Streszczenie popularnonaukowe ANG | Bladder cancer is one of the most common cancers affecting the urinary tract. The current standard treatment for its non-muscle-invasive form (NMIBC) is the intravesical administration of live BCG (*Mycobacterium bovis* Bacillus Calmette-Guérin) bacteria. While this therapy is highly effective, it is associated with the risk of serious complications such as infections, bladder inflammation or disseminated infection. Additionally, some patients may find BCG therapy inadvisable or poorly tolerated. Additionally, some patients may find BCG therapy inadvisable or poorly tolerated. Furthermore, BCG immunotherapy involves multiple steps and can be a long-term treatment process. Thus, there is a pressing need for new and, importantly, safer treatment alternatives.

My project aims to investigate the potential of extracellular vesicles (EVs) released by BCG bacteria as an alternative to classical immunotherapy. EVs are spherical structures, composed of proteins, lipids and nucleic acids, secreted by bacterial cells that play a role in their intercellular communication. Preliminary studies of EVs derived from BCG strains suggest that they can induce an immune response similar to that induced by BCG mycobacterial cells, but without the risk of complications.

As part of the project, I plan to isolate, purify and accurately characterise the extracellular vesicles secreted by the three BCG strains, and then study their effects on human immune cells and cancer cells under laboratory conditions. Then, I will analyse the chemical composition of the vesicles secreted by the three BCG strains, their morphology and size, and what cytokines and signals the immune cells produce when stimulated with EVs.

I hope that the results of my research will allow us to assess the safety of EVs, their anti-tumour efficacy, and contribute to the development of new cell-free treatments for bladder cancer. This project may also open the way to other applications of extracellular vesicles in modern immunotherapy.