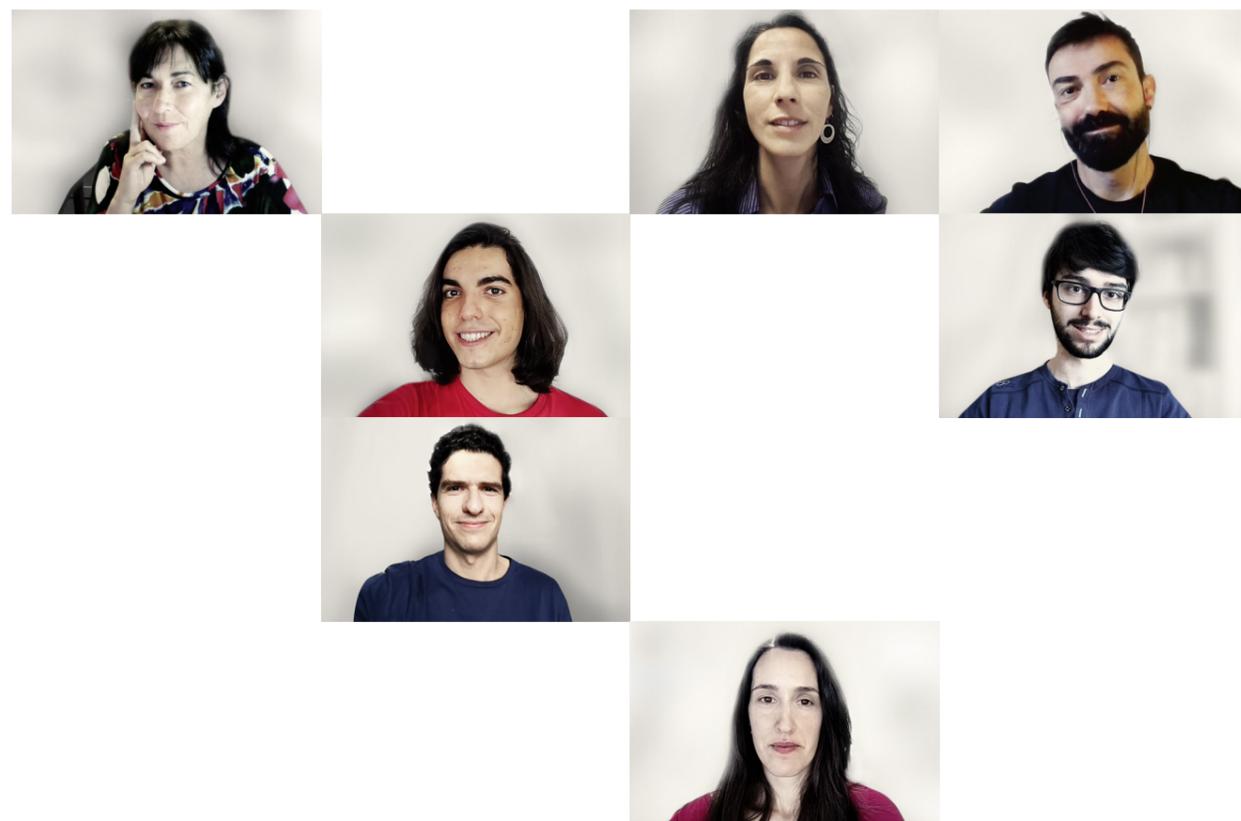


MOLECULAR IMAGING CORE UNIT

Francisca Mulero
Core Unit Head

Technicians
Tatiana Álvarez, Guillermo Garaulet (TS)*, Silvia Leal (until July), Sergio Mateos (until August) (TS)* (PEJ)**
Guillermo Medrano, David Sabador



OVERVIEW

A new strategy involving molecular imaging is Theranostics, which integrates diagnostics and therapy for patient management. In the oncology field, this technique combines tumour diagnostic imaging and therapeutics, trying to improve existing techniques. The possibility of detecting the disease, guiding therapy and conducting follow-up is opening a new chapter in precision medicine.

In molecular imaging medicine, theranostics refers to the use of molecules labelled with either diagnostic radionuclides (e.g. gamma-ray or positron emitters) or with therapeutic radionuclides (beta-particle emitters) for diagnosis and treatment of a particular disease. Thus, molecular imaging and disease diagnosis can effectively lead to personalised treatment using the same study molecules.

“Theranostics gives you the possibility of using exactly the same molecular targeting compound for both diagnostic and therapeutic purposes. ‘If you can see it, you can treat it’.”

(since September) (TS)* (PEJ)**
Gloria Visdomine
*Titulado Superior (Advanced Degree)
**Plan de Empleo Joven (Youth Employment Plan)

Visiting Scientist
Marta Oteo Vives (CIEMAT, Madrid, Spain)

RESEARCH HIGHLIGHTS

In 2020, the Molecular Imaging Unit received a new grant from the BBVA Foundation to start working on theranostics applications of radiolabelled antibodies. We also continued with the rest of our ongoing projects. One of our projects, granted in collaboration with CIEMAT, focuses on developing and labelling nanobodies produced by camelids using the ImmunoPET strategy (FIGURE). This strategy combines the high specificity and selectivity of the antibodies with the high sensitivity and quantitative capabilities of PET. We also continued our participation in the RENIM network programme. Our project, supported by a grant from the Comunidad de Madrid (RENIM-CM), focuses mostly on developing nanoparticles to perform optical imaging and multimodality imaging (optical-MRI or PET-MRI) for the detection of primary tumours and distant metastasis.

The results of these research projects, in which the Molecular Imaging Unit is actively involved, will directly benefit CNIO scientists, who will be able to use and test these new imaging tools in their own research.

In 2020, we also installed a new optical imaging system, IVIS Lumina III, to replace the old one, to perform diagnosis and follow-up of tumours, as well as to phenotype different models and organs. The system improves throughput diagnosis by increasing the sensitivity and signal-to-noise ratio of the images.

The Molecular Imaging Unit continues to provide CNIO researchers with state-of-the-art molecular imaging equipment

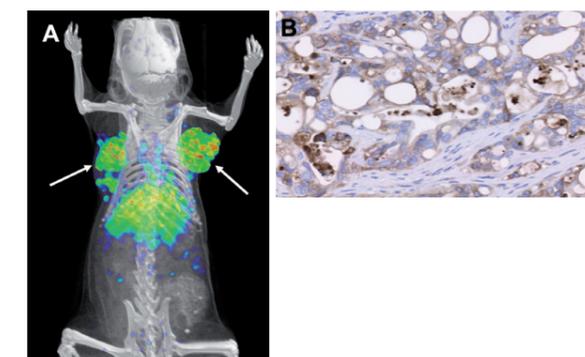


FIGURE (A) Representative PET/CT images, with ⁸⁹Zr-DFO-LEM2/15 at 24 h, of a mouse with subcutaneous CAPAN-2 cells. White arrows indicate the tumour. (B) IHC MTI-MMP was detected using the LEM2/15 antibody.

and human resources in order to guarantee the highest quality studies and to develop and update protocols and imaging techniques that serve to optimise tumour visualisation in both the preclinical and clinical fields. The Unit also assesses and advises researchers on the best-suited imaging modality for their research projects. ■

• PUBLICATIONS

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- Shaikh F, Andersen MB, Sohail MR, Mulero F, Awan O, Dupont-Roettger D, Kubassova O, Dehmeshki J, Bisdas S (2020). Current landscape of imaging and the potential role for artificial intelligence in the man-

agement of COVID-19. *Curr Probl Diagn Radiol*. PMID: 32703538.

• Book Chapter

- Shaikh F, Franc B, Mulero F (2020). Radiomics as Applied in Precision Medicine. In: *Clinical Nuclear Medicine*, Ahmadzadehfar H, Biersack HJ, Freeman L, Zuckier L (eds). Springer, Cham. DOI: https://doi.org/10.1007/978-3-030-39457-8_3. Print ISBN: 978-3-030-39455-4. Online ISBN: 978-3-030-39457-8.

• AWARDS AND RECOGNITION

- Faculty of MIT *linQ* with Massachusetts Institute of Technology and Advisory Board Member of *Catalyst Europe*, a programme that belongs to the EIT Health Campus pillar.
- Member of Spanish PET Group, Spanish Society of Nuclear Medicine and Molecular Imaging (SEMNM).
- Project evaluator of *Junta de Andalucía* and *Agencia de Qualitat Universitaria de les Illes Balears*, Spain.
- Editorial Board Member, *PLOS ONE* Journal.