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BrightPath concludes agreement to develop personalized cancer vaccine

Research collaboration focusing on a novel method for neoantigen identification

Tokyo – BrightPath Biotherapeutics, a biopharmaceutical company, entered an agreement for developing a personalized cancer vaccine using a novel method involving the body's immune response. The collaborative research agreement was concluded with The University of Tokyo and the Kanagawa Cancer Center in Yokohama.

Recent progress in cancer immunotherapy has led to remarkable advances in the development of treatments for cancer patients. They include such treatments as immune checkpoint inhibitors, making use of the body's immune response to recognize and attack cancer cells, and chimeric antigen receptor T-cell (CAR-T) therapy, employing the body's own immune cells that have been genetically altered to better target tumor cells.

To realize more effective therapies, researchers are now focusing on personalized medicine, which offers optimal treatment based on individual patients' pathology and immune responses. Rapid progress in genome sequencing and analysis technologies in recent years is making it possible to comprehensively analyze cancer-specific genetic mutations that are unique to each patient.

Because antigens (substances that give rise to an immune response) derived from such mutations, called neoantigens, appear only when cancer develops, the immune system is more likely to recognize them and mount a strong response to the tumor. Trials aimed at developing fully personalized cancer immunotherapy, in which each patient receives a unique set of neoantigens, are currently underway.

A fully personalized neoantigen vaccine has two important elements: One is to identify the neoantigens made by an individual's tumor using next-generation DNA sequencing technology; the other is to predict neoantigen-derived peptides—a type of chemical compound—that the patient's immune system might recognize.

The current research collaboration will employ a combination of mass spectrometry, an analytical method that identifies and measures the mass of various substances, and gene mutation analysis to increase the accuracy of identifying neoantigens and predicting immunogenicity—the capability for eliciting an immune response—in evaluating the feasibility of producing an optimal mix of neoantigens for vaccination.

The gene analysis will be conducted to precisely identify the gene mutations unique to cancer cells based on analyzing a pair of genomic DNA taken from healthy cells and tumor cells. At the same time, mass spectrometry analysis will be used to identify peptides that appear on the surface of cancer cells after isolating them. Matching the results of both analyses will make it possible to identify neoantigens that actually show up on the surface of the cancer cells and are thus expected to possess immunogenicity.

The collaboration consisting of genomic, proteomic (studying the set of proteins produced by a certain genome) and immunology research is led by Professor Hiroyuki Aburatani and Associate Professor Takeshi Kawamura of the University of Tokyo, with Dr. Tetsuro Sasada, director of the Cancer Vaccine Center at the Kanagawa Cancer Center, and BrightPath also participating.

BrightPath is currently conducting two clinical trials for cancer peptide vaccines: a late-stage trial in Japan employing a semi-personalized administration method, and an early-stage clinical trial in the U.S. using a combination of a peptide vaccine and immune checkpoint inhibitors.

This research collaboration promises to lead to the next phase of clinical studies aimed at developing a fully personalized cancer vaccine as a next-generation treatment for the disease.

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Appendix

Diagram of neoantigen vaccine