June 1st, 2023
Repertoire Genesis Inc.

Notice of publication of antigen prediction analysis algorithm

We are pleased to announce that a paper on our antigen prediction analysis algorithm has been published in the electronic version of Viruses (paper titled "Idiotope-Driven T-Cell/B-Cell Collaboration-Based T-Cell Epitope Prediction Using B-Cell Receptor Repertoire Sequences in Infectious Diseases").

The technology to identify antigens recognized by T-cell receptors (TCRs) on lymphocytes has not yet been established. In recent years, antigen prediction technologies using AI techniques such as machine learning have been developed, but these technologies mainly predict the probability of antigen presentation. And, they are unable to make accurate predictions when the antigen is unknown because they rely heavily on existing data. The antigen prediction analysis technology we have developed is an advanced version of the repertoire analysis technology that can examine the repertoire of TCRs and BCRs, and predicts antigens from BCR sequences obtained by repertoire analysis. This technology is based on two theories, “immune network theory” and “idiotope-driven T-B collaboration”, and predicts the antigens that the body's immune system utilizes from a completely new angle.

Normally, B cells recognize foreign antigens such as viruses as non-self and produce antigen-specific antibodies to protect the body. Antibodies recognize and bind to antigens at their hands (antigen recognition sites). The antigen and antibody hands are complementary, and if the antigen is non-self, then the opposite hand shape is also non-self, and the antibody hand looks non-self to the immune system. Then a second antibody (antibody 2) which recognizes the antibody against the foreign antigen (antibody 1) is produced, but since the hand of antibody 2 is complementary to the hand of antibody 1, the hand of antibody 2 is complementary to the hand of antibody 1, that is the same shape as the original antigen. This is the idea behind the immune network theory. Therefore, by examining the sequence of the BCR of antibody 2, the antigenic epitope can be predicted.

In this paper, we show the results of antigen prediction using this antigen prediction analysis technology on the BCRs of patients with viral infections in a joint research project conducted

by the Graduate School of Medicine, the University of Tokyo (Professor Moi Meng Ling) and the Graduate School of Medicine, the Tokai University (Professor Takashi Shiina).

By using the newly developed antigen prediction technology and other repertoire analysis technologies, we intend to promote antigen prediction in various infectious diseases, autoimmune diseases and oncology, and thereby contribute to solving unmet medical needs.

For details of the above paper, please refer to the following web page.
(https://www.mdpi.com/1999-4915/15/5/1186)

About Repertoire Genesis

Repertoire Genesis Inc. is a Japanese biotechnology company dedicated to developing novel immune related treatment and diagnostics based on its corporate mission of "curing the incurable". We take an approach to analyze the immune system in detail based on our unique immune diversity analysis technology such as TCR/BCR repertoire analysis and neoepitope analysis. Since our establishment in October 2014, we continue to challenge to provide effective treatments and diagnostics for unresolved medical problems specifically focusing on cancer, autoimmune and infectious diseases.

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