B-CELL IMMUNOTHERAPIES

B-cell immunotherapies link an immunogenic protein with a B-cell epitope and incorporate an adjuvant to produce a B-cell cancer vaccine that induces the body to produce antibodies against the normal self-proteins, such as HER2 or PD-1 (known as breaking immune tolerance).

The antibodies produced following the vaccination are a 'polyclonal' mixture of antibodies that bind to different parts of the vaccine antigen. This makes them somewhat different to the monoclonal antibody drugs, even though they bind to the same target in the body.

The use of B-cell immunotherapies to stimulate the patient's immune system to produce polyclonal antibodies may have advantages over synthetic antibodies, including:

- Lower cost of production: B-cell immunotherapies are much cheaper to manufacture than mAb drugs.
- The polyclonal antibody response may reduce the risk of the tumour becoming resistant to the therapy and could potentially improve efficacy.
- The vaccine stimulates continuous antibody production via a lasting immune response that may inhibit tumour recurrence.

- The natural polyclonal antibodies produced following vaccination are potentially safer than synthetic mAb drugs and may avoid toxic side effects of mAb administration, which can include ventricular dysfunction, congestive heart failure or anaphylaxis.
- Subcutaneous or intramuscular injection of the vaccine is more convenient than intravenous infusion of mAb drugs.
- B-cell cancer vaccines are distinct from T-cell cancer vaccines, which bind to class I MHC molecules on antigen-presenting cells and are recognised by cytotoxic T-cells. Although several T-cell vaccines have shown limited therapeutic benefits in clinical trials, they have not caused striking tumour regression.

HER-VAXX

HER-Vaxx is a B-cell immuno-therapy designed to treat tumours that over-express the HER-2/neu receptor, such as gastric, breast, ovarian, lung and pancreatic cancers.

Developed by leading scientists at the Medical University of Vienna in Austria, the immuno-therapy is constructed from several B-cell epitopes derived from the extracellular domain of HER-2/neu.

It has been shown in pre-clinical studies and in Phase I studies to stimulate a potent polyclonal antibody response to HER-2/neu, a well-known and validated cancer target.

PD1-VAXX

PD1-Vaxx is a B-cell immuno-therapy which aims to induce the body to produce polyclonal antibodies that block PD-1 signalling, and thus produce an anticancer effect similar to Keytruda, Opdivo and the other immune checkpoint inhibitor monoclonal antibodies that are transforming treatment of a range of cancers. PD1-Vaxx has shown great potential in preclinical studies. It outperformed an industry-standard mouse anti-PD-1 antibody in a mouse model of colorectal cancer.

Developed by Professor Pravin Kaumaya at the Ohio State University in Columbus OH, the immunotherapy is constructed from a single B cell epitope derived from the extracellular domain of PD-1.

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TECHNOLOGY

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