醫療財團法人
台灣血液基金會
捐血救人 Taiwan Blood Services Foundation

2020 ANNUAL REPORT

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Message from the President

Taiwan has been very successful its pandemic prevention in 2020, a fact obvious to all in the world. Despite the raging COVID-19 pandemic, medical services continue to operate normally in Taiwan due to the preemptive preparedness efforts by the Ministry of Health and Welfare and local governments. In retrospect, during the most severe period of the 2003 SARS epidemic, almost all medical practices were suspended, and the blood demand in hospitals plummeted by 25%. In contrast, the blood demand only decreased by 6% in 2020, because the whole society was so highly united in fighting against the COVID-19 pandemic, effectively reducing its impact on the medical system. To collect enough blood during the pandemic period was never an easy task, while the cancelation of large-scale annual awards ceremony and blood donation promotion activities due to pandemic added even more difficulties to the task. Fortunately, we have so many selfless Bodhisattva-like regular blood donors who are always willing to help those patients in need of blood transfusion to get necessary medical treatment.

Following the national epidemic prevention policy at any time, Taiwan Blood Services Foundation (TBSF) and its Blood Centers have, since the COVID-19 outbreak, been not only implementing all the pandemic prevention measures to protect the health and safety of blood donors and the patients, but also striving to balance the supply and demand of blood for medical use. Moreover, TBSF has also set up in its Hsinchu Blood Center an emerging infectious pathogen testing laboratory, which has been approved by the Central Epidemic Command Center as a "designated inspection agency for reported cases of severe and special infectious pneumonia,Covid-19 disease," aiming to timely monitor the emerging infectious diseases in the future.

In 2020, TBSF worked hand in hand to improve blood quality and enhance blood transfusion safety. The significant achievements

we had made included the continuous promotion of leukoreduced blood products to reduce adverse blood transfusion reactions. By the end of 2020, there have been 178 medical institutes that have been using the leukoreduced blood products in a full range, and the national utilization rate of leukoreduced blood products has increased significantly from 54% at the end of 2019 to 77% at the end of 2020. Our goal is to make this national utilization rate reach 100% in early 2022, so as to keep pace with advanced countries, improve blood transfusion safety, and protect the health of patients.

For 3 consecutive years since 2017, TBSF has gained the SNQ (Symbol of National Quality) certification and won 1 silver and 2 bronze medal awards for the "National Biotechnology and Medical Care Quality Award". In 2020, TBSF presented the theme: "The pioneer in detection for the expression of Miltenberger blood-group antigen by using human monoclonal antibody, anti-Mia (HIRO-377T)" and gained another bronze medal award in this "National Biotechnology and Medical Care Quality Award" competition. All these awards show that TBSF has received national recognition in all aspects. In addition, TBSF has been successful in self-cultivation of hybridoma cell lines secreting anti-Mia monoclonal antibodies to produce reagents, which can be used for the comprehensive detection of blood donors and label the Mia-antigen test results on each bag of red blood cell

products. This method, first-of-its-kind in the world, not only greatly improves the safety of blood transfusion in patients, but also makes the blood bags more recognizable, thus reducing the workload of hospital blood banks.

We have formally applied the concept of "patient blood management (PBM)" to revise the "Essentials of Blood Components" health education manual and renamed it as "Practical Blood Transfusion Manual" so as to assist hospitals in promoting and applying those measures that help increase blood sources for clinical use but reduce the cost of blood transfusion, because all the blood components can be transfused more accurately and effectively. In addition, TBSF has also obtained the agreement of the Australian National Blood Authority (NBA) to translate its "Guidelines for Patient Blood Management" from English into Chinese and publish it in Taiwan, so as to vigorously promote the concept of patient blood management in our country.

As TBSF celebrated its 30th anniversary of establishment in 2020, we published the "TBSF's 30th Anniversary Special Issue" to record the breakthroughs and efforts that we have made in the blood donation campaigns in Taiwan over the past 30 years. Although there were challenges along the way, we have always adhered to the unchanging core value of voluntary non-remunerated blood donation and shoulder the mission of saving life by blood donation. To commemorate this 30th anniversary, TBSF has also organized, for the first time, the "Blood Donation, Love Never Ends" photo competition, hoping to capture precious pictures and tell memorable stories related to blood donation through the camera lens.

To serve the enthusiastic blood donors, we have not only successively added new blood donation sites but also renovated some blood donation sites to create a more comfortable blood donation environment and continue to provide blood donors with professional and high-quality services. The "Nanhai Blood Donation Room" established by the Taipei Blood Center in 1983 was completely renovated and refitted to create a blood donation space more in line with functional requirements, including the upgrades of software and hardware and the digitization of various operations, bringing comfort to the public with a

new design sense. We are also committed to the development of artificial intelligence technology. For instance, our Kaohsiung Blood Center has added T3 and T4 AI unmanned vehicles to assist in the transportation of samples, documents, and storage items to improve efficiency in inspection and various operations.

In the future, to improve the security of information and communication, we plan to obtain the ISO27001 certification in 2022, so that we can meet the international standards of information security management, implement information management, and protect the personal data of blood donors. We will also continue to promote the digitization of our attendance and documentation systems. It is our sincere hope that while making contributions to environmental protection, TBSF can also strengthen the timeliness and convenience of various administrative operations. Moreover, TBSF has set up the department of auditing to strengthen internal control and internal audit to ensure the goal of sustainable development in the hope that the management of the blood business can be incorporated with ESG concepts. In addition to the mission of saving life by blood donation, TBSF also hopes that its effective governance models can reflect its strong care about environmental protection and its desire to give back to society.

It is indeed very lucky for us to have the support and assistance of governments, medical institutions, schools, enterprises, associations and other units under the impact of the COVID-19 pandemic. It is even more valuable to have so many enthusiastic blood donors to help us maintain the balance of supply and demand of blood and ensure the abundance of blood for medical treatment so as to safeguard the medical rights of patients. As an indispensable part of Taiwan's medical and health system, we will continue to promote blood donation campaigns in Taiwan and look forward to your support of the national blood sufficiency policy to maintain a stable blood source.

Sheng-Mou Hou

President

About us

Our Aim

Upholding the concept of "happy blood donation and safe blood use," the TBSF practices a voluntary non-remunerated blood donation system, insists on strict blood quality control and provides the most complete services for blood donors and blood recipients so as to ensure a sufficient blood supply for clinical uses.

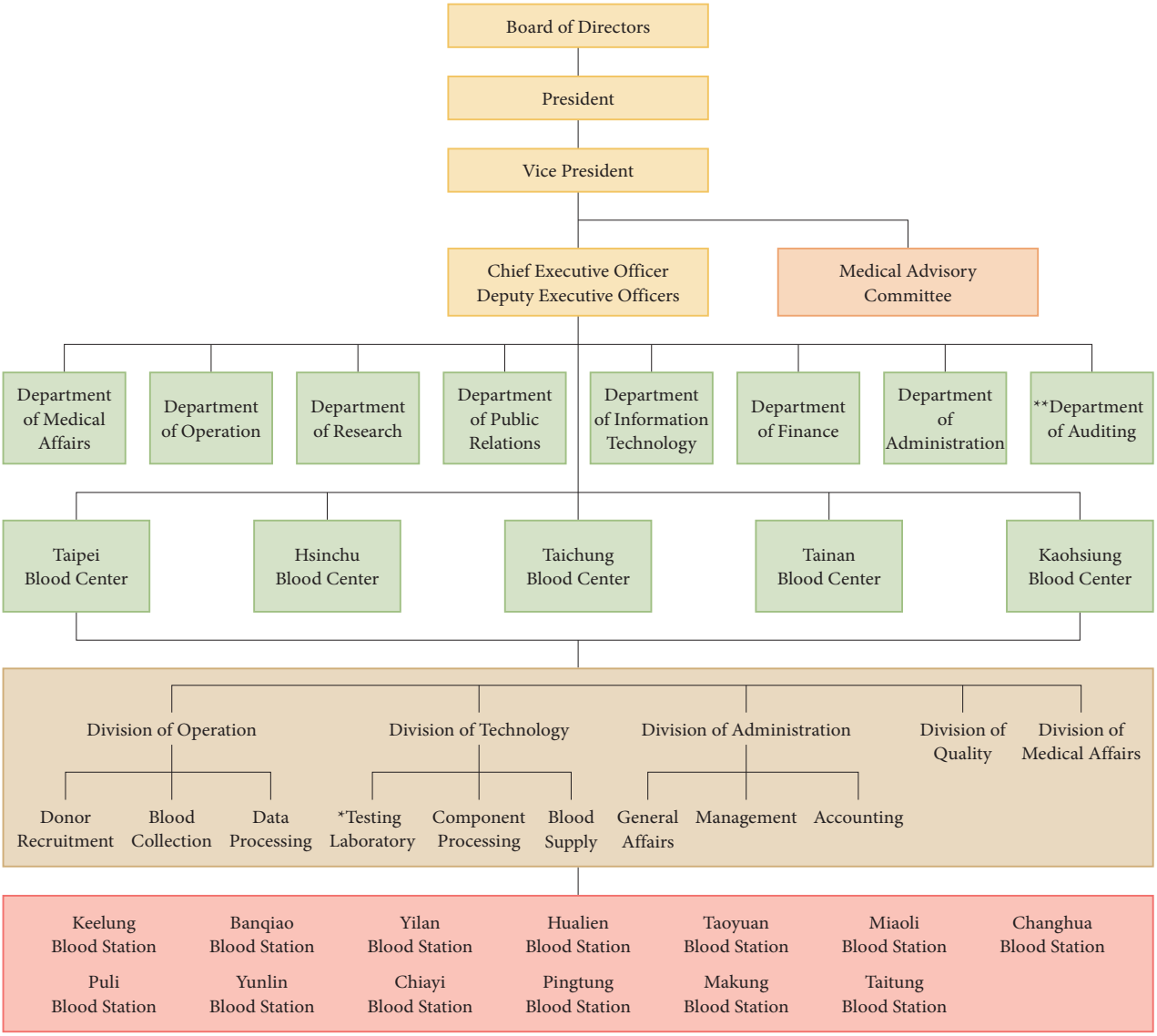
Our Vision

Adhering to sustainable development under the principles of integrity, harmony, efficiency, and innovation, the TBSF vows to become the leader in blood supply for safe clinical uses in Taiwan.

Our Missions

1. To plan and implement blood donation services.
2. To establish blood donation systems, and to conduct research and development on safe blood use.
3. To conduct research on blood science and technology.
4. To collect , laboratory-test, and supply blood for patients of public and private hospital.
5. To conduct research on the health maintenance of blood donors.
6. To conduct matters concerning the use and safety management of blood suitable for transfusion.
7. To plan and supply blood in large quantity at times of major disasters or wars.
8. To commission toll fractionation , to storage and supply domestic plasma derived products.
9. Other matters concerning blood donation and supply.

Organization



Note: * There are 2 centralized testing laboratories in Taipei and Kaohsiung Blood Center.

** As of Jan 1, 2020, the auditing office was set up, reorganized into the department of auditing on Oct 23, 2020.

History of Taiwan Blood Services Foundation (1974~2020)

1974

April • Chinese Blood Donation Association was established.

August • Taipei Blood Center was established.

1975

October • Taichung Blood Center was established.

1976

December • The Kaohsiung Blood Center was established.

1978

July • Taipei Blood Center started the production and supply of blood components, including packed RBC, washed RBC, WBC concentrates, platelets, fresh frozen plasma and frozen plasma.

1981

July • Tainan Blood Center was established.

1983

January • Taipei Blood Center introduced leukocyte and platelet apheresis.

1985

July • Human leukocyte antigen (HLA) laboratory was established.

1987

June • Hospital-based and Red Cross paid donor blood banks closed.

1988

January • Implementation of anti-HIV-I test.

1989

December • To prevent blood donations from high-risk AIDS groups and other unsuitable donors, the Blood Centers started "a confidential phone call", whereby donors could call to notify the Blood Centers if the blood donated is unsuitable.

1990

January • Chinese Blood Services Foundation which is the predecessor of Taiwan Blood Services Foundation was established.

1991

April • Hualien Blood Center was established.

December • The annual blood donations exceeded one million units, and the blood donation rate reached 5.18%.

1992

May • Hsinchu Blood Center was established.

• Implementation of anti-HCV test.

• Establishment of electronic database of red cell phenotypes.

1993

February • Introduction of HLA-matched apheresis platelets.

September • Implementation of a computer system to replace manual work of blood donation and processing.

1995

April • It is the first time, the President met the 28 outstanding blood donors in the presidential palace for annual blood donor recognition event.

1996

January • Implementation of anti-HTLV test.

1997

January • The Minister of Department of Health, Chang Po-ya and the President of TBSF Lin Kou-Sin announced to start the productions of plasma derivative products.

1998

February • Implementation of RBC irregular antibody screening test.

April • The first public umbilical cord blood bank was established. The plan was ended in January 2013.

1999

March • The Blood Centers got approval of the MCA (Medicines Control Agency) and sent source plasma to plasma fractionation plant of SNBTS (Scottish National Blood Transfusion Service).

2001

August • Consolidation of 6 blood centers' testing labs into 2 centralized labs located in Taipei and Kaohsiung blood centers.

December • The "TBSF" plasma derivative products started to supply.

2007

January • Implementation of bacteria testing for all apheresis platelets.

2009

September • The archive sample bank built in Hsinchu Blood Center was launched.

2013

January • Implementation of Nucleic Acid Amplification Testing (NAT).

2015

July • The TRALI (transfusion-related acute lung injury) prevention policy was initiated with the following two initiatives: 1) male plasma was prioritized for transfusions. 2) HLA & HNA antibody screening for female apheresis donors.

November • Implementation of cholesterol, LDL-C, and HbA1c tests every 3 years for those who have donated blood in the past 2 years and are above 40 years old.

2016

October • Implementation of the mobile social communication app LINE official account named " i-Blood " with intelligent query, personalized notification and instant push broadcast functions.

2017

February • Haemovigilance reporting system was launched.

April • Hualien blood center was reorganized and merged into Taipei and Kaohsiung blood centers.

2018

August • The new Blood Management System based on Internet Data Center was launched.

December • The universal screening of RBC Mia antigen have been introduced.

• The TBSF hosted at the 5th APEC Blood Safety Policy Forum in Taipei.

2019

June • The singer, Miss Fang Wu, our blood donation spokesperson, composed the song to encourage the public to give blood.

November • Testing and labeling of RBC antigens C, c, E, e, Jka, and Jkb for leukocyte-reduced RBCs.

2020

March • Hsinchu Blood Center has added the supply of " irradiation of blood products " since March 1.

March • In response to the COVID-19 pandemic, we have set up the TBSF Epidemic Prevention Command Center.

June • To introduce the concept of patient blood management, we have published the " Practical Blood Transfusion Manual " and distributed it to hospitals.

August • The Hsinchu Blood Center has completed the construction of its "Emerging Infectious Pathogen Testing Laboratory," which has been since September 25 approved as a "Designated Testing Agency for Reported Cases of Severe Special Infectious Pneumonia" by the Central Epidemic Command Center.

OUR PERFORMANCE

OUR PERFORMANCE

Recruitment and retention of blood donors

Blood Donation Month
"Donate blood and share love!"

The 2020 Blood Donation Month started on December 23, 2019 and ended on January 23, 2020. The purpose of holding the "Blood Donation Month" event one month before the Lunar New Year every year is to remind people that patients still need blood transfusion during the Lunar New Year period. In general, the number of blood donors reduces greatly during such a period because every family is busy preparing for the coming traditional festival of importance, because the weather turns cold, because people are returning home or traveling abroad and so on and so forth. As Lunar New Year holiday is long, we need to store even more blood stocks to call it sufficient for the medical treatment of the wounded and the sick. It is thus hoped that people can develop the good habit and turn themselves into regular blood donors so as to help those in need.

Rui-qin Zhou thanked the vast number of blood donors and called for blood donation to help patients at the press conference for Blood Donation Month.

At the press conference, TBSF CEO Sheng-tang Wei (left), Mr. Han-qing Guan (second from right) and Mr. Rui-qin Zhou (first from right) called on the public for regular blood donation to feed off the blood banks.

The press conference for Blood Donation Month was held at the TBSF conference room on December 20, 2019. Blood receiver Mr. Rui-qin Zhou, also a patient with hemophilia, and blood donor Han-qing Guan were invited to the event.

In 1992, Mr. Zhou crashed in a car accident. Although not physically injured, he suffered massive hemorrhage in the abdominal cavity and lost consciousness at the time arriving at the hospital. His spleen ruptured and lost nearly 2000 C.C. of blood. Fortunately, he was successfully rescued after part of his spleen was removed and blood was transfused. Therefore, Rui-qin Zhou, who is also Chairman of the Hemophilia Association of Taiwan, always calls for blood donation based on his own experience and represents the patients to express their extreme gratitude to those anonymous blood donors.

Blood donor Han-qing Guan's wife fell into a coma on Lunar New Year's Eve one year and underwent emergency blood transfusion. Fortunately, hospitals in Taiwan have enough blood stocks at all times so that his wife survived for more than one year. Thereafter, adhering to the concept of "a candle lights others and consumes itself", Mr. Guan regards blood donation as his mission, hoping to return the favor to society. He has carefully kept all his blood donation records in the past 35 years, including the TBSF's "Conscientious Call-back" leaflets,

Mr. Han-qing Guan showed at the press conference all his blood donation records in the past 35 years. All the volumes note down his precious memories and the track records of how he has fulfilled his mission.

inspection reports, certificates of appreciation, and the audience with President Tsai in 2019. He claimed the latter event as the worthiest and the proudest thing in his whole life!

World premiere LINE FRIENDS — themed bloodmobiles in Taiwan!

TBSF hopes that younger generations will eventually become the mainstay of blood donation in Taiwan. To promote the awareness of blood donation among younger generations, TBSF strives to encourage them to actively participate in blood donation, develop the habit and then turn themselves into regular blood donors. With this goal in mind, TBSF once again cooperated with LINE Co.,Ltd. in 2020 to jointly create five unique LINE FRIENDS-themed bloodmobiles, the first of its kind in the world, each of which is stationed in Taipei, Hsinchu, Taichung, Tainan, and Kaohsiung. They have begun to perform the blood-raising missions since April 2020, and passersby can see them decorated with the most familiar images of BROWN and CONY. Aside from the themed bloodmobiles, those exclusive LINE FRIENDS characters on the bloodmobiles are also used to design a series of limited-edition souvenir items such as masks, mouse pads, notebooks, and so

Matching the themed bloodmobiles, the limited-edition small objects designed with the LINE FRIENDS characters are so cute that they are conducive to publicity, attracting the attention of students.

Targeting the campuses as a main area to recruit blood doners, the eye-catching LINE-themed bloodmobiles are paired with exclusive small gift items, in the hope that young people will take the first brave step to donate blood and then turn themselves into regular blood doners.

Blood donation ambassador Fang Wu not only filmed an introductory video but also donated blood on the bloodmobile. She also appealed to the public that blood donation is safe and giving blood can save lives. So, roll up your sleeves to donate blood right now.

on. TBSF gives out such small gifts, which are changed every season, to attract young people to pay attention to the topic of blood donation, and then donate blood in actuality.

Due to the pandemic, the event press conference originally scheduled to take place at the campus of National Taiwan University on March 31 encountered difficulties because of the policy of closure of universities and colleges. It was finally held in front of Grace Baptist Church on Xinsheng South Road, Taipei City, where there was an enough space to allow the Blood Center to park the bloodmobile and handle blood donation activities. Before the start of the event, blood donation spokesperson Fang Wu came to the venue early to shoot an introductory video, introducing the subject-limited bloodmobile and the anti-pandemic measures on the bloodmobile, telling the general public that bloodmobile is safe. She also got on the van and became the No. 1 blood donor accompanied by BROWN and CONY.

On the event day, Roger Chen, Managing Director of LINE Taiwan, also came to the event and took the lead to donate blood. Roger Chen, a regular blood donor, has been vigorously supporting the deepening of cooperation between the two parties.

Partner with Facebook to launch Facebook Blood Donations

The "Facebook Blood Donations" service,

LINE and TBSF jointly create the limited-edition LINE FRIENDS-themed bloodmobiles

a collaboration between TBSF and Facebook in Taiwan, was officially launched in Taiwan on July 24, 2020. Since Facebook launched the Facebook Blood Donations service in 2017, more than 70 million people have registered worldwide. Such a matching technology allows Facebook users who have registered for this function to know the blood shortage situation and where to go for blood donation; Taiwan is the first country in East Asia to use this "Facebook Blood Donations" service.

In Taiwan, Facebook is the most widely used social media platform, which has 19 million active users every month, accounting for 80% of the total population in Taiwan. Each Blood Center under the TBSF has its own official Facebook page followed by more than 260,000 fans, who will receive blood donation messages through the technological services of this largest social media platform, so that they are proactively reminded to give blood when the blood stock level is low.

Facebook launched the "Facebook Blood Donations" service in Taiwan, which can effectively notify and remind users to give blood at the blood donation spots nearest to them when there is a blood shortage.

The roles of red blood cells, platelets, and white blood cells in "Cells at Work!" bear the responsibility of education and they are also loved by their fans deeply.

This definitely brings in greater benefits for the promotion and publicity of blood donation.

Anime "Cells at Work!" to help recruit blood donors

The "Cells at Work!", a popular science anime series that is highly popular in China, Japan and Taiwan, released a special screening edition of "Cells at Work: Bacteria!" in Taiwan. To help promote blood donation, three "Cells at Work!" special blood donation vans are stationed in Taiwan. In addition, to help promote the weekday fixed-point blood donation, a special "Cells at Work!" desk calendar will be given to those enthusiastic blood donors who give blood at a specific location on workdays (from Monday to Friday), starting from September 21, 2020 onward.

Representatives took group photos with President Tsai.

Recognition of blood donors with outstanding donation merit

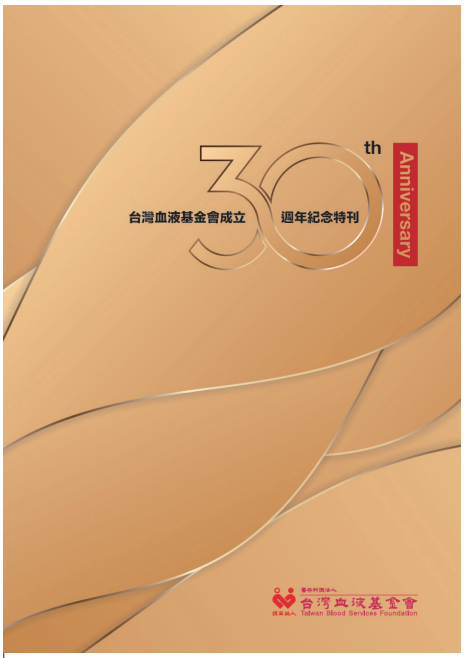
37 representative blood donors with outstanding donation merit in 2019 were received by President Tsai Ing-wen at the Presidential Office Building at 11 a.m. on November 27, 2020.

Coming into being for 30 years, TBSF is a combination of conservatism and constant improvement

To improve and protect the medical rights and interests of people in Taiwan, the Chinese Blood Donation Association (BDA) donated funds to establish the "Chinese Blood Services Foundation (CBSF)" so as to comply with the Medical Care Act upon its promulgation. Placed under the jurisdiction of the Department of Health of the Executive Yuan, the CBSF, the predecessor of TBSF, was formally established on January 1, 1990, to manage the blood centers in Taipei, Taichung, Tainan and Kaohsiung, which are actually engaged in the recruitment and retention of blood donors.

TBSF is responsible for the promotion and supply of blood for clinical use in Taiwan. After stabilizing the sources of blood, it has begun to commit itself in blood technology and research and the improvement of blood safety and quality for accurate blood transfusion in medical treatment. Facing future challenges, such as changes in the social environment, changes in social structure, and the continuous advancement of medical standards, TBSF will uphold the principles of "integrity, harmony, efficiency, and innovation" and strive to achieve its goal for sustainable development in the recruitment and retention of blood donors and blood transfusion safety.

As TBSF celebrated its 30th founding anniversary in 2020, we published the "TBSF's 30th Founding Anniversary Special Issue" to record the breakthroughs and efforts that we have made in the past 30 years. Included in the Issue are such eventful achievements and important milestones as the comprehensive implementation of NAT testing on blood donors to comply with the international standards, the construction of blood management information system for total traceability of blood, the compliance with the national blood sufficiency policy to provide high-quality blood preparations for our fellow countrymen, the sharing of Taiwan's experience to showcase national strength on the international stage, the promotion of "leukoreduced blood products" to make blood transfusion safer and more secure, the promotion of the concept of correct blood use to make blood transfusion for medical treatment more accurate, and the construction of a world-class automated blood component manufacturing center. Adhering to the everlasting core value of voluntary non-remunerated blood donation, we vow to be the pioneer in securing blood sources for safe medical use in Taiwan and make our best contributions to Taiwan's medical services.



"TBSF's 30th Founding Anniversary Special Issue" published by TBSF.

"Blood Donation, Love Never Ends" photo competition

Blood for medical use in Taiwan relies heavily on those voluntary non-renumerated blood donors and the country enjoys the highest national blood donation rate in the world. The link between blood donation and blood transfusion symbolizes the flow of love and allows life to continue. As 2020 coincides with TBSF's 30th founding anniversary (counted from the year when Chinese Blood Donation Association (BDA) put up the fund to set up CBSF, the predecessor of TBSF), we hosted this first photo competition

to commemorate the cause, hoping to capture through the camera lens the moments of blood donation, the passionate street solicitation of blood donors, the gratitude of blood receivers and their family members toward blood donors, the infusion of hope and life, and so on. This photo competition is intended to convey many of the precious images and beautiful stories through visual transformation.

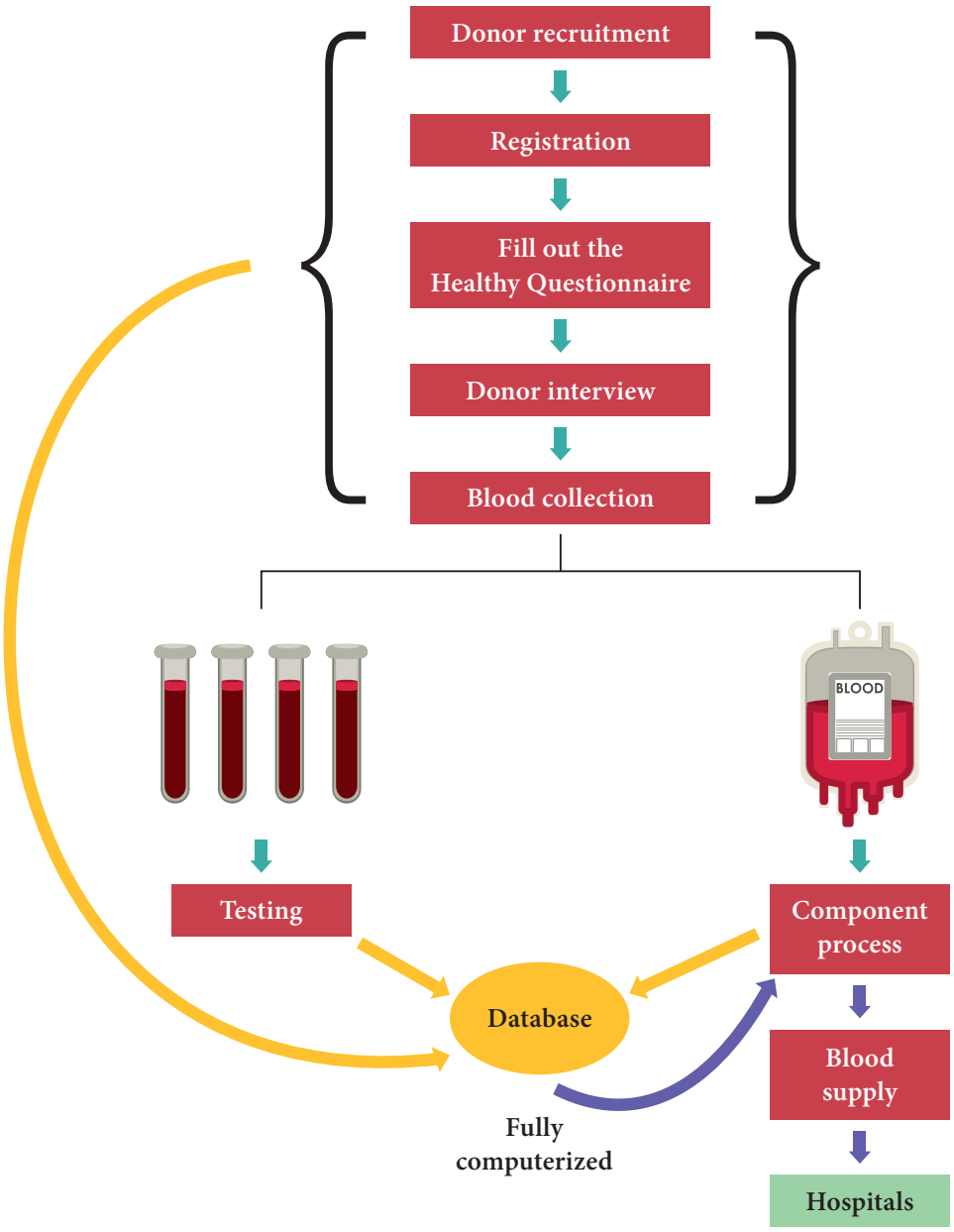
The call for submissions, to which many blood donors and photography enthusiasts responded, lasted nearly three months and ended on November 20, 2020. A total of 724 entries were received and then evaluated at a review meeting held at the TBSF headquarters at 10 a.m. on December 2, 2020. Finally selected were one First-Place Award, one Second-Place Award and one Third-Place Award, ten Merit Awards, twenty Honorable Mentions, and Twenty Judges' Awards.

Since 2017, TBSF has gained the SNQ (Symbol of National Quality) certifications for 3 consecutive years and won 1 silver and 2 bronze medal awards in the "National Biotechnology and Medical Care Quality Award" competition by respectively presenting such themes as "The Pioneer of Safe and Sufficient Blood Supply", "The Comprehensive and Highly Efficient Laboratory Testing of Donor Blood to Ensure Transfusion Safety in Taiwan", and "Kaohsiung Blood Center: Guardian Angel for Patients in Southern Taiwan, Remote Areas and Offshore Islands". In 2020, TBSF presented the theme: " The pioneer in detection for the expression of Miltenberger blood-group antigen by using human monoclonal antibody, anti-Mia (HIRO-377T) ", which gained the SNQ certification and won another bronze medal award in this "National Biotechnology and Medical Care Quality Award" competition. All these awards show that our responsibility at TBSF is to improve blood quality for medical use, and we have been always striving to achieve the goal of saving lives in a timely and safe manner.

Participate in international conferences and academic exchanges, share experiences and gain new knowledge

TBSF actively participates in various international conferences and exchanges to absorb relevant new knowledge and to obtain important references for various improvements. In fact, such events are also an important channel to learn of the current international situations. In 2020, most of the international conferences and exchange activities, such as 2020 AABB Virtual Annual Meeting, APBN Board Video conference, and the 36th International Congress of the ISBT, were held virtually in the form of webinars due to the COVID-19 pandemic.

Blood operation process

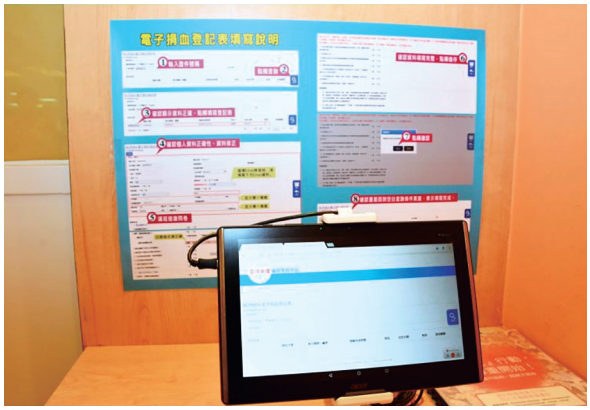


The production of each bag of blood results from regional blood donation activities held after the evaluation and planning by the Donor Recruitment Section of the Blood Center. The personal information of each blood donor is filed and stored after the blood donor completes the blood donation registration form, the physical examination interview, and the blood collecting process. Then, each tube of collected blood is sent to the Laboratory for viral, biochemical, & blood-type testing. The examination results are automatically delivered to the computer for storage. Each blood bag is sent to the Blood Component Processing Section to be further processed as each kind of final plasma product, such as packed RBCs, platelets, and so on. Finally, each qualified blood bag will be sent to the Distribution Section based on the needs of the hospital.

Blood donation operation process

A “Private Interview Space” is arranged in each blood center, blood donation room, and blood donation van so that each blood donor can honestly complete the survey and relevant questions in private surroundings. The following is an introduction to the blood donation process:

A photo ID, such as an Identification Card of Taiwan is needed to verify the identity of a blood donor during the blood donation process. In 2020, more than one million people donated their blood so the blood supply reached approximately 6 billion milliliters.



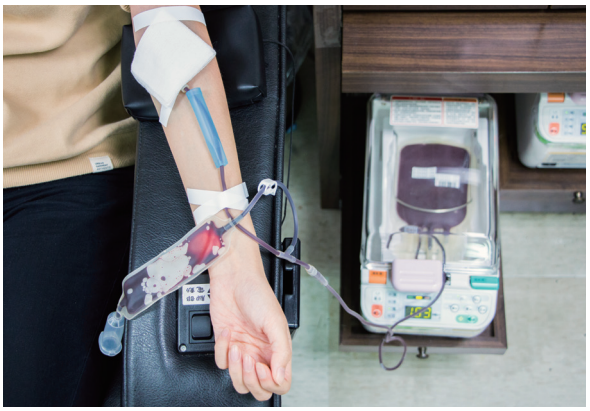
Each person needs to fill in the blood donation registration form, which in addition to basic information, also asks questions concerning recent individual health status and whether there is a high risk of sexual behavior and other issues that need to be answered honestly. Lastly, each person needs to sign the form.

Inside the blood donation van, each seat is equipped with a monitor that plays a health lesson video about blood donation to remind blood donors of the importance of blood safety.

The “Private Interview Space” is arranged to enable blood donors to honestly answer the questionnaire and related questions in private surroundings.

In addition to measuring weight, body temperature, blood pressure and hemoglobin, a staff will provide health education about blood safety and ensure that the blood donor is qualified. This is the first step for blood safety check.

The “Conscience Call Back” sheet can remind blood donors to call the blood center back via the phone number on the sheet to ensure appropriate follow-up treatment of the blood can be carried out if they have not told health professionals of high-risk behaviors or any issues that they think may affect the safety of the blood.



During the blood collection process, each blood bag is put in the automatic oscillator for weight measurement, and the quantity of collected blood is monitored to protect the safety of blood donors.

Each blood unit will have four tubes reserved for each test. Three of them are for viral, biochemical, blood-type testing and the other one is for archieve sample.

The collected blood will be temporarily stored in a temperature-controlled container to maintain quality.

In the bright and open blood donation rest area, snacks like cookies and milk are served. Magazines and TVs are also provided in the area so that blood donors can relax after the process.

The collected blood and tubes will be delivered to the blood center by professionals in dedicated incubators and trolleys.

The following table lists relevant criteria and conditions for blood donation:

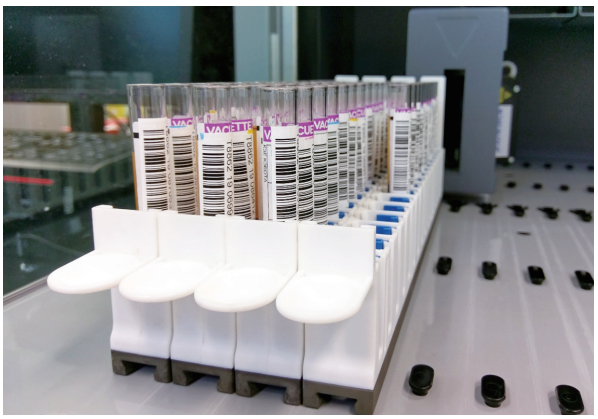
	Whole blood		Platelet apheresis	
Volume	250 ml	500 ml	1 unit	2 units
Age	17-65	17-65	17-65	17-65
Body weight	male: 50 kg female: 45 kg	60 kg	60 kg	60 kg
Oral Temperature	35.5~37.5°C			
Hemoglobin	male: 13g% female: 12g%			
Platelet count			180,000/uL	Trima: 250,000/uL MCS: 300,000/uL Amicus: 250,000/uL
Interval	2 months	3 months	2 weeks	
Max donations per year	male: 1500 cc female: 1000 cc		24 donations	

Blood testing

To ensure that the quality and sustainability of laboratory testing, donor screening is mainly performed in two sites. Testing Sections in Taipei Blood Center and Kaohsiung Blood Center are in charge of nationwide blood examination operations. Currently, routine donor screening include: ABO blood type, Rh blood type, Mia antigen, irregular antibody screen, ALT, HBsAg, anti-HCV, anti-HTLV, anti-HIV, syphilis, and viral nucleic acid testing (HBV, HCV, and HIV-1). The operating procedure is as follows:

Average testing volume is around 5,000 per day using fully automated testing equipment. Test results are delivered via an exclusive network to each blood donation center to meet the goals of speed, accuracy, and safety.

The specimen will undergo a centrifugal operation process.



Tubes are ranked in order, and a fast fully automated barcode scan is performed.

A variety of automated test equipment

Freedom EVOlyzer:

used to test HBsAg, anti-HCV, anti-HTLV, anti-HIV and so on. To ensure test sensitivity, British working standards are used for each test run.

Beckman AU5800:

Fully automated ALT, Cholesterol, and LDL-C test equipment.

Beckman PK7400:

Fully automated blood type, syphilis test equipment, and irregular antibody screening.

TIGRIS:

Fully automated viral nucleic acid test (HBV, HCV, and HIV-1)

Since December 5, 2018, the TBSF has expanded its tests on the Mia antigens. All the Mia antigen test results are indicated on each bag of red blood cell products, so that if a patient needs to transfuse the antigen-negative blood products, the hospital can directly select the right blood products according to the labeling on the blood bags and immediately inject them to the patient. The labeling of Mia blood group antigen on each blood bag effectively improve blood transfusion safety in Taiwan.

Blood donor services

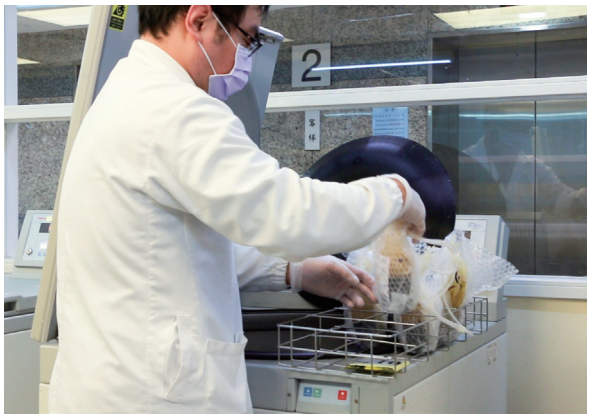
In addition to the routine donation testing, our Foundation has also performed three tests, namely, Total Cholesterol, LDL-C, & HbA1c, every three years for regular blood donors who are older than 40 years old. The BMI of a blood donor is shown in the test report. Furthermore, for blood donors who are older than 40 years old and have donated blood more than once within the past two years, if they have donated whole blood more than 100 times or apheresis blood more than 500 times, they can receive one free abdominal ultrasonic examination in one of our Foundation's appointed hospitals.

Component processing

After non-remunerated blood donated is returned to the blood donation center, it will go through the counting process, computer input, blood component processing, checking and bacteria testing (Apheresis platelet) to be made into a variety of final blood products. These final products will be supplied to each hospital for patient blood transfusions after undergoing strict blood testing processes.

Generally, blood will be sent to the Component Process Section within 8 hours of blood collection.

The number of blood units is counted and recorded in the computer.



Based on different centrifugal criteria, different final blood products can be produced.

Using a leukocyte reduction filter or inline filtration blood bags, white blood cells triggering an immune response can be removed to make the blood safer for transfusion recipients.

Blood can be separated into plasma in the upper layer and red blood cells in the lower layer based on the principle of different blood composition density. The automatic blood components extractor can squeeze plasma out into adjunct bags to be sealed.

Packed RBC is sealed into four sections for blood group testing and cross matching in the future. Each blood bag tubing has a unique blood section number for further tracing, checking, and testing.

Every blood bag has a unique barcode and blood-type label for further tracing, checking, and testing.

Qualified blood products are put in blue baskets while unqualified ones are put in red baskets; while ones with quarantined blood products are put in green baskets, and ones that have not been examined are in yellow baskets.

Separated plasma and each final product needs to be carefully placed neatly to avoid stacking for uniform freezing.

Each qualified component needs to be labeled and placed neatly in blue baskets. These items are then managed in the warehouse according to different temperature conditions.

Other matters

Each unit of apheresis platelets is supplied only after passing bacteria testing to ensure the safety of transfusion recipients.

The preservation time, temperature, and material cost for each final product are listed in the table below:

Component	Expiration	Storage temperature	Cost (Dollar/ unit)
Packed RBCs	35 days	1~6°C	475
Washed red blood cells	24 hours	1~6°C	675
Deglyceride Frozen RBC	24 hours	1~6°C	1,375
PLT Concentrate	5 days	20~24°C	300
White blood cell	1 day	20~24°C	300
Apheresis platelets	5 days	20~24°C	4,300
Fresh frozen plasma	1 year	< -20°C	300
Frozen plasma	5 years	< -18°C	200
Cryoprecipitates	1 year	< -20°C	150
Whole blood	35 days	1~6°C	575
Leukocyte-Reduced RBC	35 days	1~6°C	925
Pre-storage Leukocyte-Reduced Apheresis Platelet	5 days	20~24°C	7,300

Distribution

The management, allocation, and transportation of blood for medical use are monitored based on the strictest standards in the five blood donation centers. The blood storage warehouse in each blood donation center sets different conditions for preservation temperature, environment, and equipment for different blood products. Blood supplies for hospitals are always available 24 hours. Specific refrigerator vans for blood freezing/storage are responsible for the allocation and transportation of blood for medical use in each hospital blood bank.

Current blood supply channels include five blood centers, 13 blood stations, and several proxy-supply hospitals.

Each blood storage warehouse of a blood center is equipped with a central temperature monitoring system to monitor blood temperature 24 hours/day. In addition to written documents, relevant information about temperature is filed and stored in electronic files so the records are more complete and accurate, and both the blood items and the equipment are safer and more secure. Each blood transportation vehicle of a blood donation center is equipped with the latest cold-storage/freezing system to monitor whether the temperature is stable and maintained within the standardized range so that the quality of each blood item can be ensured.

Blood supplies are currently classified into two categories: individual and group. Individual blood supply refers to the approach for an individual to get blood from the blood center when patients in hospitals that neither have blood banks nor a signed group-supply contract for the need of a blood transfusion. Group blood supply refers to hospitals that have blood banks or have signed a "group-supply contract" with a blood center. With this approach, the blood center will regularly deliver blood products needed to each hospital for storage so that blood is ready for transfusion at any time.

Meanwhile, each blood center has established a list of blood donors filed by red blood cell antigen. If a blood usage emergency occurs, the center will contact blood donors for immediate support.

The blood supplies of each blood center are available to hospitals 24 hours/day.

The quantity of stored blood in each blood center needs to be maintained at more than seven days for safety concerns. Four to seven days of storage are a bit lower, while less than four days of storage is considered dangerous. There is a safe storage quantity signal display set up on the official website of Taiwan Blood Services Foundation so that people can check the latest information of each blood donation center.

Each kind of final blood product to be dispatched to hospitals will be checked by computer one-by-one to ensure safety.

Based on the needs of each hospital, final products are put into boxes with clear labels for blood-type and blood item name.

Each packaged box of blood items will be put into a dedicated incubator bags.

They are put in specific transportation vehicles according to the temperature requirement of the blood item with temperature-monitored equipment and are ready to be delivered to each hospital.

In line with the health policy of "National blood used by the nation", our Foundation started to collect source plasma in January 2007 to ease the difficult situation of a lack of blood preparations in Taiwan. The collected blood plasma's original material is delivered by batch to the CSL plasma factory in Australia to be further processed into blood derivatives. Four blood derivatives of the TBSF are made: 20% Human albumin for Intravenous Use, Human Immunoglobulin for Intravenous Use, 250IU Blood Coagulation Factor VIII Concentrate, and 500IU Blood Coagulation Factor IV Concentrate. Among them, TBSF Human Immunoglobulin for Intravenous Use is the main supply in Taiwan and can already achieve the 100% supply-to-demand goal.

Reference laboratory

As medical treatment improves, the demand for each subtype of blood clinically provided to patients receiving long-term blood transfusion also increases. Some blood types are quite rare. We continue to provide red cell testing services, transfusion reactions, and transfusion infection survey services, as well as source red cell to produce the testing reagents for pre-transfusion antibody screening. The clinical safety of blood transfusion is ensured through the following actions,

1. To provide HLA- or HPA-matched platelets.
2. To supply antigen-negative red blood cells (mainly E-, c-, Mia-) .
3. Screening for leukocyte (HLA & HNA) antibodies among female platelet donors.

Research

We completed the initial study of the Dengue fever outbreak in Southern Taiwan in 2015, and these reports were presented at the ISBT in 2016.

To improve blood quality and increase blood safety, we continue our research programs. All research programs have been reviewed by the IRB (Institutional Review Board), and the IRB of our Foundation has passed the audit by the Ministry of Health and Welfare. Our research results are primarily recognized by blood transfusion medical experts and published in academic journals and at medical associations of blood transfusion both internationally and domestically.

Our publication in English during 2020 are the following:

1. Secular Trend and Geographic Map of HCV Infection among 4 Million Blood Donors in Taiwan from 1999 to 2017. Hepatology communications 2020;4(8):1193-1205
2. Optimal collecting policy for apheresis platelets in a regional blood center. Vox Sanguinis 2020;115:148-158
3. Deterrent factors of blood donation among lapsed blood donors in the fixed sites of Taiwan. ISBT Science Series 2020;0:1-12(early view)
4. Investigation of transfusion associated hepatitis C virus infection in Taiwan 2015-2018. J Formosan Medical Association 2020;119:752-756

Blood transfusion safety

To assist the hospitals in seeking possible causes of blood transfusion adverse reactions, we have established Taiwan Haemovigilance System with Taiwan Society of Blood Transfusion since 2016, which five hospitals (namely National Taiwan University Hospital, Taipei Veterans General Hospital, Far Eastern Memorial Hospital, Linkou Chang Gung Memorial Hospital, and Tri-Service General Hospital) have taken the lead in demonstrating how to send notifications since 2017. In the year of 2020, 38 hospitals have been qualified for notification. It is expected that after the system is gradually expanded to all the hospitals in Taiwan, we will be able to collect and analyze blood data from patients, provide better blood transfusion strategies to solve those issues related to blood donation and transfusion, and help to improve blood transfusion safety. On the other hand, we have re-written the "Handbook of Blood Component Therapy". Adding the concept of PBM (Patient Blood Management), we published brand new "Handbook of Precise and Practical Blood Transfusion" which has been distributed to hospitals from June, 2020.

Furthermore, to reduce the risk of transfusion-related acute lung injury (TRALI), the policy of supplying male-donor-predominant plasma has been implemented since July 11th, 2015. Female blood donors for apheresis donation must pass the leukocyte antibody screening, which has led to the reduction in donations of antibody-positive blood. Therefore, more protection is provided for our blood supply. In addition, through the whole year, medical doctors

at our Foundation actively hosted medical lectures about blood transfusion in each hospital to advocate the concepts of "Blood transfusion adverse reactions and preventive measures", "Blood component therapy-usage of pre-storage leukocytes reduced blood components", and "Proper and effective blood transfusion (Patient Blood Management)", "Taiwan Haemovigilance System and Practice". These concepts can help to reduce the possibility of patient adverse events caused by blood transfusion, improve recovery, and reduce hospitalization costs so that the medical quality of blood transfusions can be promoted even further.

Information system and network security

Our Foundation has used the previous blood donation/supply management information system for more than a decade. Considering the assessment and concern of future blood donation services, the improvement of internal operational processes, blood safety, and quality control, our Foundation have completed the updated blood management information system and formally launched it online at August 8th of 2018. We hope to take advantage of these computer technologies to attain our digitalized, paperless, and automation goals to promote both operation quality and blood donor services.

To strengthen the prevention of malevolent software spread by new blackmail software via webpages or e-mail, we regularly invite professional lecturers to give educational training to all the staff at each blood donation center, in addition to daily updating of computer viral protection software codes. We hope to protect the personal information of blood donors, employees, and internet friends in a highly standardized way through everyone's efforts and the monitoring by the personal information management committee. To increase complete network efficiency and effectiveness and the safety of computer information, we conduct risk assessments of information assets on information facilities and data. The risk classifications are all controlled in the range of low risk. In March 2016, the AD (Active Directory) web domain and virtual platform setup project was launched to establish and integrate the internet service management framework of activity contents at our Foundation and blood donation centers.

The system framework of the LINE interactive application platform adopts Gateway and Firewall to separate the LINE OA server from the backstage management server and database to ensure the safety of blood donor information. The backstagse function of the system can execute all automatic displays and accurately display to respective blood donors for blood donation activity broadcasts or individual blood donation invitations. In the future, more functions will be developed for the purpose of promoting blood donations.

To ensure computer information security, the TBSF has not only updated its anti-virus software virus codes this year but also established the Symantec Messaging Gateway (SMG) to strengthen the mail functions in filtering malware, web sites, viruses, and so on. When

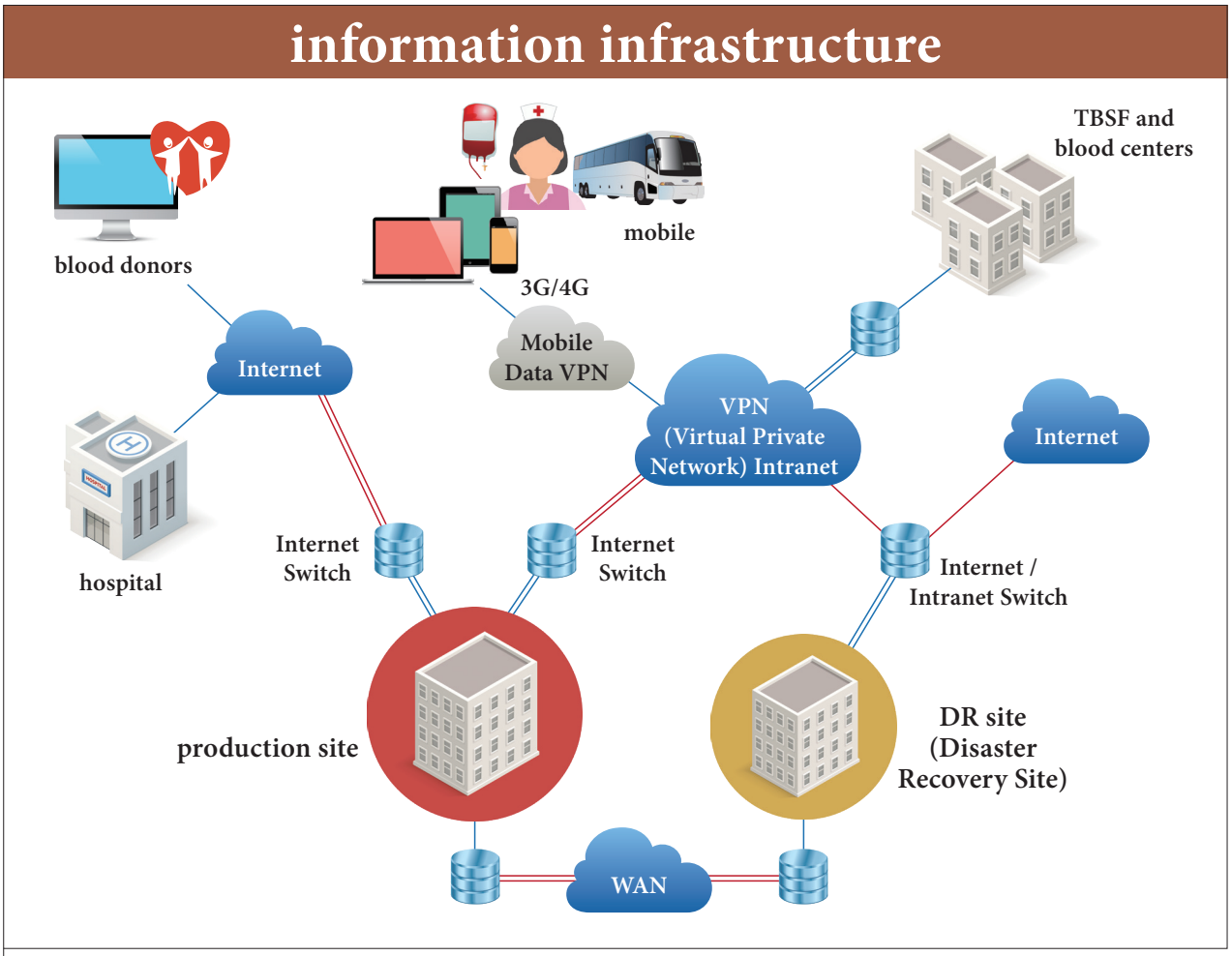


Illustration: Our Foundation provides the internet framework for the blood donation/supply system. Via a high-speed internet cable and wireless transportation, the information of blood donors can be checked quickly and accurately at each blood donation site.

an attached file is identified by the system as malware, the attachment to the email will be automatically deleted by the system.

New system online, building a smart management donation blood supply process

The TBSF's newly customized information system was finally launched on August 8, 2018 after undergoing the process of system analysis, program writing, unit testing, integration testing, data conversion, parallel testing, environmental construction, and education and training.

In operation from 1999 to 2018, the original donation and blood supply system has existed for nearly 20 years. As a result, all its software and hardware were no longer able to carry and calculate millions of pieces of data. In the face of the leap forward in digital technology and the need to update many functional requirements, the TBSF has since 2015 fully re-evaluated its user requirements, network architecture, programming language, and database. Interviews and planning were carried out across the entire line of blood collection, recruitment, testing, and component,

blood supply, medical services, quality management and work processes. In addition, online blood donor appointments, filling forms, inquiry systems, and hospital network operating systems were developed. In order to build a system that meets the needs and is in line with the times, the TBSF has invested a lot of manpower and time to plan this highly automated blood management information system and applies cloud technology to fully upgrade the software and hardware devices and uses the network and digital technology to integrate the workflows and services from the system side. It is expected that the system developed this time will enhance the consistency in work performance, the rigor in quality control and the service efficiency.

The TBSF has not only overcome the overwhelming challenge in transferring the information on blood donors that has been accumulated for more than 40 years to the new system, but has also incorporated the databases originally scattered in the blood donation centers across the country into the era of cloud synchronization and virtual and real integration. In the part of the blood donation process, the TBSF has used the cross-platform APPs in the cloud technology to import by a single click the blood donor's data into the database, making the work and service processes even more rigorous and smoother. All high-end information devices are placed in the professional IDC (Internet Data Center) computer rooms, so as to synchronize remote backup and improve system stability and availability.

The most significant change for blood donors is the high degree of electronization of the process and the simultaneous uploading of the blood donor data to the database. After a blood donor logs in the system, he or she can key in through a tablet the blood donation registration form and the health questionnaire and then confirms his or her personal information by a digital signature. As this data collection process is digitized and can be carried out online in advance, blood donors do not waste time in waiting for the registration and filling the form on the spot. This paperless movement is not only more environmentally friendly but also more convenient in that a blood donor can either insert his or her health insurance card or read the barcode on his or her ID card to get his or her name and other personal information, accelerating the data display time and replacing the manual operation with automation for double certification to greatly reduce human errors.

It is particularly worth mentioning that the health questionnaire is designed to be more rigorous. This is to strengthen blood safety management by linking a donor's reply to each question in the front-end health questionnaire to each of the blood products and the control code of donors in the blood management information system. If any condition not suitable for blood donation is triggered, the system will automatically intercept the blood donor and trace back all the blood products in the past according to the conditions set by the system, forming a completely monitored protection network in the blood safety management.

In order to shorten the waiting time for

the blood donors, the new Blood Management Information System provides an appointment service for making blood donations. Those who donate whole blood can make appointments in advance within one month, and the system will take the initiative to remind the donors by email 2 days before the appointment date. Those who donate blood by apheresis can make 2 appointments within a month, but if your blood donation conditions are not met, the system will suspend your appointment for blood donation.

In the "Donor Special Zone" system, you can check the previous blood donation records, the next donation date, the records of praise and recognition, and even download the blood donation certificate online. All of these operations can be done not only on a personal computer, but also on your mobile phone or tablet. Now, the processes and services before and after blood donation are more convenient, and closer to the donors, making blood donation a convenient and simple good thing!

For the hospitals, we have also constructed a "hospital network operation platform" on the system. Not only can the hospital blood bank directly subscribe to various required blood products through the platform, but it can also answer in the system such information as blood uses, blood transfusion investigation, blood consultation application, etc. This horizontal integration of the hospital's blood and blood supply operations improves the response efficiency, making the two-way management of blood products more rapidly and more reliably. It not only provides better and more efficient services for the hospitals, but also improves the blood quality for medical uses.

At the beginning of the launch, people may feel a little bit unaccustomed, but in order to improve the overall quality for the supply of blood and blood products through the efficient digital network and cloud technology, people are urged to support the smart blood information management system so as to create a highly efficient mechanism for blood donation and supply service.

Information security issue is never ending

After the new information system was launched, we have installed the information security system on the Gateway of the TBSF main office and the end points of each of the TBSF Blood Donation Centers so as to strengthen information security and meet the requirements of the regulations.

To ensure the security of TBSF computer information system, we need not only to continuously update the antivirus software, but also to establish the Symantec Messaging Gateway (SMG) to enhance the filtering of malware and virus from the email and URL system. When the system judges an attachment of an email to be malicious software, the email attachment will be deleted automatically by the system.

We conduct information asset risk assessments on information equipment and materials every year and control the possible risk levels to a low risk range. The enhancement of information security requires a high degree

of cooperation from all our colleagues. As everyone must have a correct concept, we hold annual all-round education and training to give lectures and conduct assessments and continue to deepen the publicity of security issues, so that our colleagues can collect, handle and utilize personal information according to relevant laws, administrative orders or internal norms. We also send letters to our subcontractors, requesting them to conduct on-site audit on personal information management for the printing of inspection reports that we outsource to them, and no major defects have been found so far. We also regularly convene the Personal Information Management Committee to examine how effectively each blood donation center manages its personal information in a particular year. It is hoped that while strengthening the information security management, we can also protect the private information for our blood donors and internal colleagues.

Reward records

1992

Gold Medal of Times Advertising Awards in the Corporate Charity category

Award-winning work: "Jackie Chan and Blood Donation" TV Ad

1992

The 1st National Public Welfare Award

1993

"Creator of History" Charity Model Award

1995

Honorable Mention of the 2nd Best Advertising Slogan Awards

Award-winning work: "Give Blood, Save Lives."

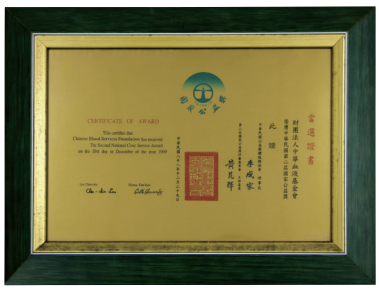
1996

Bronze Medal of the 3rd Best Advertising Slogan Awards

“I thank you even though I don’t know who you are!"

1999

National Public Welfare Award



2008

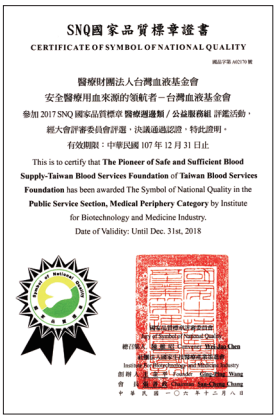
Internet Activity Award Contribution Award

Website Vitality Award

2017

The certification of SNQ (Symbol of National Quality) and Silver Award in the National Biotechnology Clinical Quality Award.

The Theme: "The Pioneer of Safe and Sufficient Blood Supply"


SNQ國家品質標章證書
CERTIFICATE OF SYMBOL OF NATIONAL QUALITY
醫療財團法人台灣血液基金會
安全醫療用血來源的領航者－台灣血液基金會
參加 2017 SNQ 國家品質標章 醫療週邊類 / 公益服務組 評鑑活動，
經大會評審委員會評選，決議通過認證，特此證明。
有效期限：中華民國 107 年 12 月 31 日止
This is to certify that **The Pioneer of Safe and Sufficient Blood Supply-Taiwan Blood Services Foundation** of **Taiwan Blood Services Foundation** has been awarded The Symbol of National Quality in the **Public Service Section, Medical Periphery Category** by Institute for Biotechnology and Medicine Industry.
Date of Validity: Until Dec. 31st, 2018

2018

The certification of SNQ (Symbol of National Quality) and Bronze Award in the National Biotechnology Clinical Quality Award.

The Theme: "The comprehensive and highly efficient laboratory testing of donor blood to ensure transfusion safety in Taiwan"


SNQ國家品質標章證書
CERTIFICATE OF SYMBOL OF NATIONAL QUALITY
台灣血液基金會
全方位、高效能的捐血檢驗 守護國人輸血安全
參加 2018 SNQ 國家品質標章 醫療團邊類 / 公益服務組 評鑑活動，
經大會評審委員會評選，決議通過認證，特此證明。
有效期限：中華民國 108 年 12 月 31 日止
This is to certify that The comprehensive and highly efficient laboratory testing of donor blood to ensure transfusion safety in Taiwan of Taiwan Blood Services Foundation has been awarded The Symbol of National Quality in the Public Service Group, Medical Periphery Category by Research Center for Biotechnology and Medicine Policy.
Date of Validity: Until Dec. 31st, 2019

2019

The certification of SNQ (Symbol of National Quality) and Bronze Award in the National Biotechnology Clinical Quality Award.

The Theme: "Guardian angel for patients in southern Taiwan, remote areas and offshore islands --Kaohsiung Blood Center"


SNQ國家品質標章證書
CERTIFICATE OF SYMBOL OF NATIONAL QUALITY
醫療財團法人台灣血液基金會高雄捐血中心
南台灣、偏鄉、離島病患用血的守護神 -- 高雄捐血中心
參加 2019 SNQ 國家品質標章 醫療團邊類 / 公益服務組 評鑑活動，
經大會評審委員會評選，決議通過認證，特此證明。
有效期限：中華民國 109 年 12 月 31 日止
This is to certify that Guardian angel for patients in southern Taiwan, remote areas and offshore islands --Kaohsiung Blood Center of Taiwan Blood Services Foundation, Kaohsiung Blood Center has been awarded The Symbol of National Quality in the Public Services/Medical Supplies & Services Category by Research Center For Biotechnology and Medicine Policy.
Date of Validity: Until Dec. 31st, 2020

2020

The certification of SNQ (Symbol of National Quality) and Bronze Award in the National Biotechnology Clinical Quality Award.

The Theme: " The pioneer in detection for the expression of Miltenberger blood-group antigen by using human monoclonal antibody, anti-Mia (HIRO-377T)"


SNQ國家品質標章證書
CERTIFICATE OF SYMBOL OF NATIONAL QUALITY
台灣血液基金會
全球首創人類單株抗體檢測米田堡血型、輸血安全更上層樓
參加 2020 SNQ 國家品質標章 醫療團邊類 / 公益服務組 評鑑活動，
經大會評審委員會評選，決議通過認證，特此證明。
有效期限：中華民國 110 年 12 月 31 日止
This is to certify that The pioneer in detection of Miltenberger antigen by using human monoclonal antibody anti-Mia (HIRO-377T) of Taiwan Blood Services Foundation has been awarded The Symbol of National Quality in the Public Services, Medical Supplies & Services Category by Research Center For Biotechnology and Medicine Policy.
Date of Validity: Until Dec. 31st, 2021

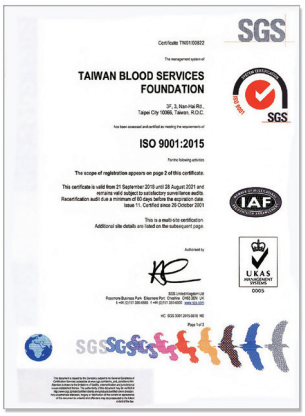
Quality assurance

1999

Approval of the Medicines Control Agency (MCA, UK) to meet their standards of the blood quality.

2001

Implementation of the ISO 9001 quality system.


SGS

TAIWAN BLOOD SERVICES FOUNDATION

ISO 9001:2015

2006

Approval of the Therapeutic Goods Administration (TGA, Australia) to meet their standards of the blood quality.

2010

The testing laboratories accredited by the Taiwan CDC for syphilis, HIV and HCV.

2012

ISO 15189 laboratory accreditation.

2012

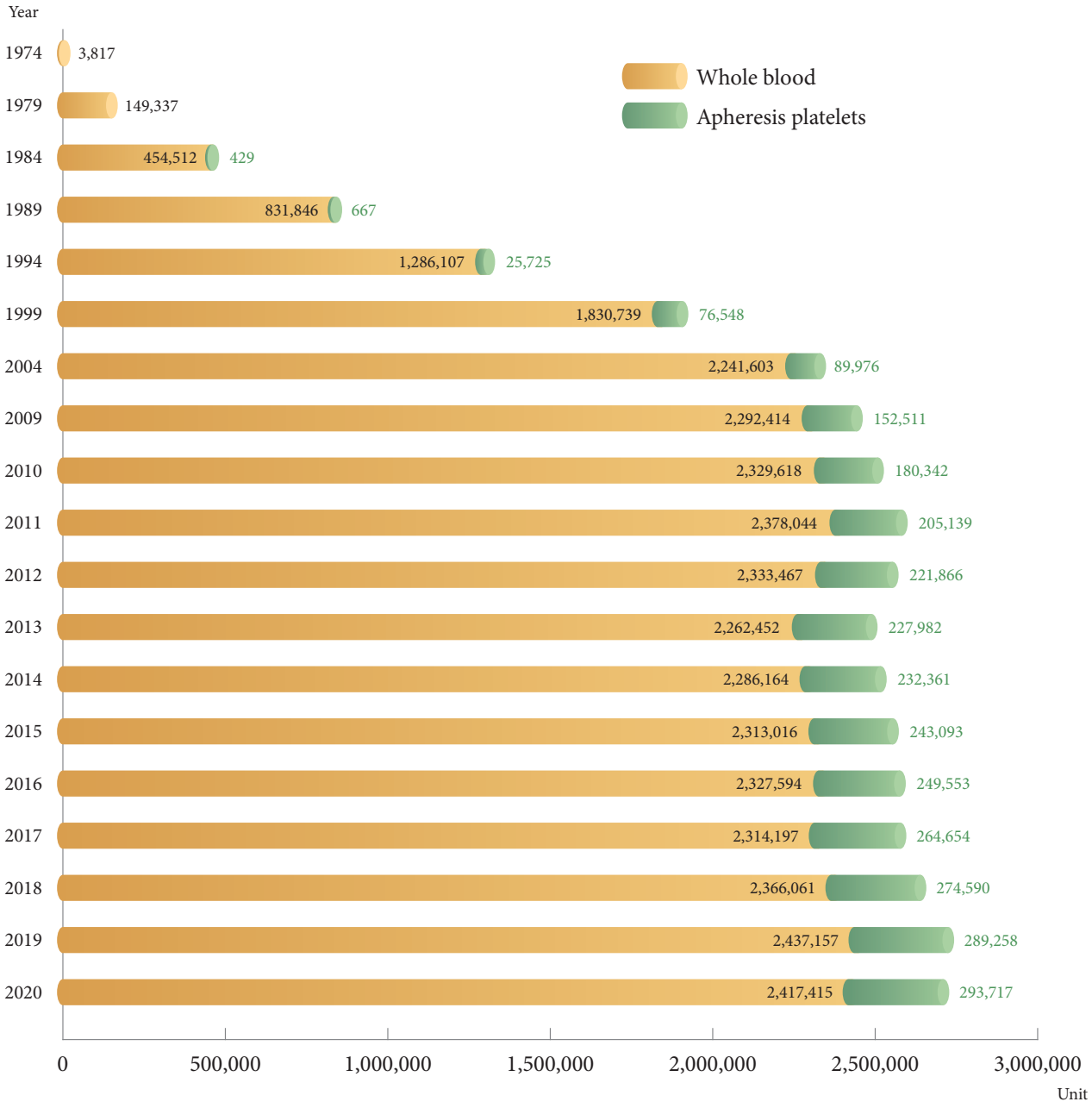
GMP manufacturing facilities licensed by the Taiwan Food and Drug Administration (TFDA).

2018

GDP Distribution facilities licensed by the TFDA.

STATISTICS

Annual blood collection, 1974-2020



Note: 1. 250ml per unit for whole blood and 500ml counts for 2 units.

2. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

Annual blood collection by blood centers, 1974-2020

Unit

Year \ Blood centers	Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Hualien blood center	Total
1974	3,817	-	-	-	-	-	3,817
1979	92,730	-	24,723	-	31,884	-	149,337
1984	187,362	-	101,219	60,123	106,237	-	454,941
1989	312,578	-	231,199	119,179	169,557	-	832,513
1994	406,604	161,765	252,889	173,297	252,897	64,380	1,311,832
1999	553,940	266,497	378,516	257,309	360,060	90,965	1,907,287
2004	642,945	333,898	489,079	321,441	437,362	106,854	2,331,579
2009	718,841	326,619	487,230	382,251	420,616	109,368	2,444,925
2010	738,274	343,531	500,298	389,938	423,333	114,586	2,509,960
2011	753,611	347,807	507,104	405,553	453,274	115,834	2,583,183
2012	752,304	343,225	504,362	405,409	434,767	115,266	2,555,333
2013	737,642	336,853	487,170	401,442	414,876	112,451	2,490,434
2014	743,926	337,408	485,767	409,314	431,181	110,929	2,518,525
2015	744,106	355,943	498,956	418,909	423,721	114,474	2,556,109
2016	771,779	364,244	507,973	421,457	447,145	64,549	2,577,147
2017	841,241	360,146	520,231	420,428	436,805	-	2,578,851
2018	869,019	373,358	536,306	424,617	437,351	-	2,640,651
2019	894,031	393,568	551,889	426,291	460,636	-	2,726,415
2020	896,115	387,625	620,102	362,506	444,784	-	2,711,132

Note: 1. Total blood collection units: calculated by both whole blood and apheresis collection.

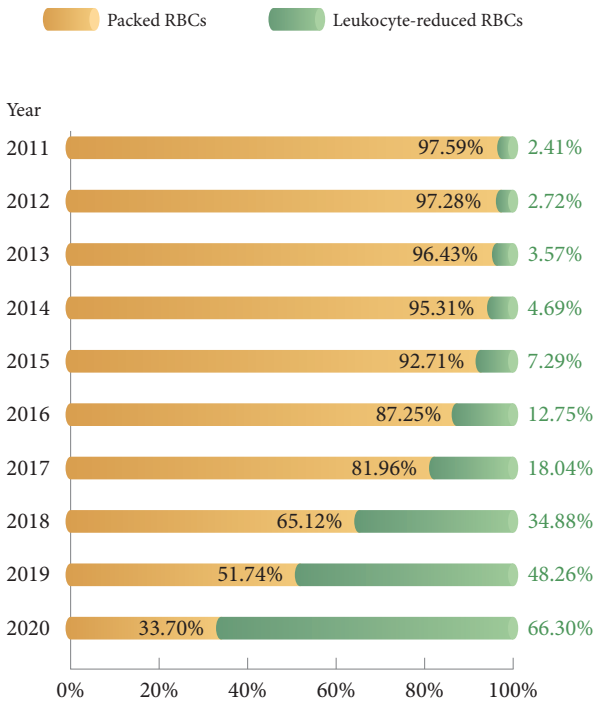
2. 250ml per unit for whole blood and 500ml counts for 2 units.

3. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

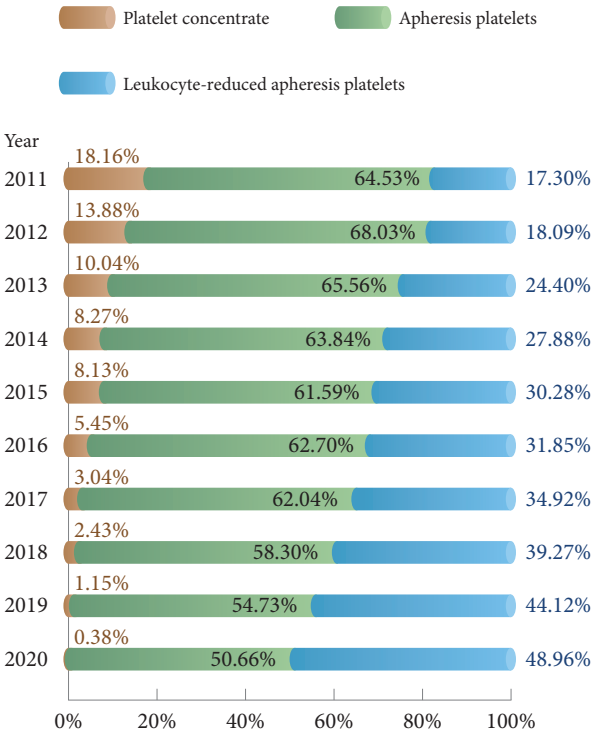
Annual blood supply, 2011-2020

Unit

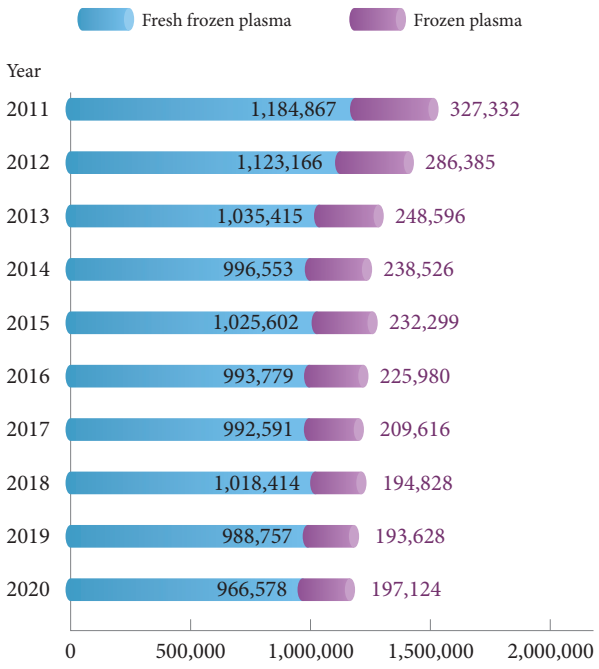
Red blood cell products



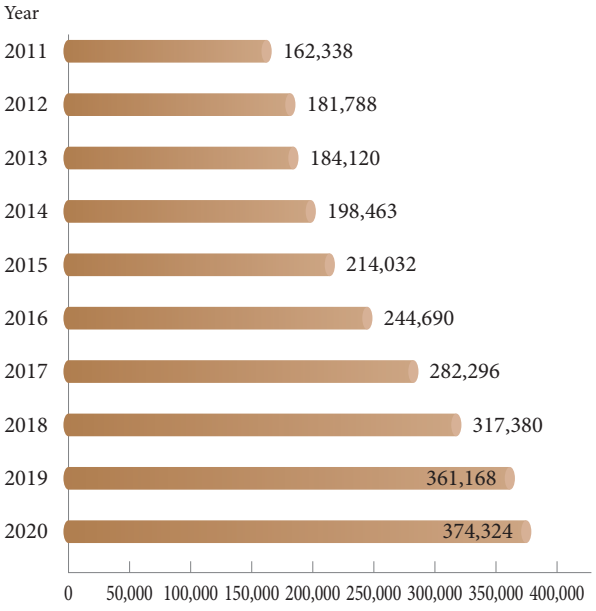
Platelet products



Plasma products



Cryoprecipitate



Note: 1. 250ml per unit for whole blood and 500ml counts for 2 units.

2. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

3. Platelet concentrate per dose for adults 12 units.

Blood and blood components issued in 2020

Unit

1. Whole blood

Blood \ Blood centers		Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Total
RBCs	Whole blood	8,089	3,797	1,902	2,469	789	17,046
	Packed RBCs	189,839	110,725	118,621	134,915	237,965	792,065
	Washed RBCs	7,817	1,576	2,691	2,934	3,870	18,888
	Leukocyte-reduced RBCs	574,765	222,813	424,825	180,079	155,605	1,558,087
	Frozen thawed deglycerolized RBCs	10	2	0	0	4	16
Subtotal		780,520	338,913	548,039	320,397	398,233	2,386,102
Plasma	Fresh frozen plasma	298,178	151,594	220,849	151,865	144,092	966,578
	Frozen plasma	49,545	25,439	38,150	27,536	56,454	197,124
Cryoprecipitate		169,568	45,664	80,244	51,856	26,992	374,324
Platelet concentrate		5,436	3,870	3,938	8	0	13,252
WBC concentrate		4,618	12	50	26	2	4,708
Total units issued		1,307,865	565,492	891,270	551,688	625,773	3,942,088
Rate of components		99.38	99.33	99.79	99.55	99.87	99.57
Rate of whole blood		1.04	1.12	0.35	0.77	0.2	0.71
PR ratio		44.55	52.24	47.26	55.99	50.36	48.77

2. Apheresis

Blood \ Blood centers	Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Total
Apheresis platelets	54,608	13,204	35,150	20,040	24,896	147,898
Leukocyte-reduced apheresis platelets	57,824	22,393	24,740	16,749	21,209	142,915
Total	112,432	35,597	59,890	36,789	46,105	290,813

Note: 1. 250ml per unit for whole blood and 500ml counts for 2 units.

2. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

3. The plasma numbers issued are for medical usage only, plasma for fractionation not included.

4. PR ratio=Plasma/RBCs

Whole blood collection per 1000 head of population, 2011-2020

Liter/1,000 population

Year	Item \ Blood centers	Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Hualien blood center	Total
2011	Blood collection (Liter)	168,680	81,785	120,913	93,291	102,674	27,168	594,511
	Population	7,054,442	3,498,987	4,484,098	3,400,813	3,737,885	1,026,326	23,202,551
	Liter/1,000 population	23.91	23.37	26.96	27.43	27.47	26.47	25.62
2012	Blood collection (Liter)	167,283	80,345	118,749	92,669	98,441	25,880	583,367
	Population	7,086,152	3,525,575	4,496,195	3,397,242	3,734,579	1,021,830	23,261,573
	Liter/1,000 population	23.61	22.79	26.41	27.28	26.36	25.33	25.08
2013	Blood collection (Liter)	163,347	78,323	113,190	91,759	93,637	25,359	565,613
	Population	7,131,766	3,555,325	4,510,598	3,394,334	3,733,713	1,018,477	23,344,213
	Liter/1,000 population	22.90	22.03	25.09	27.03	25.08	24.90	24.23
2014	Blood collection (Liter)	164,463	78,068	112,667	93,876	97,458	25,009	571,541
	Population	7,160,559	3,579,347	4,517,652	3,388,101	3,728,935	1,017,442	23,392,036
	Liter/1,000 population	22.97	21.81	24.94	27.71	26.14	24.58	24.43
2015	Blood collection (Liter)	164,554	81,996	114,808	95,724	95,492	25,681	578,254
	Population	7,187,196	3,623,818	4,532,292	3,379,761	3,724,569	1,013,926	23,461,562
	Liter/1,000 population	22.90	22.63	25.33	28.32	25.64	25.33	24.65
2016	Blood collection (Liter)	165,198	83,228	116,315	96,395	101,248	19,516	581,899
	Population	7,192,687	3,687,412	4,557,494	3,366,498	3,940,509	789,180	23,533,780
	Liter/1,000 population	22.97	22.57	25.52	28.63	25.69	24.73	24.73
2017	Blood collection (Liter)	184,975	81,657	117,976	95,089	98,853	-	578,550
	Population	7,979,516	3,712,819	4,564,263	3,361,871	3,934,001	-	23,552,470
	Liter/1,000 population	23.18	21.99	25.85	28.28	25.13	-	24.56
2018	Blood collection (Liter)	191,341	84,391	121,787	95,958	98,039	-	591,516
	Population	7,969,664	3,753,798	4,578,749	3,351,546	3,925,863	-	23,579,620
	Liter/1,000 population	24.01	22.48	26.60	28.63	24.97	-	25.09
2019	Blood collection (Liter)	196,210	88,549	125,071	95,623	103,838	-	609,291
	Population	7,965,793	3,788,788	4,580,226	3,338,816	3,917,408	-	23,591,031
	Liter/1,000 population	24.63	23.37	27.31	28.64	26.51	-	25.83
2020	Blood collection (Liter)	196,175	87,679	139,799	80,689	100,013	-	604,354
	Population	7,951,116	3,819,253	5,258,714	2,646,137	3,908,603	-	23,583,823
	Liter/1,000 population	24.67	22.96	26.58	30.49	25.59	-	25.63

Note: 1. Mid-year population, data from the ministry of interior.

2. 250ml per unit for whole blood.

Blood donation by blood centers, 2011-2020

Donation

Year	Item \ Blood centers	Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Hualien blood center	Total
2011	Blood donation	534,349	254,731	377,883	303,895	329,804	85,445	1,886,107
	Population	7,054,442	3,498,987	4,484,098	3,400,813	3,737,885	1,026,326	23,202,551
	Donation rate	7.57%	7.28%	8.43%	8.94%	8.82%	8.33%	8.13%
2012	Blood donation	526,216	248,420	371,259	304,184	300,906	83,536	1,834,521
	Population	7,086,152	3,525,575	4,496,195	3,397,242	3,734,579	1,021,830	23,261,573
	Donation rate	7.43%	7.05%	8.26%	8.95%	8.06%	8.18%	7.89%
2013	Blood donation	513,907	241,765	351,790	294,771	278,740	79,992	1,760,965
	Population	7,131,766	3,555,325	4,510,598	3,394,334	3,733,713	1,018,477	23,344,213
	Donation rate	7.21%	6.80%	7.80%	8.68%	7.47%	7.85%	7.54%
2014	Blood donation	509,548	239,797	345,234	295,028	287,690	76,822	1,754,119
	Population	7,160,559	3,579,347	4,517,652	3,388,101	3,728,935	1,017,442	23,392,036
	Donation rate	7.12%	6.70%	7.64%	8.71%	7.72%	7.55%	7.50%
2015	Blood donation	509,230	251,630	349,238	296,569	282,832	78,382	1,767,881
	Population	7,187,196	3,623,818	4,532,292	3,379,761	3,724,569	1,013,926	23,461,562
	Donation rate	7.09%	6.94%	7.71%	8.77%	7.59%	7.73%	7.54%
2016	Blood donation	511,032	253,135	349,751	293,792	296,706	58,592	1,763,008
	Population	7,192,687	3,687,412	4,557,494	3,366,498	3,940,509	789,180	23,533,780
	Donation rate	7.10%	6.86%	7.67%	8.73%	7.53%	7.42%	7.49%
2017	Blood donation	570,695	248,783	356,189	288,466	288,391	-	1,752,524
	Population	7,979,516	3,712,819	4,564,263	3,361,871	3,934,001	-	23,552,470
	Donation rate	7.15%	6.70%	7.80%	8.58%	7.33%	-	7.44%
2018	Blood donation	590,235	256,830	361,137	283,349	288,327	-	1,779,878
	Population	7,969,664	3,753,798	4,578,749	3,351,546	3,925,863	-	23,579,620
	Donation rate	7.41%	6.84%	7.89%	8.45%	7.34%	-	7.55%
2019	Blood donation	608,656	269,379	366,544	285,584	303,388	-	1,833,551
	Population	7,965,793	3,788,788	4,580,226	3,338,816	3,917,408	-	23,591,031
	Donation rate	7.64%	7.11%	8.00%	8.55%	7.74%	-	7.77%
2020	Blood donation	608,463	263,954	407,256	241,042	291,700	-	1,812,415
	Population	7,951,116	3,819,253	5,258,714	2,646,137	3,908,603	-	23,583,823
	Donation rate	7.65%	6.91%	7.74%	9.11%	7.46%	-	7.68%

Note: 1. Mid-year population, data from the ministry of interior.

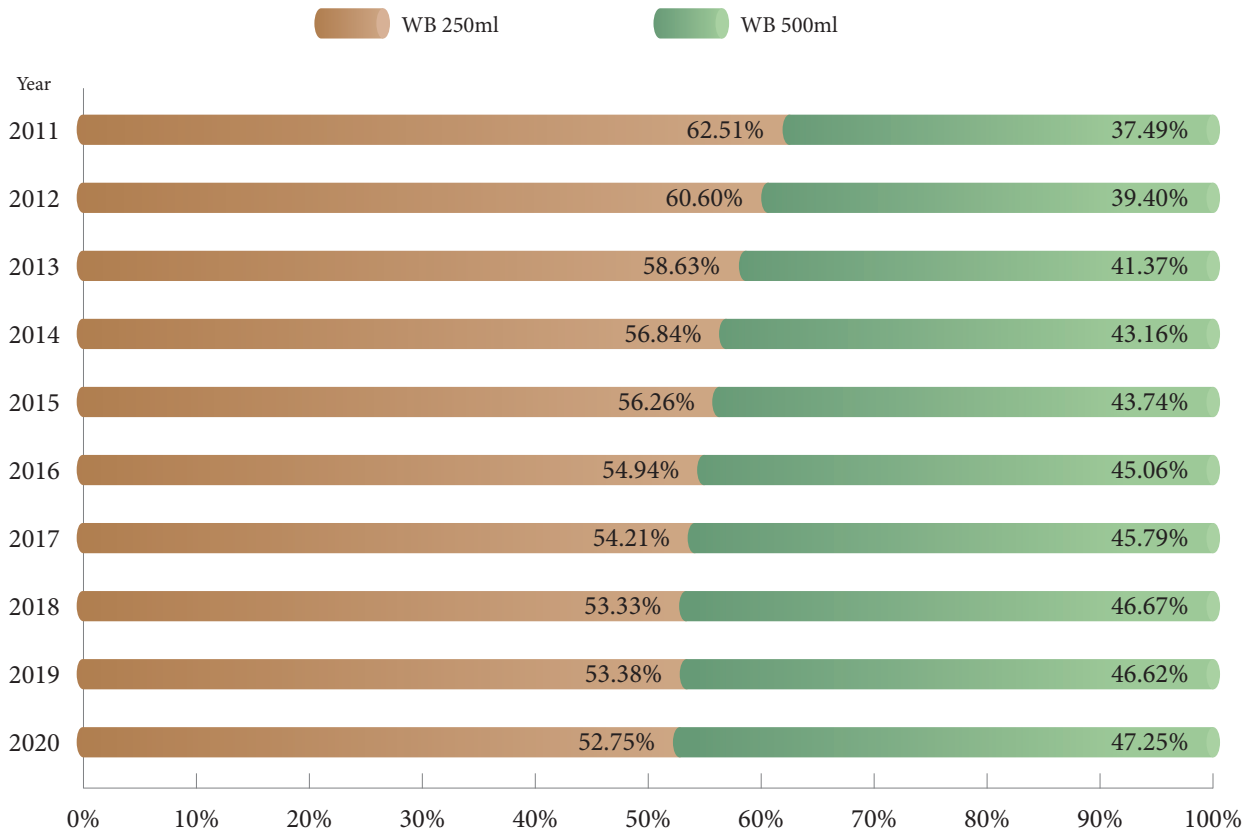
2. Both whole blood and apheresis donations are included.

Types of blood donation in 2020

Donation

Type / Blood centers	Whole blood				Apheresis				Total
	250ml	%	500ml	%	Apheresis - 1U	%	Apheresis - 2U	%	
Taipei blood center	290,915	47.81	246,893	40.58	29,896	4.91	40,759	6.70	608,463
Hsinchu blood center	129,813	49.18	110,451	41.84	10,470	3.97	13,220	5.01	263,954
Taichung blood center	191,466	47.01	183,864	45.15	2,944	0.72	28,982	7.12	407,256
Tainan blood center	115,293	47.83	103,731	43.03	4,285	1.78	17,733	7.36	241,042
Kaohsiung blood center	138,616	47.52	130,717	44.81	0	0	22,367	7.67	291,700
Subtotal	866,103	47.79	775,656	42.80	47,595	2.63	123,061	6.79	1,812,415

Types of whole blood donation, 2011-2020



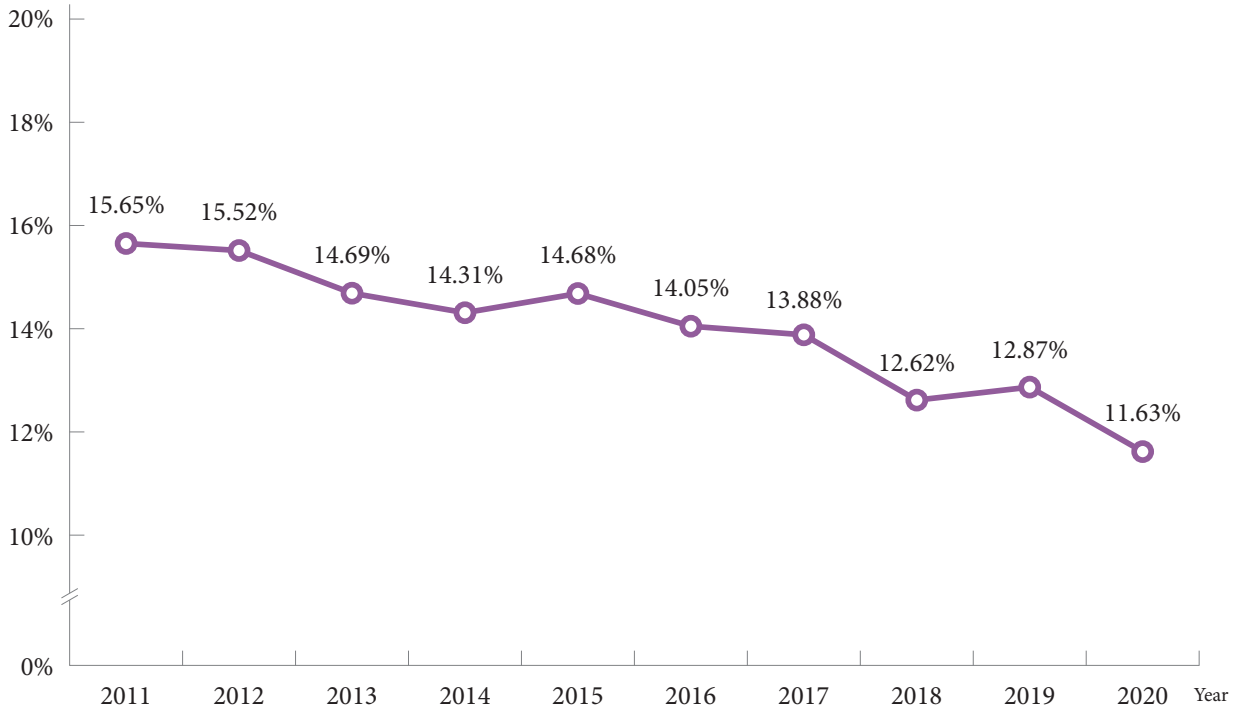
First-time donors in 2020

Donor

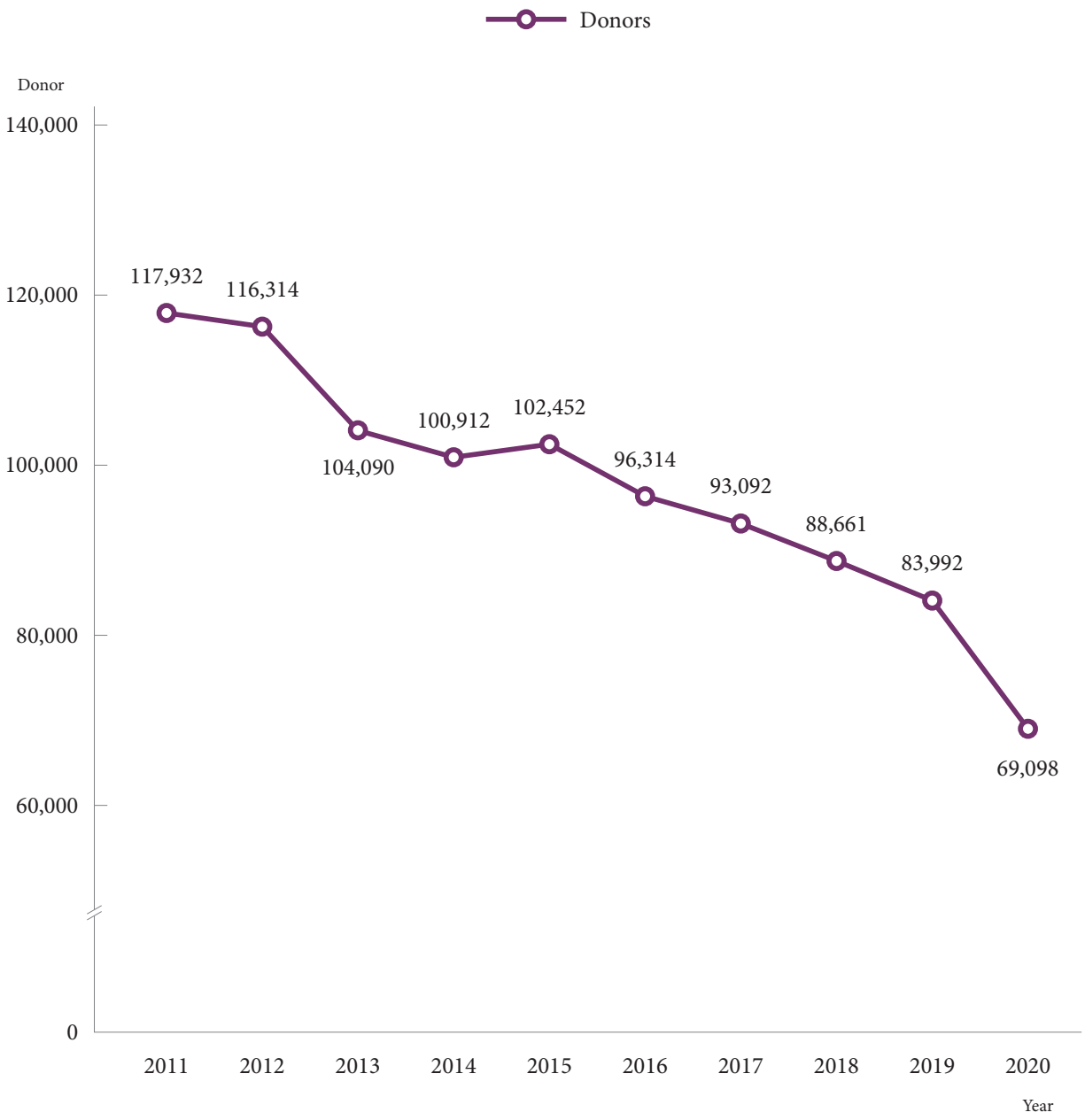
Item \ Blood centers		Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Total
Total donors(A)		341,745	153,729	241,841	135,710	162,692	1,004,139
First-time donors	No.(B)	39,387	18,113	25,655	15,584	18,036	116,775
	%(B/A)	11.53%	11.78%	10.61%	11.48%	11.09%	11.63%
First-time donors Age ≦ 24	No.(C)	21,251	9,996	15,386	10,593	11,872	69,098
	%(C/B)	53.95%	55.19%	59.97%	67.97%	65.82%	59.17%

Note: Donors who donated on more than one occasion in this year would be counted as once.

Trends in the rate of first-time donors, 2011-2020



≤24 Age first-time donors , 2011-2020



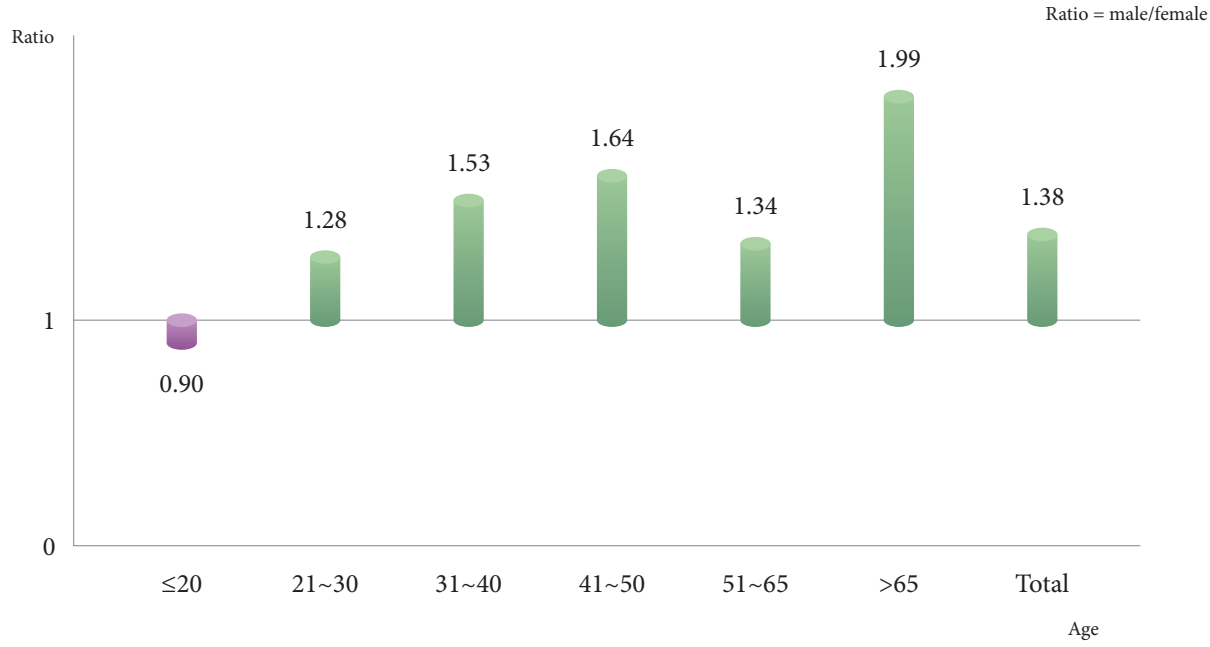
Distribution of donor by gender and age in 2020

Donor

Gender \ Age	≤20	21~30	31~40	41~50	51~65	>65	Total
Male	43,705 (7.51%)	125,884 (21.63%)	157,131 (27.00%)	143,021 (24.57%)	124,051 (21.31%)	1,043 (0.18%)	582,026 (57.96%)
Female	48,584 (11.51%)	98,353 (23.30%)	102,634 (24.31%)	86,994 (20.61%)	92,617 (21.94%)	525 (0.12%)	422,123 (42.04%)
Total	92,289 (9.19%)	224,237 (22.33%)	259,765 (25.87%)	230,015 (22.91%)	216,668 (21.58%)	1,568 (0.16%)	1,004,139 (100.00%)

Note: Both whole blood and apheresis donations are included.

Gender ratio by age



Donation frequency by gender and age in 2020

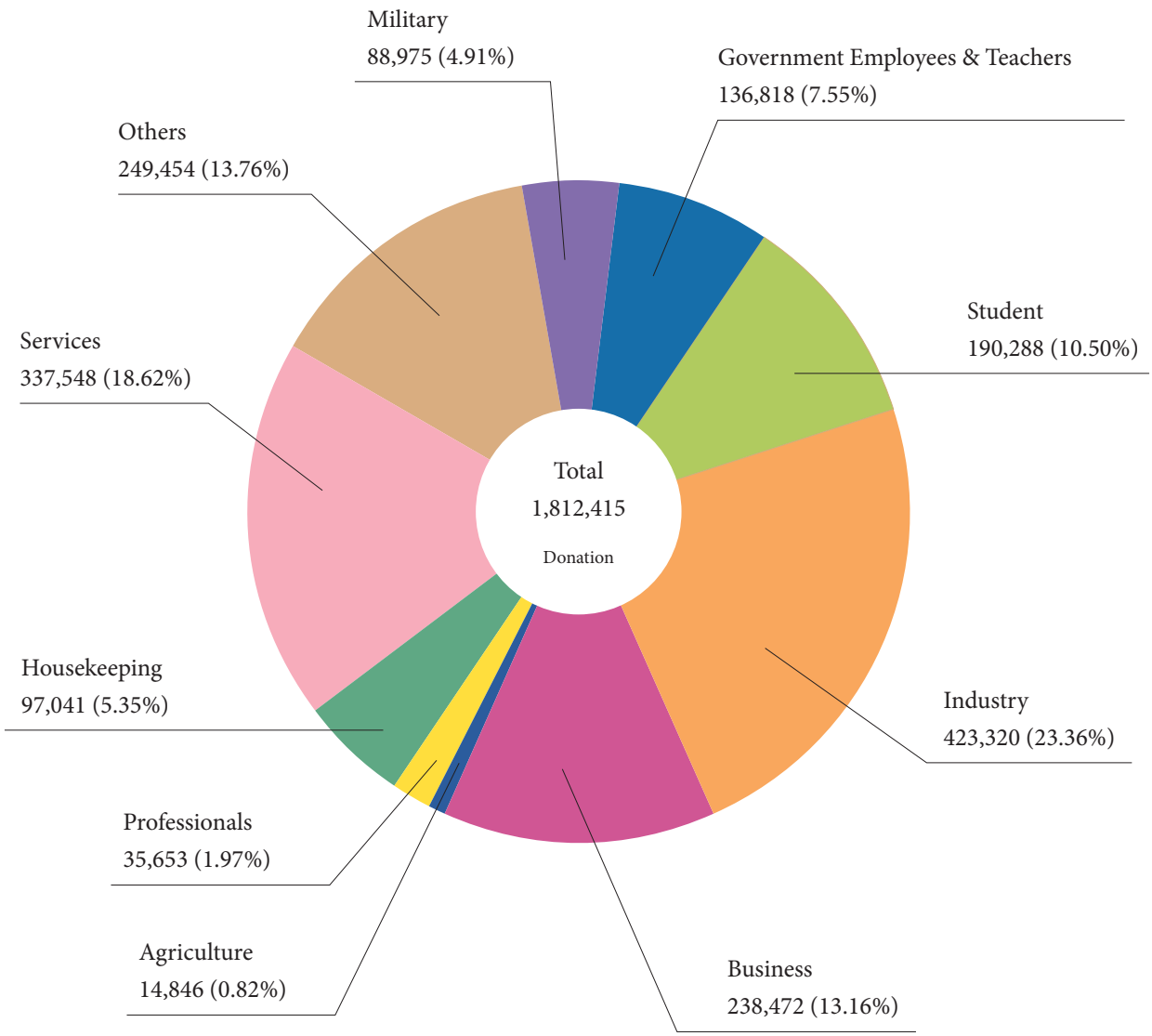
Age / Gender		Donation frequence	
≤20	Male	1.33	1.37
	Female	1.40	
21-30	Male	1.55	1.52
	Female	1.49	
31-40	Male	1.86	1.74
	Female	1.55	
41-50	Male	2.08	1.92
	Female	1.64	
51-65	Male	2.25	2.07
	Female	1.81	
>65	Male	3.28	2.95
	Female	2.28	
Total	Male	1.94	1.80
	Female	1.62	

Blood collection by sites in 2020

Donation

Blood centers / Sites	Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Total
Fixed site	345,733	134,585	193,687	138,036	176,710	988,751
	56.82%	50.99%	47.56%	57.27%	60.58%	54.55%
Mobiles	262,730	129,369	213,569	103,006	114,990	823,664
	43.18%	49.01%	52.44%	42.73%	39.42%	45.45%
Total	608,463	263,954	407,256	241,042	291,700	1,812,415

Occupational distribution of donors in 2020



Pre-donation donor deferral in 2020

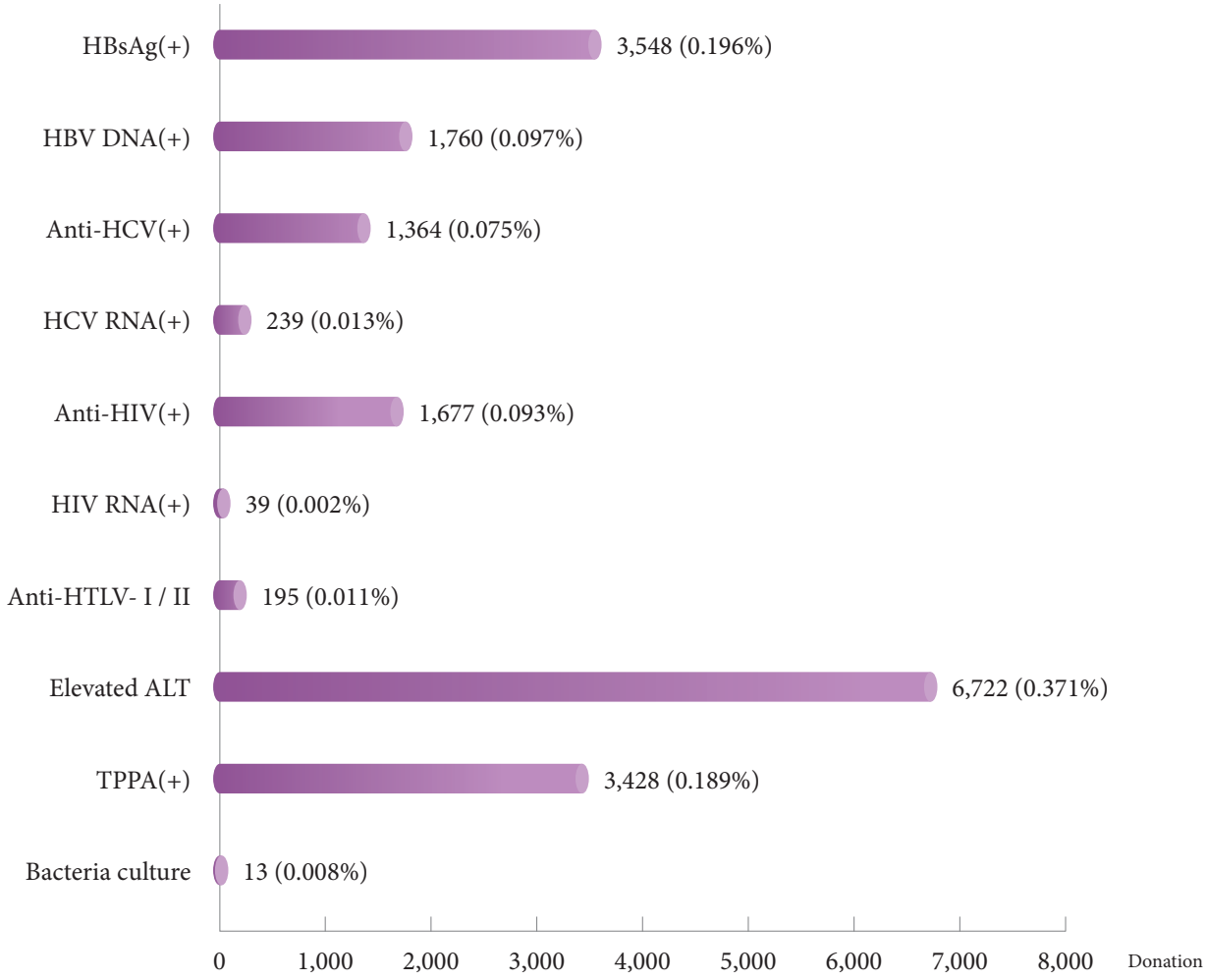
Participants

Reasons of deferral \ Blood centers		Taipei blood center	Hsinchu blood center	Taichung blood center	Tainan blood center	Kaohsiung blood center	Total
1	Low hemoglobin	33,104	6,420	27,178	9,681	19,497	95,880
2	Health questionnaire defferal	31,613	6,685	14,265	9,306	7,232	69,101
3	Blood pressure too high or too low	5,620	2,018	3,002	720	904	12,264
4	Blood vessels too thin	676	124	843	442	181	2,266
5	Low body weigh	391	124	121	176	193	1,005
6	Platelet count less than 150,000/μl or more than 600,000/μl	425	70	182	78	68	823
7	Tension	60	20	47	43	94	264
8	Body temperature too high	127	33	14	12	25	211
9	Other abnormalities	5,729	2,038	3,087	921	1,836	13,611
Deferred participants		77,745	17,532	48,739	21,379	30,030	195,425
Total participants		686,208	281,486	455,995	262,421	321,730	2,007,840
%		11.33%	6.23%	10.69%	8.15%	9.33%	9.73%

Note: Total participants include deferred participants and successful donations.

Infectious disease screening for blood issue in 2020

Positive rate：0.96%



Note: Only platelet apheresis donations were tested for bacteria culture.

Irregular erythrocyte antibody detected in 2020

Sample: 5,817

Irregular erythrocyte antibody reactive: 5,247 donations (0.3%)

Antibody	Number		Antibody	Number	
Anti-C	20	0.34%	Anti-Jk^{b}	1	0.02%
Anti-c	68	1.17%	Anti-Mi^{a}	2,207	37.94%
Anti-D	35	0.60%	Anti-P1	353	6.07%
Anti-E	807	13.87%	Anti-I/HI	1,032	17.74%
Anti-e	17	0.29%	Anti-i	4	0.07%
Anti-G	5	0.09%	Anti-Lan	1	0.02%
Anti-M	541	9.30%	Anti-Di^{a}	30	0.52%
Anti-N	4	0.07%	Anti-Wr^{a}	2	0.03%
Anti-S	20	0.34%	Anti-Jr^{a}	4	0.07%
Anti-s	0	0.00%	Anti-LW^{a}	5	0.09%
Anti-Le^{a}	324	5.57%	Anti-Pr	2	0.03%
Anti-Le^{b}	176	3.03%	Anti-Tj^{a}	1	0.02%
Anti-Fy^{a}	1	0.02%	Anti-Hr$_{o}$	1	0.02%
Anti-Fy^{b}	20	0.34%	Cold Agglutinin	40	0.69%
Anti-Jk^{a}	1	0.02%	Other	95	1.63%

Detection of donor Mi^{a} antigen in 2020

Donation

	Taipei blood center		Hsinchu blood center		Taichung blood center		Tainan blood center		Kaohsiung blood center		Total	
Mi^{a}+	29,054	4.8%	13,304	5.0%	17,378	4.3%	8,963	3.7%	12,460	4.3%	81,159	4.5%
Mi^{a}-	579,402	95.2%	250,650	95.0%	389,879	95.7%	232,079	96.3%	279,239	95.7%	1,731,249	95.5%

Statistics of ABO and RhD in 2020

Donation

Blood group	RhD+	RhD-	Total	%
A	476,693	2,208	478,901	26.42%
B	424,458	1,926	426,384	23.53%
O	795,608	3,814	799,422	44.11%
AB	107,153	533	107,686	5.94%
Total	1,803,912	8,481	1,812,393	100.00%
%	99.53%	0.47%		

Note: Sample amounts are not the same as the total donations, because of the blood drive records but some of them have no testing results.

Statistics of ABO subgroups in 2020

Donation

A subgroups		B subgroups		AB subgroups		Para-Bombay	
A_2	12	B_3	716	A_2B	82	O_{Hm}^{A}	75
A_3	8	B_{el}	60	A_2B_3	3	O_{Hm}^{B}	72
A_{el}	107	B_m	3	A_3B	1	O_{Hm}	44
A_m	2	B_x	2	AB_3	189	O_{Hm}^{AB}	7
A_x	3			$A_{el}B$	19		
A_{int}	10			AB_{el}	3		
A_1+O chimera	1			AmB	1		
				ABm	2		
				AwB	6		
				AxB	2		
				$A_{int}B$	7		
				B(A)	6		
				cisAB	2		
				A_1+A_1B chimera	1		
				A_1B+B chimera	3		

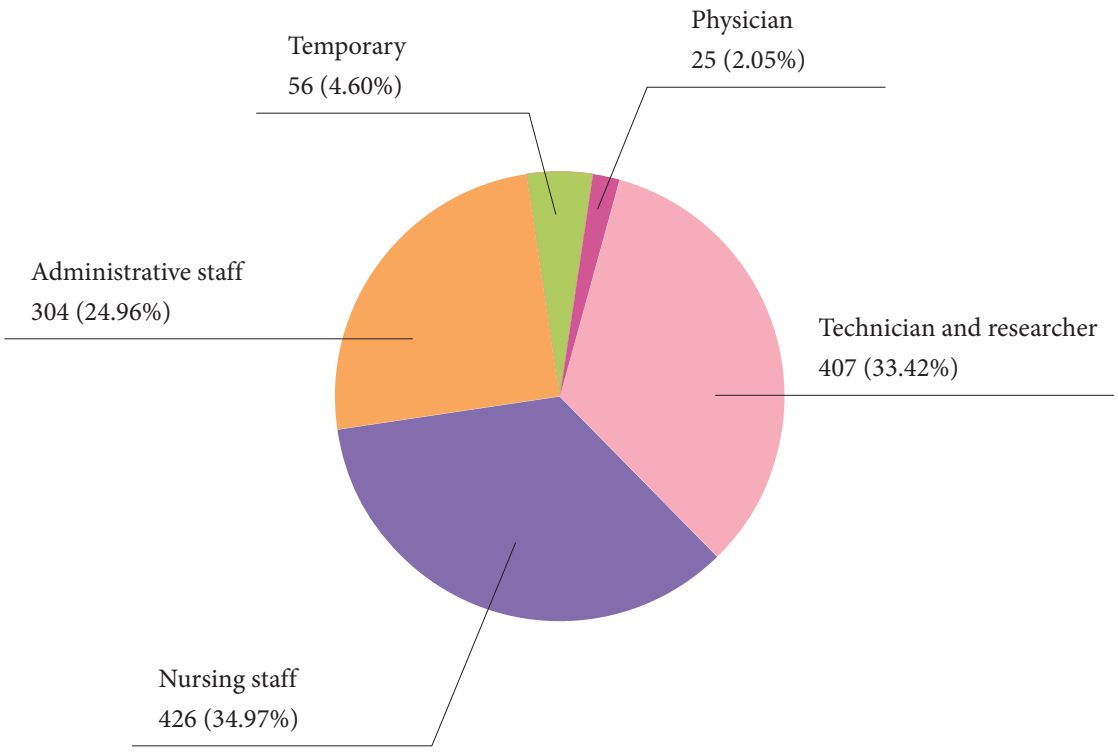
Inventory of rare RBCs

Blood groups		Unit
Rare blood groups	ABO blood groups	
para-Bombay	A	8
	B	4
	O	9
	AB	2
RzRz	B	4
	O	26
	AB	2
s(-)	O	24
Lu(a-b-)	A	26
	O	10
K(-)	O	2
	AB	2
K_0	A	8
Fy(a-)	A	4
	B	2
	O	26
Fy(a-)s(-)	O	14
D(-)Fy(a-b-)	O	2
Jk(a-b-)	A	46
	B	40
	O	52
	AB	2
Di(b-)	A	4
	O	10
i adult cell	A	2
	B	1
	O	3
Jr(a-)	O	4
p phenotype	A	4
	B	1
	O	1
Lan(-)	AB	3
Dc-	O	8
D--	A	2

Human resources in 2020

Person

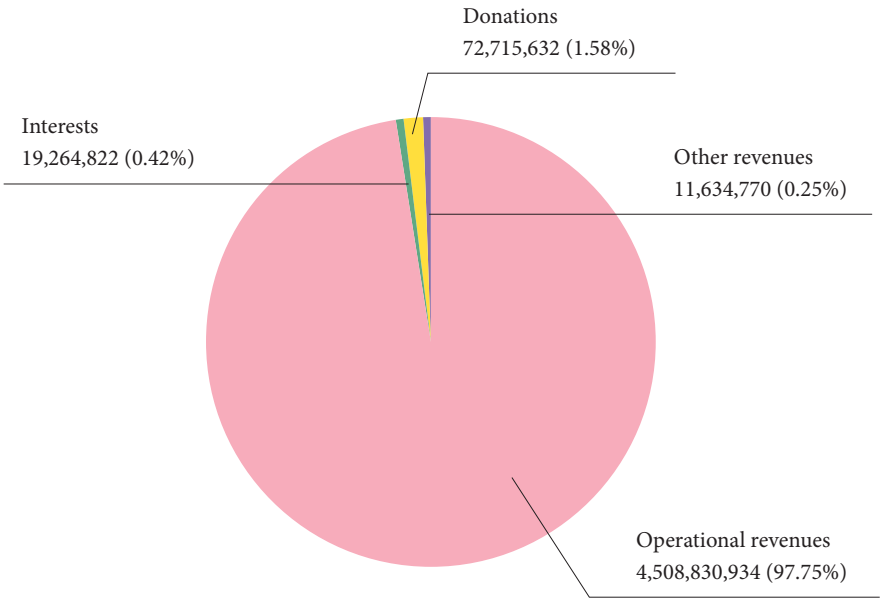
Classification / Blood centers	Physician	Technician and researcher	Nursing staff	Administrative staff	Temporary	Total	%
Head Office	1	13	0	30	0	44	3.61
Taipei blood center	9	150	160	98	26	443	36.38
Hsinchu blood center	3	54	54	42	1	154	12.64
Taichung blood center	3	65	91	48	6	213	17.49
Tainan blood center	4	45	57	41	11	158	12.97
Kaohsiung blood center	5	80	64	45	12	206	16.91
Total	25	407	426	304	56	1,218	



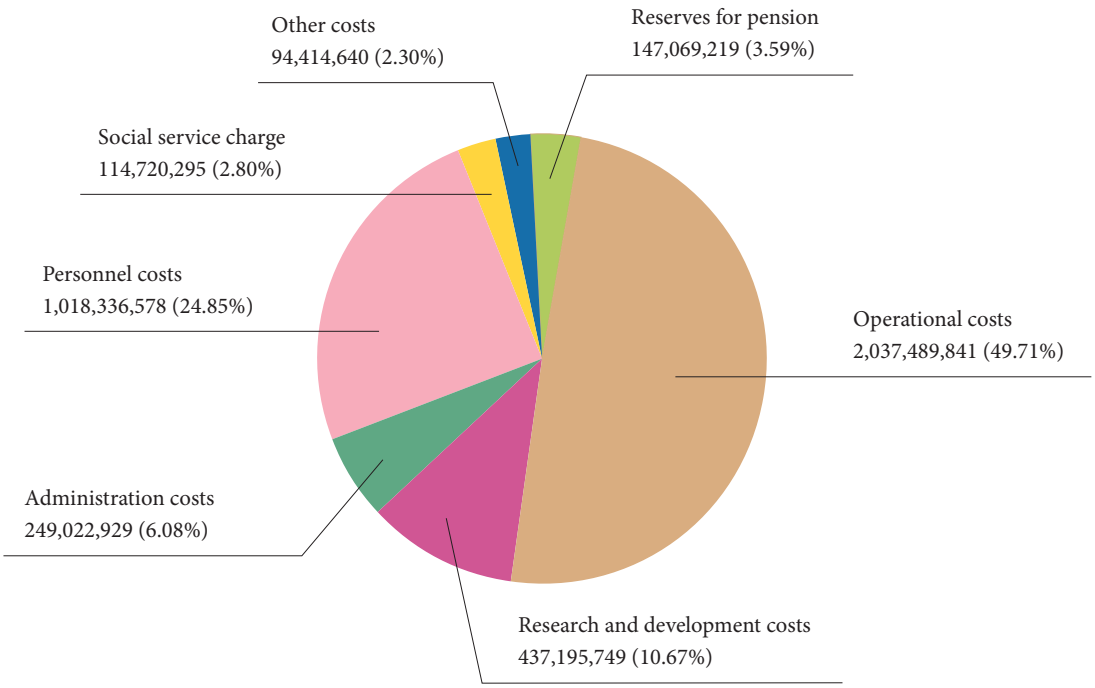
Incomes and expenditures in 2020

NT Dollar

1. Total incomes: NT$ 4,612,446,158



2. Total expenditures: NT$ 4,098,249,251



3. Balance after tax: NT$ 514,196,907

4. Capital expenditures: NT$ 384,928,702 (Equipments purchase)

APPENDIX

Blood centers in Taiwan

Head office

Taiwan Blood Services Foundation

3 FL. No. 3, Nan-Hai Road, Taipei 10066, Taiwan, R.O.C.
TEL: 886-2-2351-1600 FAX: 886-2-2395-1002
Website: www.blood.org.tw

Regional office

Taipei Blood Center

No. 123, Lih-Der Road, Taipei 112, Taiwan, R.O.C.
TEL: 886-2-2897-1600 FAX: 886-2-2897-1601
Executive Region: Taipei City, New Taipei City, Keelung City, Kinmen County, Matsu County, Hualien County, Yilan County.

Hsinchu Blood Center

No. 8, Lane 215, Guangming 11th Road, Jhubie City, Hsinchu County 302, Taiwan, R.O.C.
TEL: 886-3-555-6111 FAX: 886-3-555-0305
Executive Region: Taoyuan County, Hsinchu County, Miaoli County

Taichung Blood Center

No. 1176, Sec. 4, Taiwan Boulevard, Xitun Dist., Taichung City 407, Taiwan, R.O.C.
TEL: 886-4-2461-2345 FAX: 886-4-2461-3939
Executive Region: Taichung City, Changhwa County, Nantou County, Yunlin County

Tainan Blood Center

No. 85, Sec. 1, Yongfu Road, West Central Dist., Tainan City 700, Taiwan, R.O.C.
TEL: 886-6-213-1212 FAX: 886-6-213-3201
Executive Region: Tainan City, Chiayi City, Chiayi County

Kaohsiung Blood Center

No. 1837, Gaonan Highway, Nanzi Dist., Kaohsiung City 811, Taiwan, R.O.C.
TEL: 886-7-366-0999 FAX: 886-7-364-1556
Executive Region: Kaohsiung City, Pingtung County, Penghus County, Taitung County

Blood centers and stations

Published by the Taiwan Blood Services Foundation

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醫療財團法人
台灣血液基金會
捐血救人 Taiwan Blood Services Foundation

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