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A Human Survivin Peptide for Vaccination Against Neoplasia

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Ref# RP10-002

Keywords: Glioma, cancer, multiple myeloma, peptide, vaccine, survivin.

Collaboration Research Opportunity: Roswell Park Cancer Institute is seeking partners to help co-develop the use of a recombinant human survivin peptide for use in vaccination against cancers.

Summary: Malignant gliomas are among the most devastating of all human cancers. Even with aggressive treatment , including surgery, radiation therapy, and chemotherapy ; survival remains poor. Survivin is a tumor-associated antigen that is highly expressed in many cancers and is associated with chemotherapy resistance, increased tumor recurrence, and shorter patient survival. These features of the protein have made it an attractive target for vaccination strategies.

Technology: Researchers at the Roswell Park Cancer Institute have developed a peptide "molecular mimic" vaccine based on the survivin protein that is immunogenic in humans. Unlike other survivin based vaccine technologies, this peptide mimic elicits both CD8+ T cells and CD4+ T cell support targeted against tumor cells. This peptide is a 15 amino acid long epitope corresponding to AA53-AA67 of wild type survivin sequence. Roswell researchers have engineered an artificial replacement of AA57 (Cysteine to Methionine) and formulated the vaccine for delivery as a KLH conjugated peptide in adjuvant. As a result of this change, the peptide exhibits enhanced immunogenicity resulting in a strong immune response against human glioma cells. The "mimic" peptide contains several CTL epitopes with relatively limited HLA restriction and a Helper T cell epitope all designed within a single peptide, the change of C>M allows for enhanced presentation of these epitopes to the immune system and thus a more robust downstream immune response.

Potential Commercial Applications:

- Potential therapy for patients in malignant glioma
- Most tumor cells express survivin, which should be targetable in this manner, therefore, this vaccine is not limited in usage in only gliomas but is applicable to almost any survivin-expressing cancer.
- Similar to its use as a cancer vaccine if given to patients with autoimmune disease cells involved in the pathogenesis of arthritic joint (RA) or central nervous system (MS) destruction could also potentially be targeted.

Competitive Advantages:

- This vaccine targets a protein present in over 90% of all cancer cases (other ones on the market have targets that are only present in 15% of cases)
- The vaccine produces a multi-arm immune response (other competitors produce single-arm responses which do not have the cell killing potential or specificity of this technology).
- This vaccine is cell-free, does not use patient cells. It is easy to produce and can be stored on a shelf until needed. This avoids the enormous production cost of other cell-based technologies.
- Initial positive results in Phase I Clinical Trials in malignant glioma. Phase II trials planned.

Development Status: Survivin Peptides as Cancer Vaccines –US Patent, #7,943,138 (2011);

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Survivin Peptides for Autoimmune disease – US Patent, #8,580,269 (2013);

Awarded Peoples Republic of China Patent (2013); Awarded Japan Patent (2013); Worldwide PCT, Pending Canada, EU & South Korea.

Inventors: Michael J. Ciesielski, PhD & Robert A. Fenstermaker, MD

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