Comprehensive Immune and Molecular Analysis of Two Metastatic Melanoma Patients Treated with Personalized Neoantigen Vaccine, NEO-PV-01, in Combination with Anti-PD-1: A Case Study

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Methods

Neoantigen
cancer
vaccine
response
CD8+ T cells
nathefour

cancer
vaccine
response
CD8+ T cells
nathefour

cancer
vaccine
response
CD8+ T cells
nathefour

cancer
vaccine
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1. NEO-PV-01 is composed of up to 20 unique neoantigen peptides of 14–35 amino acids in length.
2. NEO-PV-01 + nivolumab
3. ELISPOT
4. H&E
5. No prior systemic therapy
6. PBMCs
7. 6 of 8 patients with melanoma exhibited (9) were mutant specific
8. For Patient M1, of the nine, eight peptides generated CD4+ and four generated CD8+.

Results

Table 1: Patient Characteristics

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Ethnicity</th>
<th>Prior Therapy</th>
<th>Tumor Type</th>
<th>Stage</th>
<th>Regression</th>
<th>Treatment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>45</td>
<td>M</td>
<td>White</td>
<td>NS</td>
<td>Melanoma</td>
<td>T2</td>
<td>Metastatic</td>
<td>Nivolumab</td>
<td>PR</td>
</tr>
<tr>
<td>M4</td>
<td>52</td>
<td>M</td>
<td>White</td>
<td>NS</td>
<td>Melanoma</td>
<td>T3</td>
<td>Metastatic</td>
<td>NEOPV-01 + nivolumab</td>
<td>CR</td>
</tr>
</tbody>
</table>

The table above shows the characteristics of the two patients included in the study. Patient M1 was treated with nivolumab monotherapy and had a partial response (PR). Patient M4 was treated with NEO-PV-01 + nivolumab and achieved a complete response (CR).

Figure 1A: A Personal Neoantigen Vaccine

The figure illustrates the concept of a personal neoantigen vaccine, which targets specific neoantigens present in individual patients. The vaccine is designed to elicit an immune response against the neoantigens that are unique to the patient's cancer.

Figure 1B: Neoantigen-Induced T Cell Expansion

The figure shows the expansion of neoantigen-specific T cells in response to treatment with NEO-PV-01 + nivolumab. The T cells are activated and expanded in vitro, indicating the vaccine's ability to induce an effective immune response.

Figure 2: NT-OPT NEO-PV-01 with Neoadjuvant Treatment and Assessment Schedule

The schedule outlines the timeline for neoadjuvant treatment with NEO-PV-01 and assessment of the immune response post-treatment.

Figure 3: Vaccination Induces Neoantigen-Specific T Cells

The figure demonstrates the induction of neoantigen-specific T cells following vaccination with NEO-PV-01. The T cells can be activated with different neoantigen peptides and expand over time.

Figure 4: Vaccination Induces Neoantigen-Specific CD8+ T Cells

The figure focuses on the induction of CD8+ T cells specific to neoantigens. The T cells are activated and expanded in response to vaccination, highlighting their crucial role in the immune response.

Figure 5: CD8+ Neoantigen-Specific T Cells Express Cytolytic Markers

The figure shows CD8+ T cells expressing cytolytic markers such as CD69 and CD107a, indicating their cytotoxic function.

Figure 6: Epitope Spread: Expansion of an Immune Response to Peptides Not Included in the Vaccine

The figure illustrates the expansion of immune responses to peptides not included in the vaccine, demonstrating the vaccine's ability to induce a broad immune response.

Figure 7: Neoantigen Epitope Mapping of Tumor Antigens

The figure presents the mapping of neoantigen epitopes on tumor antigens, showing the diversity and specificity of the immune response.

Figure 8: Neoantigen-Specific T Cells Functionally Kill Cancer Cells

The figure demonstrates the ability of neoantigen-specific T cells to kill cancer cells, highlighting their antitumor efficacy.

Figure 9: Vaccination Leads to Epitope Spreading

The figure shows the progression from the initial immune response to a broader epitope spreading, indicating an enhanced immune response over time.

Figure 10: Limited Tumor Observed in Post-Treatment Biopsies

The figure illustrates the limited tumor observed in post-treatment biopsies, highlighting the vaccine's efficacy in reducing tumor burden.

Table 2: Summary of Findings

<table>
<thead>
<tr>
<th>Finding</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1. Patient M1 |...
| 2. Patient M4 |...

The table summarizes the key findings from the study, highlighting the therapeutic benefits of NEO-PV-01 + nivolumab in treating melanoma.

Acknowledgments

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References


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