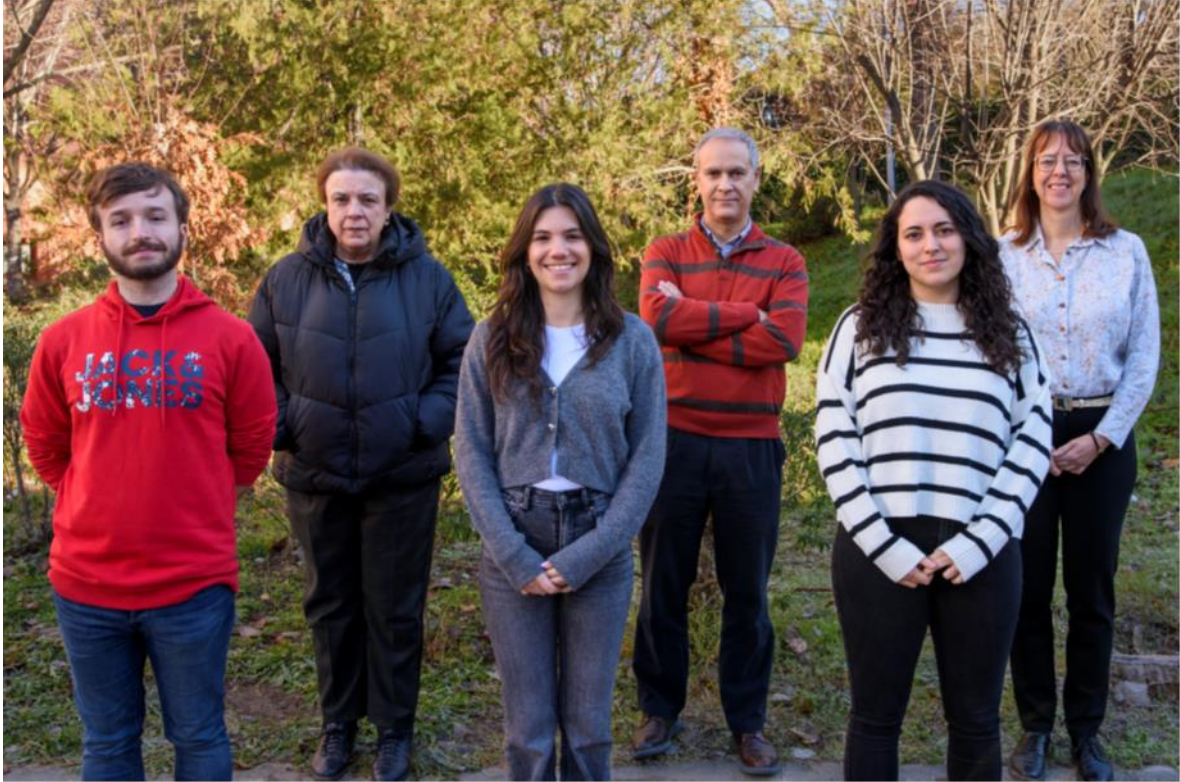


Team name and photography

Protein engineering against antimicrobial resistance

Centro de Investigaciones Biológicas Margarita Salas (CIB-CSIC), Madrid, and CIBER de Enfermedades Respiratorias (Instituto de Salud Carlos III).



Brief description

Our group is dedicated to the study of the structure, stability and engineering of proteins with a biomedical goal. One of our research lines involves the molecular study of bacterial cell-wall lysins based both on host and phage enzymes ("enzybiotics"). Besides the characterization of novel hydrolases, we are investigating the use of beta-beta solenoid modules as molecular devices that can be engineered to specifically recognize the surface of a particular, selected microorganism and use them to design novel "à-la-carte" hybrid enzybiotics. On the other hand, the use of nanotechnological approaches allow us to boost the effectivity of our antibacterial compounds.

Group Members:

Jesús Miguel Sanz Morales (PI)

Beatriz Maestro García-Donas (Assistant Professor and Visiting Researcher, Universidad Complutense de Madrid)

Alicia Rodríguez Bernabé (Laboratory Technician)

Maribel Torices (Ph. D. student)

Javier Sebastián (Ph. D. student)

Inés Pareja (Ph. D. Student)

Pedro García González (until 2022)

Roberto Vázquez (until 2022)

Research topics:

New enzybiotics against respiratory pathogenic bacteria

Novel antimicrobials targeting pathogenic bacteria surfaces

Protein biotechnology: structure, engineering and immobilization

Recent articles:

Blanco et al (2023). Enzybiotic-mediated antimicrobial functionalization of polyhydroxyalkanoate nanoparticles. <https://doi.org/10.21203/rs.3.rs-2759932/v1>

Ortiz-Miravalles et al (2023). Drug Repositioning as a therapeutic strategy against *Streptococcus pneumoniae*: cell membrane as potential target. <https://doi.org/10.3390/ijms24065831>

Vázquez et al (2022). Monomodular *Pseudomonas aeruginosa* phage JG004 lysozyme (Pae87) contains a bacterial surface-active antimicrobial peptide-like region and a possible substrate-binding subdomain. <https://doi.org/10.1107/S2059798322000936>

Vázquez et al (2022). Essential Topics for the Regulatory Consideration of Phages as Clinically Valuable Therapeutic Agents: A Perspective from Spain. <https://doi.org/10.3390/microorganisms10040717>

Vázquez et al (2022). Improvement of the Antibacterial Activity of Phage Lysin-Derived Peptide P87 through Maximization of Physicochemical Properties and Assessment of Its Therapeutic Potential. <https://doi.org/10.3390/antibiotics11101448>

Vleugels et al (2021). Choline-functionalized supramolecular copolymers: towards antimicrobial activity against *Streptococcus pneumoniae*. <https://doi.org/10.1021/acs.biomac.1c01293>

Maestro et al (2021). Inter-hairpin linker sequences determine the structure of the $\beta\beta$ -solenoid fold: a “bottom-up” study of pneumococcal LytA choline-binding module. <https://doi.org/10.1016/j.ijbiomac.2021.08.223>

Vázquez et al (2011). DEAE-chitosan nanoparticles as a pneumococcus-biomimetic material for the development of antipneumococcal therapeutics. <https://doi.org/10.1016/j.carbpol.2021.118605>

Research projects:

Ultrastructure and biotechnological scope of choline-binding modules: a synthetic biology approach (PID2019-105126RB-I00). Proyectos I+D+i "Retos de la sociedad" Agencia Estatal de Investigación (AEI). PI: Sanz, J.M. (CIB- CSIC). 01/06/2020-31/05/2023. 145.000 €.

Beta-beta-solenoid polypeptides: a new biotechnological tool for the molecular recognition of polymeric substrates (BETASOL) (PID2022-139209OB-C21). Proyectos de Generación del Conocimiento, Agencia Estatal de Investigación (AEI). PI y coordinador: Sanz, J.M. (CIB- CSIC). 01/09/2023 - 31/08/2026. 150.000 € (para el subproyecto)

Doctoral Thesis:

Emma Roig Molina. Estudio estructural y aplicaciones biomédicas de los módulos de unión a colina: Antimicrobianos frente a *Streptococcus pneumoniae*. Universidad Miguel Hernández (2020)

Web site

<http://tinyurl.com/cibpneumo>