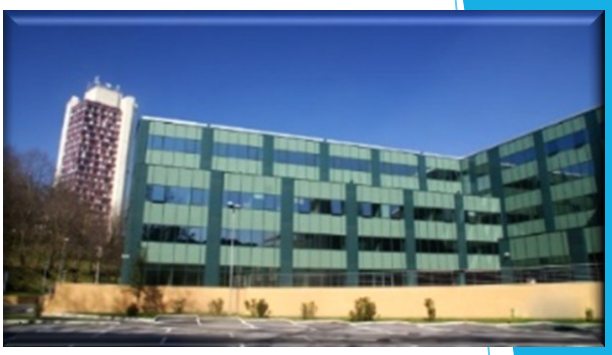
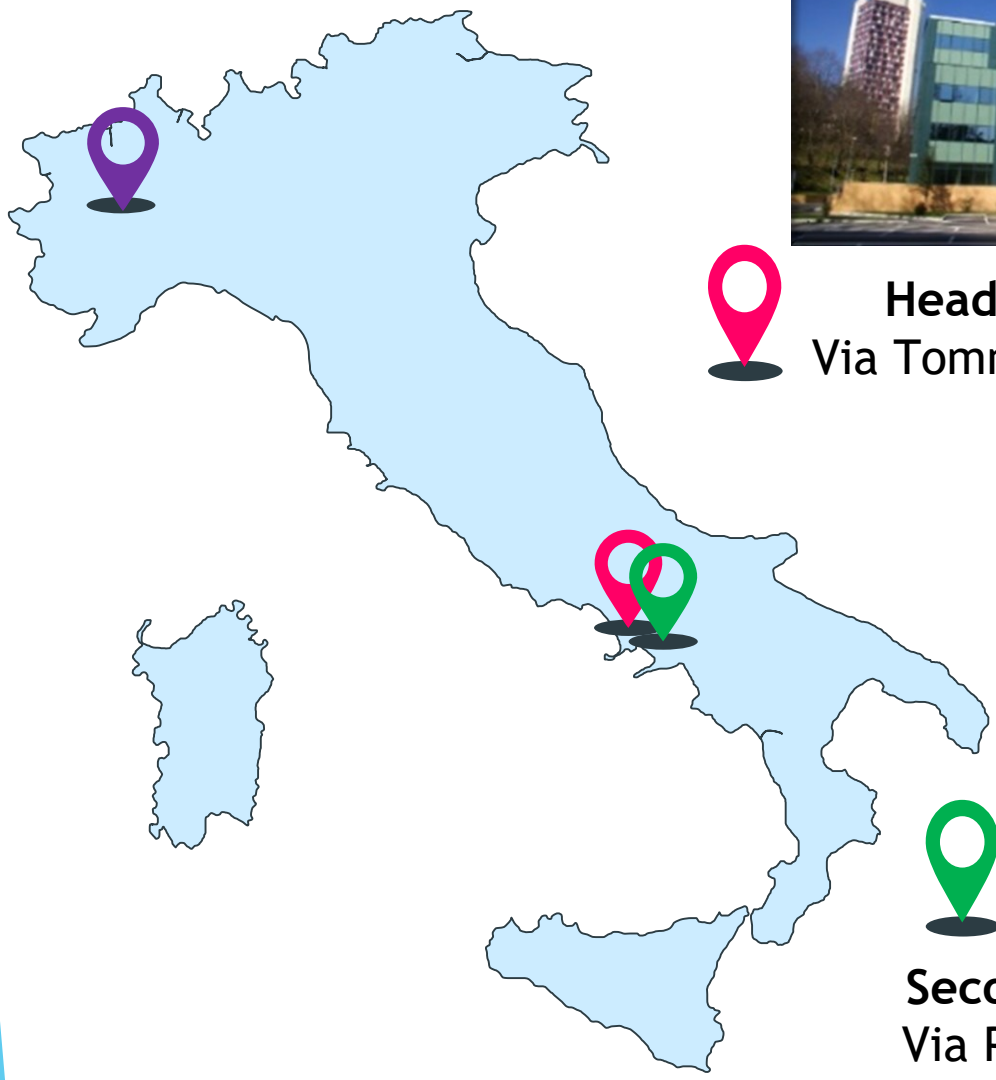
Institute of Biostructures and Bioimaging

CNR

DSB

Institute locations





Headquarter Naples
Via Tommaso De Amicis, 95

Secondary office Naples
Via Pietro Castellino, 111

Secondary office Turin
Via Nizza, 52 and Piazza Nizza, 44/B

Institute of Biostructures and Bioimaging

Our mission

The Institute of Biostructures and Bioimaging is a translational research institute that develops new diagnostic and therapeutic tools based on the understanding of the molecular mechanisms underlying human diseases

Institute research areas

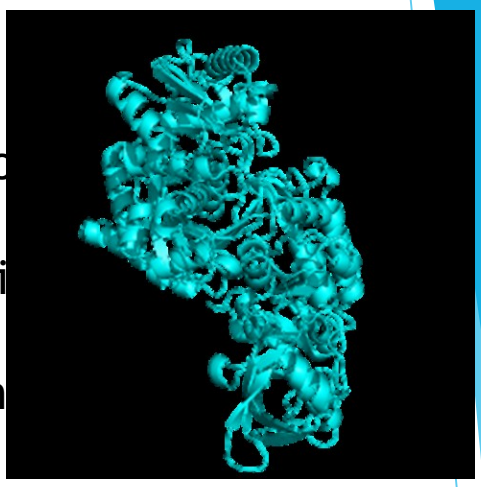
- Computational Biology
- Biomolecule Synthesis
- Molecular Biology and Biophysics
- Structural Biology
- Cellular Biology
- Preclinical Research
- Clinical Research

Computational Biology Area

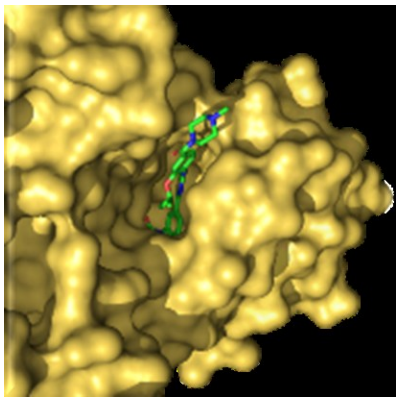
Molecular Dynamics Simulations

Conformational preferences and flexibility of biomolecular targets

Molecular Modelling and Structural Bioinformatics



- Prediction of structural models o biomolecules
- Effects of disease-associated poi mutations on protein structure
- Analysis of protein sequences an protein structural details



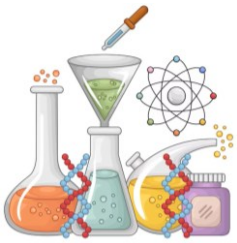
Computer-Aided Drug Design and Docking Approaches

Prediction of protein/protein and protein/ligand complexes

Theoretical Calculations

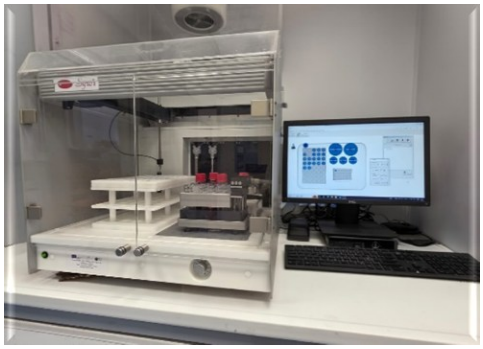
Characterization of biomolecule reactivity and photodynamics

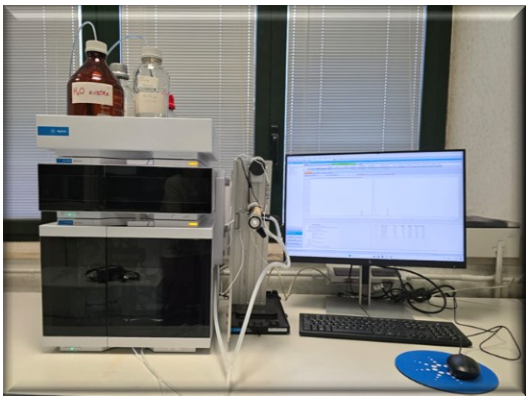
Biomolecule Synthesis Area

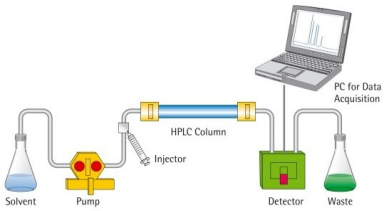


Organic and Peptide Synthesis

- Peptides
- Peptidomimetics
- Glycopeptides
- Small molecules
- DNA analogues
- Bioconjugates
- Protein synthesis





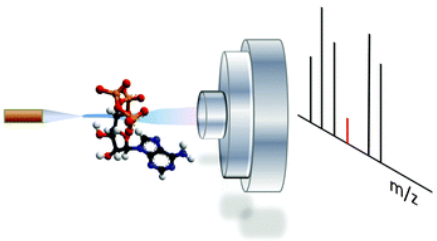


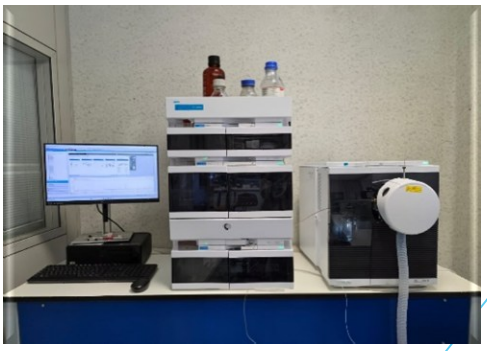
Purification

- RP-HPLC purification

Characterisation

- LC/MS analysis





Molecular Biology and Biophysics Area

Protein recombinant production

- Molecular cloning and protein expression using several eterologous systems, such as *E. coli*, baculovirus and mammalian cells
- Protein purification using chromatographic tecniques

Biophysical characterisation in solution

- Folding and stability by spectroscopic techniques
- Oligomeric states by dynamic and static light scattering
- Biomolecule identification by LC/MS/MS

Protein-protein and protein-ligand interactions

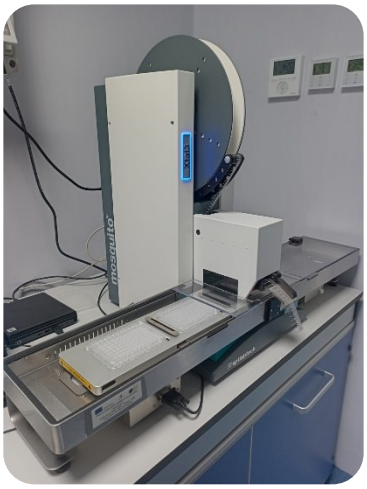
- Isothermal titration calorimetry
- Biolayer Interferometry
- Microscale thermophoresis
- Fluorescence and label-free high-throughput screening
- Phage display technologies

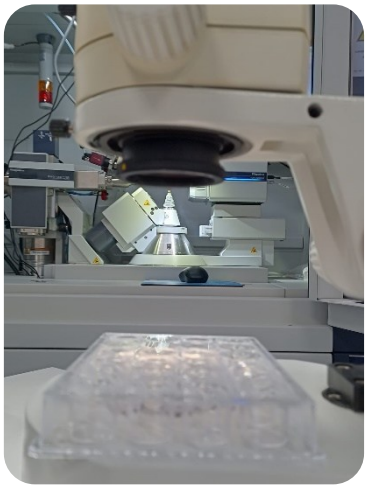
Institute of Biostructures and Bioimaging

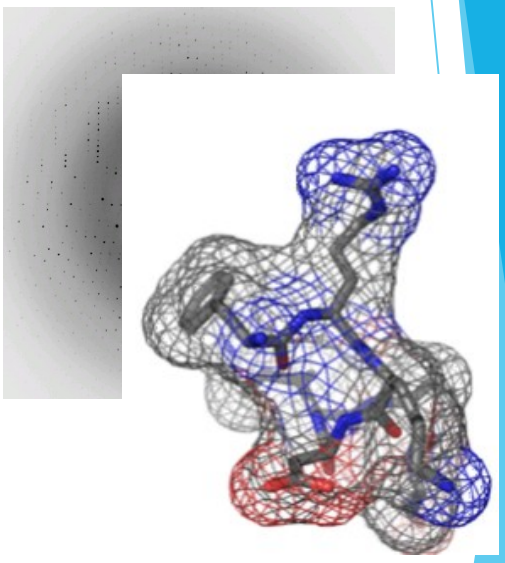
Structural Biology Area

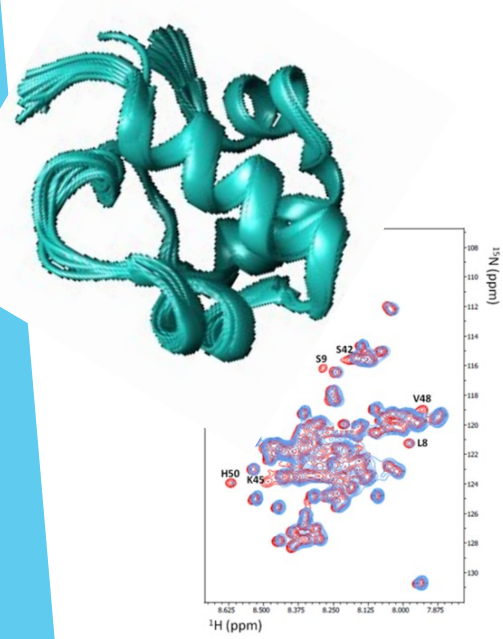
X-Ray Crystallography

- High-throughput protein crystallization
- 3D structure of proteins and nucleic acids
- Structure-based drug design
- Characterisation of reaction intermediates
- Protein/protein and protein/ligand interactions









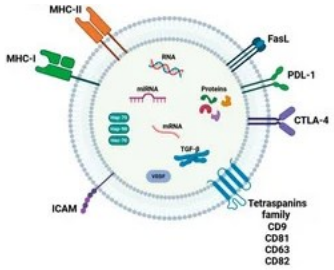
NMR Spectroscopy

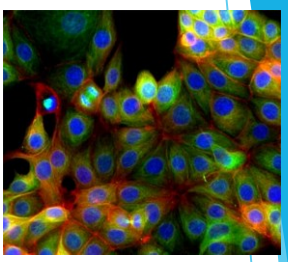
- 3D structures of proteins and peptides
- Drug Discovery
- Protein and peptide folding
- In Cell-NMR
- Protein/protein and protein/ligand interactions

Cellular Biology Area

Molecular Mechanisms of Human Diseases

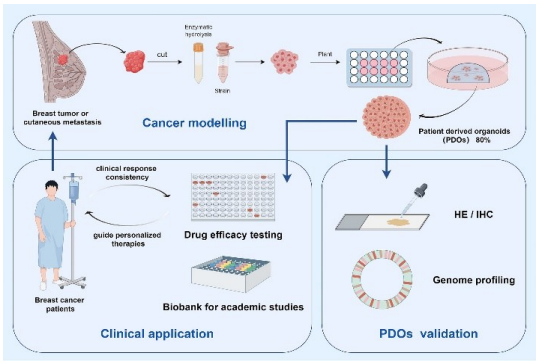
- Molecular Oncology
- Tumour microenvironment
- Extracellular vesicles
- Drug Resistance
- Drug-Target interaction
- Identification of new biomarkers
- Cellular Metabolism
- Cellular Communication and Signaling Pathways

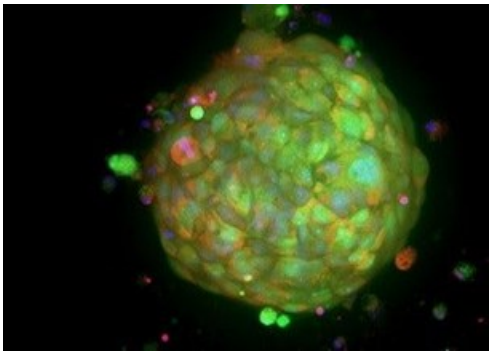




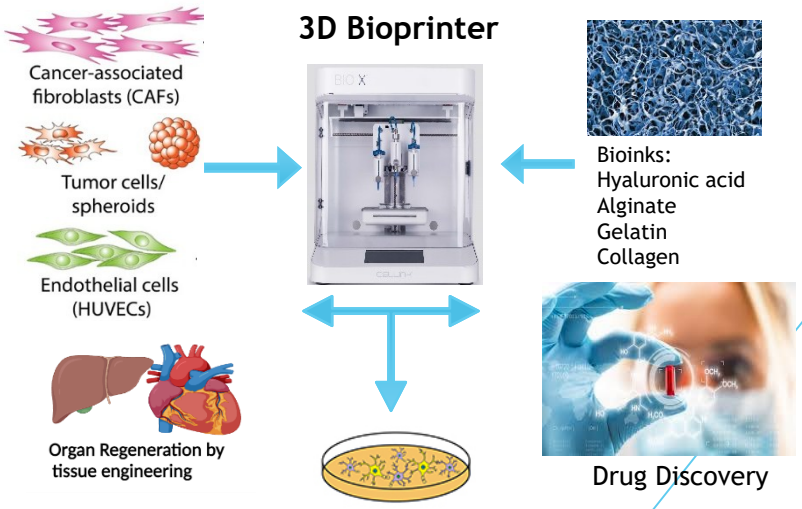
Organoids and 3D Bioprinting

- Establishment of patient derived organoids for guiding personalized therapies





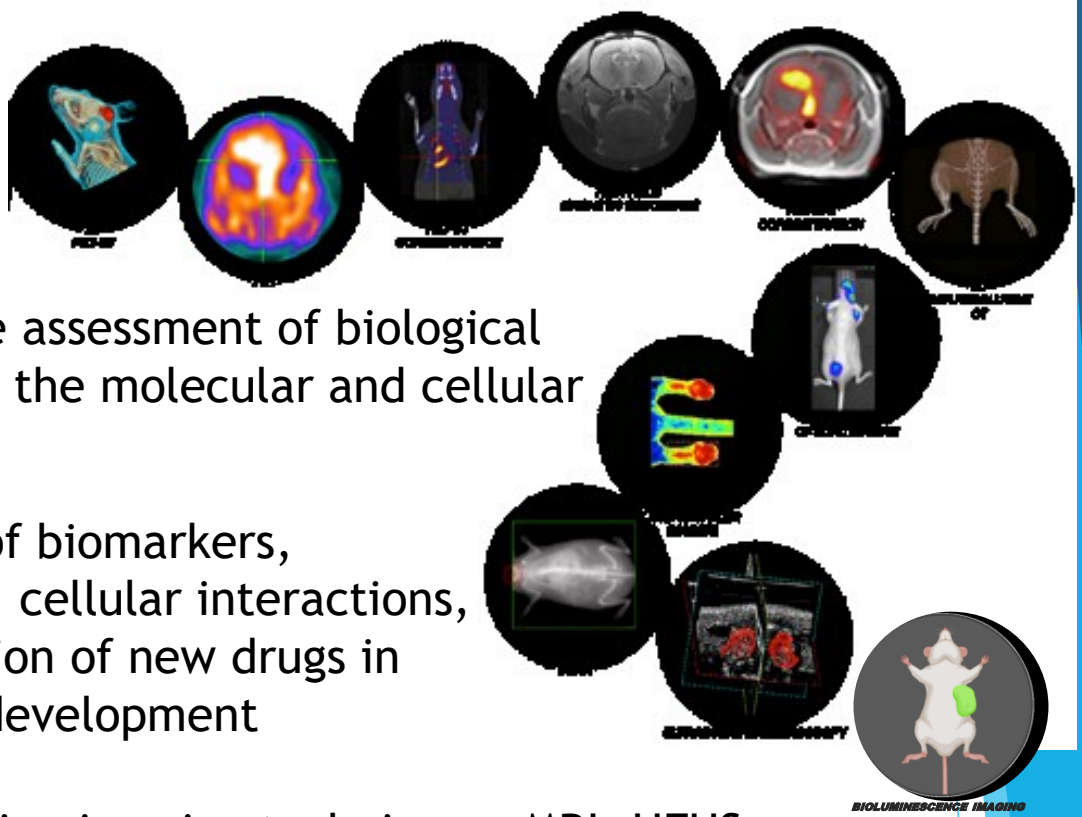
- 3D Bioprinting for Drug Discovery and Regenerative Medicine



in vitro Disease Modeling

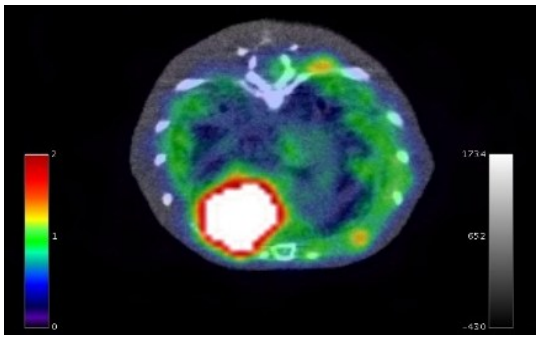
Preclinical research area

In vivo Studies and Molecular Imaging



- Non-invasive assessment of biological processes at the molecular and cellular level *in vivo*
- Monitoring of biomarkers, metabolism, cellular interactions, and evaluation of new drugs in preclinical development
- High-resolution imaging techniques: MRI, HFUS, OI, PET/SPECT

Imaging Probe Development

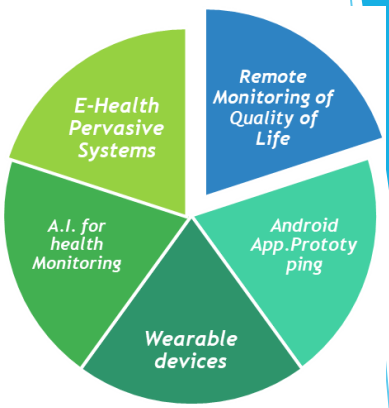


- Synthesis, characterization and in vivo validation of new imaging probes and contrast agents for several imaging modalities (MRI, OI, PET/SPECT);
- Proof-of-concept studies for clinical translation of new imaging probes

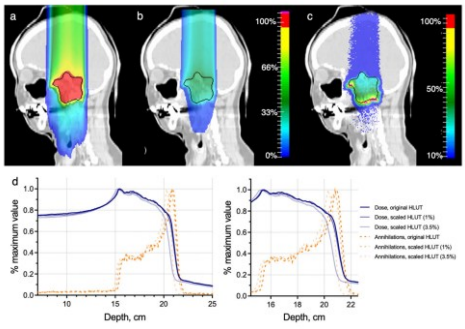
Clinical Research Area

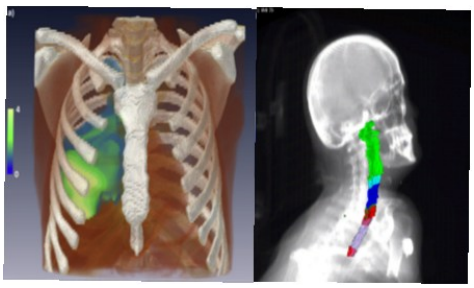
E-Health

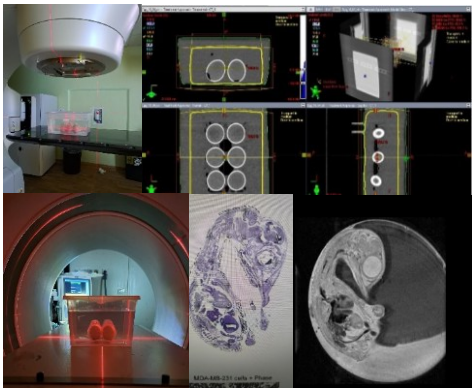
- Development of novel architectures for non-invasive monitoring systems
- New metodologies of patient remote monitoring, using user friendly technologies



Radiation and Medical Physics Research

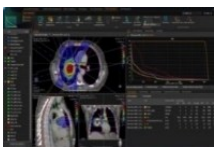




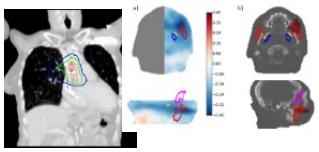


- Clinical and pre-clinical radiobiology
- New technologies for dosimetry
- Image-based data mining
- Voxel-based analysis in radiation oncology
- Probabilistic treatment plan optimization

State of the art treatment



State of the art treatment planning

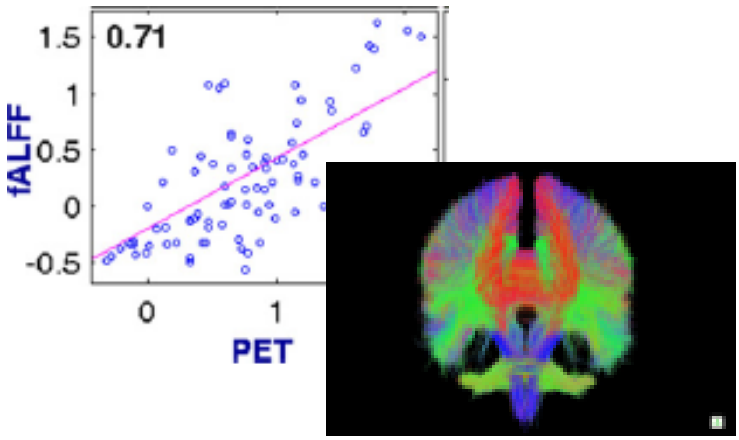


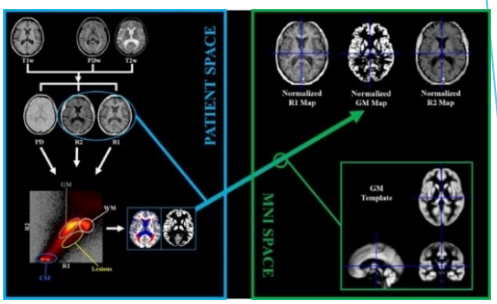
Innovative data analysis

Clinical Research Area

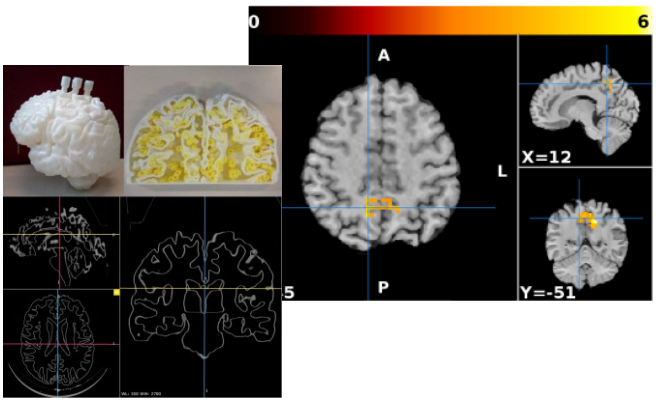
Clinical Bioimaging

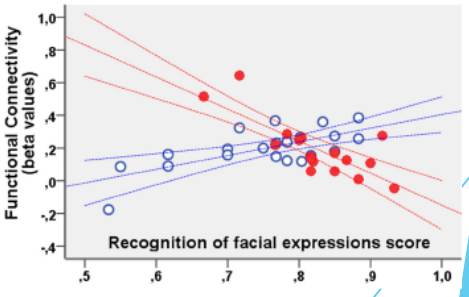
- Neurodegenerative Disease
- Movement & Psychiatric disorders
- Hybrid PET-MRI Imaging
- Relaxometry/Segmentation





- Aging
- Resting –state fMRI
- Antropomorphic Phantom Prototyping





IBB Infrastructures

IBB is part of the italian node of EURO BIOIMAGING

IBB has taken part in three infrastructure enhancement projects:

CIRO
(Campania Imaging Infrastructure for Research in Oncology)

IMPARA
(*Imaging from molecules to preclinical*)

SEE LIFE
(*StrEngthEning the ItaLIan InFrastructure of Euro-BioImaging*)

These projects have led to the establishment of two advanced facilities:

SIM, dedicated to the development of molecular imaging probes

Laboratory for Molecular Imaging Probe Development and Characterization

PreMI Center, focused on preclinical imaging

Preclinical Molecular Imaging Center

PreMI Center