

# Flagellin-Based Vaccine Adjuvants



*Our technology is a flagellin-expressing eukaryotic cell that acts as an adjuvant for enhancing therapeutic tumor vaccine efficacy. This patented vaccine could be used for many tumor types. This technology will allow for a localized and prolonged T-cell activation effect against tumor antigens. The flagellin can be from numerous bacteria, and the flagellin-expressing eukaryotic cell can be used in combination with irradiated tumor cells to make a cellular vaccine.*

## COMMERCIAL OPPORTUNITY

- The unmet need in the development of therapeutic cancer vaccines is the tolerance of T-cells to tumor antigens. Flagellin is a bacterial protein that inhibits tolerance to tumor antigens, and can stimulate tumor antigen-presenting cells to activate T-cells.
- Flagellin is a unique toll-like receptor (TLR) 5 ligand in that it induces upregulation of pro-inflammatory cytokine IL-12 but does not induce the anti-inflammatory cytokine IL-10. TLR5 ligation by flagellin inhibits tolerance to tumor antigens by converting tolerogenic dendritic cells into activating antigen-presenting cells that preferentially induce T-helper 1 responses.
- This market is attractive as evidenced by companies developing ligands to TLRs, such as Idera Pharma with a TLR9 agonist for solid tumor types and metastatic melanoma that is in Phase 1/2 trials, Dynavax with a TLR9 agonist for low grade B-cell lymphoma and metastatic melanoma in Phase 1/2 trials, Cleveland BioLabs with a synthetic TLR5 adjuvant for cancer treatment in Phase 2 trials, and Cervarix, a marketed vaccine for cervical cancer that contains a TLR4 adjuvant.

## TECHNOLOGY

A patent has been issued covering the following embodiments: (1a) A flagellin-expressing eukaryotic cell that has been lethally irradiated where the eukaryotic cell is mammalian or avian, where the cell lacks MHC class I molecules, MHC class II molecules, or both, where the cell is a B78-H1 cell or K562 cell that has been transfected with a flagellin gene, where the flagellin-expressing cell expresses a flagellin of *Escherichia*, *Salmonella*, *Proteus*, *Pseudomonas*, *Bacillus*, *Campylobacter*, *Vibrio*, *Treponema*, *Legionella*, *Clostridia*, or *Caulobacter*; (1b) a flagellin-expressing cell that has an antigen that is associated with a tumor cell, where the antigen is a tumor cell that has been lethally irradiated; (2) a method for preparing an adjuvant, where the flagellin-expressing eukaryotic cell has been lethally irradiated; and (3) a method for inducing the production of IL-12 where the subject has been administered the lethally irradiated flagellin-expressing eukaryotic cell.

## PUBLICATION

- US Patent 7,404,963 issued October 3, 2005 issued to Drs. Sotomayor and Suarez.
- Vicente-Suarez et al. (2007) Eur. J. Immunol. 6(4): 356-421.
- Vicente-Suarez et al. (2009) Immunol. Lett. 125(2): 114-118.

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## LICENSING OPPORTUNITY

