NEWS RELEASE

JFCR and NEC Confirm Research Results for Developing Individualized Neoantigen Cancer Vaccines Using Whole-Genome Data

Tokyo, November 7, 2025 – The Japan Foundation of Cancer Research (JFCR) and NEC Corporation (NEC; TSE: 6701) have confirmed research results supporting the development of a novel personalized neoantigen cancer vaccine using whole-genome data (*1). Analysis utilizing NEC's proprietary AI technology from breast cancer and soft tissue sarcoma has successfully enabled the prediction of numerous cancer-specific antigens (cryptic antigens, *2) originating from dark genomes—regions of the genome whose function and role remain largely unexplored—in addition to conventional neoantigens (*3). Developing vaccines using these antigens could potentially offer new treatment options for cancers that have been difficult to treat until now.

Both organizations will present these findings at the annual meeting of the Society for Immunotherapy of Cancer (SITC), held in National Harbor, Maryland, USA, from Wednesday, November 5 to Sunday, November 9, 2025.

This joint research project will be carried out as part of the Japan Agency for Medical Research and Development (AMED)'s "Action Plan for Whole-Genome Analysis for Cancer and Rare/Intractable Diseases," within the research initiative on the "Demonstration of the Clinical Utility of Cancer Whole-Genome Analysis and Research on Establishing Systems for Patient Benefit".

In recent years, personalized medicine—aiming for more effective and optimal treatments based on each patient's genomic information and gene expression profiles—has garnered significant attention. Among these approaches, immunotherapy using personalized cancer vaccines that target neoantigens specific to each patient's cancer cells is especially promising for practical application due to its potential for high therapeutic efficacy and reduced side effects. In Japan, efforts to promote research and drug discovery utilizing whole-genome analysis data are accelerating, as demonstrated by the Ministry of Health, Labour and Welfare's formulation of the "Action Plan for Whole Genome Analysis 2022" (*4). Against this backdrop, the Cancer Institute and NEC have been collaborating since 2024 on the development of a novel personalized neoantigen cancer vaccine utilizing whole-genome analysis data.

The prevalence of neoantigens is known to vary across cancer types. In this study, the Cancer Institute and NEC analyzed whole-genome data from breast cancer and soft tissue sarcoma, which are considered to have relatively low neoantigen emergence rates, utilizing NEC's proprietary AI technology. This study sought to demonstrate that integration of whole genome data allows the identification of relevant immunogenic targets, even in patients with cancer associated with a low number of canonical antigens.

The collaborative research successfully predicted the presence of numerous non-canonical antigens, in addition to previously known classes of antigen targets. Developing vaccines utilizing these findings is expected to open new therapeutic approaches for cancer types that have traditionally been considered difficult to treat with personalized neoantigen cancer vaccines.

"We are delighted to share the findings of our basic research aimed at developing next-generation personalized cancer vaccines. This work was conducted under an AMED research program based on *the Action Plan for Whole-Genome Analysis 2022* (Ministry of Health, Labour and Welfare). By integrating whole-genome data with NEC's proprietary AI technology, we have revealed the potential presence of diverse cancer-specific antigens, known as cryptic antigens, derived from the dark genome even in cancer types previously considered to have limited neoantigen expression. Moving forward, we will continue to evaluate the immunogenicity of these antigens and advance the development of personalized cancer vaccines to realize the next generation of cancer immunotherapy."

Tetsuo Noda, M.D., Ph.D., Advisor,
Atsushi Ohtsu, M.D., Ph.D., Research Director,
Japanese Foundation for Cancer Research

"We are pleased to share our research findings on cryptic antigens, developed in collaboration with JFCR. This work, which utilizes whole-genome data and NEC's proprietary AI technology, will be presented at the SITC Annual Meeting as part of a project supported by AMED. Going forward, the NEC Group remains committed to advancing our mission of delivering innovative AI-powered healthcare solutions to patients around the world."

Motoo Nishihara, Executive Officer, Corporate EVP and CTO, NEC

Presentation Details

・Abstract Number: 162

・Title: A Whole-Genome-Informed Pipeline for Neoantigen Discovery in Solid Tumors: Integrating SNV, Splice Variant, and Exon-Transposon Junction Analysis to Enable Personalized Cancer Vaccines

・Presenters: Jun Masuda

・Authors: Jun Masuda[1], Kazuma Kiyotani[2], Kazuhide Onoguchi[3], Per Brattås[4], Hugues Fontenelle[4], Angelina Sverchkova[4], Sumana Kalyanasundaram[4], Pierre Machart[5], Yuki Tanaka[3], Daiki Miura[3], Noboru Nagata[3], Koji Yoshino[1], Mingyon Mun[1], Yasuji Miyakita[1], Hiroki Mitani[1], Souya Nunobe[1], Yu Takahashi[1], Hiroyuki Kanao[1], Takashi Akiyoshi[1], Keisuke Ae[1], Kengo Takeuchi[1], Junji Yonese[1], Masayuki Watanabe[1], Seiichi Mori[6], Seiya Imoto[7], Ippei Fukada[1], Shunji Takahashi[1], Takayuki Ueno[1], Noboru Yamamoto[8], Kaïdre Bendjama[4], and Shigehisa Kitano[1]

・Affiliation: 1) The Cancer Institute Hospital of Japanese Foundation for Cancer Research, Tokyo, Japan. 2) National Institutes of Biomedical Innovation, Health and Nutrition, Osaka, Japan. 3) NEC Corporation, Tokyo, Japan. 4) NEC OncoImmunity AS, Oslo, Norway. 5) NEC Laboratories Europe GmbH, Heidelberg, Germany. 6) Japanese Foundation for Cancer Research, Tokyo, Japan. 7) The Institute of Medical Science, the University of Tokyo, Tokyo, Japan. 8) National Cancer Center Hospital, Tokyo, Japan.

・Release Date: November 8, 2025

***

Note:

(*1) Genome analysis includes: ① methods targeting only specific genomic regions called coding regions, and ② methods targeting both coding and non-coding regions. In this study, whole-genome data analysis (corresponding to ②) was performed on samples provided by cancer patients.

(*2) A type of neoantigen; a cancer antigen originating from non-coding regions of the genome that do not encode proteins.

(*3) Refers to “cancer-specific antigens (markers)” newly generated by genetic mutations in cancer cells. Since they are absent in healthy cells and appear only in cancer cells, the immune system can recognize them as foreign substances and target them for attack.

(*4) A plan formulated as a national strategy primarily to advance genome analysis in the medical field. Its objectives include developing new diagnostics and treatments for cancers and rare/intractable diseases, as well as promoting the realization of personalized medicine.

About Japanese Foundation for Cancer Research

Japanese Foundation for Cancer Research (JFCR) was founded in 1908 as the first organization in Japan specialized for study and control of cancer. JFCR has been playing a leading role in cancer research and treatment for a long time.

We have three research centers and a hospital, which are "Cancer Institute" for basic cancer research, "Cancer Chemotherapy Center" for drug development, "Cancer Precision Medicine Center" (CPM Center) and "Cancer Institute Hospital of JFCR" for development of novel cancer treatments. These centers and a hospital are working together to achieve our common goal which is cancer control.

About NEC

The NEC Group leverages technology to create social value and promote a more sustainable world where everyone has the chance to reach their full potential. NEC Corporation was established in 1899. Today, the NEC Group's approximately 110,000 employees utilize world-leading AI, security, and communications technologies to solve the most pressing needs of customers and society.

For more information, please visit https://www.nec.com, and follow us on Instagram, Facebook, and LinkedIn.