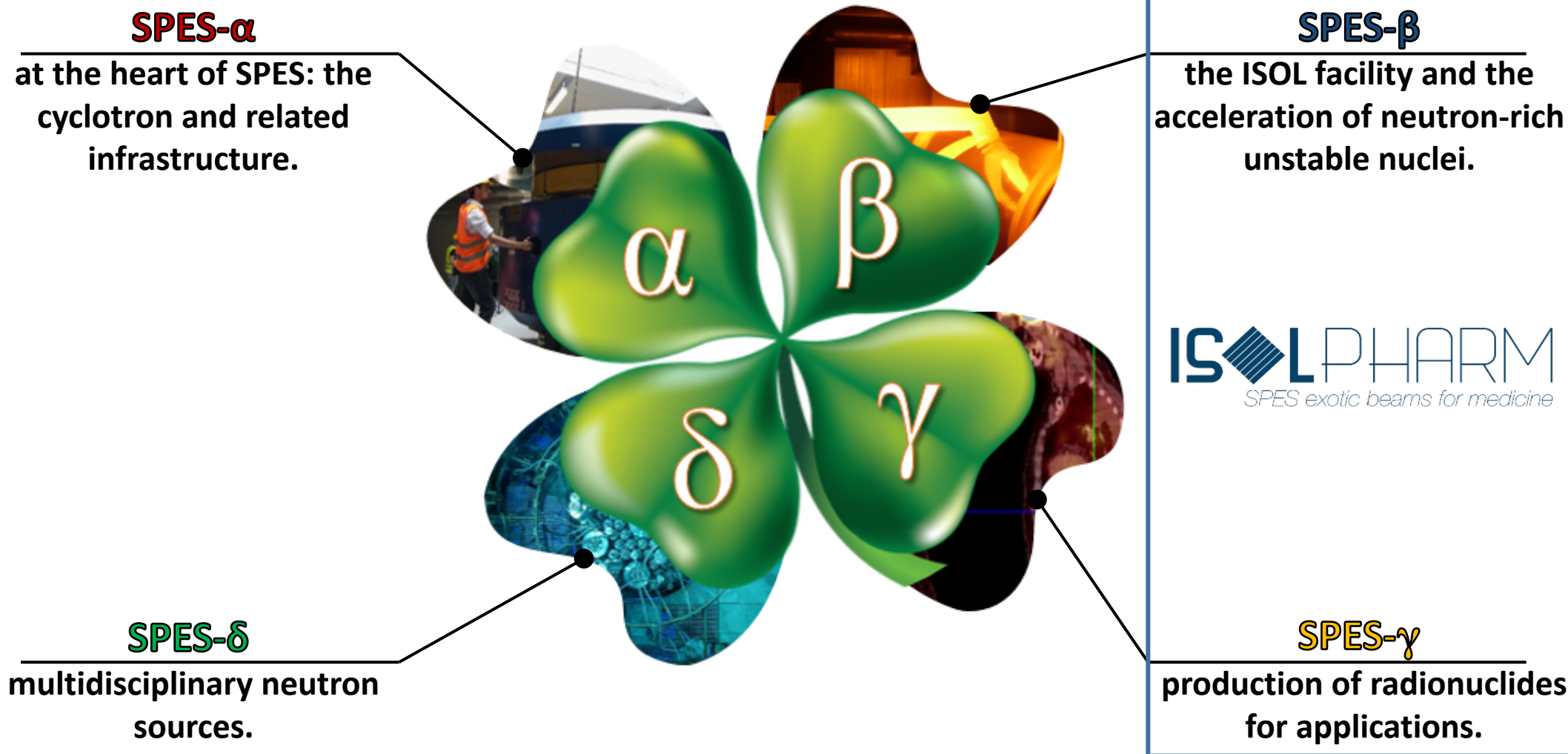


ISOLPHARM_EIRA

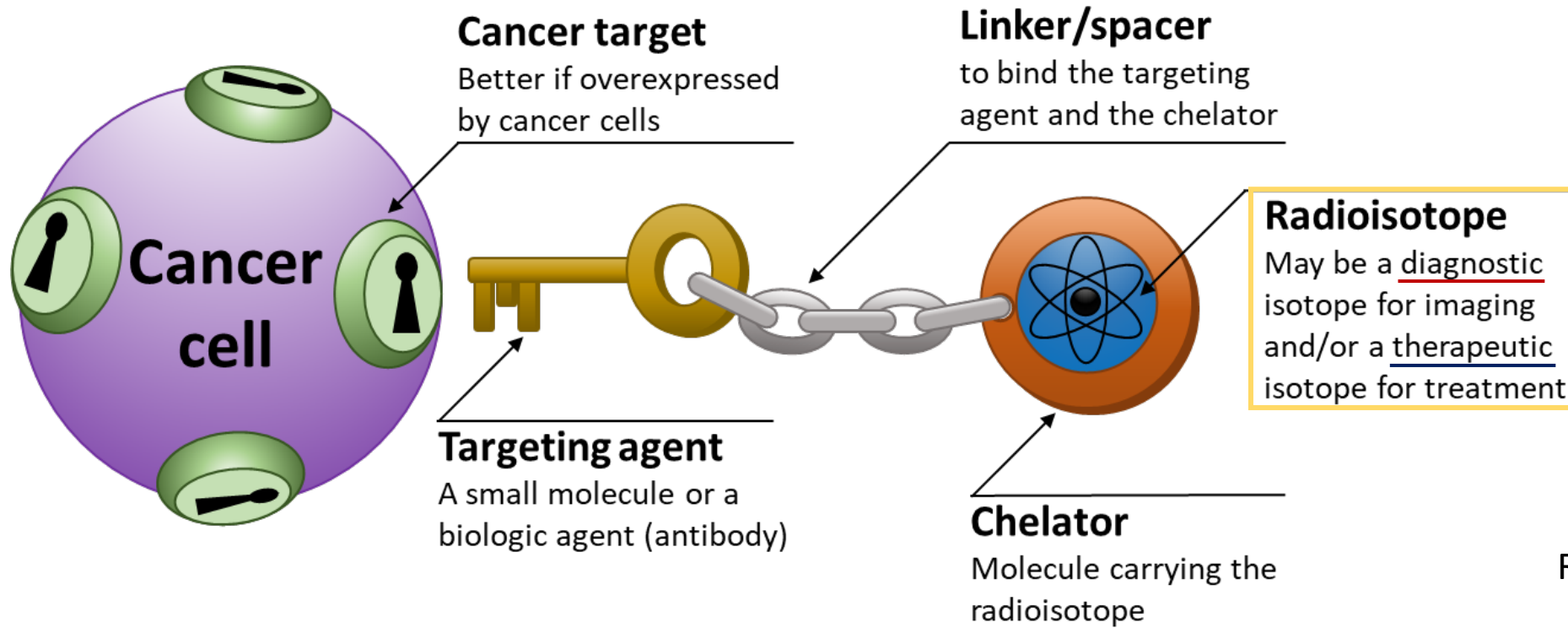
Experiment on Interdisciplinary research on
Radioactive Ag



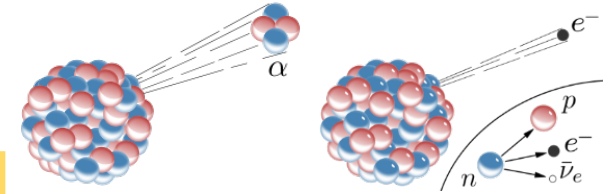
ISOLPHARM framework: the SPES project



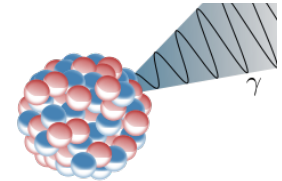
Radiopharmaceuticals



Therapeutic agents



Diagnostic agents



Radionuclides properties:

Decay properties

Half-life

Chemical properties

Production Feasibility

Specific activity

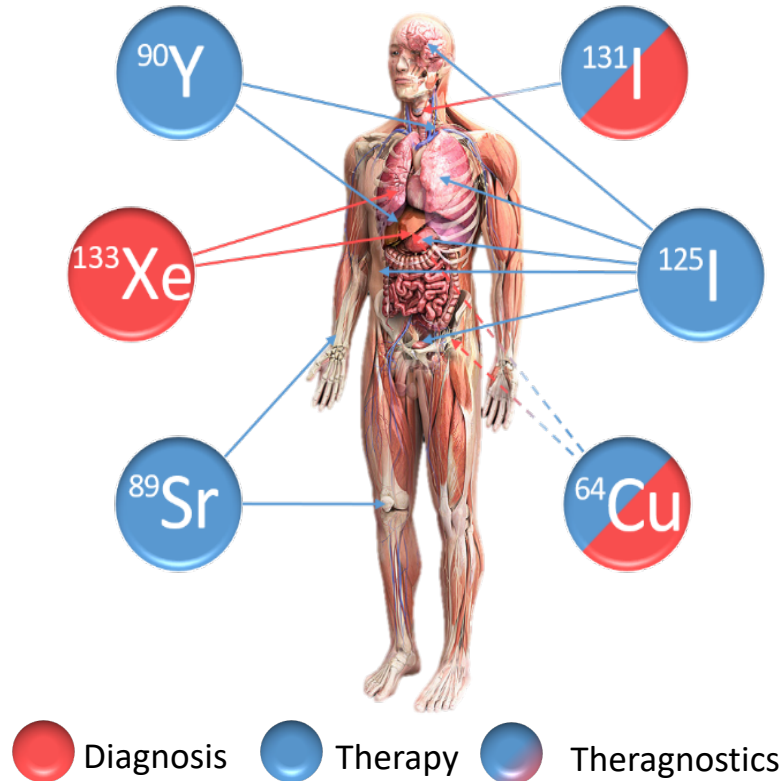
$$\rightarrow \frac{\text{activity of the radioisotope (MBq)}}{\text{mass of the element (mg)}}$$

Radionuclidic purity

$$\rightarrow \frac{\text{activity of the desired nuclei}}{\text{overall activity of the compound}}$$

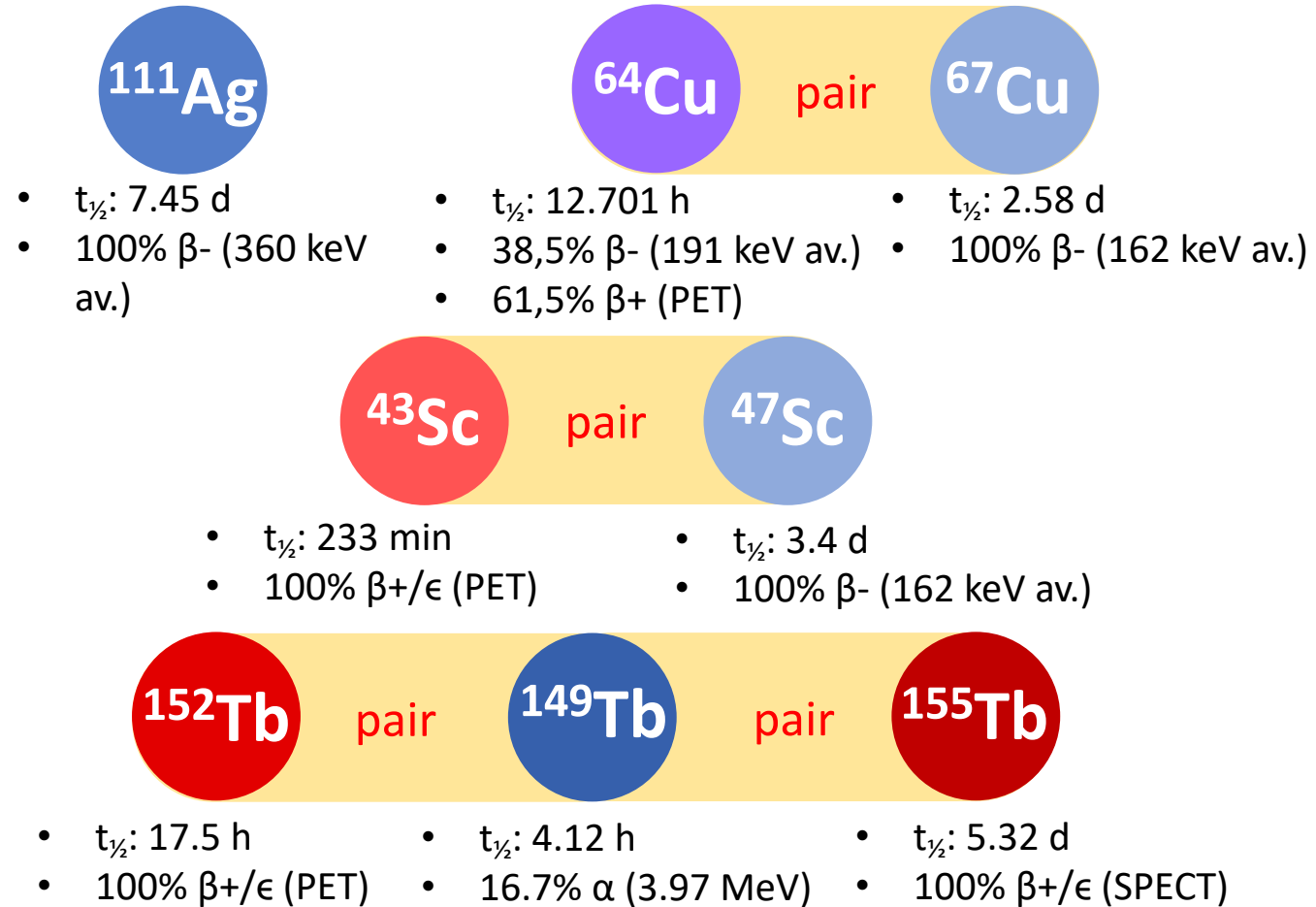
Possible ISOL isotopes medical interest

Early feasibility studies were focused on state-of-art radionuclides:



F. Borgna *et al.*, *Appl. Radiat. Isot.*, 2017

ISOLPHARM true potential can be expressed if innovative/less available nuclides are considered



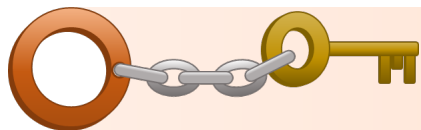
Project organization

^{111}Ag

Task 1: Physics



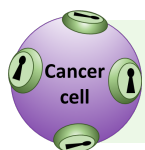
- Simulation and study of ^{111}Ag production via the $^{110}\text{Pd}(n,\gamma)^{111}\text{Ag}$ reaction.
- Quality control of the production of ^{111}Ag through spectroscopy analysis
- Laser ionization of Ag



Task 2: Radiochemistry



- Development of a library of novel chelators for silver and copper and characterization of their properties.
- Small molecules and linker development
- Radiolabeling of the synthesized compounds prior with ^{64}Cu and then with ^{111}Ag , characterization of their properties (stability, etc.)
- Development of more efficient purification methods from isobaric contaminant



Task 3: Biology



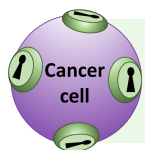
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and Applications



- In vitro activities: study of affinity and internalization using fluorescence (eventual studies with ^{64}Cu and ^{111}Ag)
- Development of 3D scaffold and cell cultures for studies in dynamic conditions
- In vivo tests using fluorescence
- In vivo imaging using ^{64}Cu and ^{111}Ag radiolabelled compounds



Task 3: Biology

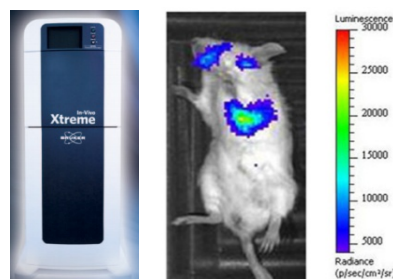
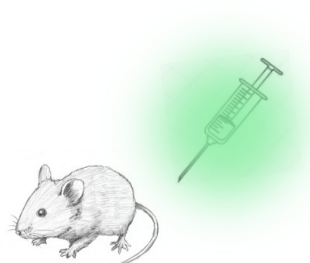


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and Applications



In vivo tests using florescence

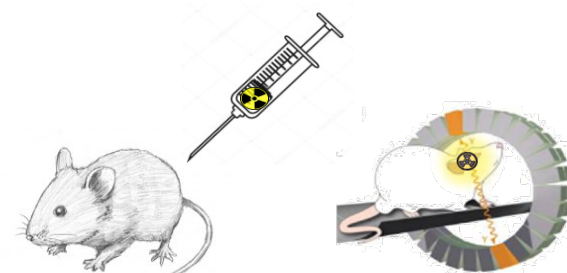
- Injection of mice with fluorescent compounds
- Analysys of mice bearing tumours using the In-Vivo Xtreme I (Bruker) at the CIBIO MOF
- Verification of the uptake of molecules from aspecific sites or from rare cells with higher CCK2R levels
- Evaluation of the therapeutic potential



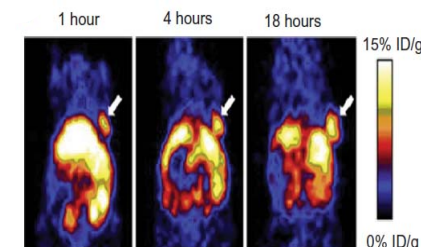
In vivo Xtreme

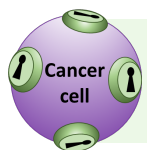
In vivo imaging using ^{64}Cu , ^{68}Ga and ^{111}Ag radiolabelled compounds

- Injection of mice with ^{64}Cu , ^{68}Ga and ^{111}Ag radiolabelled compounds
- *In vivo* imaging experiments with radiolabelled compounds will be performed at CAPIR – Center for Advanced Preclinical in vivo Research
- Evaluation of the therapeutic potential



microPET





Task 3: Biology

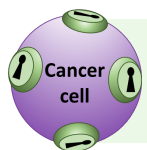


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***In-vivo* tests with radiolabelled compounds: IBFM-CNR and Department of Biomedical and Biotechnological Sciences- University of Catania**





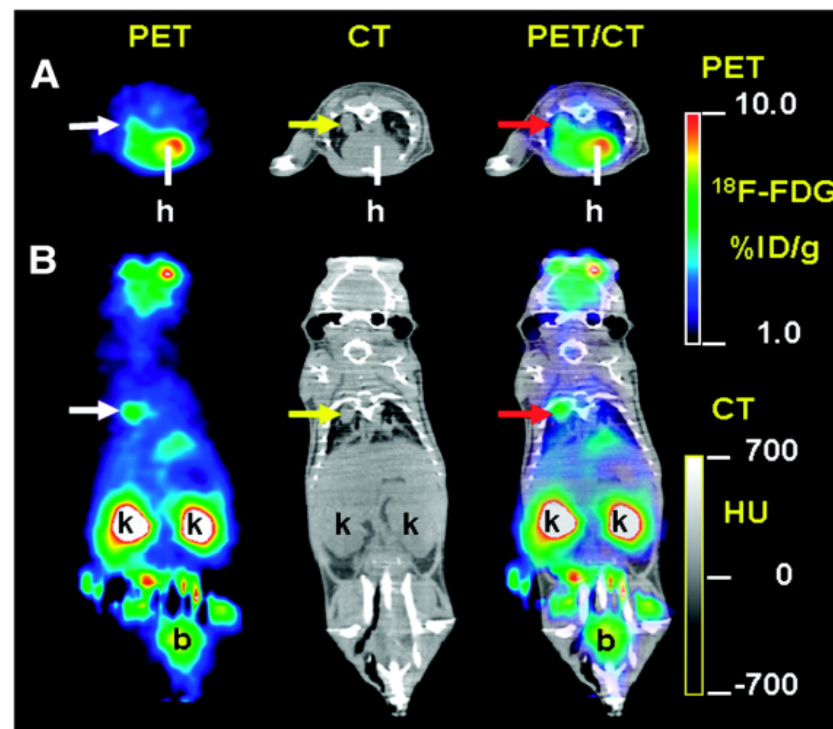
Task 3: Biology



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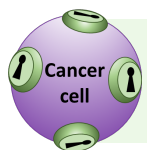
***In-vivo* tests with radiolabelled compounds: IBFM-CNR and Department of Biomedical and Biotechnological Sciences- University of Catania**



Test with ^{64}Cu and
 ^{68}Ga labelled



Submitted Animal
Ethical Committee
protocol



Task 3: Biology



Trento Institute for
Fundamental Physics
and Applications

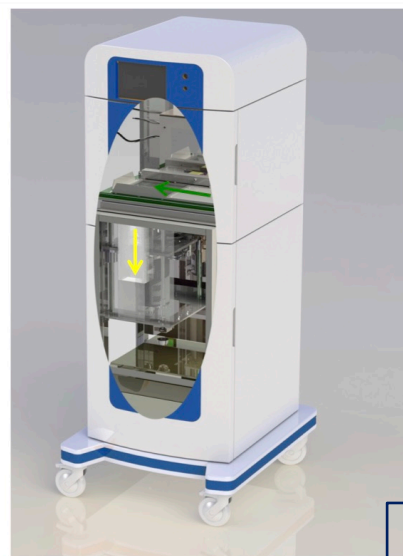


In-vivo tests with radiolabelled compounds: IBFM-CNR and Department of Biomedical and Biotechnological Sciences- University of Catania

Direct Radioisotopic Imaging



- Radioisotopic Phosphor Screen
- Cherenkov and Non-Cherenkov isotopes
- ^{18}F , ^{111}In , $^{99\text{m}}\text{Tc}$, ^{125}I , ^{64}Cu , ^{32}P , ^{68}Ga , ...
- Small compound tracking
- Complimentary to dedicated PET/SPECT platforms



Multimodal Optical/X-ray/DRI One system for all imaging needs



Sensitive Bioluminescence

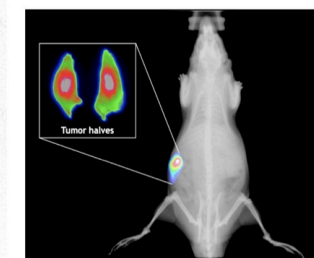
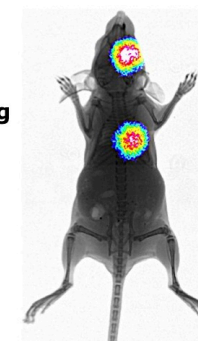
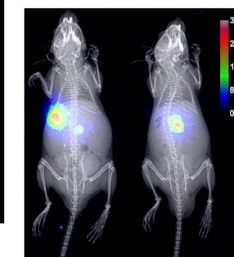
High resolution X-ray

Multispectral Fluorescence

Cherenkov Imaging

Direct Radioisotopic Imaging

Reflectance Imaging



Test with ^{111}Ag labelled



		Year 1	Year 2	Year 3
		[€]	[€]	[€]
INFN-LNS				
Inventoriabilities		0	0	0
Consumables	mice Balb/C nude (130€/mouse)			3900
	Animal Housing (0,1€/mouse/day)			100
	Imaging exams (PET and 2D image)			2100
	Organ removal to activiy measurment			600
	TOTAL	0	0	6700
Travels	Travels for meetings	2000	2000	5000
TOTAL INFN-LNS		2000	2000	11700

Not used for COVID

We ask to push on 2021 2500€, consumables, of 3th year to start the preclinical studies

Personnel involved

2021

- Giorgio Russo, Local Resp. , 30% FTE
- Francesco Paolo Cammarata, 30% FTE
- Rosalba Parenti, 70% FTE
- Alessandro Stefano, 30% FTE
- Marco Pometti, 70% FTE



giorgio-russo@cnr.it