Poster Abstract

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Self-adjuvant nanovaccination as novel tool to combat bacterial infections

Aldabra stands at the forefront of medical innovation in vaccines, driven by our novel T-Fender platform technology, based on self-adjuvant, self-aggregating synthetic long peptides. Our therapeutic and prophylactic vaccines unleash potent and precisely targeted cellular immune responses, providing a robust defense against bacterial and viral infections. T-Fender vaccines are easily adaptable by the use of AI-based prediction technology, while their manufacturing and formulation is straightforward.

We have collected compelling data to substantiate our rational and unveil the underlying mechanism of action (MoA). Our research reveals that the adjuvant Pam_2Cys, a lipidic Toll-like receptor (TLR) 2/6 ligand, selectively engages with immune cells, while sparing other cell types. Moreover, our vaccines exhibit high efficiency in uptake by immune cells, surpassing non-self-adjuvant constructs.

The peptides in our vaccine form nanoparticles through their amphiphile character and are processed by endolysosomal enzymes (cathepsins) after uptake, releasing CD4+ and CD8+ T cell epitopes intracellularly. These epitopes are then displayed on the cell surface through cross-presentation, a key process for efficient immune responses. Our investigation of various cleavage sites revealed that precise enzymatic cleavage sites outperform natural protein overlap in epitope cross-presentation efficacy. Notably, cellular processing of our self-adjuvant constructs leads to significantly enhanced cytokine secretion and MHC complex recruitment compared to non-self-adjuvant peptides.

Antimicrobial resistance (AMR) is an urgent public health threat with an annual death toll of more than 1 million per year. For instance sexually transmitted bacterial infections like Gonorrhoea, caused by *Neisseria gonorrheoeae,* have constantly developed resistance to many new antimicrobials, that are currently marketed.

Self-adjuvant T-Fender nanovaccines can contribute to fight AMR through the safe induction of disease-specific T cells and thus cure and protect patients in need.