

100 Years of Terumo —History of Value Creation—

Since its establishment, Terumo has continued advancing over the past 100 years, standing alongside patients and those in medical settings as we create new value.

Building the foundations of public health

1921  
Foundation of the Red Line Thermometer Corporation by a group of medical scientists led by Dr. Shibasaburo Kitasato



Courtesy of the Kitasato Institute archives

Controlling infections

1963  
Launch of Japan's first disposable syringe



1969  
Launch of Japan's first blood bag

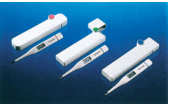
1973  
Launch of Japan's first intravenous solutions in soft plastic bags, based on the technology accumulated through the development of blood bags



Developing eco-friendly technologies

1983  
Launch of digital thermometers for hospitals in Japan

1985  
Termination of mercury thermometer production and implementation of efforts to spread digital thermometers



Reducing patients' physical strain

1982  
Launch of the world's first microporous hollow fiber membrane oxygenator



1985  
Launch of the angiographic catheter system in Japan and entry to the field of vascular intervention



Pursuing patient-friendly healthcare

1988  
Launch of the peritoneal dialysis system in Japan

1993  
Launch of the blood glucose monitor in Japan

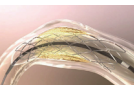
2005  
Launch of the world's thinnest injection needle for administering insulin and other medications in Japan



2006  
Entry to neurovascular intervention therapy with embolization coils for treating brain aneurysms



2008  
Launch of the drug-eluting coronary stent in Europe



2013  
Launch of Japan's first intravenous injectable acetaminophen antipyretic analgesic

Achieving greater safety and security in medical fields

1999  
Launch of prefilled syringes in Japan



2000  
Introduction of the closed infusion system in Japan

2012  
Introduction of the IV solution bag for safe administration in Japan



2017  
Launch of Japan's first spray-type adhesion barrier

2018  
Launch of Japan's first insulin patch pump



The Age of Thermometers

Infection Prevention Initiatives

Growing Along with Developments in Healthcare

1921-

1960s-

1970s-

1921  
Foundation of the Red Line Thermometer Corporation for the purpose of manufacturing accurate clinical thermometers in Japan

1936  
Change of company name to Jintan Thermometer Corporation

1971  
Establishment of local affiliates in the U.S. and Europe (Belgium)  
  
1974  
Change of company name to Terumo Corporation

1989  
Establishment of Shonan Center R&D facility in Japan

Made-in-Japan Thermometers Lay the Foundation for Individuals to Take Care of Their Own Health

At the time of Terumo's founding in 1921, however, Japan's supply of thermometers from Germany, the U.K. and the U.S. was suddenly cut off with the outbreak of World War I. An initiative to manufacture high-quality thermometers domestically in Japan was launched, with Dr. Shibasaburo Kitasato as one of the founding members. This was the beginning of Terumo.

A small factory existed that produced mercury thermometers with a red line core. Terumo used this as a prototype and set about improving the accuracy and manufacturing quality. Irregularities in alignment resulting from sudden cooling during manufacturing caused inconsistent readings, but such challenges were overcome using unique technology. Soon, Terumo began to receive recognition both within and outside Japan for its thermometers. Once considered instruments for hospital use only, they entered widespread household use as the 1920s progressed. As a result, now-common behaviors such as staying home when we have a fever and managing our health by monitoring our temperature eventually permeated through society and into people's daily lives.

Eradicating Infection from the Medical Field

Everyone has seen a syringe. They are common medical devices used for giving vaccinations and administering medication. Today, disposing of syringes after a single use is the normal practice, but that only became the case over the last half century. Until then, syringes were reused following sterilization. This led to the spread of hepatitis and other diseases.

To solve this problem, Terumo started developing single-use disposable syringes in the 1950s. To succeed, one of the challenges Terumo had to overcome was the major issue of sterilization. Unlike conventional syringes made of glass, high-temperature sterilization after production was unsuited to the plastic parts of disposable syringes. Aided by the advice of research institutions and experts outside Japan, Terumo achieved the practical use of a low-temperature gas sterilization method suited for medical instruments, and in 1963 became the first company to market disposable syringes in Japan.

Terumo went on to develop soft bag containers for storing blood for transfusion and IV solutions. Since these products were designed in a way that did not require needles during use, they helped reduce the risk of blood contamination and the spread of infection.

Passion for Saving Lives

After establishing such modern healthcare norms as household-use thermometers manufactured in Japan and disposable syringes, Terumo's next challenges involved supporting and sustaining human biological activity.

Terumo continued enhancing its dialyzer technology launched in 1977, eventually creating the world's first porous hollow-fiber oxygenator that substitutes for the patient's lungs to exchange gas during surgery. ECMO also has roots in this technology, and has been used to treat respiratory failure caused by COVID-19, giving hope to patients fighting this infectious disease.

As always, our goal remains the same: to create new technology that benefits and saves as many lives as possible—Terumo's belief has not changed and it never will.

Standing by Those Living with Illness

Some patients are faced with life-long diseases. Terumo has been supporting such patients' everyday lives and working to improve their quality of life.

Patients living with Type I diabetes require several insulin injections every day. Terumo developed a needle with the aim of reducing their pain. Another example is an insulin patch pump, which allows for regular insulin injections regardless of clothing or situation. This product was developed to facilitate treatment in everyday life.

For patients with chronic kidney disease, Terumo has enabled dialysis to be carried out either at home or when out and about, with a range of products for peritoneal dialysis (PD). PD has been adopted by many patients as a dialysis treatment option.

Terumo is steadfast in its dedication to providing technologies that allow everyone to live their lives just the way they choose.

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Supporting the development of medical technologies

**Mid-1990s**  
Support for spreading TRI (transradial intervention: a coronary intervention technique with catheter insertion made from the radial artery in the wrist)

**2002**  
Establishment of Terumo Medical Pranex, a training facility for medical professionals (Japan)



Providing a safe, efficient medical service platform

**2012**  
Introduction of an infusion systems that can be connected to hospital IT systems in Japan

**2013**  
Introduction of a series of vital sign measuring devices with communications functions in Japan



Meeting the latest needs derived from advancements in medicine

**1998**  
Launch of a kit packing business to include administration devices (needles) in pharmaceutical companies' medicines in Europe

**2003**  
Full-scale launch of the CDMO to meet pharmaceutical companies' needs



Offering new therapy possibilities

**2011**  
Addition of the centrifugal apheresis system to the lineup

**2012**  
Launch of the hybrid graft in Europe

**2016**  
Introduction of the autologous skeletal myoblast sheet, the world's first approved regenerative medicine for cardiac regenerative therapy in Japan



**2016**  
Addition of the world's first intrasaccular device to aneurysm treatment portfolio



**2019**  
Launch of the cell therapy fill and finish system



Stride Ahead  
100th

Stride Ahead  
100th

The Challenges of Becoming a Global Company

1990s–

**1999**  
Cardiovascular division of 3M Company becomes part of Terumo, leading to establishment of Terumo Cardiovascular Systems Corp. in the U.S.

**2002**  
Vascutek Ltd., a U.K. manufacturer of vascular grafts, joins Terumo Group

**2006**  
MicroVention Inc., a U.S. neurovascular intervention device company, joins Terumo Group

**2011**  
CaridianBCT Holding Corp. (currently Terumo Blood and Cell Technologies), a global leader in the blood transfusion industry, joins Terumo Group

**2014**  
Revision of the Group logo

**2017**  
Bolton Medical, Inc., a U.S. manufacturer of stent grafts for aortic treatment, joins Terumo Group

**2019**  
Rebuilding the Terumo Group Identity, newly creating Core Values

Side by Side with Medical Professionals Responsible for Human Lives

A strong will to support medical professionals—this is carried through all of Terumo's products and services.

In product development, superior usability is pursued to offer reassurance to medical professionals so they can focus on taking care of patients. Through technologies such as a closed infusion system for securely connecting syringes and intravenous devices, prefilled syringes designed for safer healthcare provision and products designed to protect medical professionals from exposure to anticancer drugs, Terumo supports frontline medical professionals in their fight to save lives.

Terumo also offers the practical training required in various medical fields. In addition to helping medical professionals to understand the correct usage of devices and to acquire new skills and techniques, Terumo grasps the needs of such professionals and applies this knowledge to develop or improve products, simulators, and training programs.

Terumo will keep advancing together with medical professionals as it embarks on the next stage of its journey.

New Technologies Empower Healthcare

Terumo has taken on a new challenge of incorporating a wide range of technological innovations to accelerate progress in healthcare.

One example is the Smart Infusion System, equipped with drug libraries that can be integrated with a hospital's IT systems. As a feature of our infusion pumps and syringe pumps used to administer medicine and nutrition to patients, it supports accurate medication and plays an important role in improving treatment efficiency and safety.

Terumo is dedicated to providing personalized solutions to complement the existing product portfolio with custom-made devices available to treat aortic pathologies. These custom solutions enable treatment for many patients where no other commercially available or conventional means are available.

Terumo also utilizes artificial intelligence (AI). We have launched a joint AI-tech research initiative with a medical institution to develop ways that technology can be used to assist physicians' decision-making processes with automatic measurements of the coronary artery diameter and clot area, as well as selection of the optimal medical device. The aim is to improve the speed and accuracy of healthcare by using AI to effectively support doctors' conventional work.

By embracing new technologies, Terumo is moving forward to realize better healthcare.

Pursuing New Possibilities for Healthcare

Using patients' own cells to treat diseases—a new door for healthcare is about to open, and cell-sheet transplantation is one example of the new treatments becoming available.

These cell-sheets are created by taking a patient's own muscle tissue, culturing the cells of that tissue and forming them into sheets, which can then be grafted onto the patient. Expectations are rising for such regenerative therapy to become a new option in the treatment of diseases where recovery is difficult with more traditional medication or surgery. Terumo will continue research and development in this area and take regenerative medicine to the next level.

Terumo's centrifugal therapeutic apheresis system is used in the treatment and management of various conditions, such as sickle cell disease. We aim to continue providing new treatments, such as therapeutic plasma exchange, with this device to positively impact patient lives. In addition, Terumo offers products, software and services to enable customers to collect and prepare blood and cells to help treat challenging diseases and conditions.

Over these past 100 years, Terumo has faced a wide range of healthcare challenges and worked toward creating outstanding innovations that satisfy the requirements of patients and medical professionals.

Today, we have recognized again the role and importance of healthcare and reaffirmed our unchanging Group Mission of "Contributing to Society through Healthcare".

Our activities to achieve a better future for patients and medical professionals will never end. As long as there are patients and medical professionals in the world who are waiting for Terumo's products and services, we will stride ahead into the next 100 years.

Note: The regulatory approval status and availability of these products differ by country or region.

## 100 Years of Terumo —History of Value Creation—

## Terumo will walk alongside healthcare providers now and into the future toward realizing an ever greater contribution to society.

Terumo has three companies encompassing seven global businesses that not only work to improve treatment efficacy and help reduce the mental and physical burdens on patients, but also provide products and solutions that help solve a variety of challenges in medical settings.

### Cardiac and Vascular Company

#### Contributing to improve patients' quality of life by promoting minimally invasive treatments

As part of the transition to minimally invasive treatments, there has been a move away from surgical treatment to the broad use of vascular intervention. Among the procedures, Terumo has actively promoted to expand the use of Transradial Intervention (TRI), where device is introduced through the radial artery in the wrist. The Terumo brand currently enjoys the top global share in products for TRI procedures. Compared with introducing the device through the femoral artery, which has been the standard treatment, TRI offers the benefits of shorter duration of hemostasis, lower risk of complications, and less burden on patients, who in some cases are able to walk soon after the procedure. In addition to improving patients' quality of life, TRI also enables shorter hospitalization, with discharge possible on the day of the procedure. It makes possible to reduce healthcare expenditures and improve treatment outcomes, which also contributes to improve medical cost efficiency.

Terumo provides unique solutions for medical settings, including products as well as our trainings for medical professionals around the world, to promote this treatment further.



TRI image

# Contributing through to Society Healthcare

### Blood and Cell Technologies Company

#### Supporting the development and commercialization of cell therapy and providing patients with new treatment options

Chimeric antigen receptor T-cell (CAR-T) therapy is a gene-modified cell therapy that has been approved by the United States Food and Drug Administration (FDA) to treat certain lymphomas in blood. The treatment involves collecting T cells from the cancer patient, modifying them in the laboratory so that they attack the cancer, expanding (increasing the number of) the modified cells and infusing them back into the patient, where the cells fight the cancer. Another example of innovative cell therapy is mesenchymal stem cell (MSC) therapy, in which cells collected from a

### General Hospital Company

#### Contributing to maximize the value of pharmaceuticals and improved drug delivery with unique technologies and expertise

In recent years, the pharmaceutical market has been shifting from development of conventional small-molecule drugs to biopharmaceuticals, which are expected to have less adverse drug reactions and offer greater efficacy, and the use of immunotherapy has expanded. Along with these changes, the handling of drugs has grown more complex. In addition, prefilled syringes are now also used widely outside emergency medicine, including home injections. Terumo develops drug delivery devices including prefillable syringes and needles for drug kits made by leveraging its material technology optimized for the characteristics for each drug, and, utilizing

advanced manufacturing technology to design and produce drug-device combination products through alliances with pharmaceutical companies. In these alliances, Terumo proposes comprehensive solutions from matching materials compatible with the drugs to device design customized for the application to achieve the drug delivery needed by medical settings together with the pharmaceutical company and generate new value, thereby contributing to healthcare.

Terumo is uniquely positioned to achieve this, from our past efforts to convert the market from glass to plastic syringes and our experience in providing both pharmaceuticals and medical devices over our long history.



Top: Pre-filled syringe with auto-injector  
Bottom: Pre-filled syringe with safety device

donor's bone marrow are cultured and transplanted into the patient.

Terumo Blood and Cell Technologies is advancing cell and gene therapy by automating cell production from collection to infusion. We apply current technologies and expertise to solving customer problems with products that can refine, simplify and automate the cell manufacturing cycle from beginning to end. Cell expansion is one of the most important steps within that cycle, so we applied our expertise to develop the Quantum Cell Expansion System. Quantum uses a sterile disposable kit and maintains a consistent and controlled micro-environment for cell culture by automating key processes such as feeding cells, removing waste, adding oxygen and removing carbon dioxide. Customers value Quantum because it is a fully closed

and automated system and because it achieves highly consistent, reproducible processes and cell products. Quantum, which has been used in the development of COVID-19 vaccines, uses the same hollow-fiber (HF) technology that was once used in Terumo's hemodialysis business, where we have profound expertise. By leveraging the technologies and know-how that Terumo has cultivated over many years, we further strengthen our cell processing product portfolio to contribute to and capitalize on the growing cell therapy market.



Quantum cell expansion system