Early Results from a Phase 1 Clinical Study of a Cancer Vaccine Targeting Tumor Associated Antigen MUC1 in Ductal Carcinoma in Situ for Immune Interception of Breast Cancer

Emilia J. Diego, MD[1,2]; Julia Foldi, MD PhD [2,3]; Priscilla F. McAuliffe, MD PhD [1,2]; Qurat Ul Ain Sabih, MD [1,2]; Rohit Bhargava, MD [2,4]; Leisha Emens, MD PhD [5]; Andres M Salazar, MD [6]; Olivera Finn, PhD [7]

[1]University of Pittsburgh Department of Surgery, [2]UPMC Hillman Cancer Center, [3] University of Pittsburgh Deparment of Medicine, [4] University of Pittsburgh Department of Pathology,
[5] Calico Lifesciences, [6] Oncovir, [7]University of Pittsburgh Department of Immunology

Introduction

Hypoglycosylated tumor MUC1, a transmembrane glycoprotein, is recognized by human T-cells and antibodies as a tumor-associated antigen. It is overexpressed in premalignant precursor lesions, including ductal carcinoma in situ (DCIS), thereby serving as a potential potent DCIS rejection target.

The anti-MUC1 vaccine is composed of a 100aa long MUC1 peptide corresponding to 5 tandem repeats of 20 amino acids from the MUC1 variable number of tandem repeats region (VNTR), admixed with the poly-ICLC adjuvant Hiltonol.

Vaccine-induced immune response to MUC1 may halt DCIS recurrence or progression to invasive disease and may offer a future strategy for primary disease prevention in high-risk individuals.

Hypothesis: our MUC1 peptide vaccine will be both safe and immunogenic in patients with DCIS and that the elicited systemic immune response will affect changes in the microenvironment of the DCIS from pro- to anti-tumor.

Objectives

1. To assess the immunogenicity of the MUC1 vaccine in ER+ DCIS
2. To assess the safety and feasibility of the MUC1 vaccine in ER+ DCIS patients prior to surgery
3. To characterize peripheral MUC1-specific effector T-cells, regulatory T-cells and myeloid derived suppressor cells (MDSC) at baseline and after vaccination. Changes in features of the tumor immune microenvironment and peripheral immunity at baseline and after vaccination may also be explored.

Methods

Trial details: single institution, open label, randomized, controlled phase I clinical trial (NCT06218303)
Inclusion criteria: women with previously untreated estrogen-receptor positive (ER+) DCIS histologically confirmed on core needle biopsy (CNB).
Trial design:

- Randomization 2:1 to the vaccine group.
- *Vaccine arm*: patients receive 3 subcutaneous (SC) or intramuscular (IM) injections at week 0, 2, and 12 after enrollment and then undergo standard of care (SOC) surgery
- *Control arm*: patients undergo SOC surgery at 12 weeks.
- All patients can opt to take daily SERM or AI during study
- Optional booster to vaccine responders 6 mo post-surgery.
- Adverse events are monitored per Common Terminology Criteria for Adverse Events (CTCAE) version 5.0.

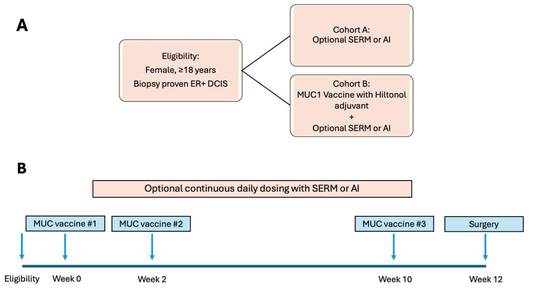
Primary endpoint: Immunogenicity based on determination of ≥2-fold increase in serum anti-MUC1 IgG from baseline using enzyme-linked immunosorbent assay (ELISA)
Correlatives:

- Tissue from the pre-treatment CNB and the post-treatment operation are collected.
- Add here how immune response is determined

Statistical Analysis:

- Fisher's exact test will compare primary immunogenicity between the study arms with one-sided α=0.05.
- Power analysis: enrollment of 50 patients planned

Study Schema



Results

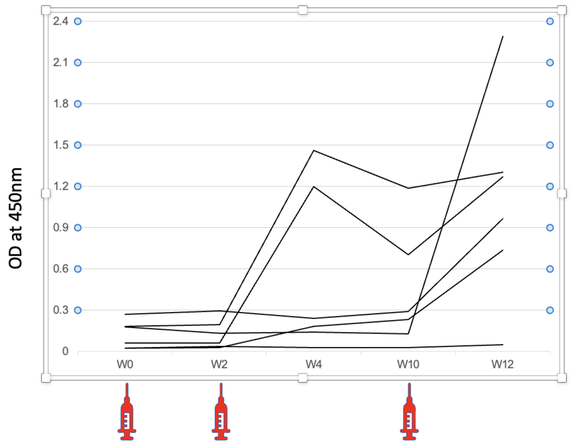


Figure 1. Vaccine-induced anti-MUC1 antibody (IgG) in the first 7 vaccinated patients, measured by ELISA at the time of each injection and 2 weeks post-inoculation. OD values represent IgG concentrations..

Results

- 20/50 patients enrolled to date.
- Mean patient age is 66.
- The primary vaccine series elicited or boosted anti-MUC1 IgG in 6 of the first 7 vaccinated women, for a **response rate of 86%.**
- Only 1 patient to date was eligible to receive the booster vaccine and showed a strong immune memory response.
- There was no anti-MUC1 IgG present in the control group.
- There are no serious adverse events reported to date.
- Extensive phenotyping of peripheral blood mononuclear cell samples from both groups and evaluation of MUC-specific cellular responses are in progress, as are tissue analyses.

Conclusions

MUC1 peptide vaccine given in the premalignant DCIS setting is safe in the first 7 patients to receive the vaccine.

The 86% immune response rate predicts a high rate of response, which will allow us to study immune mechanisms activated by the vaccine, including changes in the DCIS microenvironment.

.

Contact
Emilia J. Diego
University of Pittsburgh
Email: diegoe@upmc.edu
PS4-06-18
12/11/2025 5-6:30 pm

This presentation is the intellectual property of the author/presenter. Contact diegoe@upmc.edu for permission to reprint and/or distribute.