National Cancer Center (NCC) Japan, NCC Seed Acceleration Program（NCC SAP）

Development of universal cancer antigen cocktail mRNA vaccine therapy that eradicates residual cancer cells after surgery and prevents cancer recurrence

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Vision

The development of cancer treatments that have minimal side effects and can reliably prevent recurrence is necessary. We will develop a cancer mRNA vaccine therapy that requires only a few injections, is safe, inexpensive, and has minimal side effects, and is expected to be effective in preventing recurrence. While personalized neoantigen vaccines are extremely expensive, our common cancer antigen vaccine can be prepared off-the-shelf and at a low cost. In Japan, 1 million people develop cancer each year, and 400,000 die from it. We hope to reduce the number of patient deaths by developing a cancer mRNA vaccine therapy that can prevent postoperative recurrence.

Marketability

Approximately 600,000 people in Japan undergo cancer surgery each year. Of these, approximately 100,000 experience a recurrence within five years, making them eligible for an mRNA vaccine to prevent cancer recurrence. If approved, this mRNA vaccine could become a vaccine that many patients undergoing cancer surgery will want to receive. If cancer recurrence prevention can be achieved, we may see an era in the future where cancer can be prevented with vaccines.

Innovation

Our 10 universal common cancer antigens have been proven to be frequently expressed in various solid tumors, with limited expression in normal tissues. mRNA vaccines using these full-length sequences have been shown to induce robust antigen-specific T cell responses and antibody production in experiments using HLA-expressing mice, and to have antitumor effects against cancer cells expressing the antigen.

Partnering

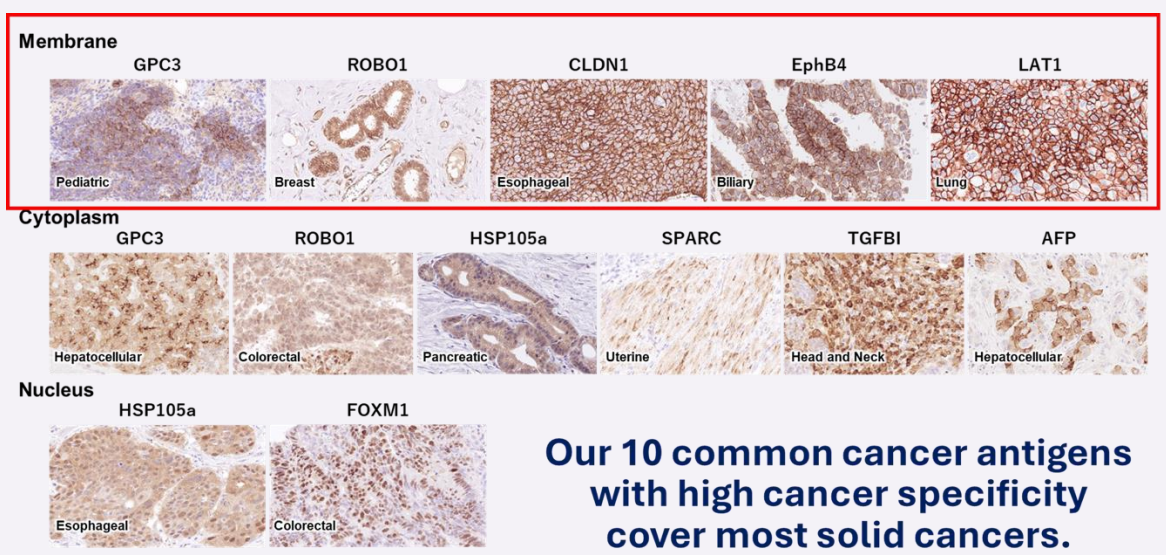
【 Expected partners 】
Pharmaceuticals・ Medical institute ・ Biotech/Drug Discovery Service ・CMO/CDMO/CRO/SMO ・ Venture capitals

【 Expectation 】
Manufacturing investigational drugs, conducting clinical trials, startup support, etc.

Research Outline

Key Words: #RNA, #Biomarker, #Immune response, #Cancer prevention

We conducted a clinical trial of peptide vaccine therapy derived from the cancer-specific antigen glypican-3 (GPC3). Several patients with advanced cancer responded after just a few doses, and seven refractory pediatric cancer patients have survived 10 years without recurrence, demonstrating the potential for recurrence prevention. However, we also encountered several cases of cancers that did not express GPC3, highlighting the limitations of peptide vaccine therapy using a single antigen. Aiming to overcome the heterogeneity of individual cancers and to apply the vaccine to a wide range of solid tumors, we decided to collect 10 common cancer-specific antigens, such as GPC3. GPC3, HSP105α, FOXM1, SPARC, ROBO1, TGFBI, AFP, EphB4, CLDN1, and LAT1 are expressed in a variety of solid tumors, with extremely high expression rates, and have been shown to be rarely expressed in non-cancerous normal organs adjacent to the tumor, with some exceptions. The full-length sequences of these 10 universal cancer antigens have been proven to contain peptide sequences capable of inducing large numbers of CTLs in experiments using HLA-expressing mice. Our proprietary mRNA vaccine therapy using these antigens has been shown to robustly induce antigen-specific T cell responses and antibody production in experiments using HLA-expressing mice, and has also demonstrated antitumor effects against cancer cells expressing the antigen.



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