INSTITUTO DE CIENCIA MOLECULAR
UNIVERSITAT DE VALÈNCIA

EXCELENCIA MARÍA DE MAEZTU

IgualdadICMol

VNIVERSITAT DE VALÈNCIA Unitat d'Igualtat i Diversitat

9 de marzo 2026
14:40h

REGISTRO AQUÍ

X Jornada de la Mujer Investigadora
Reconocimiento a la mujer científica

Se requiere registro previo

Lugar: Salón de actos - ICMol. Edificio de cabecera.
Instituto de Ciencia Molecular (ICMol), Universitat de València

Marzo 09

14:40 – 15:00 | Recepción con café

15:00 – 15:10 | ***Bienvenida*** ***- Prof. Eugenio Coronado (Director del ICMol)***

15:10 – 15:55 | ***Polypeptide-based Therapeutics with Inherent Mitochondria Tropism***

Prof. María J. Vicent
Centro de Investigación Príncipe Felipe (CIPF)
Premio Rei Jaume I de Nuevas Tecnologías 2025

15:55 – 16:55 | ***Mesa redonda institucional***

Romper el techo de cristal: liderazgo, evaluación y oportunidades en la ciencia

Moderadora
Prof. Isabel Fariñas
Catedrática de Biología Celular UV; BioTecMed

Prof. Yolanda Moliner
Directora del Departamento de Química Analítica UV

Prof. María J. Vicent
Centro de Investigación Príncipe Felipe (CIPF)

Prof. Emilio Alarcón
University of Ottawa

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GENERALITAT VALENCIANA

Abstract

Polypeptide-based Therapeutics with Inherent Mitochondria Tropism

María J. Vicent, PhD

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Mitochondrial dysfunction is a hallmark of numerous pathological conditions, including cancer, neurodegenerative disorders, and rare metabolic diseases[1]. Although mitochondria are attractive therapeutic targets, effective intervention remains limited by the lack of delivery systems that combine cytosolic access, organelle specificity, and functional versatility[1]. In parallel, the integration of small molecules, biologics, and gene therapy within a single nanocarrier remains a major challenge in nanomedicine.

We report a multifunctional polypeptide-based nanocarrier platform engineered for efficient cytosolic delivery and selective mitochondrial targeting, while enabling transport of diverse therapeutic and functional cargos. The system is based on cell-penetrating diblock copolymers composed of poly-L-ornithine (PLO) and polyproline (PPro), designed to promote membrane translocation and cardiolipin-mediated mitochondrial localization[2]. Modular chemical functionalization supports the conjugation of mitochondria-active small molecules and biologics, as well as the formation of stable polyplexes for non-viral gene delivery.

Beyond mitochondrial targeting, the nanocarriers exhibit intrinsic endosomolytic properties that facilitate cytosolic release[3]. Exploiting this feature, the platform was adapted for plasmid DNA delivery, yielding enhanced stability and transfection efficiency in advanced cancer cell models. Mitochondrial targeting and gene delivery can be combined sequentially within the same construct, enabling coordinated subcellular interventions. The chemical versatility of the system further allows incorporation of unconventional cargos, including light-driven molecular motors, which retain functionality and exhibit light-responsive behavior without inducing cytotoxicity or oxidative stress[4].

Functionally, the nanocarriers modulate mitochondrial activity, alter oxidative phosphorylation, and induce controlled bioresponses in a concentration-dependent manner. This adaptability supports applications across multiple disease areas, including targeting therapy-resistant cell populations in metastatic cancers such as peritoneal carcinomatosis[5], as well as potential extension to neurodegenerative and rare mitochondrial disorders[1]. Overall, this platform provides a flexible and translatable approach for integrated subcellular targeting, cytosolic delivery, and advanced therapeutic modulation.

ACKNOWLEDGEMENTS

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References

1. a) Pegoraro C. et al Adv Drug Deliv Rev 2024; b) Wang Y. et al Adv Drug Deliv Rev 2024, 211, 115355; c) Prasad Yadav U. et al Front Oncol. 2020 10.3389/fonc.2020.01010
2. a) Pegoraro C. et al Adv Mat 2025: 10.1002/adma.202411595; b) WO 2025/003463
3. Pegoraro C. et al Chem Mat 2025, 37 (4) 1457
4. Pegoraro C. et al J Mat Chem B 2025, 13(8) 2658)
5. Emmings E. et al Int. J. Mol. Sci. 2019, 20(1), 229

Biography

Dra. María J. Vicent

Centro de Investigación Príncipe Felipe (CIPF)

Prof. María J. Vicent is the head of the Polymer Therapeutics Lab. at Príncipe Felipe Research Center (CIPF) since 2006 and coordinator of the Cancer Program. She is also responsible for the Screening Platform, a Specialist Site in the European infrastructure EU-OPENSCREEN. She serves as president for the Controlled Release Society (CRS), She is editor in chief of Advanced Drug Delivery Reviews.

Dr. Vicent's research group (http://www.VicentResearchLab.com), specializes in developing novel nanopharmaceuticals for therapeutic and diagnostic applications, particularly in addressing unmet clinical needs through Polymer Therapeutics. Her work has been supported by national and European grants, including prestigious awards like the ERC Consolidator grant-MyNano, ERCPoC-POLYMMUNE, ERCPoC-Polybraint, and Fund Health La Caixa-NanoPanTher, PINT, NanoGBA or NanoERT; received from both academia and industry.

María has been honored with several awards, apart from the very recent award Jaume I in New technologies 2025, she also received the Samyang award and several Women in Science recognitions. Recognized for her contributions, Dr. Vicent is a member of the National Academy of Inventors (FNAI) and a fellow of the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows since 2019. She was also inducted into the Controlled Release Society (CRS) College of Fellows in 2021. María has co-authored >160 peer-reviewed papers and holds 15 patents. Six of these patents have been licensed to the pharmaceutical industry, with one contributing to the founding of the spin-off company 'Polypeptide Therapeutic Solutions S.L.' in Valencia, Spain, established in 2012 and rebranded as Curapath after its acquisition by Arcline in 2021 now a well-known CDMO with 100 employees.