

Toward an Era When Healthcare Will Be Optimized for Individuals

Amid the rapid technological innovation that is taking place, the world of healthcare is also seeing new breakthroughs in diagnostic and treatment methods. In line with its mission of shaping the advancement of healthcare, in recent years Sysmex has been focusing on personalized medicine. We introduce these initiatives here.

What does “personalized medicine” mean?

It means medicine that provides the treatment optimized for each individual.

Mamoru When my father drinks alcohol, he goes red in the face. But my mother doesn't, even if she drinks the same amount. Why is that?

Guide This is because different people metabolize alcohol differently. Did you know that the same thing happens with medicines?

Mamoru Really? How is that?

Guide Even people who have the same disease and take the same medication can see different effects. The medicine works for some people but not on others, and some may experience side effects while others do not.

Mamoru Even though they take the same medication? Why?

Guide This is because gene differences mean that different people have different physical conditions.

Mamoru What are genes?

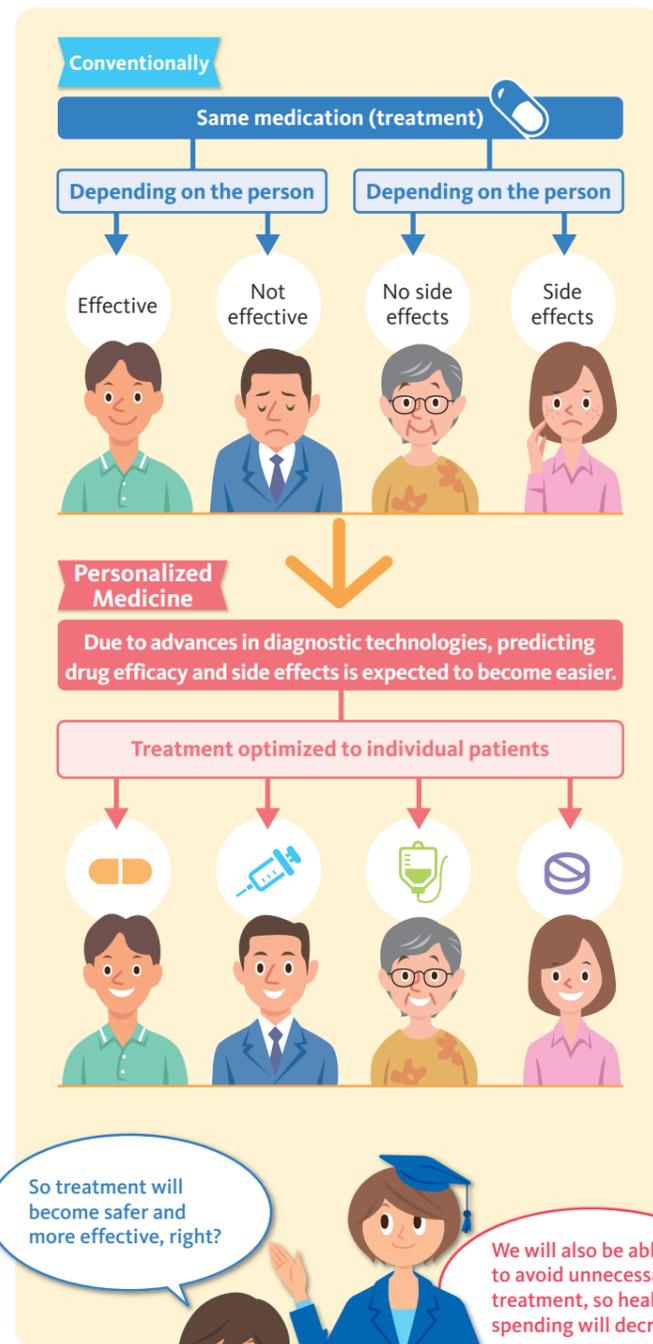
Guide Genes are like blueprints for making the body. Each person has a different blueprint, so our bodies and the way we respond to medicines are different.

Mamoru I wouldn't want to take medicine that wasn't going to work.

Guide Of course not. That's the reason for research on analyzing lots of information about the body, including genes, to predict whether medicine will be effective or produce side effects.

Mamoru So they will know what medicine works for me?

Guide Yes. In the past, medicines and treatment methods were selected according to the disease. In the future, it might be possible to choose highly effective medicines and treatment methods for each patient.



How will people be examined?

Expectations are high for analysis methods based on components of the blood.

Mamoru To make this “personalized medicine” possible, they will need information about our bodies. How will they get that?

Guide Well, in the past, people usually got this information through surgery, by cutting away part of the tissue affected by disease.

Mamoru Surgery is a pretty big thing, isn't it?

Guide It is. Surgery places a major burden on a patient's body. It is also expensive, so doing such testing many times is difficult.

Mamoru Isn't there an easier way?

Guide Right now, attention is focusing on the method of looking at components of the blood. If it were possible to do such testing just using blood samples, the burden on patients would be reduced a lot.

Mamoru Okay. I don't really like needles, but they aren't as scary as having an operation.

Guide As research continues, it may become possible to find out about many different diseases by studying the blood. This is expected to reduce the financial burden on patients.

Mamoru I hope this sort of healthcare arrives soon!

The burden on patients is completely different, isn't it.

Conventionally



Analysis of tissue resected from the affected area

Personalized medicine



Analysis of disease-derived components in the blood

Using blood tests makes it easier to get detailed information in tests that are easier to perform.

Sysmex's Technologies

Technology Platforms for Analyzing Cells, Proteins and Genes in the Blood

To reduce the burden on patients, Sysmex is promoting R&D activities toward the establishment of new testing technologies for analyzing disease-derived cells, proteins, genes and other elements present in blood and bodily fluids. Using its three technology platforms—cells, proteins and genes—Sysmex is pursuing the potential of new types of testing and aims to contribute to the realization of personalized medicine.

Cells

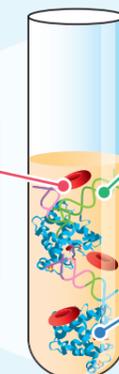
- Circulating tumor cells (CTCs)
- Circulating abnormal cells (CACs)
- Stem cells, etc.

Genes

- Circulating tumor genes (CTGs)
- Cell-free genes (cfDNA)
- Micro RNA (miRNA), etc.

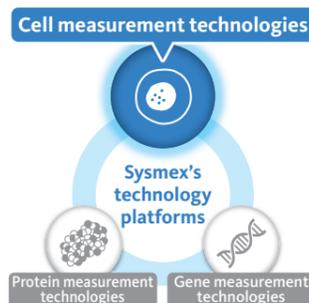
Proteins

- Circulating trace molecules
- Peptides
- Microparticles, etc.



Testing Cells

In this series, we introduce Sysmex's recent initiatives in the area of personalized medicine. Here, we explain about testing cells that circulate in the blood.



What can we learn from cells circulating in the blood?

We can see if the physical condition is abnormal in any way, and we can find some clues to help diagnose different diseases.

Mamoru Is it true that our bodies are made up of lots of cells?

Guide Yes, it is. Cells are the basic building blocks for all sorts of organisms. The human body is made up of around 60 trillion cells.

Mamoru Are bones and muscles made of cells, too?

Guide Yes, they are. So are the skin, nerves and organs. The blood contains red and white blood cells and platelets, which are also a type of cell.

Mamoru I remember my father looking at the results from his medical checkups and saying that his red blood cell numbers were low.

Guide Blood goes to all corners of the body, and it provides information about the whole body. Oftentimes, if a person has a disease their blood will appear abnormal, too.

Mamoru Is that the reason for looking at red and white blood cells?

Guide That's right. **Hematology, which means testing to find out the number, types and sizes of red and white blood cells, helps us find the "clues" to many diseases.** When you go to the hospital to make sure nothing is abnormal, this is one of the first tests they take.

Mamoru I see. What sorts of things, specifically, do red and white blood cells tell us?

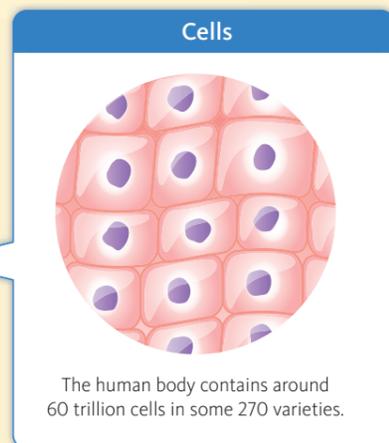
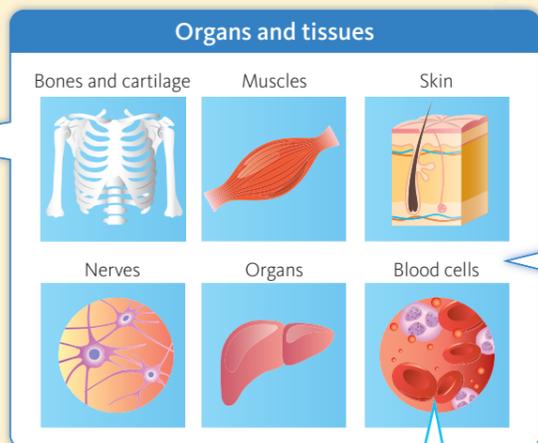
Guide To start with, because red blood cells carry oxygen throughout the body, having too few of them can cause diseases like anemia.

Mamoru What else?

About Cells

So our bodies are made up of lots of cells.

Blood cells, like red and white blood cells, are one type of cell.



Sysmex's main business

Hematology

Testing to measure and analyze the number, types and sizes of red and white blood cells

Guide White blood cells help to protect the body from foreign organisms that get in. So if the number of white blood cells increases, that might be an indicator of a pathogen in the body.

Mamoru They tell us many things, then.

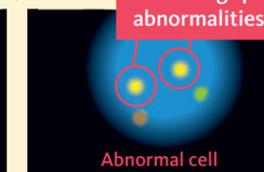
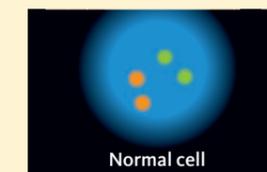
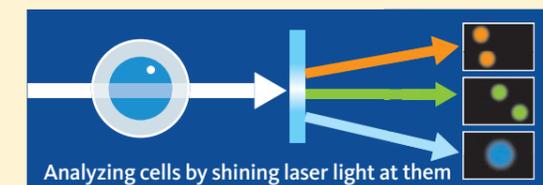
Guide In recent years, it has become possible to do more than analyze the number and type of red and white blood cells. Technologies are being developed to analyze the features and functions of individual cells.

Mamoru What? Looking at individual cells in more detail?

Guide That's right. And because of that, some people think it might be possible to detect cancer or other cells that circulate in the blood in very small numbers.

Mamoru Wow, investigating cancer with a blood test is impressive!

It's amazing that such detailed information can be analyzed from cells.



Detecting specific gene abnormalities in a cell

Sysmex is using the technologies it has built up to take on the challenge of moving forward with technologies for analyzing cells circulating in the blood.

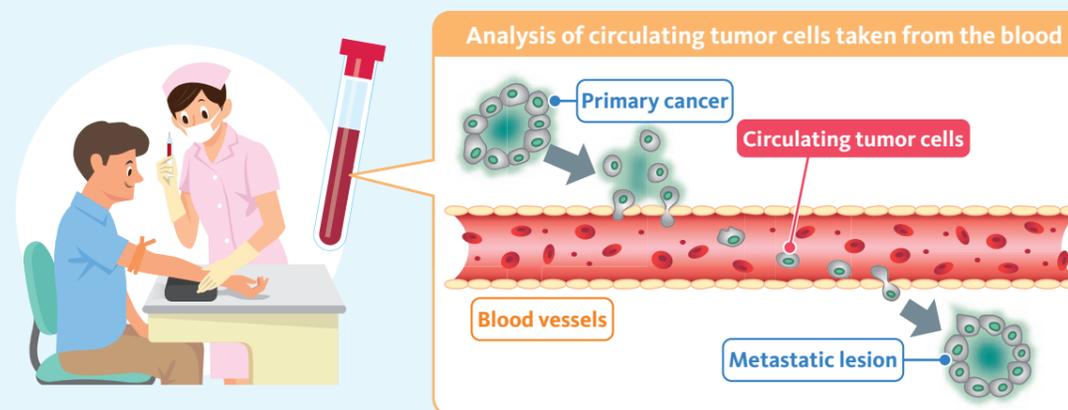
Sysmex's Initiatives

Analyzing Circulating Tumor Cells in Pursuing R&D on New Diagnostic Technologies for Cancer

Currently, cancer diagnosis and treatment requires surgery and other approaches for removing tissue from a patient's body in order to obtain detailed information about the cancer. However, testing that requires surgery places a major burden on patients, both physically and economically. The development of diagnostic technologies to obtain cancer information through blood tests is promising as a new method to reduce the burden on patients.

Circulating tumor cells make up on a very small proportion of cells existing in the blood, and are assumed to be the cause of metastasis from original cancer tissue to other organs. Sysmex is pursuing joint R&D with pharmaceutical manufacturers to establish technologies for obtaining information useful in cancer diagnosis and treatment by analyzing these circulating tumor cells.

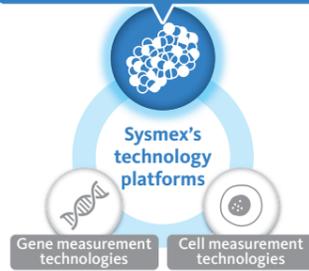
By creating new value in cancer analysis, Sysmex hopes to bring innovative healthcare one day closer to cancer patients.



Testing Proteins

In this series, we introduce Sysmex's recent initiatives in the area of personalized medicine. Here, we explain about testing proteins that circulate in the blood.

Protein measurement technologies



What do protein tests look for?

Proteins help protect the body from diseases. These tests look at how many proteins are in the blood.

Mamoru I was told I should eat lots of protein because I'm in a growth phase. Are proteins important?

Guide Proteins are important components of the body. Muscles and skin are all made up of proteins. Proteins make up around 20% of a person's body.

Mamoru Interesting. Does everyone have the same shape of proteins?

Guide No. Proteins are made up of lots of amino acids that are connected like chains. The type of protein and the way it works differs, depending on the way in which these amino acids

are arranged. Our bodies have around 100,000 different types of proteins.

Mamoru So many!? What types are there?

Guide In addition to making up the body, some proteins regulate the metabolism or operate the body in other ways. Proteins are also involved in the immune response, which means preventing disease by fighting pathogens.

Mamoru So proteins protect the body?

Guide That's right. When viruses or other pathogens enter the body, organisms (antibodies) are created to fight them. These are also a type of protein.

Mamoru People with diseases create proteins to fight those pathogens?

Guide Yes. We can find the cause of a disease, the type, and the condition by looking at whether specific proteins are present in the blood and if so, how many of them. This type of testing is usually called immunochemistry.

Mamoru I see. What sort of diseases can they look for?

Guide Well, infectious diseases caused by viruses or allergies are two examples. Organisms called tumor markers, which cancer cells create, are also proteins. Those tumor markers can help in diagnosing cancer.

Mamoru They can be used to study many types of disease.

Guide In recent years, advances in technologies for studying proteins are making it possible to study even more diseases.

Sysmex's Initiatives

Moving Forward with Technological Developments for Diagnosing Alzheimer's Disease from Proteins in the Blood

Alzheimer's disease, a disease in which the brain gradually loses function, is thought to be caused by the accumulation in the brain of proteins called amyloid beta. To date, brain imaging and cerebrospinal fluid examinations that look at the state of accumulation of amyloid beta have been the main methods of diagnoses. However, these tests are expensive, and testing facilities are limited. They also require inserting needles into the lower back, which places a major burden on patients.

Sysmex is pursuing joint research with Eisai Co., Ltd. to develop methods of diagnosing Alzheimer's disease using blood tests, which place less of a burden on patients than conventional testing. The companies will continue with this R&D in the aim of providing new value in the prevention, diagnosis and treatment of dementia.

Conventional testing methods

Brain imaging examinations

Cerebrospinal fluid examinations

- High testing costs
- Limited testing facilities
- High physical burden for patients

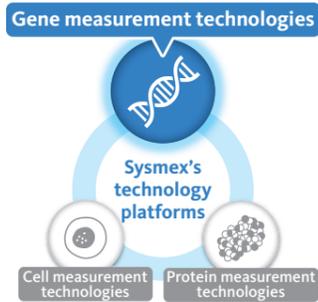
New testing methods under development

Blood tests

- Inexpensive and simple (fast)
- Low physical burden for patients

Testing Genes

In this series, we introduce Sysmex's recent initiatives in the area of personalized medicine. Here, we turn the spotlight on testing genes.



What do gene tests look for?

In addition to the attributes and features we were born with, gene testing investigates for susceptibility to specific diseases.

Mamoru One of my friends is much taller than I am, even though he's the same age. Why is that?

Guide One reason might be that his body is made using a different blueprint.

Mamoru A blueprint?

Guide Our bodies are made up of lots of cells, which are themselves made of proteins. Genes hold the information telling the proteins what cells to make.

Mamoru My body is based on information from genes?

Guide Yes. Gene differences are the reason people have different physiques, skin colors and constitutions. By studying genes, we can also learn a lot about disease.

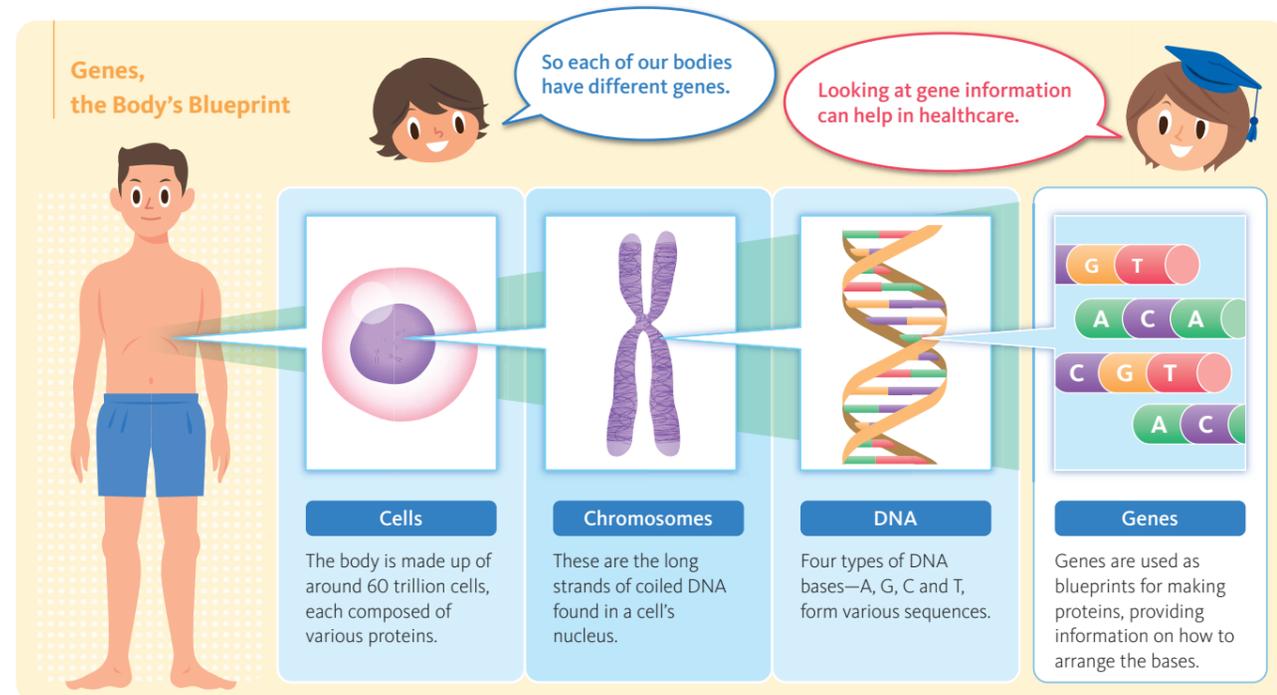
Mamoru Like what?

Guide We can search for the causes of a disease and what drugs will be useful for treating that disease. It has even become possible to know what diseases a person is susceptible to contracting in the future.

Mamoru How is it possible to know all that?

Guide Genes are rows of organisms called bases. Bases come in four types: A, G, C and T. These rows are lined up differently for different people. But **for some reason, in some people part of a row suddenly changes. Some other people have genes that are different from birth.**

Mamoru What happens then?



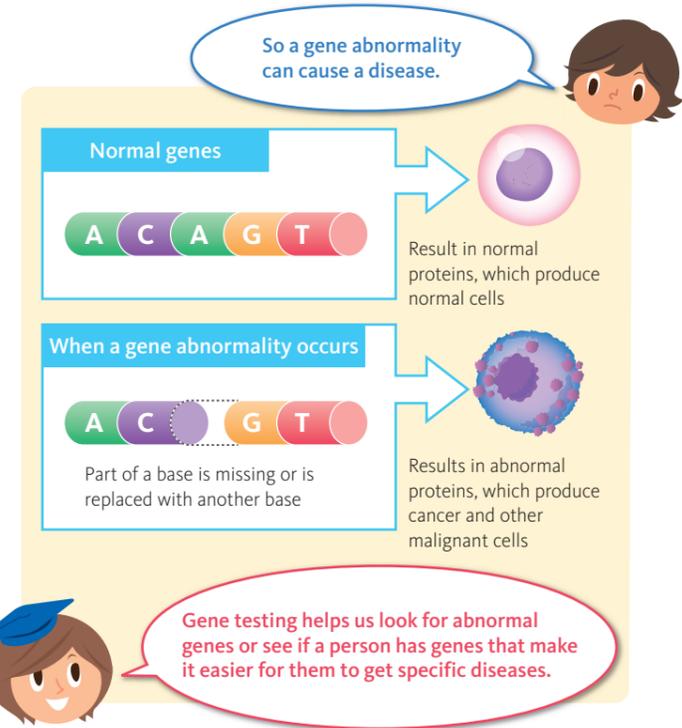
Guide It becomes impossible to make part of the body correctly. This can lead to disease.

Mamoru That's scary! So it's just a matter of studying how the bases are lined up?

Guide Yes. **Knowing whether or not the lineup has changed can tell us the nature of a disease and how effective a drug might be. We are getting close to the day when testing will tell us when people are born with genes aligned in a way that makes it easy for them to get certain diseases.**

Mamoru If I knew it might be easy for me to get a certain disease, I could be careful not to get it, right?

Guide Exactly. That's why R&D is moving ahead on technologies for studying genes: to prevent disease rather than just treating it.

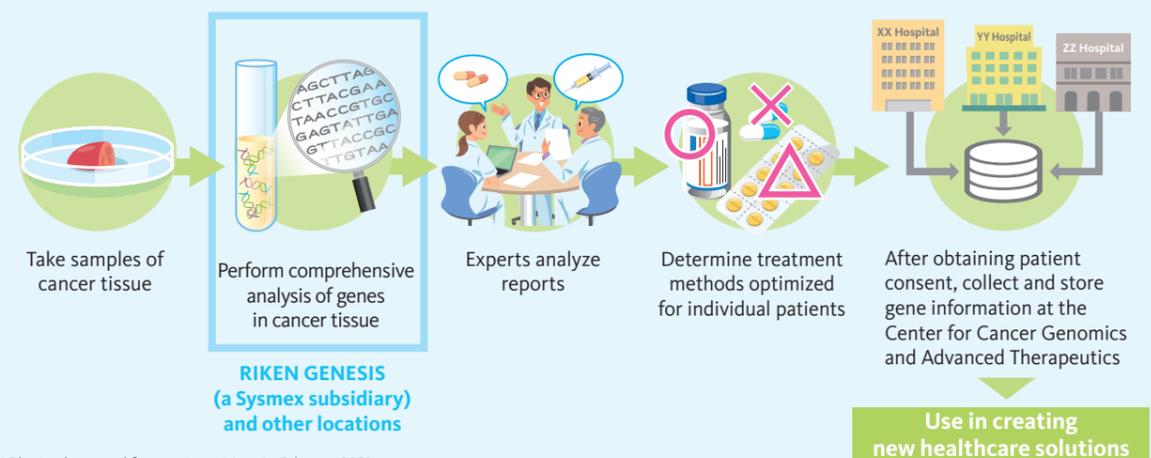


Sysmex's Initiatives

Japan's First Insurance Coverage for Cancer Genome Profiling* System

The OncoGuide™ NCC Oncopanel System, a support system for cancer genome profiling Sysmex developed in cooperation with the National Cancer Center to realize cancer genomic medicine, was the first in Japan to receive insurance coverage, in 2019.* This system, which targets patients who have already undergone standard treatment, simultaneously analyzes 124 genes that are frequently associated with cancer mutations in Japanese people. The information received from this system facilitates the determination of treatment methods based on

gene mutations, the selection of anti-cancer drugs and drug administration, allowing healthcare to be optimized for individual patients (personalized medicine). In addition to introducing this system to medical institutions and providing support through lab assay services handled by RIKEN GENESIS, the company is creating a flow of testing that can be conducted entirely in Japan, including the provision of detailed support. In this way, Sysmex is contributing to the system's introduction in clinical settings for cancer genomic medicine.



*Obtained approval for certain revisions in February 2021

*Cancer genome profiling: Analysis of information about genes' significance to cancer diagnostics (such as mutations, amplifications and fusions of multiple genes in cancer tissue)