

VACINO BIOTECH



Vaccine and nucleic acid medicine experts

An engagement of two molecules is crucial for a biological response. In medicine, drugs are searching for their target and initiate the consequent biological response. Vacino Biotech is a young startup company led by Dr. Jia-Ming Chang that focuses on exploring the molecules acting on the critical protein-protein interaction. The company has several years of experience in the biotech industry developing many cutting-edge technologies. One is called Site-Directed Epitope Design (SED), which can directly create an immune-reacted epitope based on the 3D structure of an antigen. With this technology, the epitope antigen can be designed to avoid mutation and glycosylation sites that influence either the function of antibody binding or T cell recognition.

Innovation with the COVID-19 vaccine

Since the COVID-19 pandemic, the whole world has suffered with the rapid mutation of SARS-CoV-2 viruses. However, current vaccines were not able to catch up to the newly mutated viruses. The only solution is to develop a universal COVID-19 vaccine to stop the post-pandemic spread of COVID-19. With this SED technology, **Vacino Biotech** successfully invented an oral COVID-19 vaccine, **VACINO-CO**. It contains only a 9-amino acid peptide, which can activate the human T cells to attack the virus-infected cells and generate the neutralizing antibody to block entry of the virus. The activation of the immune system against the virus antigen can be evoked by the short epitope peptide without the involvement of an adjuvant, which is an agent for boosting or modulating immune response. This reduces the risk of autoimmune disease due to exposure to excess adjuvant, which can amplify and/or modify the immune response and often induces unwanted immunity against our own body. The HLA-restricted epitope peptide is truly next-generation vaccine technology. It provides the advantage of universal protection, T and B cell activation, and a high safety profile. Most importantly, it is available orally.

Innovation in brain delivery

With extension of SED technology, **Vacino Biotech** has invented a very useful peptide, **VACINO-BT** (VBT), which can target the transferrin receptor-1 (TfR-1) and can transport drugs to the brain by transcytosis. Such big molecules could not be distributed to the brain due to the blood brain barrier (BBB), which is an obstacle for treating brain-related diseases, e.g. brain metastases and long COVID. The VBT peptide shows superior activity regarding TfR-1 binding. Within an hour, the VBT peptide itself can penetrate the BBB mimic model in vitro and distribute in the brain of an in vivo model. When VBT is conjugated to an antibody, it can help antibody distribution and enrichment in the brain and spinal cord regions. Similar results were observed when VBT was incorporated onto lipid nanoparticles, a conventional delivery system for nucleic acid drugs. Remarkably, oral VBT-conjugated antibodies showed an identical result in regions of the brain. This means that VBT not only can support the BBB penetration, but it also facilitates the intestinal absorption of antibodies. This observation of high transportation activity opens an unlimited imagination for treating brain diseases.

Innovation in nucleic acid manufacturing

Vacino Biotech has another breakthrough technology, marketed as **R-MOD**. It takes one-pot chemical synthesis methods, which combine different materials (nucleic acid, peptides and polymers) with a one-step reaction. The module chemical design makes therapeutics changeable to create a diversity of drugs based on micro-RNA (miRNA). The polymer stabilizes the miRNA, and the pH-sensitive peptide guarantees the release of micro-RNA within the cells to elicit their function for modulation of gene expression. Dr. Marc Aurel Busche, with the UK Dementia Research Institute at University College London, believed that [the accumulation of beta-amyloid and aggregation of intracellular tau proteins are the major causes of Alzheimer's disease \(AD\)](#), as reported in the journal *Nature Neuroscience*. In fact, the Alzheimer's Association reported last year that the [removal of beta-amyloid contributes a modest improvement in AD](#). More and more evidence shows that [neuroinflammation is an early cause of AD pathogenesis](#), including a June 2022 report in the journal *Frontiers*. The first miRNA-based neurodegenerative drug from **Vacino Biotech** is **VACINO-ADmir**, which was developed to reduce neuroinflammation by up-regulation of the PD-L1 expression of neurons to prevent damage from microglia cells in an exacerbated environment. With protection of neuron cells, [it might be able to stop the progression of Alzheimer's disease, Parkinson's disease and other related neurodegenerative diseases](#), as reported in 2022 by the journal *Molecular Neurodegeneration*.

Into the future

Vacino Biotech is a rapidly growing biotech company based in Taiwan, ROC. The management team, Dr Jia-Ming Chang, president, Fang-Ju Chou, vice president of business promotion, and Dr. Yi-Ru Lee, chief scientific officer, has gained much experience from the international biotech industry. Since the company was founded in 2020, more than 15 patents have been submitted worldwide to protect the rights of intellectual property. **Vacino Biotech** persistently keeps working on cutting-edge innovation in vaccines and neurodegenerative medicine.



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