

# The Life Bank of Catalonia



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# More than just a blood bank

## THE UNION BETWEEN DONORS AND RECIPIENTS

The Banc de Sang i Teixits (Blood and Tissue Bank, BST) is a Catalan public company whose purpose is to **transform and improve the life** of many patients by providing an adequate and efficient supply of blood, blood products and tissues. This is made possible by more than **900 professionals** from a wide range of fields. We are much more than a blood bank. **We are a life bank**, because our mission is to ensure that everyone who needs **red blood cells, plasma, platelets, tissue or breast milk** has it when

and where it is needed. We provide health and well-being for **more than 100,000 people a year**.

And we do it also thanks to **research**, the other main function of this life bank. We are leaders in the development of **blood-, cell-, gene- and tissue-based therapies**. We develop drugs with all these components, which are part of life and the springboard for progress in the **new personalised medicine**, the path of the future that is opening up new possibilities for curing many patients.

*The BST is an international leader in blood, cell and tissue treatment and research*

*We reach everywhere because we have a network throughout the country*

KEY FIGURES 2023



Over  
900  
employees



13  
transfusion services  
in main hospitals



250,000  
blood donations



1,800  
tissue donors



Over  
70,000  
transfused patients



600  
newborns fed with  
human milk



15  
daily mobile  
campaigns



Over  
700  
milk donors



6,500  
registered volunteers  
in the REDMO



27,500  
plasma donations

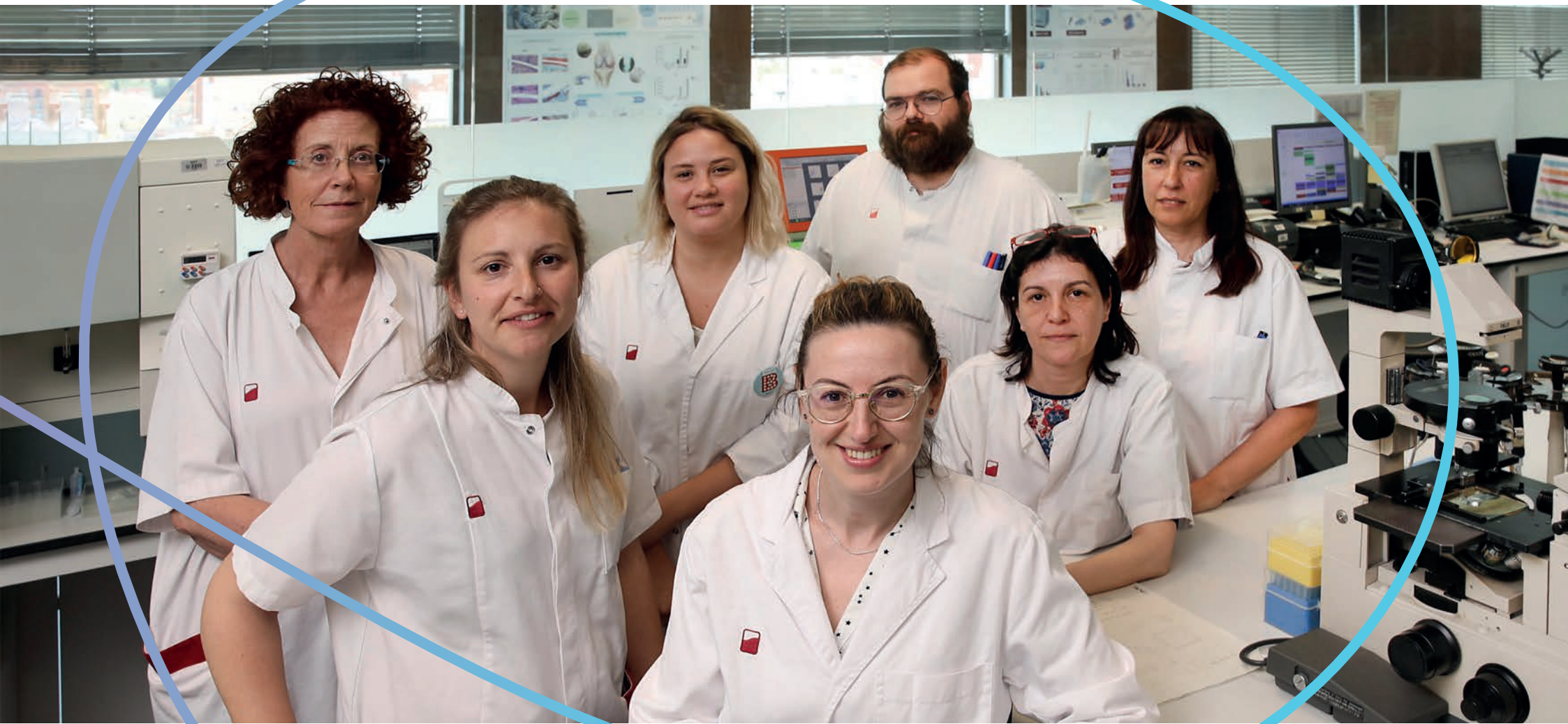


60  
research projects



11  
innovation projects

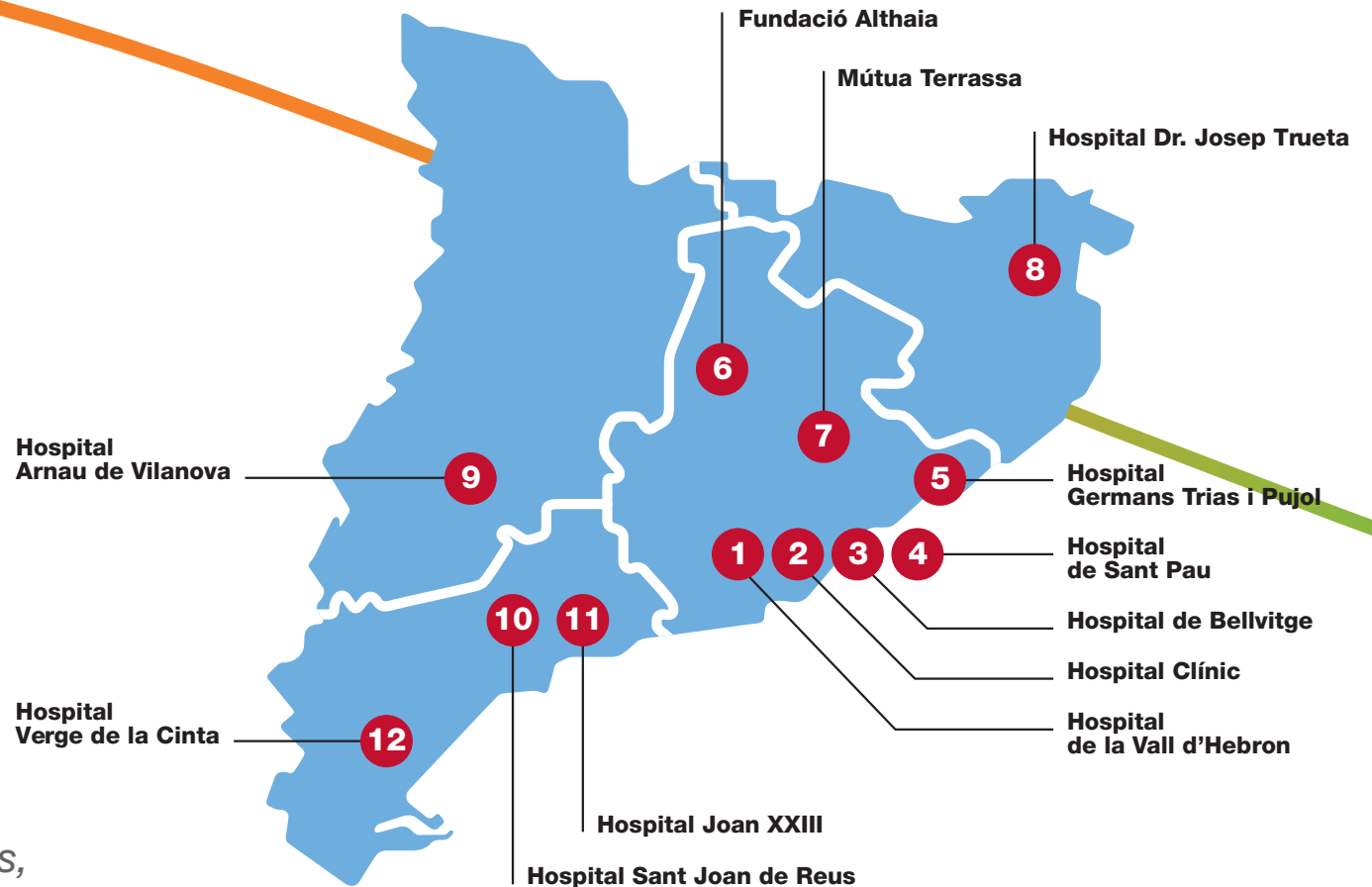
*We are a life bank that goes beyond blood,  
plasma and platelet donation*



*We are a public company  
with a call to serve*

# A unique donor to patient model

We operate as a network with a unique world benchmark model. We are active in all public and private centres in Catalonia, meeting the needs of **over 7.5 million people**.



*We fractionate blood into red cells, plasma and platelets*



## An exceptional model throughout the territory, from donor to patient

Through this model, the BST Blood Bank monitors and **is responsible for all donations of substances of human origin (SoHOs) in Catalonia: blood, plasma, platelets, tissues, corneas, umbilical cord blood, placenta, breast milk and bone marrow. We have 13 permanent donor centres**, located in all the major hospitals, and we organise **over 4,300 blood and plasma collections a year** to reach the whole of Catalonia.

All these SoHOs arrive at the BST Blood Bank headquarters where they are **processed and treated** for transfusion, to be turned into medicinal products, for research, or for storage for when they are needed.

The BST is responsible **for the entire process**. It returns all these substances, aimed at improving patients' health, through the network that includes all the hospitals. This life bank also manages all the transfusion services in the main Catalan public hospitals and is responsible **for 80% of transfusions** carried out in Catalonia.

In other words, we are responsible for the whole cycle; we use a **donor to patient** model, from donor to patient, the only such model in Spain and one of very few worldwide. The cycle includes **donation, processing, healthcare activity and research**.

A value chain with a notably multidisciplinary workforce that has made us an exceptional target for innovation for the sector's leading biotech companies.

*We perform 3 million diagnostic tests a year to ensure the safety of all transfusions*

*We produce blood-derived products; drugs that can only be made from donor plasma*

*We perform 300,000 transfusions a year*

# We are a test bench for leading technological developments

## WE WERE THE FIRST TO AUTOMATE BLOOD FRACTIONATION

For 20 years we have been at the cutting edge of technological advances in fractionation and guaranteeing the highest levels of safety and quality for both blood components and tissue and cell manipulation processes. We were **the first to incorporate automation** into the process of fractionating blood into **red cells, plasma and platelets**. We have turned our technology partners into collaborators. We have been a **test bench** for the leading specialised companies, working together to innovate and achieve the best technological solutions.

This is why we are leaders in applying the latest developments to obtain products that are unique in terms of **safety, quality and purity**. Our historic leadership spans the entire process: from fractionation, with the best centrifugation machines for separating blood components, and validation, with the best reagents for tests, storage and supply and with the first Cardex, the smart cabinet for serving blood, right up to transfusion.

Our **donor to patient** model that brings us close to patients has allowed us to adapt our products more closely to their needs and become one of the few organisations where innovation is possible throughout **the entire process: in all the SoHOs we work with**.

*For 20 years now, we have been a test bench for the best technological innovations for blood, tissue and cell processing*



Paying close attention to the epidemiological health of 7.5 million people

**OVER 3 MILLION DIAGNOSTIC TESTS A YEAR**

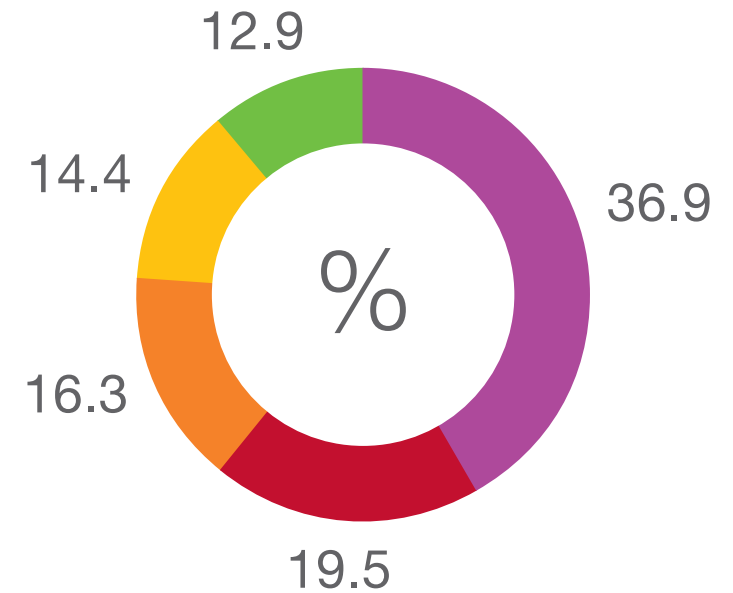
We take the **epidemiological pulse** of society every day thanks to the presence of our blood banks throughout the territory. We analyse blood received from all over our territory to ensure it can be transfused and we provide the backbone for the haemotherapy system in Catalonia; in other words, we diagnose, control and monitor blood donation- and transfusion-related problems **with more than 3 million diagnostic tests per year**.

The **Transfusion Safety Laboratory** is responsible for analysing and validating all SoHOs reaching the BST Blood Bank and is working to become a **platform to support public health** in the epidemiological surveillance of numerous infectious diseases.

Our constant presence makes us keenly aware of and responsive to the needs of physicians who care for patients in all the hospitals and more attentive to the general epidemiological health map, which can be crucial with regard to the **emergence and extinction of diseases**.

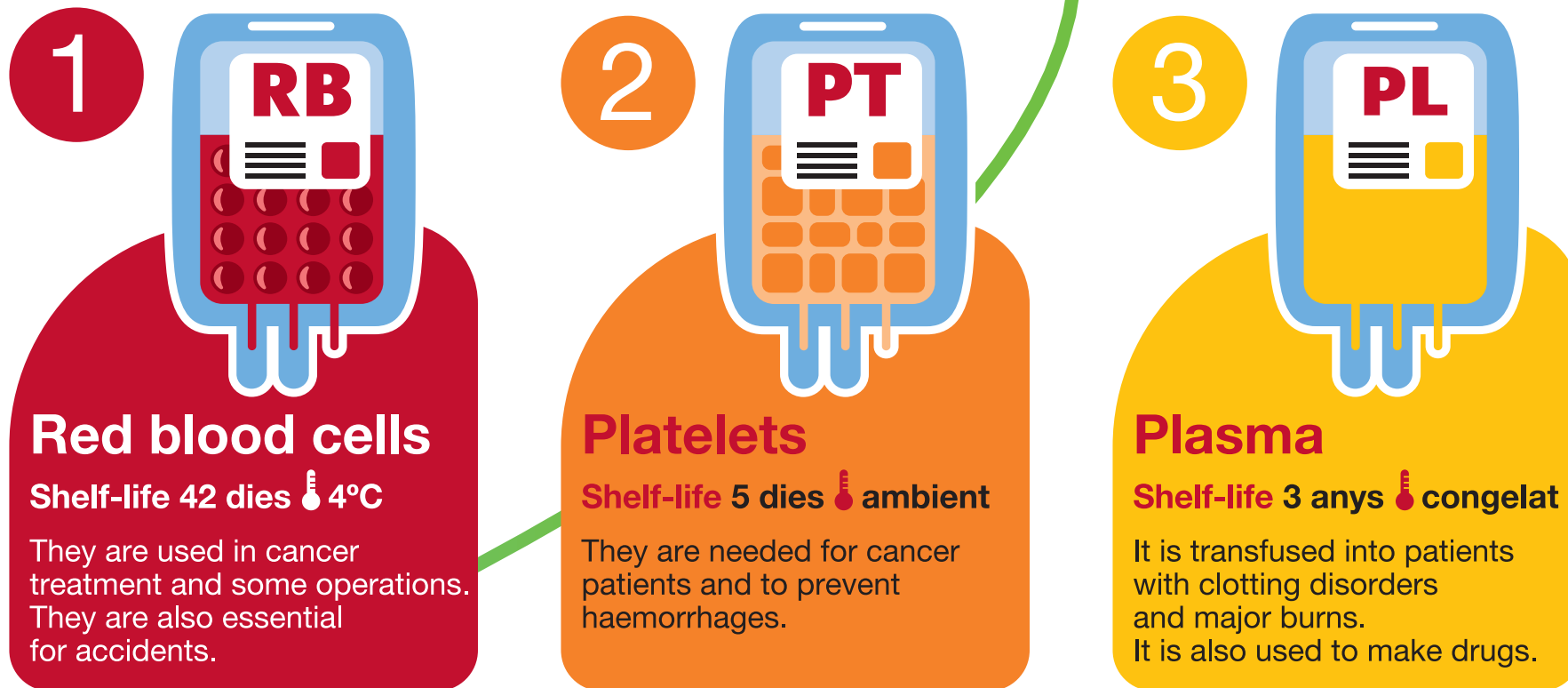
*Our technological partners  
have become our collaborators*

## Why is blood needed?



- All types of cancers
- Digestive diseases (e.g. intestinal bleeding)
- Circulatory system diseases (e.g. heart attack)
- External injuries and consequences (e.g. fractured femur)
- Blood diseases (e.g. anaemias)

A donor's blood is separated into three different parts



*Our engineers have designed a specific machine in the process of fractionation and traceability of blood bags*

# Donors, our big family

200,000 PEOPLE UNITED IN THEIR COMMITMENT TO HELPING

All our activity serves to save or improve people's lives, all of it based on **altruistic donations from thousands of people. We have donors of blood, plasma, platelets, breast milk, umbilical cord blood, placenta, tissue, corneas and bone marrow.** We guarantee treatment for patients in all Catalan hospitals and we have successfully met the challenge of providing 1,000 donations a day.

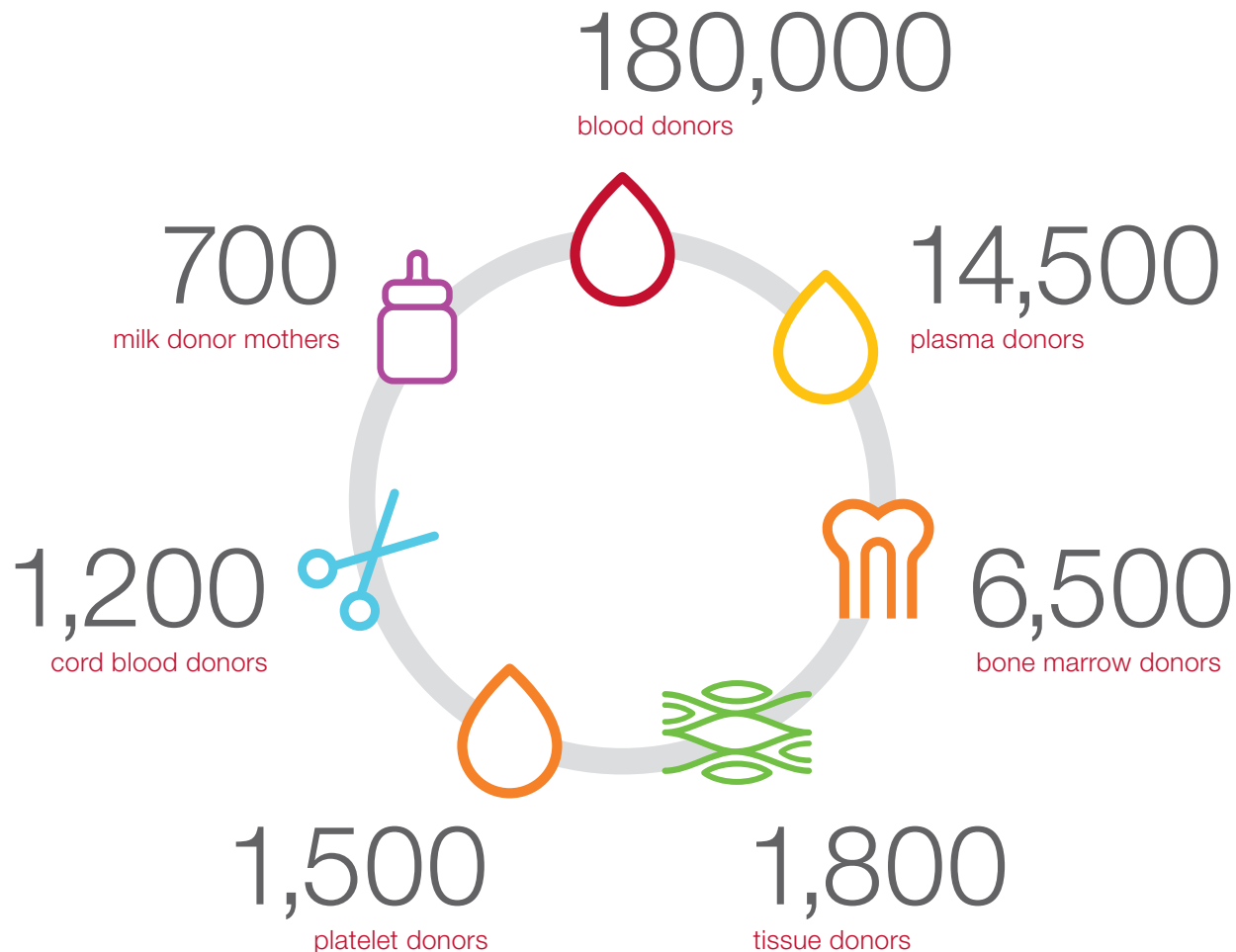
More than 70,000 people receive blood every year in Catalonia. This means that, each year, we transfuse **more than 300,000 blood components** to patients who need them. And this is thanks to nearly **180,000 people who give blood, 14,500 who give plasma and 1,500 who give platelets.**

But the donor family is even larger. We are a Breast Milk Bank, with **more than 800 mother donors a year**, a Cord Blood Bank, with **more than 1,200 mothers** who have donated umbilical cord blood after giving birth, and **700 more** who have donated placenta. In addition, around **1,800 people** donate their tissues each year after death to the benefit of many patients. At our life bank, we ensure all these actions can be converted into health for thousands of people.

*Becoming a donor:  
an experience close to excellence*



# BST Community 2023



## CARING FOR THE DONOR

We are committed to improving the donor experience throughout the entire donation process. Year after year, we reinvest our experience into greater rigour, safety and efficiency in serving this large family.

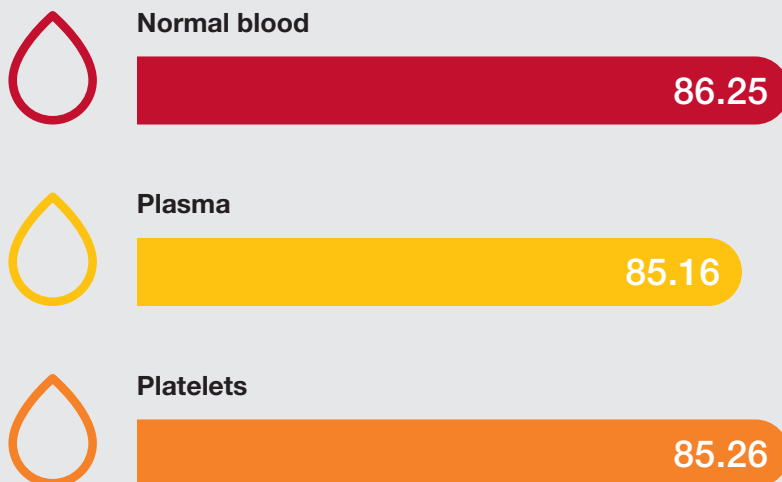
**We have a rating of 8.6** and we are working to deliver **an experience of even greater excellence.**

We also use **artificial intelligence (AI)** to generate algorithms to improve donor recruitment campaigns and obtain better results. This is only the tip of the iceberg, which will allow us to analyse the large volume of stored BST data and turn it into previously unpublished knowledge.

*Using artificial intelligence (AI) to improve campaigns*



## Satisfaction index graph



*Donors give us  
a rating of 8.6*

## The world's "best" donors

We have been **world leaders** in blood donation for decades. Spain ranks first in blood donations worldwide, with an average of 36 donations per 1,000 inhabitants. In Spain, **Catalonia is among the autonomous communities with the highest number of blood donors, our reason for saying we have "the best donors in the world"**.

### Ranking of world blood donations

Source: WHO

1st	<b>Spain</b>
2nd	<b>Estonia</b>
3rd	<b>Croatia</b>
4th	<b>Portugal</b>
5th	<b>Austria</b>

*We are world leaders  
in blood donations*

# State-of-the-art facilities in a pioneering building

The BST headquarters are in the Frederic Duran i Jordà building, a smart, energy-efficient building that **uses 60% less energy** than a standard building thanks to the air-conditioning and lighting systems, and the unusual **thickness of its walls**, which are clad in wood to increase insulation. The 16,000 square metres of the building form a **large white concrete cube** with four vertical internal cores containing stairs, lifts and toilets, but no other columns anywhere.

We have extraordinary **facilities and infrastructures**, accredited for their quality and excellence for handling tissues, blood and cells and for research, with specialised laboratories and refrigerated spaces. We have **10 clean rooms, isolated spaces** with low contaminant levels that permit open and closed manufacturing systems, cell expansion platforms and bioreactors, required in numerous research projects and prepared for **advanced therapies**.

We have **cryopreservation tanks**, the only such tanks in Catalonia, whose functions include storing the promising, **new CAR T-cell therapies** for certain cancers, and storing **blood from 20,000 umbilical cords**, which can be used to cure leukaemia.

Every week, **professionals from blood banks and research institutes worldwide** visit our rooms and facilities, attracted by a model that is already a world benchmark.

| *10 clean rooms covering 250 m<sup>2</sup>  
for advanced therapies*



Maximum energy  
efficiency

### A PROPRIETARY IT SYSTEM TO INTEGRATE ALL THE PROCESSES IN THE DONOR TO PATIENT MODEL

To ensure all this technology is fully optimised, our engineers and computer scientists are currently designing a proprietary computer system that will integrate this entire process, from donor to patient and in all areas: blood, tissues and cells.

Innovation has been a constant feature in our history. Not many years ago, our engineers invented a unique machine we called “Scalextric”, which helps us in the process of fractionating blood into the three blood components; red blood cells, plasma and platelets. **That’s why we say every donation can save three lives.** Our headquarters, the Frederic Duran i Jordà building by the sea in Barcelona, is the brain that powers our network and technological innovation model. It receives blood from all over Catalonia, then processes and fractionates it, ensures it is safe, and prepares it for delivery to patients in hospitals.



Clean rooms and  
cryopreservation tanks

*Cryopreservation tanks for medicinal  
products, tissues and cells*



*Laboratories equipped  
with the latest diagnostic techniques*

# The challenge: to convert cells, tissues and blood into medicinal products

## FIRST-LINE LABORATORIES

The **Transfusion Safety Laboratory** works at full capacity because it is responsible for testing and validating all SoHOs arriving at the BST Blood Bank every day. But this is not the only laboratory.

The **Immunohaematology Laboratory** is a point of reference for blood group-related diagnoses and receives samples from many hospitals **throughout Spain**, including complicated cases where a rare group is suspected. Together with the University of Bath, it is working on a research project to **manufacture laboratory red blood cells**, with support from the “la Caixa” Foundation.

Almost 20 years ago, the BST Blood Bank promoted research in Spain into the so-called “rare” blood groups and created a network of specialised centres that is now part of a larger panel managed by the World Health Organization (WHO). There are a further 300 different blood types apart from the ones everyone knows (A, B, AB and O, and the Rh+ or -groups). And this network makes it possible to find compatible blood for when these people with these “rare” blood groups need it, all over the world.

The BST Blood Bank building also houses several other unique diagnostic laboratories in the field of blood-related diseases and human genetics, such as the genomic laboratory, the immunobiology laboratory and the microbiology laboratory, who join forces in the study of immune-related diseases or developing new advanced cell therapies.

*We research how to create  
laboratory red blood cells*

## BST research, key figures



56 researchers on staff



60 active projects



2,000 new transfusion products

150 patients treated with ATMPs



€3 M annual research investment



43 scientific publications

202 cumulative impact factor

4.68 mean factor

### A NEW GENERATION MEDICINE

The BST Blood Bank boasts leading professionals, facilities and equipment to develop new treatments that use the body's biological elements to "cure". These treatments are changing the way blood cancers and other diseases are treated.

They make up the new, personalised medicine that facilitates the development of drugs based on modified human genes, tissues or cells. This new dimension in medicine includes cellular laboratories, genomic support platforms and biobanks.

*We are leaders in the search for "rare" blood types*

# Future: the leading hub for advanced therapies (CTAEC)

Of all the regions in Spain, Catalonia has treated the highest number of oncology patients with cell therapy medicines, which require specific cryopreservation equipment and highly trained personnel to handle them. Since 2016, the BST has been promoting a pioneering model for delivering **innovative cancer therapies across the public hospital network**.

Over time, this has become a **model of excellence, a network** (hub-and-spoke) model in which the BST headquarters house the laboratory, equipment, technology (especially the **cryopreservation tanks** to

keep these new drugs made from human cells below  $-150^{\circ}\text{C}$ ) and, above all, the experts trained in handling these products. This journey has culminated in the commission to promote the future **Advanced and Emerging Therapies Hub of Catalonia (CTAEC)**, which is soon to become a reality.

The BST is a research centre and producer of these kinds of drugs, which provide a new way of fighting cancer. We have worked with the pharmaceutical industry in the manufacture of numerous **CAR-T cells**, immunotherapy-based drugs made using the

most innovative cell therapies. We are involved in several clinical trials together with other institutions, with whom we have promoted projects such as creating a bank of stem cells genetically modified to become lymphocytes to fight certain types of cancer.

We have a number of ongoing research projects related to natural killer cells, which destroy tumours, and have come a long way in stem-cell therapy. We also work with advanced molecular tools and bioinformatics to improve the diagnosis of hereditary bleeding disorders, among other conditions.

*We develop therapies  
with leading hospitals*



## RESEARCH PROGRAMMES

### 1 SoHO donation and biosafety

1.1 Donor behaviour, ethics and promoting donation

1.2 Safety: emerging pathogens, epidemiology, surveillance

### 2 Transfusion medicine and haemotherapy

2.1 Immunohaematology

2.2 In vitro production of red blood cells for diagnostic and therapeutic use

2.3 Precision genomic diagnostics

2.4 Development of blood components

2.5 3.5 Immunogenetics and histocompatibility

### 3 Cell, tissue and advanced therapies

3.1 Stem cell-derived immunotherapies

3.2 New cell therapies for cancer treatment

3.3 New tissue and tissue engineering therapies

3.4 New cell therapies for the treatment of chronic and autoimmune diseases

*Stem cell research  
is the main focus*

We are much more  
than just a blood bank  
We are a research  
institution

## CELL THERAPIES, THE STARTING POINT

Our production of cell therapies is largely due to the fact that the BST obtains **progenitor cells**, stem cells, through apheresis processes in hospitals in Catalonia. They process, cryopreserve, store and distribute them when a transplant is needed for **leukaemia or other blood diseases**.

This activity is the starting point for a wide-ranging research project with major goals, such as boosting an unprecedented cell therapy to fight opportunistic infections in transplant patients. This antiviral therapy,

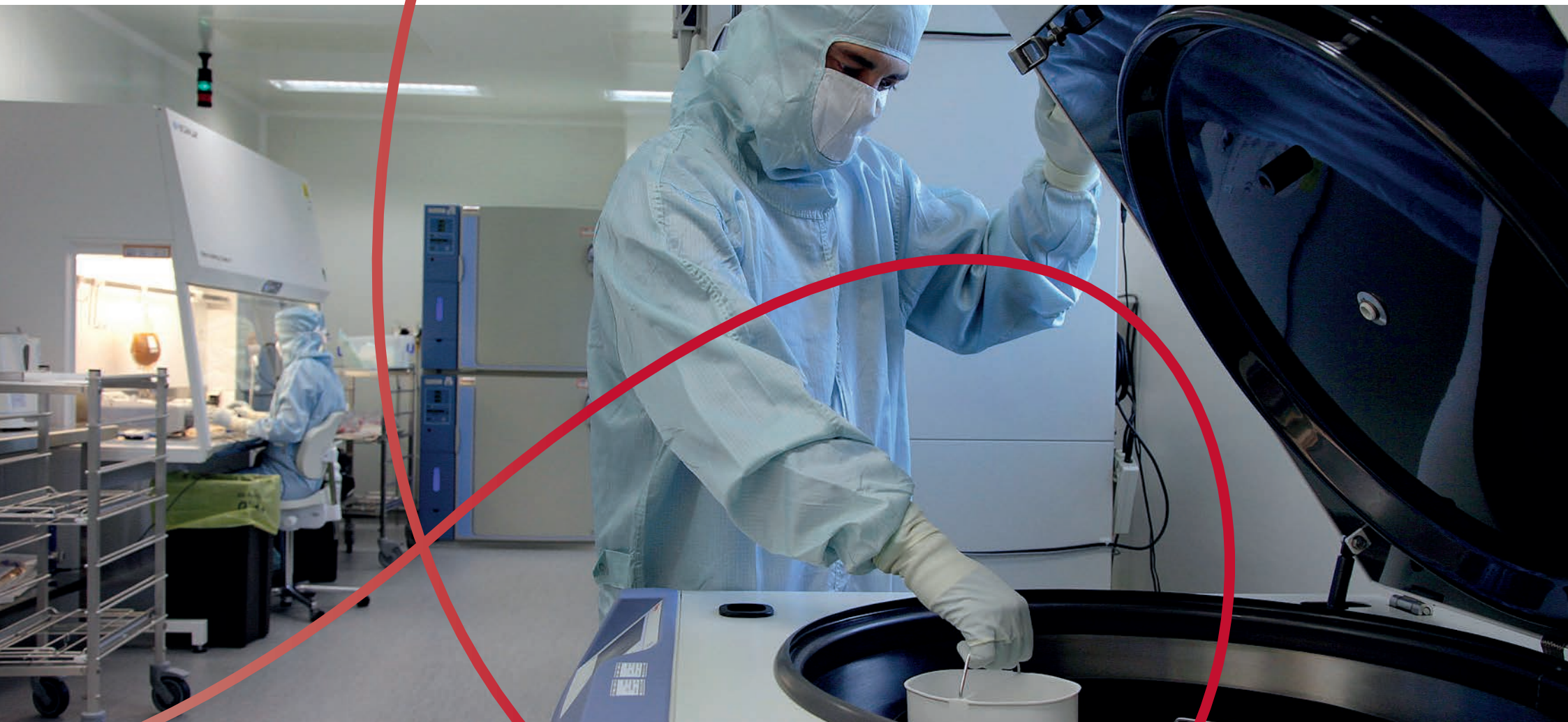
**ViroTCell, has allowed us to treat more than 80 patients** in 10 years who failed to respond to any other drugs.

In addition, our researchers' experience and expertise make us a valued partner for companies and laboratories to conduct tests that support advanced therapies, such as cell counters.

In 2023, 88.5% of clinical trials in Spain (involving 5,308 active trials) were conducted in Catalonia, ranking it fifth in Europe and eighth worldwide.

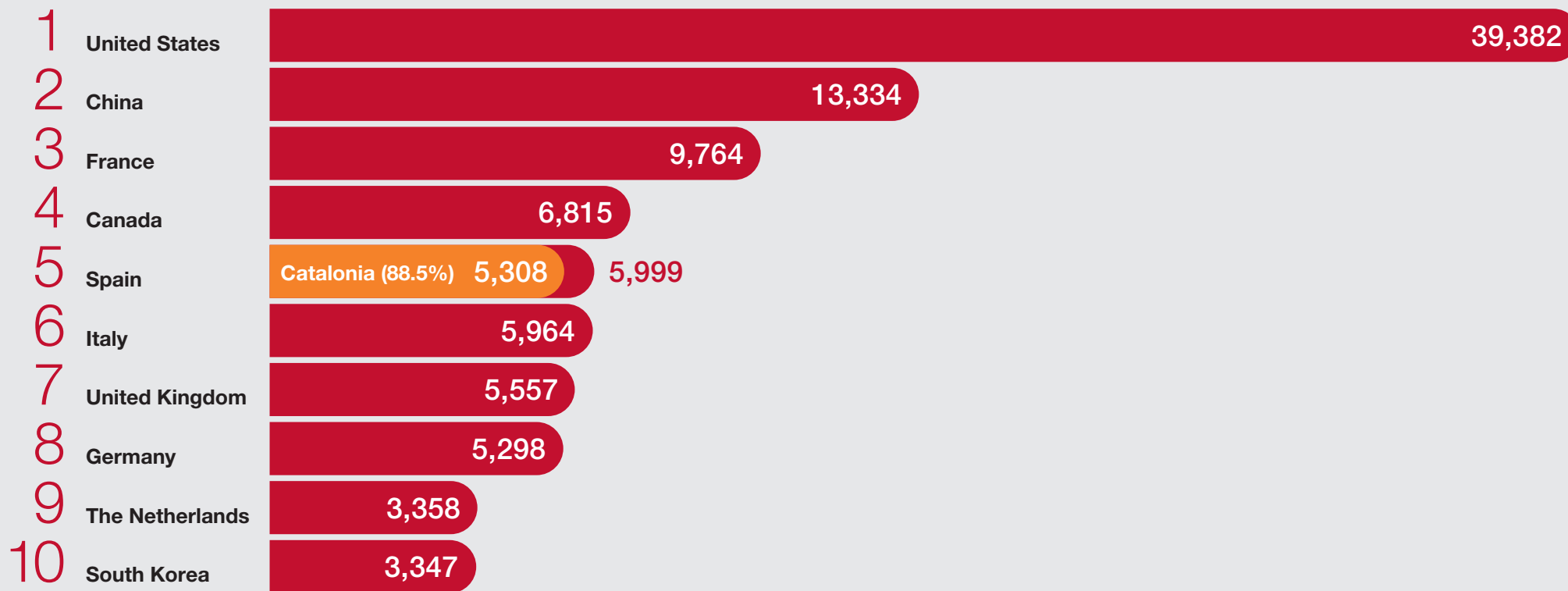
For the 2013-2022 period, the Catalan biomedical sector ranked third in number of scientific publications related to advanced therapies in Europe, behind only Switzerland and the Netherlands. And we are the region to have registered the highest percentage growth (156%) over the same period.

*Fighting cancer with new drugs  
that boost defences*



# Top 10 worldwide

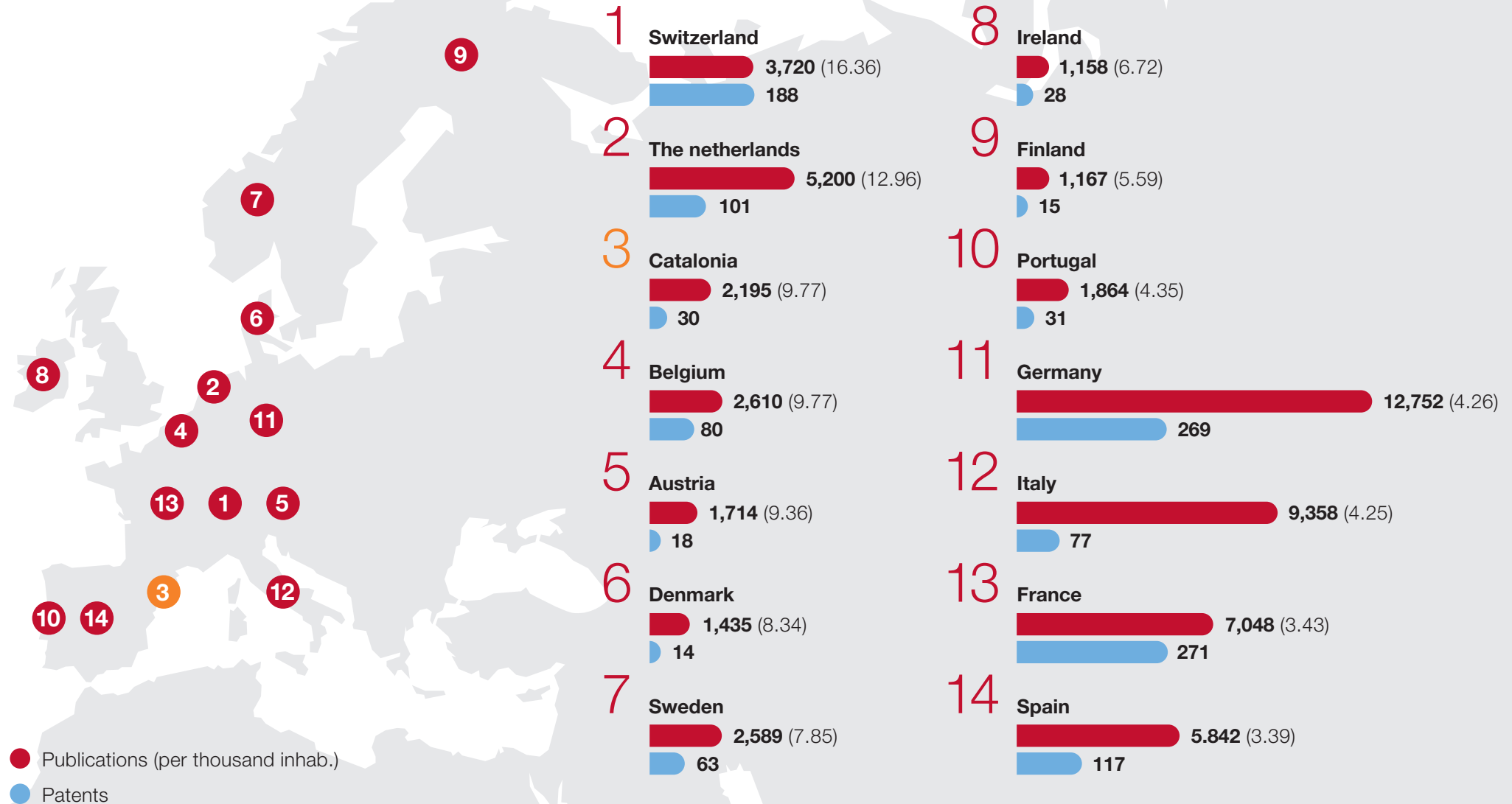
Number of active clinical trials (2023)



*Catalan research institutes rank fifth in Europe in terms of numbers of clinical trials*

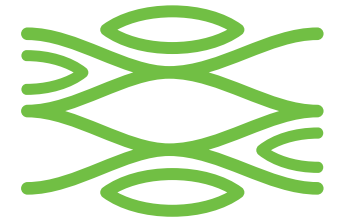
# Total publications and patent applications in advanced therapeutics (2013-2022)

Ranking per thousand inhab.



● Publications (per thousand inhab.)  
● Patents

# Each tissue donor can help over 100 people



## A MULTI-TISSUE BANK

We are **the largest multi-tissue bank in Europe**. A single tissue donor can help over 100 people. Skin, corneas, bones, tendons and heart valves can be reimplanted in patients to restore function to damaged tissues. Each year, the **eye bank** receives over 1,700 donations for corneal transplants, although this still does not cover existing demand. Each year, around 16,000 patients benefit from the tissues from deceased donations processed by the BST. Unlike other donations, tissue is supplied by the BST Tissue Bank to the **rest of Spain and the rest of Europe**.

The BST Tissue Bank's activities are constantly expanding: we supply tissues for transplants, heart valves, arteries, tendons and ligaments. We "make skin" for major burns and have even developed the world's **seven first bio-implants made from stem cells** to repair the dead part of the heart in patients who have suffered a heart attack, in a clinical trial called **Pericord**. This advanced therapy was produced **by the tissue and cell therapy teams in clean rooms**. We are also conducting studies with other research institutes **to make coronary artery bypasses from donor veins**.

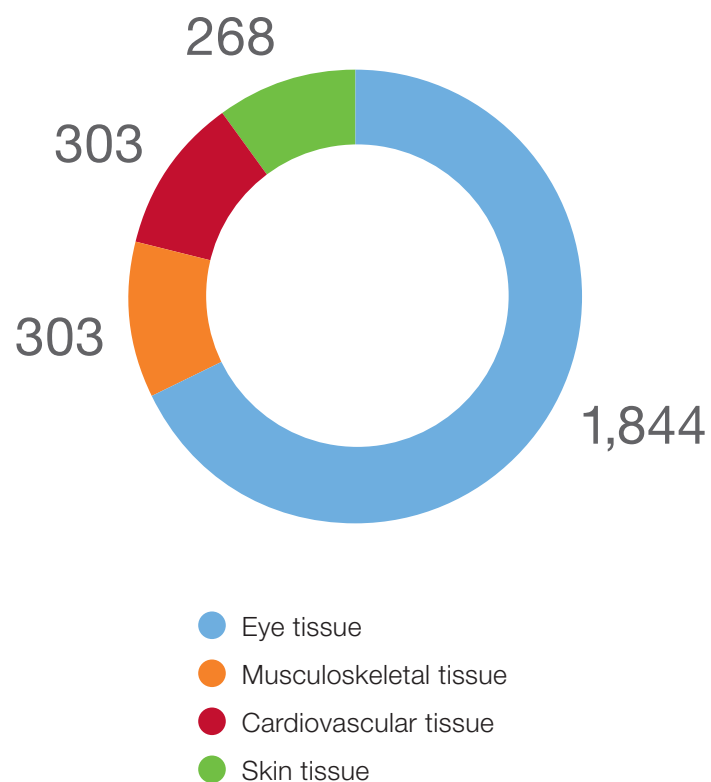
Our proximity to patients, thanks to the donor to patient model, is a source of numerous improvements and allows us to provide optimal solutions, as in the case of Hospital Universitari Germans Trias i Pujol, with whom **we make customised "dermal membranes"** to match surgeons' needs. Advances in regenerative medicine are becoming increasingly important.

The least known donation

*We supply the rest of Spain  
and Europe when necessary*

# Cadaveric tissue donation

2,718 tissues obtained from 1,878 donors in 2023



15,859 tissues distributed in 2023



3,194  
eye tissue units



12,002  
musculoskeletal tissue units



268  
cardiovascular tissue units



395  
skin tissue units

## Tissues sent to the whole of Europe

We are leading the **Egalite** project, which aims to unify criteria for the work of blood, tissue and cell banks throughout Europe. Twelve international organisations are working to harmonise donation practices and devise strategies to make the processing and exchange of biological components between international health systems compatible.

*Corneas are the most highly demanded donor tissue*

*16,000 patients receive skin, bone and eye tissue*

# 20,000 umbilical cords in 25 years

## EUROPE'S LEADING UMBILICAL CORD BLOOD BANK

Our Cord Blood Bank performs the most transplants in Europe and ranks third highest worldwide. This is because we over 25 years old. As a result, at the BST we store over 20,000 umbilical cords frozen at  $-196^{\circ}\text{C}$ , ready to be sent anywhere in the world when needed by a patient. Umbilical cord blood donated by pregnant mothers is used to cure blood diseases such as leukaemia. It is an alternative treatment to bone marrow transplant, since **98% of patients can find a compatible cord donor**.

We are the public bank for **seven autonomous communities in Spain and for Andorra, integrating over 50 maternity hospitals in the concordia programme**.


As a result, **2,000 patients** with leukaemia or bone marrow diseases from all over the world have received transplants in these 25 years.

And the therapeutic uses of cord blood have increased its therapeutic potential five-fold. Today, this stem cell-rich blood is used not only mainly for transplants, but also for other therapeutic uses: platelet-rich plasma to cure patients of ulcers such as diabetic foot (495 treatments a year), platelet gel for severe skin disease in newborns (butterfly skin), eye drops for severe eye injuries (150 treatments a year). And there is more: the creation of a Research Biobank for scientific teams around the world to use to carry out research.

In addition, since 2022, the BST Blood Bank has promoted joint cord blood and placenta donation in Catalan maternity hospitals. Over the last year, 620 mothers have donated placentae and more than 1,200 have donated cord blood. Amniotic membranes have opened the door to new therapeutic possibilities that are still in their infancy, such as regenerative treatments for eye and skin ulcers and assisting the healing of major burns.



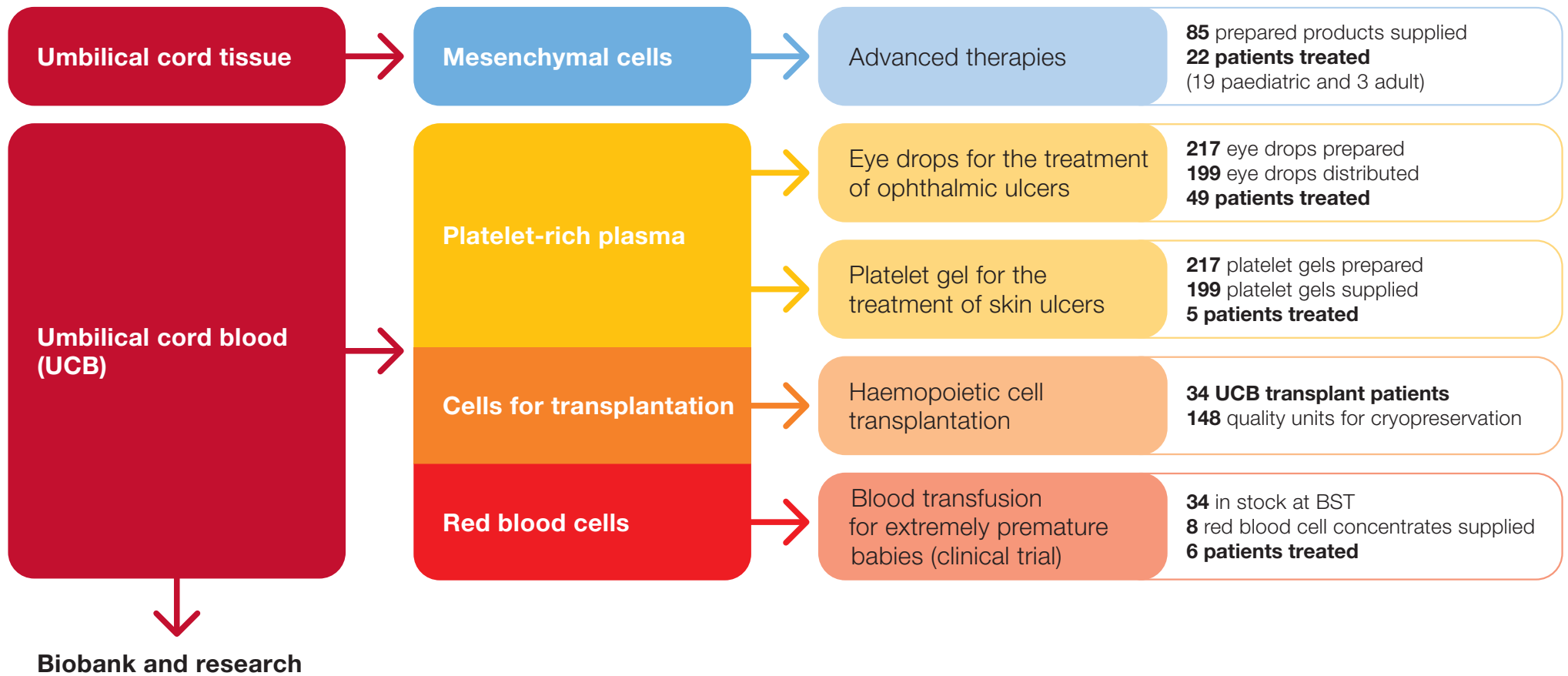




## First simultaneous placenta and umbilical cord blood donation

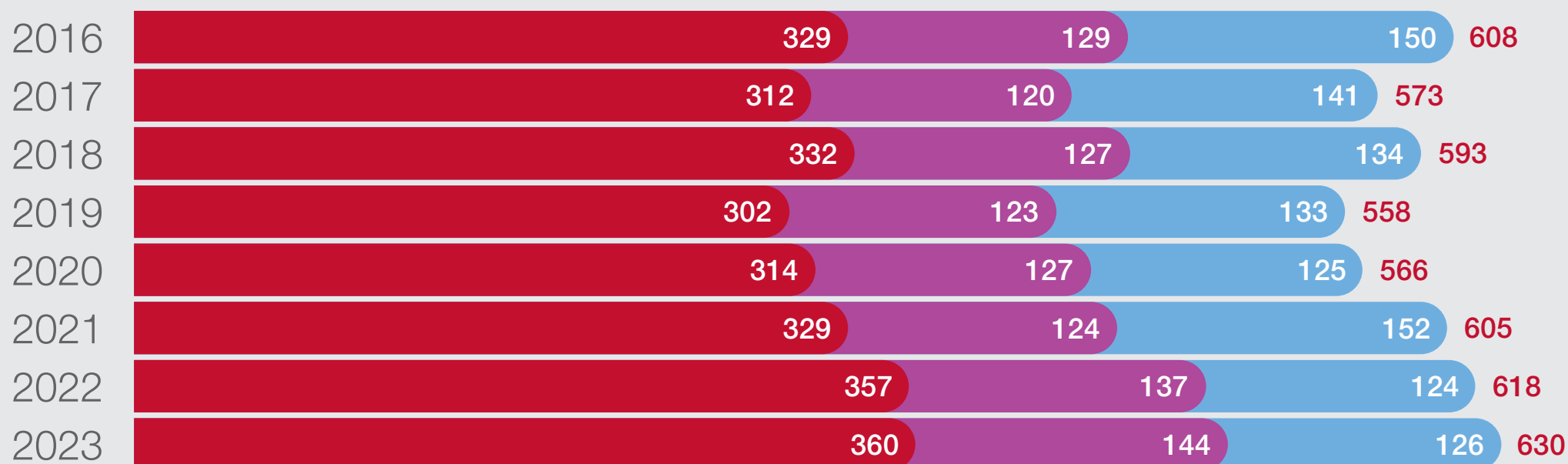
*We store umbilical cord for seven Spanish autonomous communities and Andorra*

## CURRENT UMBILICAL CORD APPLICATIONS



## Trends by type of transplant (OCATT)

- Autologous
- Family allogeneic
- Non-family allogeneic



*98% of patients can find  
a compatible cord*

# The ideal bone marrow donor is male and under 40 years of age

## BONE MARROW DONATION

The BST Blood Bank is responsible for recruiting bone marrow donors through the **Bone Marrow Donor Registry (REDMO)**, managed by the Josep Carreras Leukaemia Foundation. This Spanish registry is part of the international registry network and can therefore access voluntary donors and cord blood units available anywhere in the world, and vice versa. Last year we managed to get 6,013 people to join. There are now almost 75,000 people registered in Catalonia.



76,824

Voluntary donors in the Bone Marrow Donor Registry (REDMO) in 2023 in Catalonia

6,579

new donors registered in the REDMO in 2023 in Catalonia

95

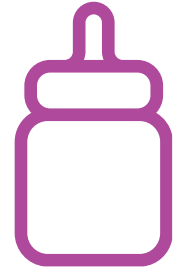
donors have been effective in 2023 in Catalonia

Source: José Carreras Leukaemia Foundation



*We have reached a total of over 600 bone marrow or cord blood transplants per year*

# Breast milk bank



## THOUSANDS OF “MILK SIBLINGS”

We are the largest family in Catalonia because we have over 6,000 milk siblings from the last 12 years. Since it was founded in 2011, the Breast Milk Bank has been feeding **extremely preterm babies** in need. Twelve years on, an average of 600 babies a year in the 21 Catalan maternity hospitals receive milk from mothers who express and donate it while breastfeeding their own babies. In 2023 we reached a total of over 800 donor mothers.

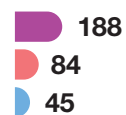
Extreme preterm births are babies born before 32 weeks and weighing less than 1.5 kg in one of the Catalan maternity wards, who have had to spend weeks in an incubator before going home. These preterm babies represent just over 10% of all babies born prematurely.

The Breast Milk Bank processes three types of special milk that is generated by mothers in the first phase of breastfeeding and for this reason, it is much more suitable for extreme preterm newborns. It also makes what we call “skimmed milk” for babies suffering from a condition known as chylothorax. Using centrifugation, the fats in the milk are reduced, as they are not recommended for babies with this disease.

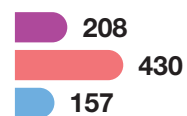
For a premature birth,  
every drop counts



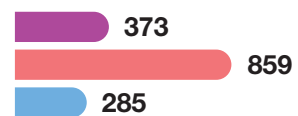
2011



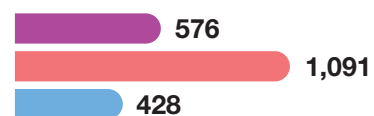
2012



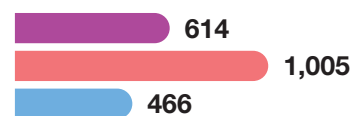
2013



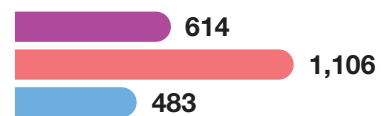
2014



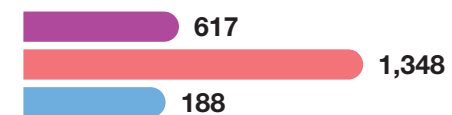
2015



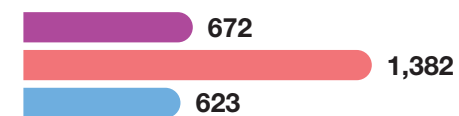
2016



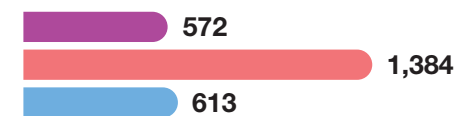
2017



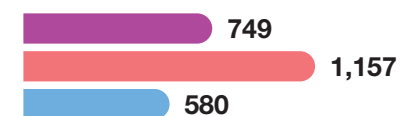
2018



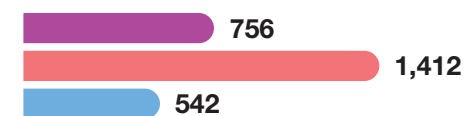
2019



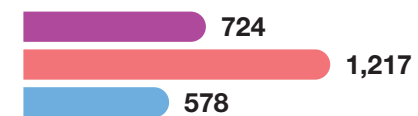
2020



2021



2022



● New donors

● Litres distributed

● Newborns

# A history of community service

## DOING IT TOGETHER MAKES IT POSSIBLE

The building housing the BST headquarters is named in honour of **Dr. Frederic Duran i Jordà** (1905-1957), the Catalan doctor considered the father of blood banks. During the Spanish Civil War, he created one of the first donor registries in the world and he was the first person to devise a method for transporting blood from Barcelona to the front **in refrigerated lorries**, which was then systematised.

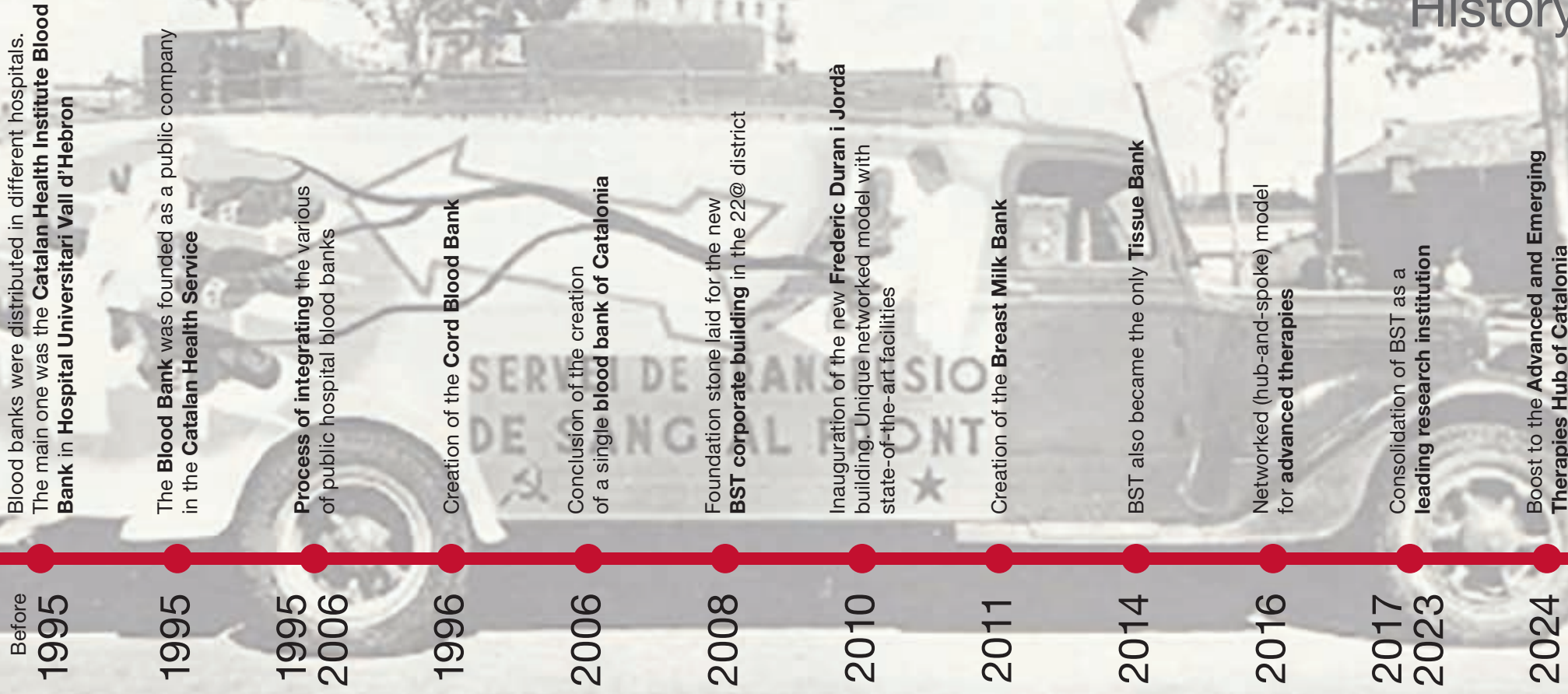
Previously, no one had managed to transport blood to battlefronts anywhere in the world and donation was from vein to vein. The feat was short-lived, as Frederic Duran i Jordà had to flee when Franco's troops reached Barcelona.



Frederic Duran i Jordà, the doctor who brought blood to the front

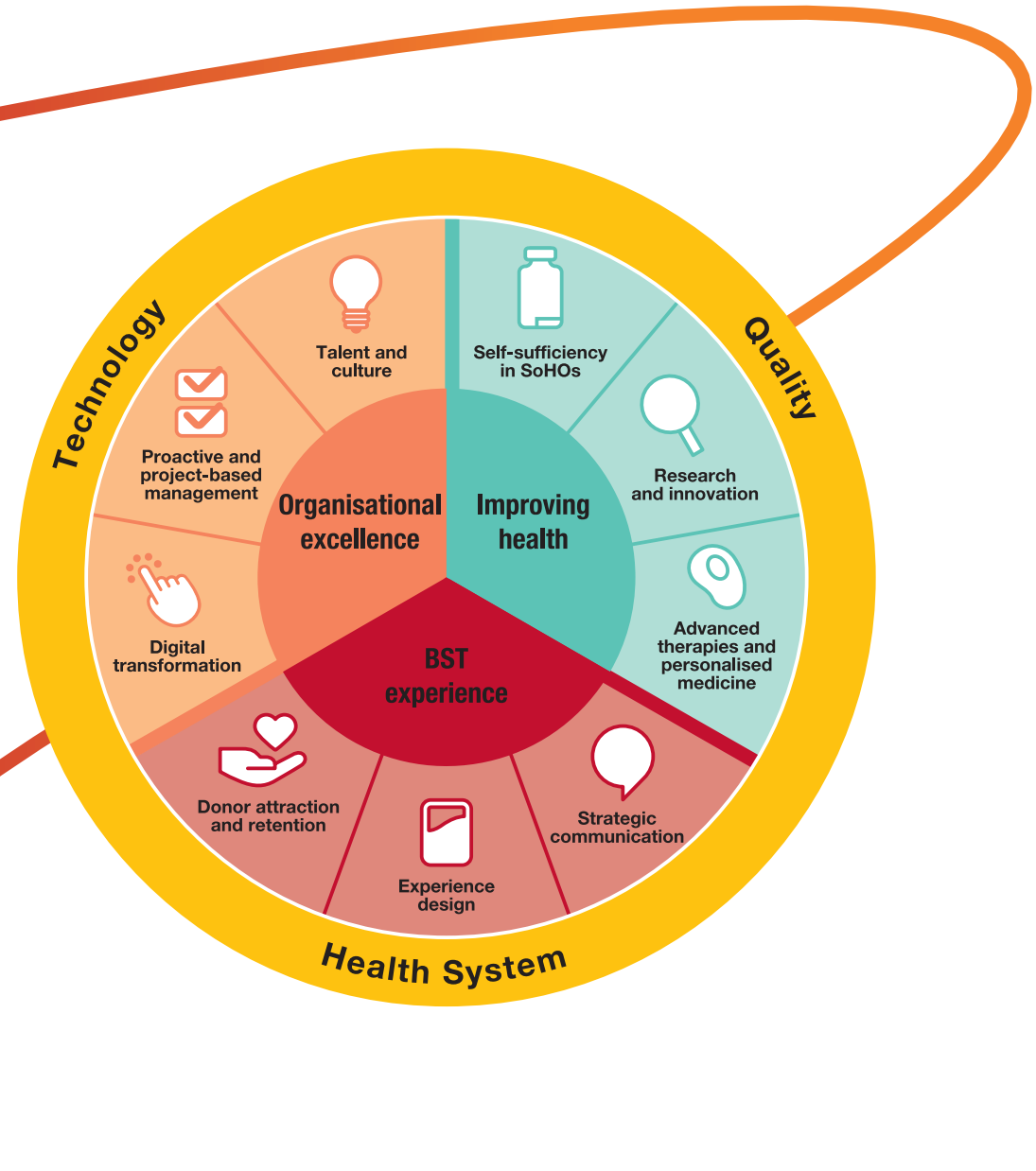


# History



# We build our future

BST's corporate culture is characterised **by teamwork**. In this spirit, we are tracing the roadmap to mark our way forward. The key areas in which we focus our efforts are: improving all possible aspects to provide people with even better health; providing training and the best technology to achieve professional excellence; and achieving the highest quality in our relations with donors, suppliers, social spokespersons, institutions and everyone with whom we work or establish relations. These are the reasons why we continue working.







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