

# Biocompatible Carriers for Eradicating HIV Reservoirs in PLWH

**F. J. Ostos**, M. Martínez-Santa, J. A. Lebrón, M. López-López, M. L. Moyá, E. Bernal, F. García Moscoso, J. Vitallé, S. Bachiller, T. I. Lopes Da Costa, J. M. Pedrosa Poyato, A. Pérez-Gómez, C. Gasca-Capote, M. R. Jiménez-León, L. F. López-Cortes, E. Ruiz-Mateos, P. López-Cornejo, M. Rafii-El-Idrissi Benhnia

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Clinical Unit of Infectious Diseases, Microbiology and Parasitology, Immunovirology Lab, Institute of Biomedicine of Seville (IBiS), Virgen del Rocío University Hospital, CSIC, University of Seville

Department of Medical Biochemistry, Molecular Biology, and Immunology, School of Medicine, University of Seville

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# INTRODUCTION

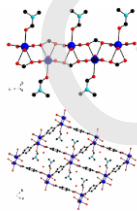
There is a viral persistence in anatomical and cellular HIV reservoirs despite cART. In this sense, novel immunotherapeutic approaches need to be developed to eradicate HIV.

## HYPOTHESIS

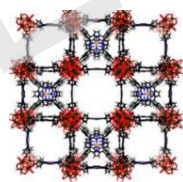
The combination of Toll-Like Receptors (TLRs) ligands and cART encapsulated into biocompatible structures will synergistically increase the ability of the drugs to home different tissues, and the activation of HIV production and decline cell-associated HIV DNA in cells from PLWH; and enhance the innate immune responses *in-vitro* and *in-vivo* in mouse model and humans.

## OBJECTIVE

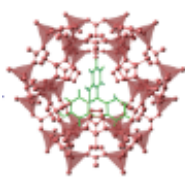
- i) Characterization of the biocompatibility of several structures: Metal Organic Frameworks (MOFs) and liposomes.
- ii) Evaluation of the encapsulation efficiency and drug of release of a triple combination of antiretroviral drugs consisting of bicitgravir (BIC)/nevirapine (NVP) + tenofovir (TDF) + emtricitabine (FTC), together with TLRs agonists: TLR-4 (MPLA), -7 (GS-9620), and -9 (CpG-(ODN 2216) class A).



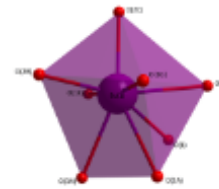
Ca(BDC)(DMF)(H<sub>2</sub>O)



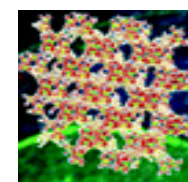
PCN-224



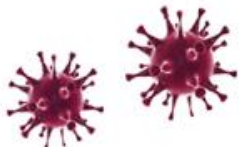
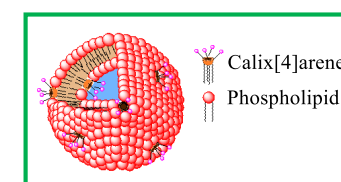
ZIF-8



Eu(BTC)

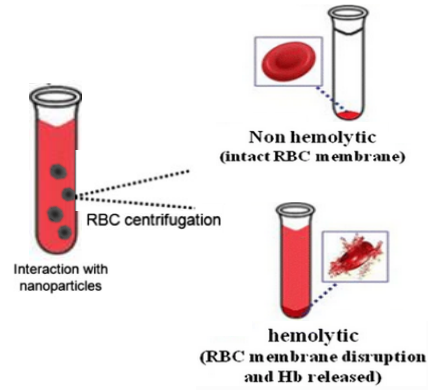
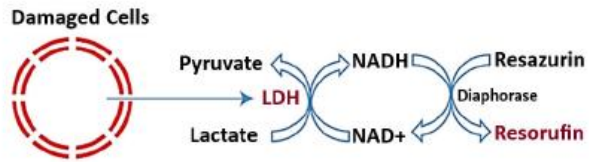


Tb(BTC)



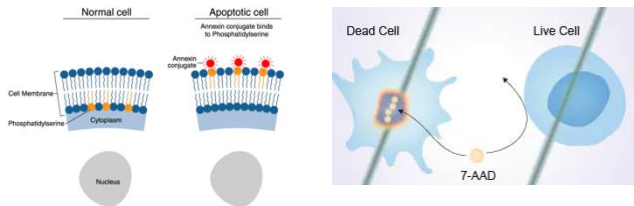
# METHODOLOGY

## BIOCOMPATIBILITY

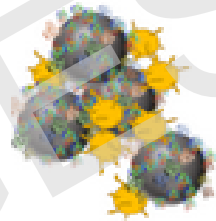


## ENCAPSULATION AND DRUG RELEASE STUDIES

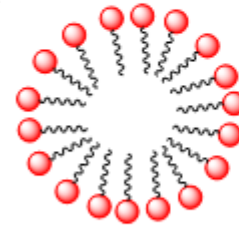
### Cytotoxicity LDH



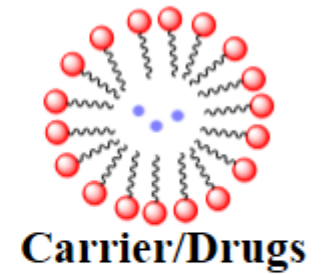
### Hemolysis



### Drugs



### Carrier

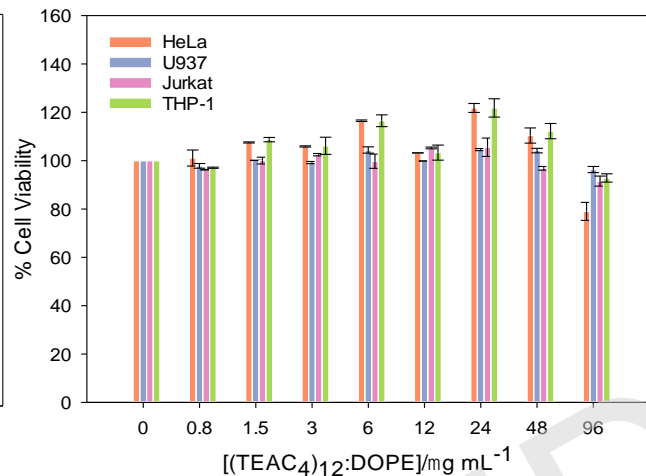
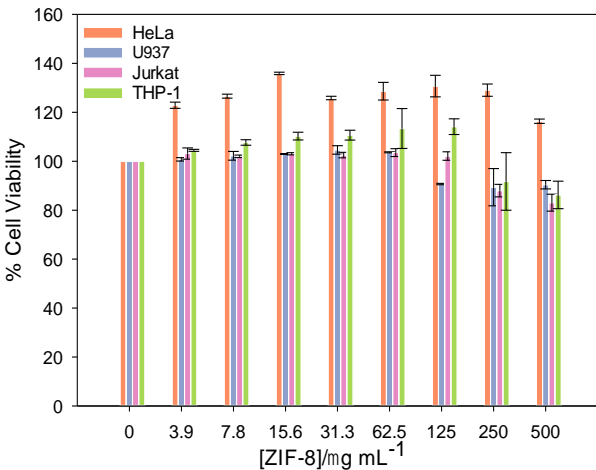


### Apoptosis & Necrosis

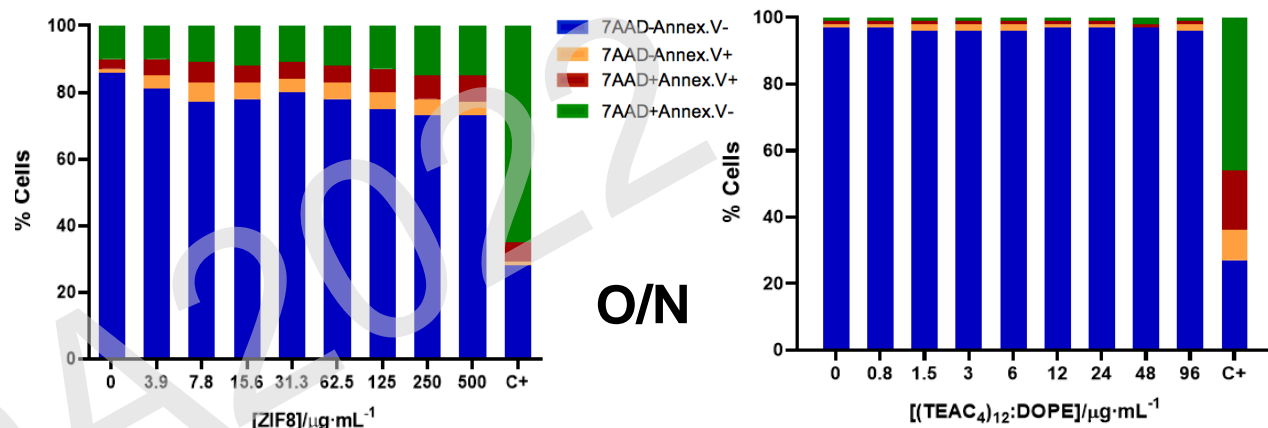
### Platelet aggregation



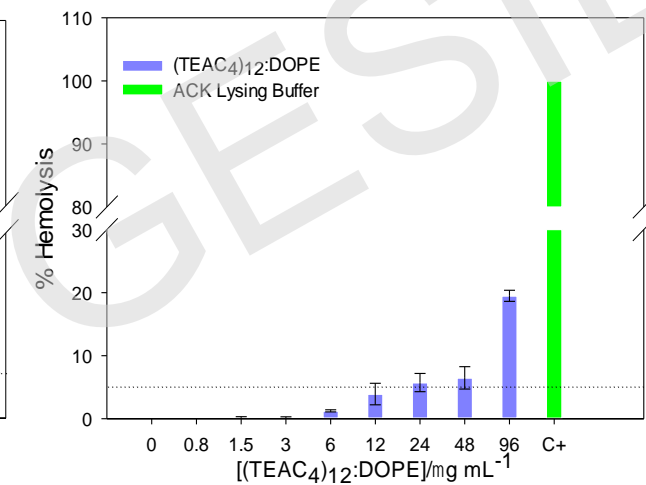
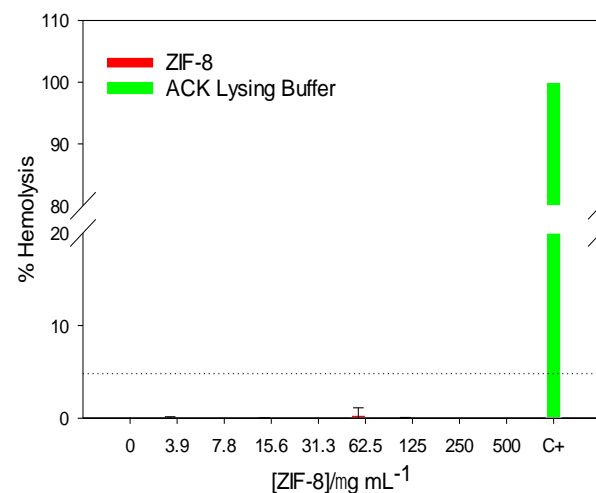
Cytotoxicity LDH



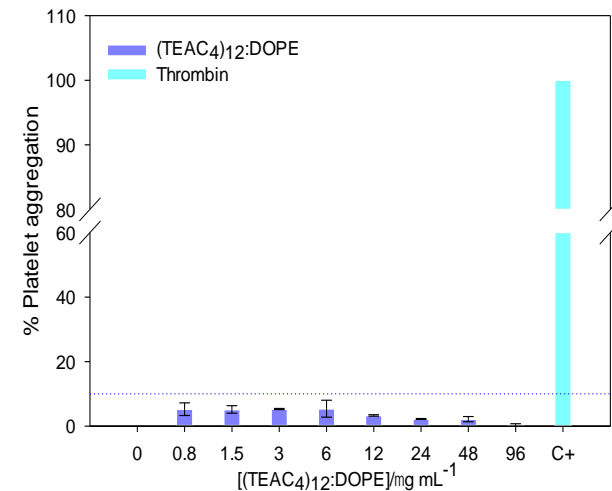
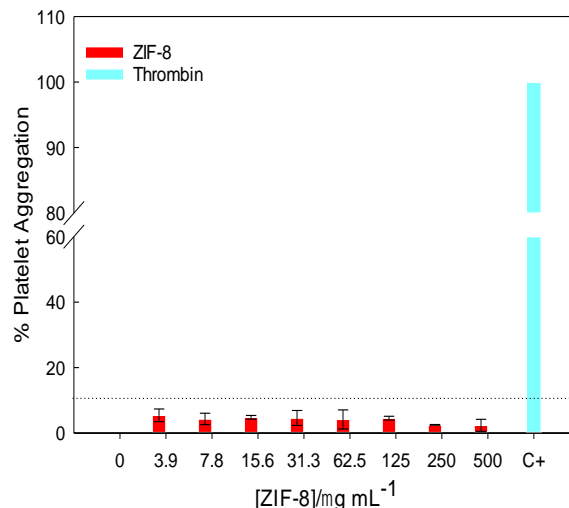
Apoptosis & Necrosis



Hemolysis

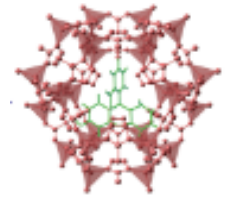


Platelet aggregation

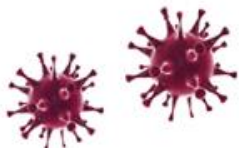
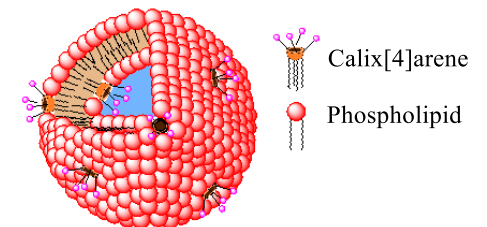


## ENCAPSULATION OF ANTIRETROVIRALS AND TLR AGONISTS

ZIF-8	TDF	FTC	BIC	GS-9620	ODN-2216	
<b>Encapsulation Efficiency (EE), %</b>	76±5	100±2	88±7	100±3	90±4	
<b>Drug release, %</b>	pH= 7.4	95±9	5.3±0.3	2.3±0.7	3.0±0.3	100±3
	pH= 5.5	98±5	6.4±0.4	1.2±0.2	1.4±0.5	93±5
<b>Time for drug release, days</b>	7	7	7	7	7	



(TEAC <sub>4</sub> ) <sub>12</sub> :DOPE	TDF	FTC	BIC	
<b>Encapsulation Efficiency (EE), %</b>	pH= 7.4	69±2	10±2	76±4
	pH= 5.5	35±1	32±4	36±3
<b>Drug release, %</b>	pH= 7.4	100±3	98±4	29±1
	pH= 5.5	100±3	88±2	19±4
<b>Time for drug release, days</b>	pH= 7.4	4	4	4
	pH= 5.5	3	3	3



# CONCLUSIONS

- These systems usually showed high encapsulation efficiency and biocompatibility.
- Therefore, both structures could be considered potential candidates for eradicating HIV reservoirs in PLWH.
- Further studies to evaluate the encapsulated drugs and TLR agonists to reach the lymph nodes as well as to modulate the innate immune system in a mice model are on the way.



# ACKNOWLEDGMENTS



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