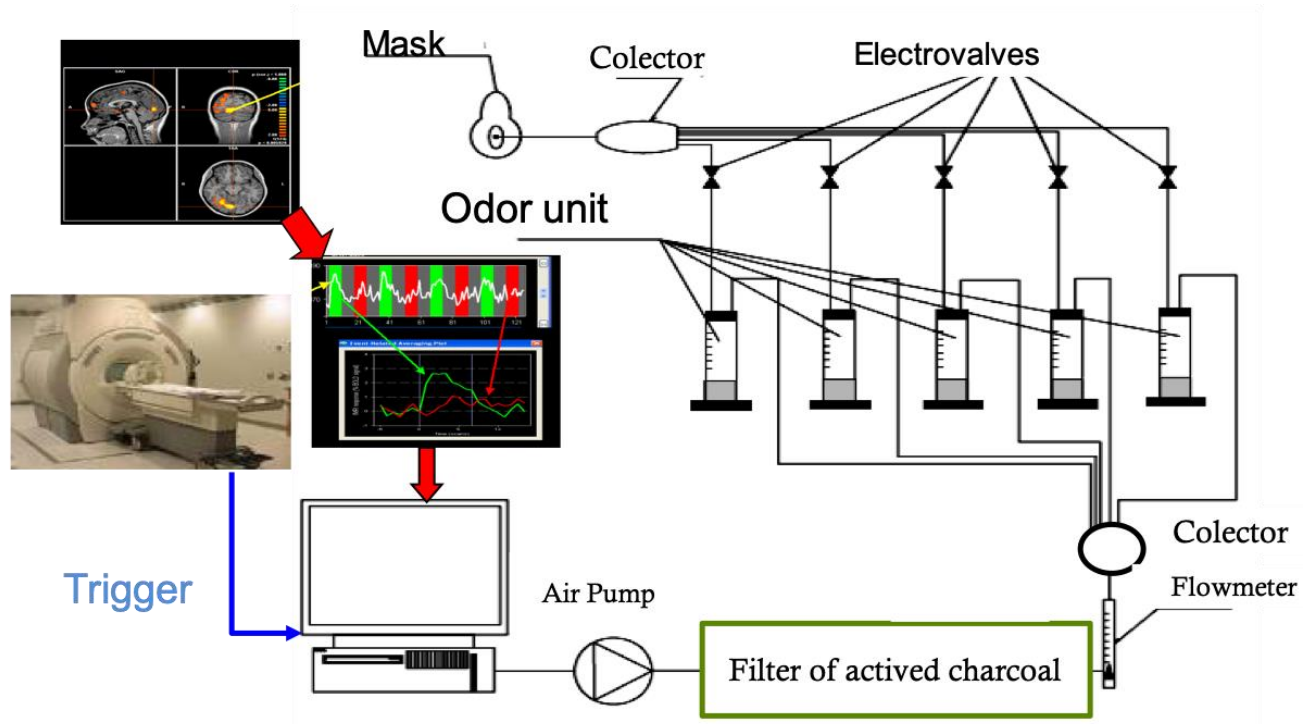
MRI DATA ANALYSIS

FUNCTIONAL



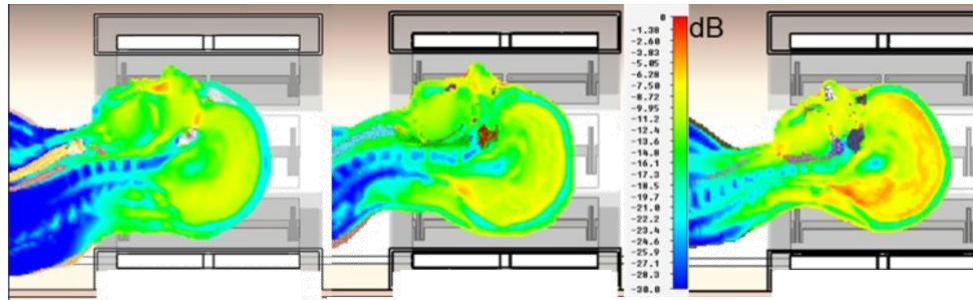
RESTING-STATE
FMRI

ODOR PERCEPTION AND ANOSMIA



SAFETY OF HIGH-FIELD MRI

- Specific Absorption Rate (SAR) becomes a major limiting factor at High Field MRI (7T)
 - Limits the maximum flip-angle and shortest TR
 - Limits image contrast and total scan time
- The accuracy of SAR prediction is limited by the model
 - The location of SAR hotspots varies depending on the subject-specific anatomical variations



MS-SAR PROJECT: IMPROVING RF SAFETY FOR HIGH FIELD MRI



**Yigitcan
Eryaman**
m+Vision



**Elfar
Adalsteinsson**
MIT



**Norberto
Malpica**
URJC



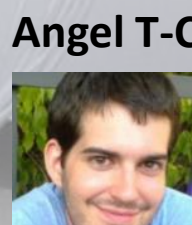
**Emanuele
Schiavi**
URJC



**Joaquin
L. Herraiz**
m+Vision



**Lawrence
Wald**
Martinis

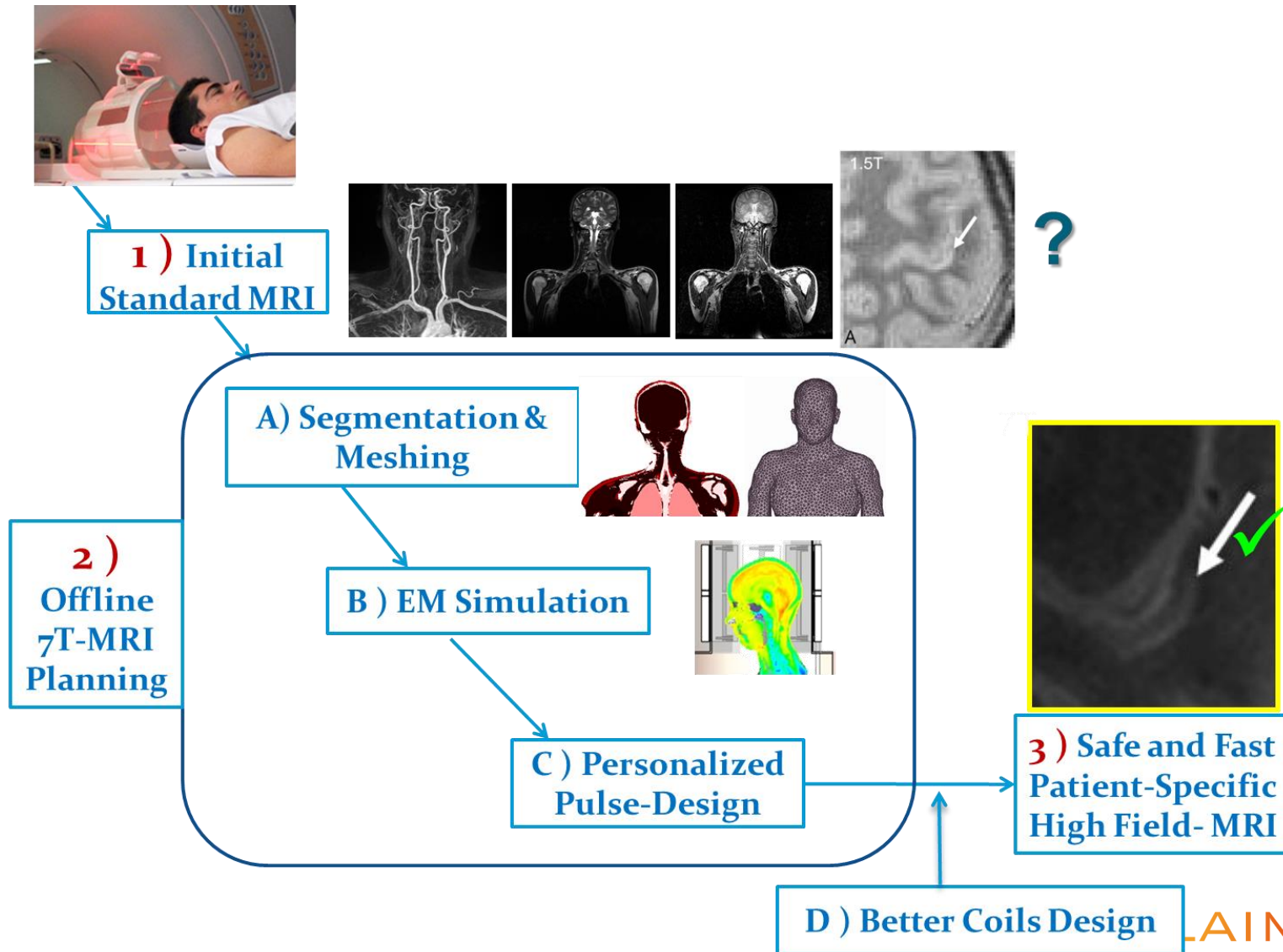


Angel T-C.



Adrian M.

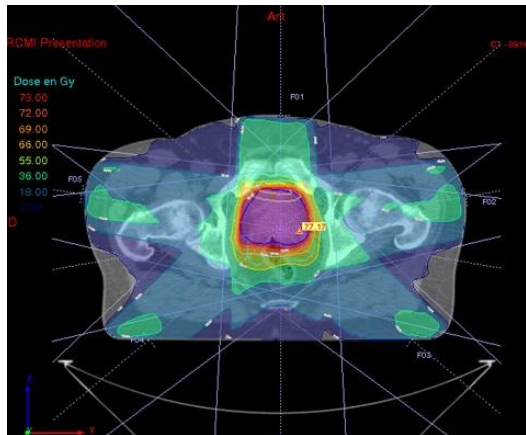
PROPOSED WORKFLOW



PROPOSED WORKFLOW SIMILAR TO IMRT

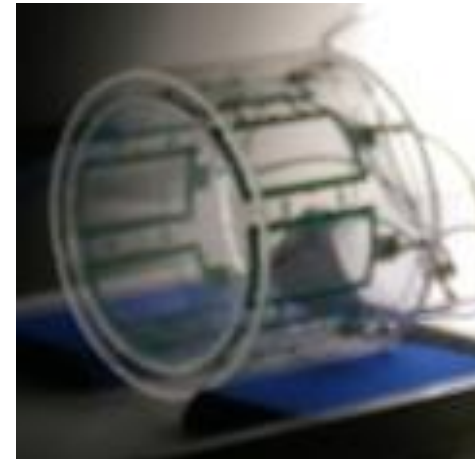
IMRT (Intensity-Modulated Radiation Therapy) Planning

- Offline, Based on a previous CT
- Select **Intensity & Angle** of each X-ray Beam
- **Goal:** Dose in Tumor
- **Limitation:** Dose in Healthy Tissue



High-Field MRI Planning

- Offline, Based on previous MRI
- Select **Intensity & Phase** of each Coil (~16 parameters)
- **Goal:** Best SNR
- **Limitation:** Global and local SAR



PET/MR IMAGING

