Novel Engineered Oral Vaccine against HIV/AIDS

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HIV causes significant morbidity and mortality worldwide, especially in developing countries that cannot provide healthcare to its citizens. The most efficient and cost-effective preventative method to the spread of HIV would be an affordable and accessible AIDS vaccine. The goal of this project is to engineer two antigen presenting constructs of a possible vaccine: a S. mitis bacterium containing an HIV-1 gene that will 1) express the antigen on the cell-wall or 2) express the antigen in the cytoplasm, and to determine the effect of location on the immunogenicity of the construct. The manipulation of the S. mitis genome for changes in protein expression location in this system is a novel approach. A gene cassette containing the gp120 gene was created and inserted through homologous recombination into the pullulanase A gene of the S. mitis. A signal peptide was included for the expression of the gp120 protein in the secretion model. In the cell wall model, a signal peptide and a lipid cell anchor, LPXTG were included. In the cytoplasmic model a 5'UTR region was used as a promoter. The successful isolation and integration of the gp120 gene into the S. mitis genome was confirmed through PCR. Western blots were done on the constructs to demonstrate the effects of the signal peptide, LPXTG and 5'UTR on the locational expression of the gp120 protein. The cell-wall expression model was successful in expressing the gp120 protein in the cell. The cytoplasm expression model was not successful and the gp120 protein was not expressed at all. The secretion model was successful in secreting the gp120 protein outside of the bacteria. Future studies hope to test the construct's immunogenicity in mice, and possibly humans.

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