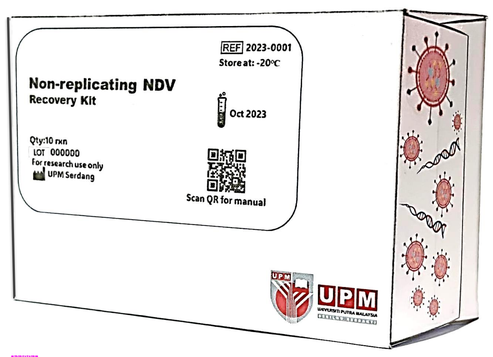
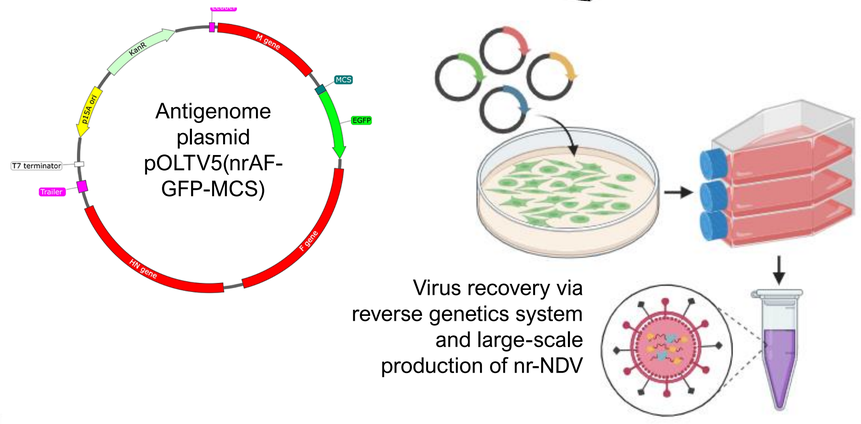
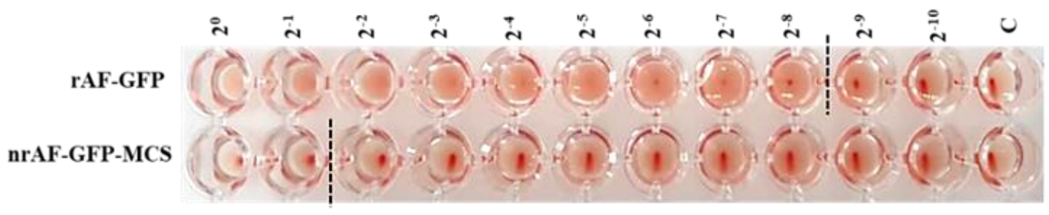
Non-Replicating Recombinant Newcastle Disease Virus as a Viral Vector

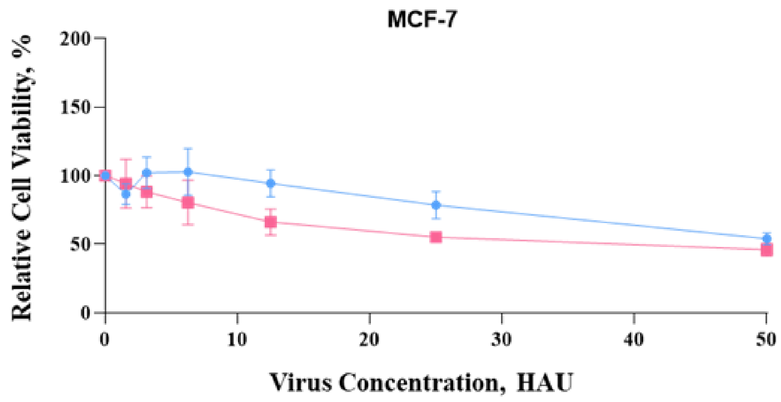
PATENT NO. PI2022005663







Hemagglutination assay for replicating NDV (rAF-GFP) and non-replicating nrAF-GFP-MCS after recovery and large-scale propagation. Absence of teardrop in the well indicated presence of the virus.



Comparison of the oncolytic effect of the non-replicating nr-AF-GFP-MCS and the replicating rAF-GFP in breast cancer cells, MCF. The effect is similar for both strains.

Hemagglutination assay for non-replicating nrAF-GFP-MCS harbouring RBD gene from Sars-CoV-2 virus, nr-RBD after recovery. Absence of teardrop indicated presence of virus.

BRIEF TECHNOLOGY

The invention is a system producing genetically-engineered/ recombinant non-replicating Newcastle disease virus (nr-NDV) carrying a green fluorescent protein (GFP) gene and a multiple cloning site (MCS) – **nrAF-GFP-MCS** that has the capability of being a viral vector, vaccine, and/or an agent for treating cancer.

CURRENT ISSUES

- NDV is a pathogenic avian virus that could cause tremendous loss to the poultry industry during an outbreak.
- However, NDV is not pathogenic to human and was proven clinically as an agent to kill cancer cells.
- Furthermore, cloning of immunostimulatory gene and apoptosis-inducing gene into NDV was found to enhance the cancer killing activities.
- In addition, NDV has been studied in human trial as viral vector for vaccine
- Interestingly, a safe, non-replicating NDV vector to deliver therapeutic transgenes is unavailable.

INVENTIVENESS & NOVELTY

- **Established system:** nrAF-GFP-MCS could be produced using reverse genetics.
- **Safe:** nrAF-GFP-MCS undergoes abortive infection thus failing to produce infectious viral progenies
- **Versatile:** Foreign transgene(s) could be inserted into the MCS.
- **Proven:** nrAF-GFP-MCS could express the transgenes

USEFULNESS & APPLICATION

- **Vaccine development:** Gene(s) of interest that could elicit immune response could be inserted into the virus to be expressed as an antigen/immunogen.
- **Gene therapy** – Gene(s) of specific protein could be inserted into the virus allowing the expression during virus infection in the specific target cells.
- **Cancer therapy** – Immunostimulatory gene(s) could be inserted into the virus allowing the expression during virus infection in the cancer cells to induce immune reaction in targeting the cancer – immunotherapy.

IMPACT OF THE PRODUCT

- A potential therapeutic agent for the treatment of cancer in human that is safe to the avian species and would not cause disease outbreak.
- The oncolytic effect of the non-replicating NDV vector is similar as compared to the replicating NDV viral vector.
- Non-replicating NDV viral vector expressing therapeutic genes could be used for virotherapy and prophylaxis vaccine development.

MARKET POTENTIAL

- Pharmaceutical company
- Start-up company with BioNexus status

TECHNOLOGY READINESS LEVEL (TRL)

5 – Validation in real environment

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