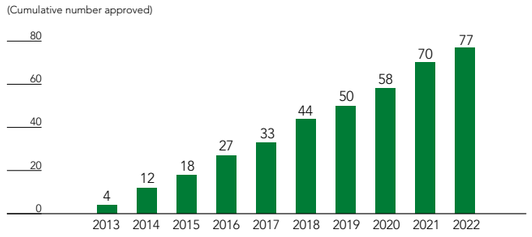
Nichirei Biosciences

Development of Companion Diagnostics

Social Issue How to Deliver Optimal Treatments for Cancer Patients

In the past, patients diagnosed with the same type of cancer were all given the same treatment. In recent years, though, advancements in biomarker research have led to the discovery of gene mutations involved in the initiation and progression of cancer, and therapies targeting those genes and proteins created from them (molecular targeted therapies) have been developed. Compared to conventional anti-cancer drugs that also act on normal cells, molecular targeted therapies offer advantages including minimizing side effects. However, since these treatments are unlikely to be effective in patients who do not have the target gene or protein, in vitro diagnostics (companion diagnostics) have been developed to accurately diagnose whether the patient is a suitable candidate for treatment with the molecular targeted therapy before treatment begins.

Cumulative Number of Molecular Targeted Therapies Approved in Japan over the Past 10 Years



Compiled by Nichirei Biosciences from the List of Approved Cancer Molecular Targeted Therapies 2022
Source: Mizukami, T., *List of Approved Cancer Molecular Targeted Therapies*

Initiatives to Resolve the Issue

Development, Manufacture and Supply of Companion Diagnostics*

In cancer treatment, pathological diagnosis is performed on tumor tissue collected from the patient. A thin specimen, sliced from the tumor tissue, is examined by a pathologist to obtain critical information about the cancer. This information is then used to determine a treatment plan. An important testing technique widely used in pathological diagnosis is immunohistochemical staining, which enables the detection and visualization of specific substances, such as proteins, in the specimen.

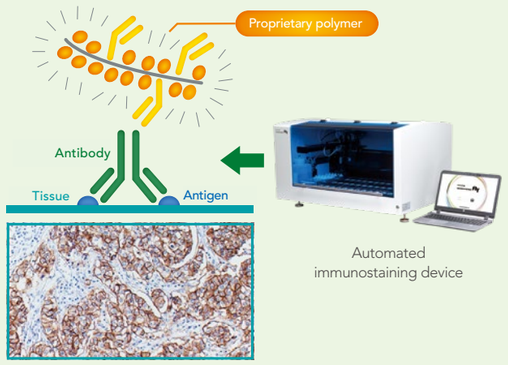
A specialized reagent is required to perform immunohistochemical staining, and Nichirei Biosciences is one of the few companies with the technology to develop and manufacture that reagent. Based on this technology, the company develops, manufactures and supplies companion diagnostics. In 2019, Nichirei Biosciences acquired and made a subsidiary of U.S. company Pathcom Systems Corporation, which develops and manufactures equipment for automating immunohistochemical staining, to further strengthen its capabilities in companion diagnostic development.

* An in vitro diagnostic agent used for testing to determine whether a patient is a suitable candidate for a specific therapy, in order to maximize the therapy efficacy and safety

Principle of Companion Diagnostics

Application of Proprietary Technology to Immunohistochemical Staining

Nichirei Biosciences developed a proprietary amino acid polymer reagent called Universal Immuno-enzyme Polymer. The use of this reagent enables the detection of proteins or other biomolecules (antigens) through antibodies that bind to them specifically. Applying this reagent to immunohistochemical staining, a technique used in pathological diagnosis, makes it possible to detect and visualize antigens in the pathological tissue sample. This reagent has been commercialized for immunohistochemical staining, and also applied to a companion diagnostic product.



Automated immunostaining device

A specific protein in a pathological tissue sample is made visible with brown dye using a proprietary polymer.

Why Nichirei Biosciences Group is Uniquely Capable

Proprietary technology in immunohistochemical staining	Experience and know-how in commercialization of companion diagnostics	Structure for providing information to medical institutions and for conducting follow-up

Expected Effect

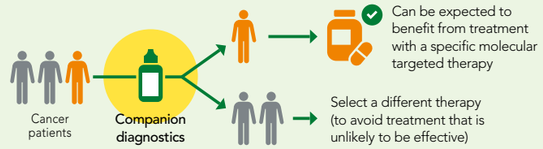
Conventional Diagnosis and Treatment

Even in the same type of cancer, there are patients who have different types of gene mutations, but until recently, a one-size-fits-all treatment regimen was implemented, using drugs with mechanisms that suppress the active proliferation of cancer cells.

While some patients respond well, there are others who do not benefit from the treatment, as well as cases where patients suffer from severe side effects.

Using Companion Diagnostics in Medical Practice

The emergence of molecular targeted therapies has enabled patients to select a therapy according to each one's gene mutations, and therapies with relatively mild side effects are now possible. Companion diagnostics have become an essential test for accurately choosing patients who can be expected to benefit from a specific molecular targeted therapy, as well as patients who are unlikely to benefit.



Future Developments

The market for molecular targeted therapies continues to expand, and development of molecular targeted therapies and other treatments targeting specific gene mutations and proteins is expected to increase. Possessing unique technologies applicable to development of companion diagnostics, Nichirei Biosciences will contribute further to the advancement of personalized medicine in cooperation with academia and partners who develop therapies.

Social Value

- Improving safety and efficacy of therapies
- Enhancing patients' quality of life
- Reducing healthcare costs by selecting optimal treatments
- Contributing to the advancement of personalized medicine
- Contributing to the advancement of life sciences

Economic Value

- Expanding the companion diagnostics business to promote personalized medicine
- Enhancing brand value as a companion diagnostics manufacturer
- Accumulation of know-how in diagnostics development through joint development with academia and other partners