

Contributing to measures against unknown infectious and other diseases that threaten humanity
GENECUBE® fully automated gene analysis system for PCR testing, and specialized reagents



Toshihiro Kuroita

General Manager
 Biotechnology Operating Department

Toyobo developed the GENECUBE® fully automated gene analysis system in 2011. The system's combination of fast-acting DNA amplification PCR enzyme KOD® DNA polymerase with a high-speed temperature control system is able to return results as quickly as 25 minutes from the start of measurement. As COVID-19 began running rampant across the globe in 2020, we leveraged our experience in the development of enzymes to accelerate development of PCR testing drugs for SARS-CoV-2 tests, receiving regulatory approval in July of that year. At present, over 300 GENECUBE® units have been adopted by medical institutions in Japan, where they contribute to society through use in daily testing.

About 70 years ago, Toyobo undertook the development of technology using microorganisms to treat effluent generated from the manufacturing of pulp used as a raw material for rayon. We also investigated the potential for industrial use of the enzymes created in the cells of microorganisms, and succeeded in applying the enzymes to diagnostic drugs. Expanding the types of enzymes, about 40 years ago we moved into the field of genetic research reagents, focusing on restriction enzymes for genetic engineering. Reagents using the KOD® DNA polymerase PCR enzyme developed by our company, collected from unique microorganisms inhabiting the undersea volcanic craters of Kodakara-jima Island in Kagoshima Prefecture, demonstrate a particularly fast DNA amplification rate and accurate replication. This has led to the reagents' use in genetic diagnosis and many other applications. Today, enzyme technologies have become core technologies in the life science business.

Unknown infectious diseases and other diseases that threaten humanity are expected to occur again in the future. By providing higher-performance products to clinical testing and other markets, we will contribute to the health of people around the world and to greater efficiency in treatment.



GENECUBE® fully automated gene analysis system

Contributing to both patients and the earth through high permeability
Cellulose-derived artificial kidney hollow fiber membrane unique to Toyobo



Kimihiro Mabuchi

General Manager
 Medical Materials Operating Department

The life science business's products are involved in the diagnosis and treatment of diseases, contributing to patients and society. Hollow fiber membranes are a core product of the business. Since the late 1970s, we have engaged in development of hollow fiber membranes for seawater desalination. We developed artificial kidney hollow fiber membranes as one of the applications and launched full-scale production in 1984. For four decades years since then, we have provided artificial kidney hollow fiber membranes for ever-increasing numbers of dialysis patients. The product features two main strengths. First, it boasts outstanding waste removal performance with little change over time during dialysis, thanks to our proprietary film-forming technology. Second, it features outstanding biocompatibility, with few cases of allergies. While general dialysis membranes are made from petroleum-derived materials, our cellulose triacetate (CTA) membrane uses natural cellulose from cotton as its starting material. This confers the advantage of very few patients experiencing allergic reactions during treatment due to conversion of hydroxy groups that affect patients to acetate. Our precise control of the membrane surface further prevents clogging and thus a lower likelihood of pressure fluctuations during dialysis, letting patients undergo treatment with confidence.

We are now working with NIPRO Corporation to build a new plant capable of integrated production that spans hollow fiber manufacturing to processing into dialyzers (filtration devices) and commercialization, with the start of operation scheduled for July 2024.

We have also extended our film-forming technology to other treatments and developed concentrated ascites reinfusion therapy (CART) membranes in 2020. These membranes see application in treatment that filters ascites accumulated due to conditions such as cancer and cirrhosis of the liver, then collects beneficial proteins with a concentrator and returns them to the patient's body. We are also advancing development of acute blood purification membranes for patients with conditions including sepsis, with delivery to patients planned for fiscal 2024.



Illustration of Dialyzer using Toyobo's CTA membrane