Structural Vaccinology against emerging pathogens

V. Napolitano, F. Squeglia, E. Kramarska, A. Ruggiero, M. Romano and R. Berisio

[1]*Institute of Biostructures and Bioimaging (IBB), CNR, Italy. rita.berisio@cnr.it*

Antimicrobial resistance (AMR) is a worldwide health problem, which contributes to morbidity and mortality globally, and is aggravated by the lack of effective vaccines. Currently available antibiotics target essential pathways imposing selective pressure that favors resistance development, leading to the alarming spread of resistance to last-resort antibiotics such as colistin and vancomycin. This scenario is further aggravated by the lack of new drugs with novel mechanisms of action in the antibiotic pipeline. The most recent studies show that over 33.000 people die every year in the EU due to infections by antibiotic-resistant bacteria. The economic impact is also formidable: AMR costs in the EU alone is estimated to be 1.5 billion € per year, both in healthcare costs and productivity losses. Vaccination is unquestionably one of the most effective public health measures available. Structural vaccinology (SV) or structure-based antigen design is a rational approach that uses three-dimensional structural information to design novel and enhanced vaccine antigens. This strategy is crucial to the development of effective subunit antigens [1-3]. Examples of vaccine antigens developed at IBB will be given.

[1] Ruggiero A., Choi H.G., Barra G., Squeglia F., Back Y.W., Kim H.J., Berisio R. (2022). *Front Mol Biosci.* 9, 964645.

[2] Grund M.E., Soo J.C., Cote C.K., Berisio R., Lukomski S. (2021). *Cells.* 10(3), 495.

[3] Berisio R, Delogu G. (2022). *PLoS Pathog.* 18(9), e1010760.