



Sweet potato harvesting event held at Denka Farm in October 2017. The local people receive us more and more warmly every year, telling us that they look forward to seeing us again the next year, and it is hugely rewarding for those who take part.

### For as Long as There Are Things We Can Do

## Denka and The Great East Japan Earthquake

On March 11, 2011, Tohoku's coast was laid waste to by a colossal tsunami. This was just one effect of the Great East Japan Earthquake that caused unprecedented damage. At the time, the state of the stricken area was broadcast on the news every day, and volunteers from all over the country came rushing to provide help. However, as time passes, reports become less frequent, and the memory of the disaster fade away. Various problems that are difficult to resolve, such as restoring the livelihoods and industries of those who were affected, have been neglected.

However, since summer 2011, Denka has continued to conduct volunteer activities focusing on the restoration of disaster-hit areas, centering around Minamisanriku-cho, Miyagi Prefecture. In addition, we have also started a project to resuscitate fields damaged by high salt levels, making use of our own company's underground pipes and fertilizer. We have been discussing various possibilities with the local associations and farmers, and in 2017, we planted 600 sweet potatoes. This plot of land is called the "Denka Pilot Farm," and while attempting to generally improve the quality of the soil, we are also currently engaging in test cultivations of onions and rice.

The scars left behind by disasters are not the sort of things that can be easily erased. However, if we continue to do what we can and make use of Denka's technology, we should be able to soothe the wounds at least a little. With that thought in our hearts, Denka will continue our activities, all the while listening to what the people need.

# The DenkaWay

Spring

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## How We Can Serve People's Lives

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# A New Gene Detection System that Creates the Future of QOL

Our new gene detection system is expected to refine the current sepsis diagnoses. We spoke to the project members from the Vaccine & Bio Research Department at the Denka Innovation Center who are helping to push forward R&D.

Life Innovation Research Institute, Denka Innovation Center  
Vaccine & Bio Research Department



**Yoichi Ide**  
Doctor of Veterinary Medicine  
Director, Vaccine & Bio Research Department  
Coordinates the Vaccine & Bio Research Department who develop next-generation vaccines and diagnostic reagents.



**Noriyuki Izumiya**  
Group Leader  
Coordinates the project. He ensures that there is an environment allowing research to smoothly progress.



**Kentaro Sakai**  
Gathers expertise from PlexBio, and brings together the nine members as the leader of the project team.

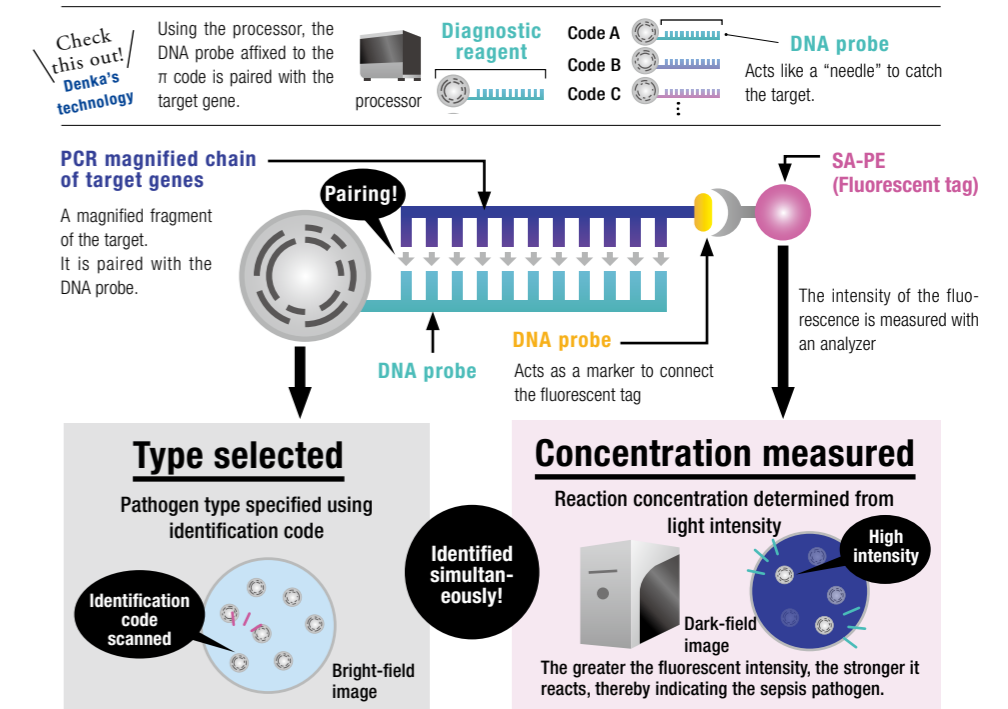


**Mizuho Higuchi**  
Member of the project team. She develops diagnostic reagents with DNA probes affixed to the  $\pi$  code.



## New gene detection system using the $\pi$ code

For each  $\pi$  code, a DNA probe for the target pathogen is created through nucleic acid fixation, and the relevant test subject is acquired. Scanning the identification code identifies the pathogen. Furthermore, a fluorescent tag is also attached to the subject, and by combining it with the highly sensitive fluorometric method which identifies the subject by measuring the fluorescence, simultaneous multiplex assays was enabled.



### Sparking innovation in sepsis diagnosis through simultaneous multiplex assays

Life Innovation Research Institute's development team of the new gene detection system from the Denka Innovation Center is working to see just how quickly they can determine the pathogens responsible for individual cases of sepsis and deliver the appropriate treatment.

In current tests to find the pathogens responsible for sepsis, specimens of patients' urine, sputum, or feces are cultivated, the existence of pathogens confirmed and type simultaneously deter-

mined, and, whether or not bactericide will be effective is verified. While this testing process is both accurate and effective, it can take over two days to receive the results.

The main benefit of the new system is bringing together the identification code, known as  $\pi$  code, and fluorometric detection methods to achieve highly sensitive, simultaneous multiplex assays. As a result, in addition to being able to determine the relevant pathogens and their immunity to medicine at the same time, the high level of sensitivity is expected to bring test times down to less than a day. Dr. Ide, the Director of the Vaccine & Bio Re-

search Department tells us a little more about the significance of the new system. "As the likelihood of death increases over time, early diagnosis and rapid treatment is essential. An accurate medicine choice also helps prevent pathogens from developing immunities. If we can create a medical equipment (in vitro diagnostics) that utilizes this technology, we will be able to greatly improve sepsis patients' QOL." As well as saving sepsis patients' lives, this new system is a fantastic innovation that also acts as a countermeasure to the evolution of drug resistant pathogens.

### Creating new possibilities for Denka through open innovation

Denka Group's Vaccine & Bio Department that engages in development of next-generation vaccines and diagnostic reagents kicked off this project in 2016. They decided to collaborate with Taiwan-based PlexBio, which works on medical equipment development and provides biotechnology services. They also acquired exclusive rights for sales of the new gene detection system in areas such as the infectious disease field in both Japan and the ASEAN region, as well as develop-

ment and marketing rights for test reagents. In March 2016, Mr. Sakai was sent to Taiwan to learn more about the new system. "The areas that our company was responsible for were the reagent diagnostics using the PCR method where genes are magnified, and the detection reagents with  $\pi$  code affixed to DNA probes. This was the first time Denka had engaged in the development of reagents for genetic testing. While thinking about how much we could make use of PlexBio's expertise as our own, I learnt about the company's technology from their reagent production methods to their machine-based measurement methods."

Simultaneous and multiplex detection of the target!

Amazing the World with Innovation



In October the same year, the Life Innovation Research Institute's research theme was officially decided. With Ms. Higuchi also joining as a researcher, the team members have been growing, and reagent development has been progressing. Ms. Higuchi tells us that "What makes sepsis so unique is that the pathogens considered to be the cause come in a huge number of forms; they can be either bacteria, viruses, or fungi. My job is to detect the genetic arrangements of the various differing pathogens and organize them. The same type of pathogens can also have different genetic makeups, and I am slowly building up a database through countless trial and error processes." The expertise gained from open innovation with PlexBio is now finally starting to take root.

### Making use of Denka's strengths, and continuing to improve to people's QOL

Denka's goal for the near future is to obtain regulatory approval for a product using the new gene detection system. Following this, while paying close attention to the market, they will develop it into a diagnosis platform to accurately meet demands. "The key to success is to show Denka's strengths as a general chemical manufacturer," says Mr. Izumitani, Group Leader. He goes on to

tell us how making use of Denka's unique expertise is also important in the commercialization process. "Of course, this system is not made only with healthcare technology, but also involves semi-conductor technology. If and when we enter the quality control phase in the future, I imagine that problems will appear that cannot be solved simply through expertise in bio. At Denka, we have an environment where we can collaborate with people from other fields of expertise, such as those in Electronics & Innovative Products. By bringing together the expertise from all of our divisions, I would like us to make the best products possible for patients."

To finish things up, Mr. Ide talks about the Vaccine and Bio Research Division's vision for the future. "The main feature of simultaneous multiplex assays are that they can be used not only for sepsis, but repurposed to provide testing for other infectious diseases, or illnesses affecting, for example, the respiratory or digestive systems. Through this research, we would like to create a new future for QOL. We will continue to work hard to achieve this."

The high-aiming and enthusiastic employees at Denka will enrich ever more enrich more people's lives in the future.



**Clement Huang**  
Sales & Marketing  
International Sales &  
Marketing Director (APAC/ME)  
PlexBio Co., Ltd.

Worked closely with Mr. Sakai to coordinate the development of the new gene detection system.

I was very impressed by Denka's analysis and market research capabilities and the professionalism they displayed in flexibly and rapidly responding to various situations. Thanks to open innovation, the development of the new gene detection system is progressing smoothly. Contributing to people's lives is key to standing out from our competitors in the biotechnology industry, and I am determined to make this project a success in order to serve our customers and sepsis patients.

## Future R&D Schedule

Our current R&D is aimed at applying for pharmaceutical approval for the gene detection system for use in the field of sepsis as quickly as possible. Going forward, we intend to apply the simultaneous multiplex detection process to a variety of different fields.

- Examples
- Fungal infections
  - Immunology
  - Viral infections
  - General use in life sciences including research etc.



With the power of chemistry,  
we want to create a world  
where everyone can live peacefully.

**Amazing**  
the  
**World**  
with Innovation

# DENKA TOPICS

Introducing Denka Group news topics from January to March 2020

Jan.

## New development of high heat-resistant acrylic elastomer for automobiles



In January, we newly developed a special high heat-resistant acrylic elastomer. While it was previously difficult to achieve with acrylic-based elastomers, we have finally succeeded in making a product that can withstand temperatures of up to about 190°C. It can be used as turbo hose rubber for gasoline vehicles, helping promote the downsizing of engines and generally contributing to a reduced environmental impact.

Jan.

## Denka ramps up sales of new functional resin, the Denka IPX Series

In January, Denka ramped up sales of the Denka IPX Series, a new grade of the Denka IP® ABS heat resistance modifier. In addition to the characteristic high resistance to heat and low-level VOC of Denka IP®, it also realizes enhanced performance in all areas including improved chemical resistance and coatability. It meets a lot of the demands in the automobile industry that have appeared following the rise of hybrid and electric vehicles.



Feb.

## Construction of the new integrated office, “Omuta Innovation Hub” completed

On February 27, the construction of our new integrated office, the “Omuta Innovation Hub” was completed inside the premises of the Omuta Plant (Fukuoka Prefecture). This brings together the previously scattered divisions of production, research, production technology, and allows us to realize unified and functional operation as a hub of the plant. We will also be promoting process and work-style reforms, aiming for improved productivity.



Jan.

## TEFKA® adopted for the CLT PARK HARUMI Pavilion supervised by Kengo Kuma

Denka has been extending the applications of TEFKA® high performance fluoride film to architectural membrane structures, and it was recently adopted for an event facility in Tokyo’s Chuo Ward, CLT PARK HARUMI



TEFKA® is applied between panels of CLT Pavilion, which was supervised by an acclaimed Japanese architect, Kengo Kuma. TEFKA® has been well received for its high transparency and light transmissivity equal to that of glass, and this is the first time it has been used for structures made of CLT.

Jan.

## Outstanding results in the CDP Water Security Report 2019 and CDP Climate Change Report 2019

In surveys that London-based company CDP holds, which rate corporations on the transparency of their environmental information disclosure and management’s participation, Denka received a rating of B in the CDP Water Security Report 2019 and an A- in the CDP Climate Change Report 2019. We will continue to enhance the disclosure of our environmental information and continue with our management path which places importance on ESG (Environment, Society, and Governance).



Mar.

## Accelerating R&D for norovirus vaccine, genomic tumor testing, and COVID-19 testing kit

In order to further accelerate the R&D in the healthcare-related businesses, Denka Group is currently focused on expanding its research facilities and promoting open innovation. One of the group companies, Icon Genetics GmbH, is planning to launch a new R&D facility in Germany for the development of norovirus vaccine, while Denka plans to establish a joint research institute in collaboration with Kyushu University, aiming to contribute to the development of genomic testing technology for tumor. In addition, Denka, formerly Denka Seiken, has entered into a joint research contract with the National Institute of Infectious Diseases in relation to the development of a simple testing kit for COVID-19. We will continue to be committed to improving people’s QOL.



Image of a general testing kit