Seminario de Química Física

Miércoles 10 de junio de 2026 – 11:30 h

Sala de Grados (Biblioteca)

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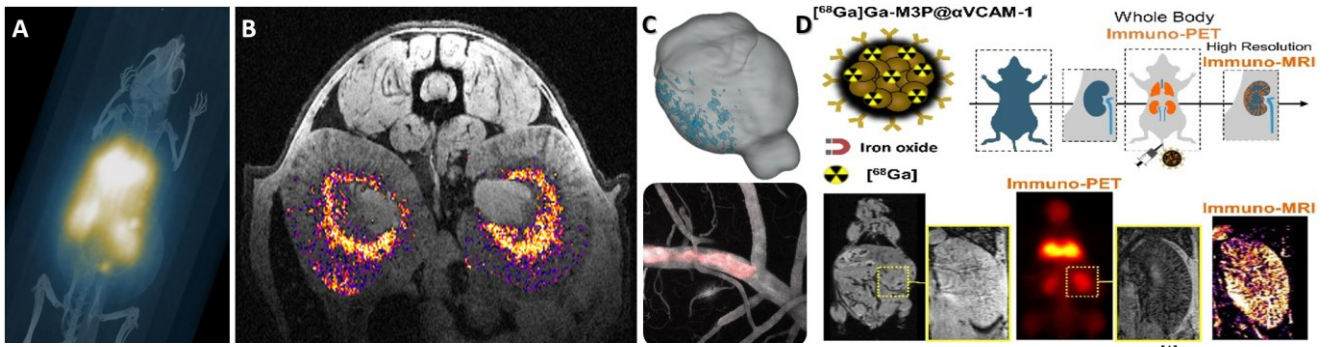
Polydopamine iron oxide particles as multimodal molecular imaging tool for inflammation and thrombosis

Molecular imaging plays a crucial role in the early detection and characterization of inflammation and thrombosis, key processes in cardiovascular diseases. Iron oxide nanoparticles are widely used due to their magnetic properties, particularly in magnetic resonance imaging (MRI) and magnetic particle imaging (MPI). However, their surface functionalization is critical to improve targeting and enable multimodal imaging. In this work, we present polydopamine-coated iron oxide particles as a versatile platform for molecular imaging. The polydopamine (PDA) layer provides a robust and easily functionalizable interface for the conjugation of targeting ligands and imaging probes, enabling the detection of biomarkers associated with inflammation and thrombus formation. These particles are compatible with multiple imaging modalities, including MRI and MPI for magnetic detection, positron emission tomography (PET) via radiolabeling, and photoacoustic imaging thanks to the optical absorption properties of PDA. This multimodal approach provides complementary information, improving both sensitivity and spatial resolution. Overall, this work highlights the potential of PDA-coated iron oxide particles as multifunctional agents for non-invasive imaging of inflammatory and thrombotic diseases.



(A) Molecular Imaging of kidneys and lung inflammation in a sepsis model by Magnetic Particle Imaging (MPI).[1] (B) Molecular Imaging of kidneys inflammation by Magnetic Resonance Imaging (MRI).[2] (C) Microthrombi imaging in ischemic stroke.[3] (D) Whole-Body Inflammation via Hybrid Immuno-PET-MR.[4]

[1] T. Bonnard, S. Pedron, S. M. De Lizarrondo, L. D'Arco, J. Melherbe, S. Trébel, J. Tashkandi, K. Alt, D. Vivien, M. Gauberti, **2025**, DOI 10.21203/rs.3.rs-7349419/v1.
[2] S. Martinez de Lizarrondo, C. Jacqmarcq, M. Naveau, M. Navarro-Oviedo, S. Pedron, A. Adam, B. Freis, S. Allouche, D. Goux, S. Razafindrakoto, F. Gazeau, D. Mertz, D. Vivien, T. Bonnard, M. Gauberti, *Sci Adv* **2022**, *8*, eabm3596.
[3] C. Jacqmarcq, A. Picot, J. Flon, F. Lebrun, S. Martinez De Lizarrondo, M. Naveau, B. Bernay, D. Goux, M. Rubio, A. Malzert-Fréon, A. Michel, F. Proamer, P. Mangin, M. Gauberti, D. Vivien, T. Bonnard, *Nat Commun* **2024**, *15*, 5070.
[4] S. Pedron, A. Guillou, F. Fillesoye, C. Jacqmarcq, C. Perrio, F. Caruso, S. Li, Y. Ju, D. Vivien, M. Gauberti, J. Vigne, T. Bonnard, *ACS Nano* **2025**, *19*, 30021.