

# GENETIC TECHNOLOGY ALERT

## **INNOVATIVE VACCINE PLATFORM BASED ON HSP-60 DERIVED PEPTIDES**

Basically, vaccines are preparations of attenuated or killed pathogens that by themselves can not cause a disease, but upon administration trigger immune response against that disease. Current available vaccines are based on various methods including live attenuated vaccines, killed whole organisms, subunits, conjugate vaccines, and others. Although very effective vaccines are available for some diseases, current techniques do not provide a solution for all infectious diseases. For some diseases, the available vaccines are not completely protective or the administration is not safe enough, while for many other diseases there is simply no effective vaccine. The reason for this, in many cases, is the absence of an effective antigen (an antigen that would stimulate the immune response). To overcome this problem, some vaccines are administered with an adjuvant, but this may lead to other difficulties. Obviously there is a need for safe vaccines that will provide good protection without requiring nonspecific adjuvant.

In order to address the need for effective vaccines against antigens that do not generate an immunogenic response, the start-up company VacciGuard has developed a platform technology that is based on peptides derived from HSP-60 (Heat Shock Protein-60) that converts weak antigens into strong immunogens. Having this platform, the company is now developing numerous vaccines against virulent pathogens for which there are no available effective vaccine solutions, as well as therapeutic vaccines against diseases such as lung cancer.

The company's technology is based on intellectual property that was developed by Irun Cohen, professor from the Department of Immunology at the Weizmann Institute of Science and his collaborators at Ben-Gurion University of the Negev. Irun Cohen has found that by conjugating poorly immunogenic antigens such as peptides and polysaccharides to HSP-60-derived peptides, they can create effective vaccines.

HSP-60 is a chaperone/stress protein that sends powerful signals to the immune system, especially at sites of inflammation, infections, and other types of

stress. VacciGuard's technology uses peptides derived from HSP-60 as carrier molecules for antigens. When conjugated to an antigen, the carrier peptide generates an immune response against the specific antigen that includes effector T cells, IgG antibodies, and long-lasting immune memory. Added adjuvants are not needed. Since VacciGuard's vaccine is a synthetic peptide, its production is a relatively simple and inexpensive process that provides a stable vaccine, which is quite easy to store. Unlike other carriers, VacciGuard's carrier may serve as a generic carrier for repetitive usage since the body does not develop antibodies against the carrier molecule.

The antigen conjugated to the VacciGuard carrier can be derived from an infectious disease pathogen or from a tumor cell. Proof-of-concept has been demonstrated in mouse models with 5 different pathogens including West Nile Virus (WNV), and the company is now focused on establishing the proof-of-concept in animal models for both a universal vaccine for influenza and a lung cancer vaccine. The antigen that is used by VacciGuard for the lung cancer vaccine is a polysaccharide that is expressed on several cancerous tissues. Speaking to *Technical Insight*, Anat Eitan, founder and CEO of VacciGuard said, "We hope that our vaccine will prevent metastasis and reduce the reoccurrence rate of lung cancer, which is currently very high." VacciGuard's vaccine would be administered after cancer surgery or other treatments designed to remove the primary tumor. Until now, the company has used two sources of the polysaccharide antigen for its lung cancer vaccine and has successfully demonstrated that the vaccine leads to the induction of long lasting IgG antibodies. According to Eitan, the company is currently working to confirm that the vaccine will indeed lead to the destruction of cancer cells.

The company technology is protected by several patents, including two granted US Patents and three additional applications in national phase, PCT, and provisional.

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