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A Next-Generation COVID-19 Vaccine Using Myeloid Targeting Platform™ Shows Superior Killer T Cell Induction and Infection Protection Properties in a Preclinical Animal Model

- Pullulan nanoparticle (PNP) was used to actively and selectively deliver SARS-CoV-2 spike protein (PNP:RBD) to antigen-presenting cells in the lymph node of mice.
- Active targeting was achieved through binding of PNP to the receptor SIGN-R1 that is specifically expressed on lymph node macrophages.
- Preclinical results demonstrated that PNP:RBD vaccine efficiently prevented SARS-CoV-2 infection by inducing a robust CD8⁺ killer T cell response.
- PNP technology holds the potential of been applicable to a wide variety of infectious disease vaccines.

United Immunity, Co., Ltd., a biotech company developing pullulan-based Myeloid Targeting Platform™, with its partners from the University of Tokyo, Kyoto University, Nagasaki University and Aichi Cancer Center announced today the publication of preclinical data demonstrating that pullulan nanoparticle (PNP, shown as PNG in the article) actively delivers the spike (S) protein of SARS-CoV-2 to antigen-presenting medullary macrophages through the selective binding to the C-type lectin receptor SIGN-R1 (mouse equivalent of human DC-SIGN). PNP vaccination strongly enhanced the induction of specific CD8⁺ T cells and thereby prevented viral infection. [The study](#) was published in the journal *npj Vaccines* on September 18.

In a K18-hACE2 mouse model of SARS-CoV-2 infection, PNP:RBD vaccine significantly decreased the viral load and prolonged the survival in a CD8⁺ T cell- and B cell-dependent manner. T cell receptor (TCR) repertoire analysis revealed that although the vaccine induced T cells at various frequencies, low frequency specific T cells mainly promoted virus clearance. Thus, the induction of specific CD8⁺ T cells that respond quickly to viral infection, even at low frequencies, is important for vaccine efficacy and can be achieved by SIGN-R1⁺ medullary macrophage-targeted antigen delivery.

Dr. Naozumi Harada, co-author and Chairman of United Immunity commented “we foresee that our PNP technology as well as our corresponding pullulan-coated lipid nanoparticle will be applicable to vaccines against a wide variety of infectious diseases”.

About United Immunity, Co., Ltd.

United Immunity is an innovative biotech company developing a Myeloid Targeting Platform™ comprising of pullulan-based nanoparticle (PNP) and pullulan-coated lipid nanoparticle (P-LNP) to target therapeutic payloads (small molecules, nucleic acids, peptides, proteins, etc.) to macrophages and dendritic cells for the treatment of cancer, fibrosis, infectious, metabolic, autoimmune, and inflammatory diseases. The company's lead program, UI-102, uses PNP to deliver a TLR agonist to tumor-associated macrophages and change refractory cold tumors into treatment-sensitive hot tumors. United Immunity's platform is also being applied to T cell booster vaccines and in vivo CAR-macrophages.

For more information on the company, please visit:

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