

# REDMO 2022

Public Report



**JOSEP  
CARRERAS**  
Leukaemia Foundation

**REDMO.**  
Bone Marrow Donors Registry

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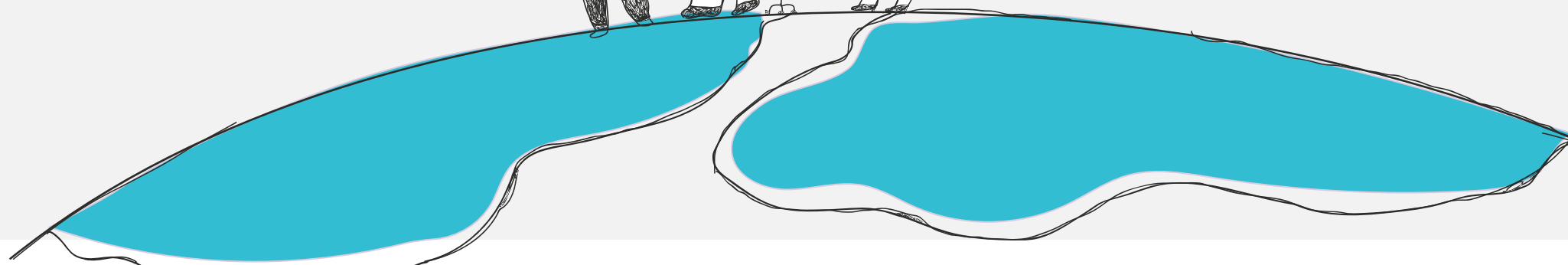
Like every year, Josep Carreras Foundation is presenting a report on the activities of the Bone Marrow Donors Registry (REDMO) over the course of 2022. **This report reflects the results of the three pillars of our work:**

**Coordinating** the processes associated with **actual donations** from our donors and umbilical cord blood units **for public use** stored in Spanish **cord blood banks**.

**Managing** the procedures associated with the more than **460,000 donors** across the country **registered** in our **database**.



**Coordinating** the procedures involved in **searching** for **unrelated donors** for national patients and the subsequent transplants.



Despite all the hurdles created by the pandemic, REDMO increased its activity for the third year running, thanks mainly to the number of donations for international patients.

In addition, we came very close to achieving the KPIs suggested by the national and international authorities. To achieve our objectives, it is essential to promote donations so that our registry continues growing and to strengthen our donor characterisation process with a view to increasing donors' visibility and efficiency within the international database. This will also improve the self-sufficiency rate, which is understood as the number of Spanish patients who receive a transplant from a national donor.

With respect to the coordination of processes for national patients, the number of transplants from unrelated donors carried out in Spain decreased slightly compared to 2021; however, the work carried out in 2022 was still much higher than pre-pandemic levels, despite the fact that almost half our procedures were interrupted at some point for various reasons, which made our work even more complex. In addition, we coordinated more donations from outside Europe in 2022 than ever before.

Finally, this report reflects the work carried out by our registry to maintain the **required quality standards**, especially in light of our future accreditation by the **World Marrow Donor Association (WMDA)**. REDMO maintains constant collaboration with all organisations related to transplantation and unrelated donation, from transport companies and healthcare centres through to Regional Transplant Coordinators, the National Transplant Organisation, the Ministry of Health and international registries.



The work described in this report would not have been possible without **collaboration** between **our team** and the **entities linked to REDMO**.



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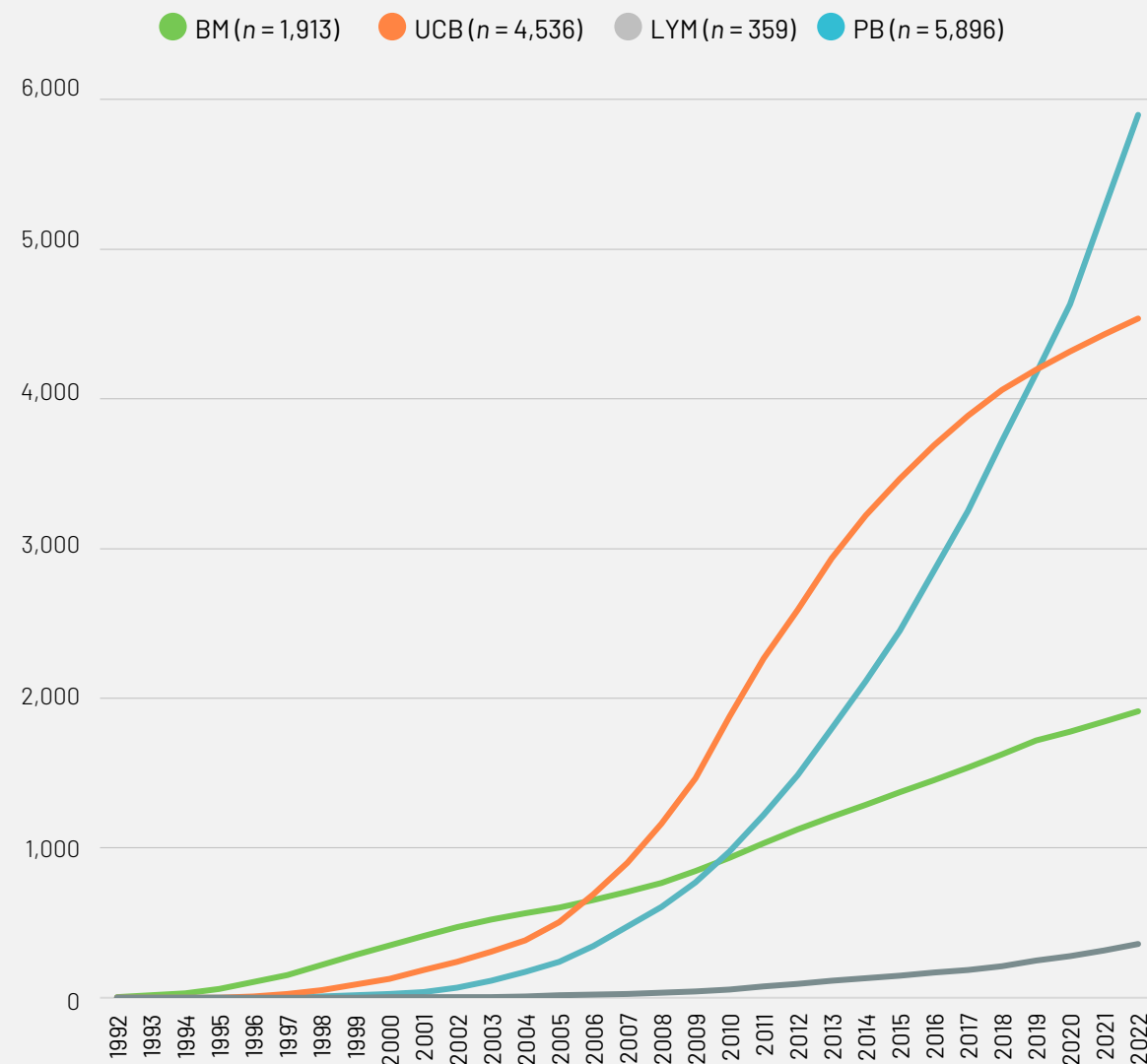


# REDMO's global activity 1991-2022

		BM/PB/UCB/LYM DONORS		
		Spanish	Foreign	Total
PATIENTS	Spanish	1,908	6,854	8,762
	Foreign	3,942		3,942
<b>Total</b>		<b>5,850</b>	<b>6,854</b>	<b>12,704</b>

Since REDMO was created in the 1990s, we have registered almost 541,000 donors in our database, shipped more than **14,000 blood samples** from our donors and managed more than **17,000 searches** for Spanish patients.

Thanks to all this activity, REDMO has coordinated the collection, transport and infusion for **12,704 transplants** for patients all over the world.



# REDMO's team



## Management

Antoni Garcia Prat



## Direction

Dr. Enric Carreras  
Dra. Juliana Villa



## Institutional Coordination

Núria Marieges



## Umbilical Cord Blood Units

Montserrat Rebagliato



## Financial Management

Carolina Salillas  
Raissa Dardet



## Communication

Marta Fernández



## Technical Coordination

Cristina Fusté  
Mar Sánchez



## Donors

Cristina Bueno  
Jessica Gallardo  
Montserrat Marieges  
Núria Giménez



## Coordination of National Collection

Alberto Míguez  
Cecilia Montesinos  
Isabel Monteagudo  
Jordi Martínez  
Júlia Martí  
Mariam Pérez



## National Patients

Ana Montesinos  
Ana Pertusa  
Beatriz Patiño  
Clara Rosés  
Emma Montenegro  
Mavi Díaz  
Svetlana Kolobukhina



## IT

Gerard Leris  
Mario Gran



## Quality & Data Protection

Anna Giner  
Iris Bargalló



# News in 2022



## Records in 2022

In 2022, REDMO was more active than ever: 1,123 new searches for Spanish patients were carried out, 1,544 medical questionnaires were completed by Spanish donors to confirm their suitability and 854 patients around the world received bone marrow donations coordinated by REDMO. These figures would not have been possible without the participation of all members.



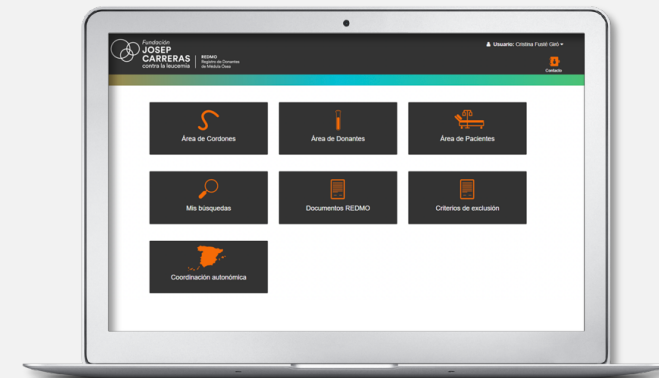
## Ninth place in the world!

In June, the World Marrow Donor Association (WMDA) presented an annual activity report on registries around the world. This report indicated that Spain **ranked ninth in the world and fourth in Europe in the supply of donations for transplants.**



## International accreditation

Being accredited means that WMDA recognises REDMO as a donor registry that ensures that every stage of the process complies with all international standards. In 2022, we passed the mid-cycle surveillance, and the next step in the process is obtaining accreditation.



## Professional website

REDMO's professional website seeks to optimise resources and improve communication with collaborating entities. In 2022, we added transplant centres and the management of unrelated donor searches. We currently have around **400 users.**



## Participation at conferences

REDMO has actively participated in the main international donation and transplantation conferences.



## Best Video Award at the WMDD

WMDA named the video we produced to mark World Marrow Donor Day (WMDD) as the best audiovisual project of the event.



## REDMO satisfaction survey

Every year, REDMO sends a satisfaction survey to all collaborating centres (transplant centres, donor centres, collection centres and cord banks) to find out how they rate our management and resolution of incidents, the functionality of the professional website, transport company services, etc. We can confirm that REDMO was rated as excellent (4.6 points out of 5) and we will take all comments into account to improve our processes.



# Figures for 2022

## Donors:

The National Bone Marrow Plan set our target to reach half a million donors by 2022.

Unfortunately, the number of new donors in our registry has fallen significantly since 2018.

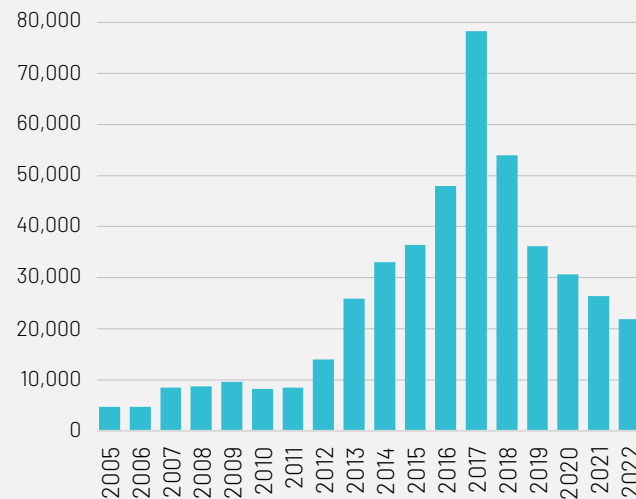
In an attempt to reverse this trend, a national campaign to promote donation will be launched.

Despite the fact that we failed to achieve the plan's target in terms of the number of donors, our efforts made so far to improve typing and reduce the age of donors have improved the efficiency of our registry, such that the rate of requests for confirmatory samples with respect to the number of registered donors is increasing every year. For that reason, requests for extended typing have fallen.

Even so, it is necessary to continue improving the quality of donor data and to provide information regarding their blood group and CMV serology. This will have a positive impact on self-sufficiency, which is understood as the number of Spanish patients who receive a transplant from a Spanish donor; according to the National Bone Marrow Plan, this should happen in 35% of cases.

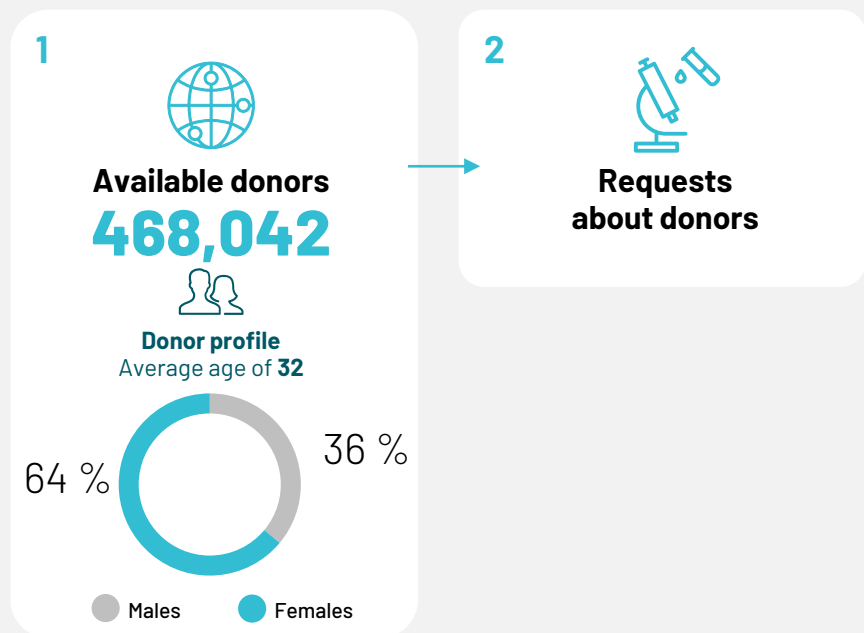
It is also necessary to improve the time it takes for donors to be registered with REDMO. The average time stipulated in the plan is 45 days, while the average in 2022 was 80 days.

Finally, we came very close to achieving the performance indicators proposed by WMDA in terms of both the confirmatory sample shipping time and the availability of donors at the time of the confirmatory sample.



# A donor's journey

Infographic on the process:



Extended typing\*

**1,035**  
requests



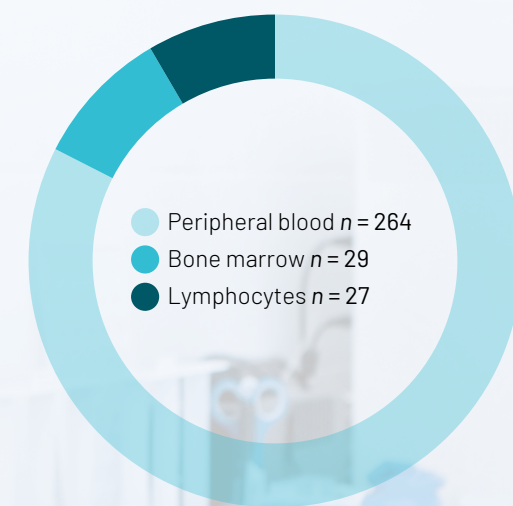
Blood sample for confirmatory typing\*\*

**1,604**  
requests



**Haematopoietic progenitor donations**

**320**  
actual donations

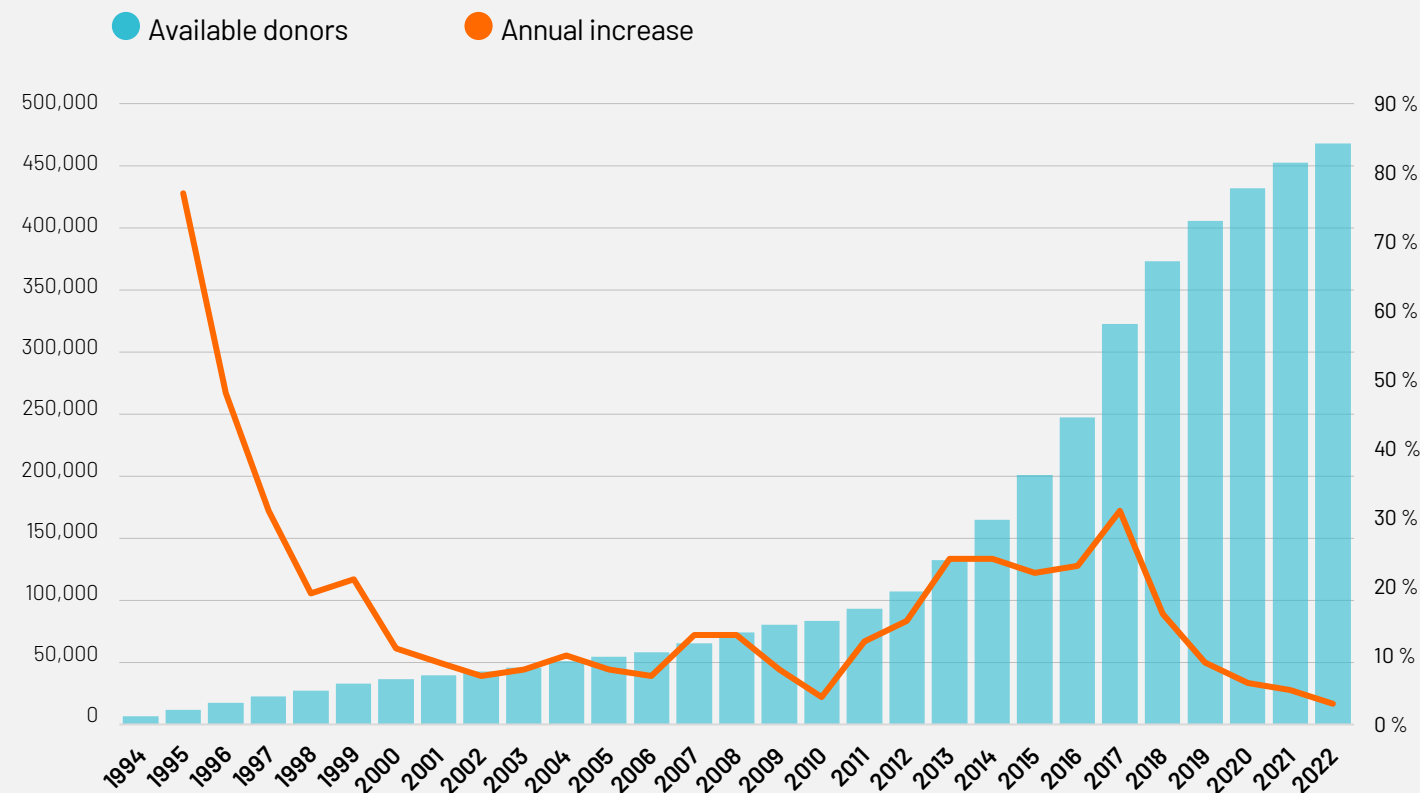


\*Typing: genetic markers necessary to assess compatibility between a donor and a patient.

\*\*Confirmatory typing: verification of the donor's typing based on a new blood sample by the transplant centre.

# 1. Available donors

## Evolution of the number of available donors.



**468,042\***

donors available in REDMO's database

The donor registration process begins by checking that the donor is aware of the commitment involved in being a bone marrow donor. If the donor accepts this commitment voluntarily and altruistically, he or she must sign a consent form and provide a blood or saliva sample to perform typing.

**A total of 22,995 donors were registered in 2022.**

Once registered, the donor's demographic and typing data is entered into the REDMO database by the donor centre and the donor then becomes part of the global donor database.

**In 2022, 21,903 donors were added to our registry, 61% of the target set by the National Bone Marrow Donation Plan.\***

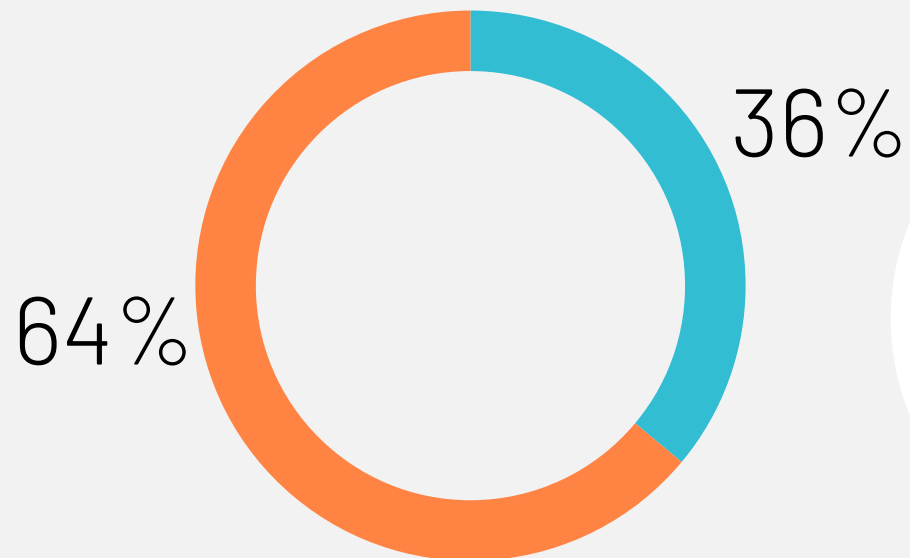
This target involved adding 36,000 donors to the registry in 2022 to reach a figure of 500,000 donors available in Spain.

\*The number of donors registered with REDMO may not correspond to the number submitted by the National Transplant Organisation or the Regional Transplant Coordinators. REDMO only considers people to be valid donors when their basic information has been entered in full and their HLA typing has been performed. By contrast, the National Transplant Organisation and the autonomous communities consider any person who has provided consent and a sample for subsequent typing to be a donor.

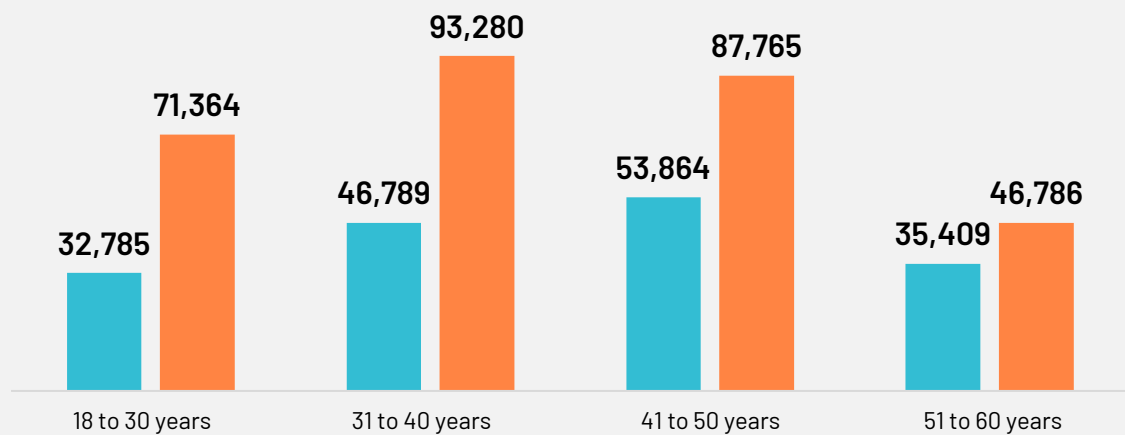


# 1. Available donors - Donor profile

● Women ● Men (n = 468,042)



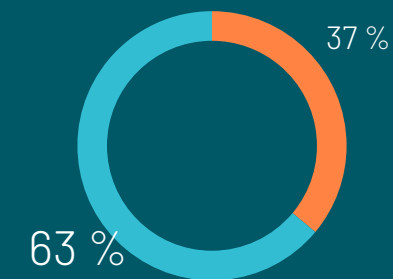
**32 years**  
 Average age of available donors  
 64 % female and 36 % male



The most important characteristic when choosing a donor, apart from histocompatibility, is age. The younger the donor, the better the transplant outcome.

In addition, when transplant centres can choose between several donors, they usually prefer male donors over female donors.

Therefore, if we look at the profile of actual donors, we can see not only that they are young (the average age is 27 years), but that the ratio between men and women is the reverse of the ratio in our registry.



To improve efficiency, therefore, we need to bring down the age of our donor population and also increase the proportion of men.

## 2. Requests about donors - Haematopoietic progenitor donations

Once donors' full details have been added to REDMO, they are available to any patient in the world who requires a donor. In the process of searching for an unrelated donor for a patient who needs a transplant, it may be necessary to carry out extended donor typing\* (if not complete) or to request a sample to confirm the donor's typing profile, availability or physical condition.

### a. Extended typing

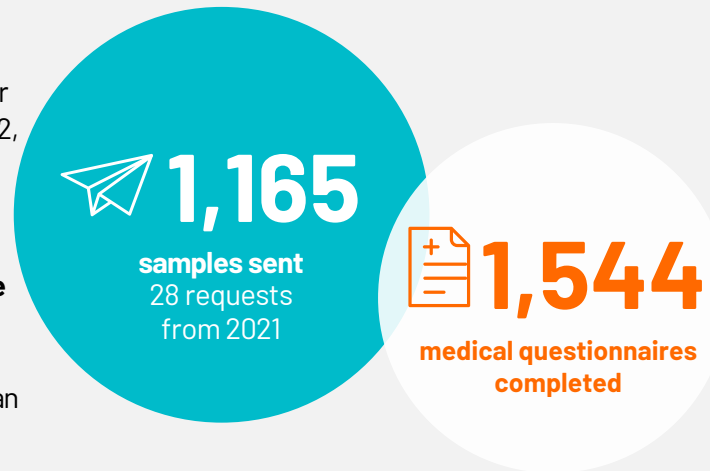
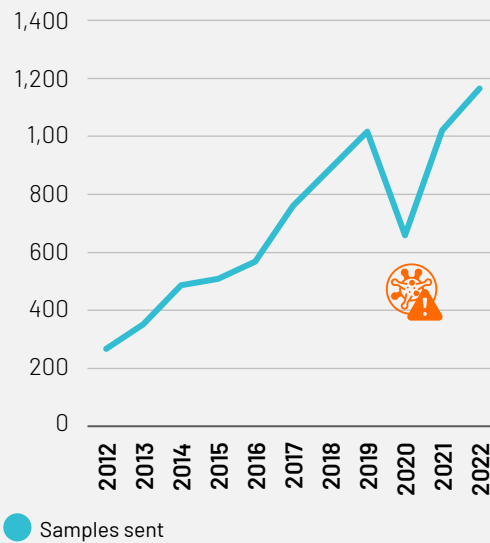
Given that our donors have increasingly complete typing information before they register, the number of requests for extended typing is decreasing year after year.

A total of 1,035 requests for extended typing were handled in 2022. On average, the results were sent within 14 days, in accordance with the KPIs set out in the National Bone Marrow Plan.

### b. Confirmatory samples

A total of 1,604 blood sample requests for confirmatory typing were handled in 2022, an increase of 20% compared to 2021.

**Seventy-nine percent of donors who were contacted** for confirmatory samples were available. It should be noted that **8% of those who cancelled did so for medical reasons** (most of them temporary), while 5% were voluntary cancellations (which represented an increase of 2% compared to 2021).



The **Community of Madrid** was the autonomous community with the most complete characterisation and information relating to its donors. Of its **62,303 donors**, 64% were under the age of 40 and 38% were men. In addition, 97% had HLA typing and 96% had ABO typing information. All this means that its donors are more visible and eligible for transplant centres.

It is also worth noting that not only did it achieve its goal in terms of new donors in 2022 (n = 5,276), but its response times for extended typing and sample requests for confirmatory typing were below the Spanish average: 13 and eight days, respectively. Its donors had availability of 88%, while the Spanish average was 79%.

\* **Typing:** genetic markers necessary to assess compatibility between a donor and a patient.

## 2. Requests about donors - Haematopoietic progenitor donations

Actual donations from REDMO donors have doubled since 2017; the figure for 2022 was 320 donations. Meanwhile, cord blood donations appear to have levelled off, with around 100 shipments a year.

Requests for REDMO donors increased both nationally and internationally (40% higher than in 2021). Requests for bone marrow and lymphocyte donations also increased noticeably.

REDMO was more efficient in 2022, since the number of donor requests outstripped the number of registered donors.

In relation to the performance indicators on actual donations, it is worth noting that the number of cancellations due to donor-related reasons remained low and we were close to achieving the figure suggested by WMDA.

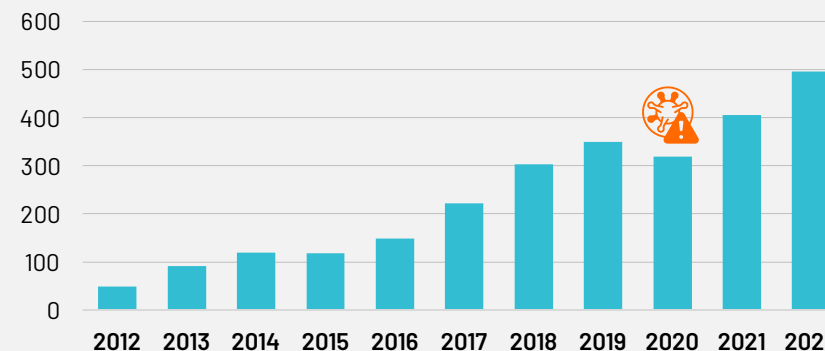
In addition, we set some historical records: **37 donations coordinated in a single month by REDMO coordinators**, 97 donations coordinated in a year in one autonomous community (Madrid) and 66 donations coordinated in a year in one collection centre (BST Sant Pau-Barcelona).

Meanwhile, the percentage of interrupted procedures remained stable with respect to the previous year, although the proportion of voluntary cancellations by donors increased and three of our donation products were not infused.

With respect to donations from umbilical cord units, the downward trend in both the incorporation of new units and the total number available continued. However, it should be noted that the number of shipments from a single bank (Andalusia) increased with respect to 2021.

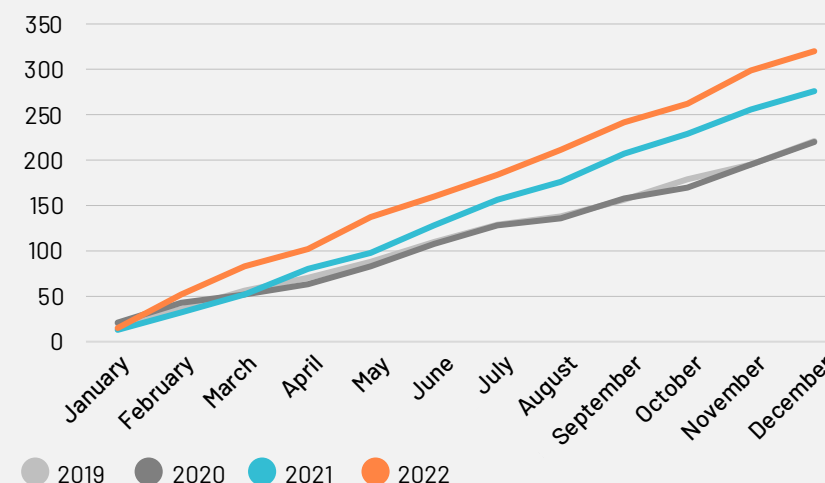
Moreover, we wanted to highlight the **new strategy under the National Umbilical Cord Blood Plan**, which will make it possible to identify a list of high-quality units with a view to increasing the efficiency of shipments.

Evolution of collection requests



**496**  
collection requests  
55 % international (▲40 %)  
45 % national (▲6 %)

Comparison of actual donations 2019-2022



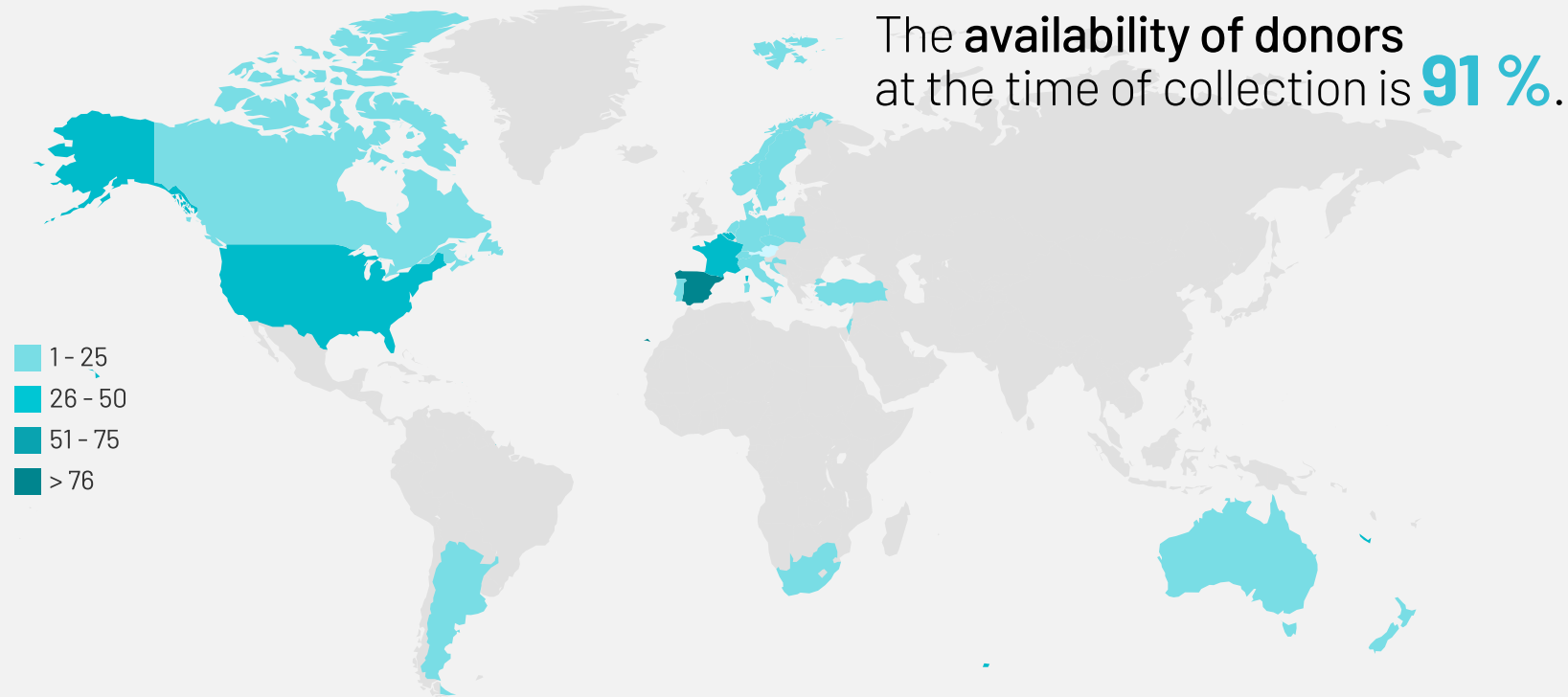
**320**  
collections carried out  
▲16 % - BM 29,  
PB 264, LYM 27

BM: bone marrow  
PB: peripheral blood  
LYM: lymphocytes



## 2. Requests about donors - Haematopoietic progenitor donations

Distribution of donations by destination country (n = 320)



The **availability of donors** at the time of collection is **91 %**.

The growth in some countries such as the **United States** (52%), **France** (56%) and **Germany** (40%) in 2022 compared to 2021 is worth mentioning.

From collection request to actual donation, 33% of the processes were interrupted; however, this resulted in the definitive cancellation of the donation process in just 18% of cases.

The profile of actual donors was male (63%), with an average age of 27 years and patient-donor compatibility of 10/10 in 70% of cases.

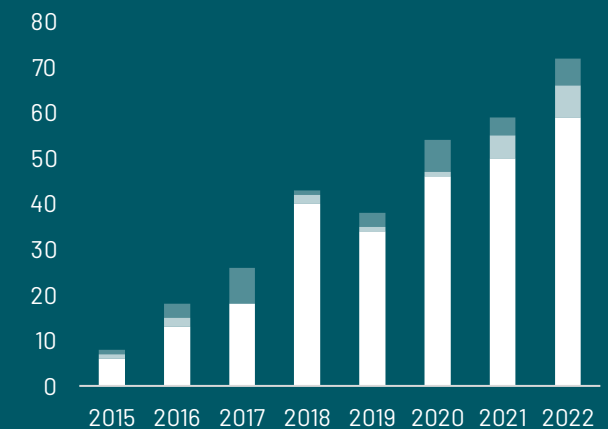
Requests for male donors increased by 16% and for female donors by 24% compared to 2021. In 2021, one in every 668 male donors and one in every 2,778 female donors donated. In 2022, these figures were one in every 574 male donors and one in every 1,481 females.



### Catalonia

BST - Sant Pau carried out **66 collections in 2022**: 59 peripheral blood (22% of the total) and seven lymphocytes. This apheresis unit began operating for REDMO in 2015 and had already carried out 285 donor collections in that seven-year period (266 peripheral blood and 19 lymphocytes).

Meanwhile, Hospital Clínic in Barcelona collected **33 bone marrow donations from unrelated donors** in that same period, thus positioning itself as the centre with the most collections of this type in Spain.



BM: bone marrow  
PB: peripheral blood  
LYM: lymphocytes

■ PB ■ LYM ■ BM

# Figures for 2022

## Umbilical cord blood units:

When a request for reservation and/or shipment of an umbilical cord blood unit for transplantation is received, it is necessary to carry out a study to validate the quality of the unit and thus confirm its suitability for transplant.

**In 2022, 132 requests for reservation of umbilical cord blood units were received.**

Once the umbilical cord blood unit has been validated, the unit can be shipped **if the transplant centre requests it.**

**In 2022, 102 units for transplant were shipped** to different countries, including the United Kingdom (28), the United States (23), Colombia (13), France (10), the Netherlands (9), Spain (7) and other countries (12). Before they are shipped, the units are cryopreserved in tanks to maintain their temperature and prevent loss of viability during shipping.

### Umbilical cord blood units (UCB) available per banks.

Bank	Number of UCB units*
Andalusia	22,136
Catalonia	19,028
Madrid	7,940
Galicia	6,377
Valencian Community	4,996
Basque Country	1,771
VidaCord	124
Ivida	37



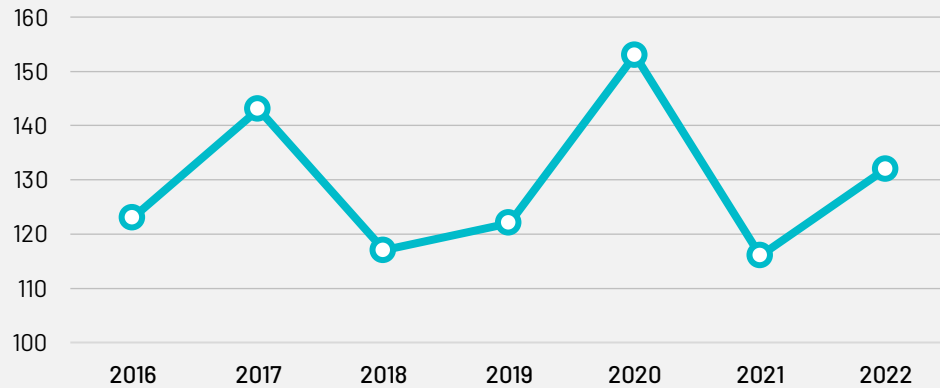
# 62,409

cord units available,  
299 added in 2022.

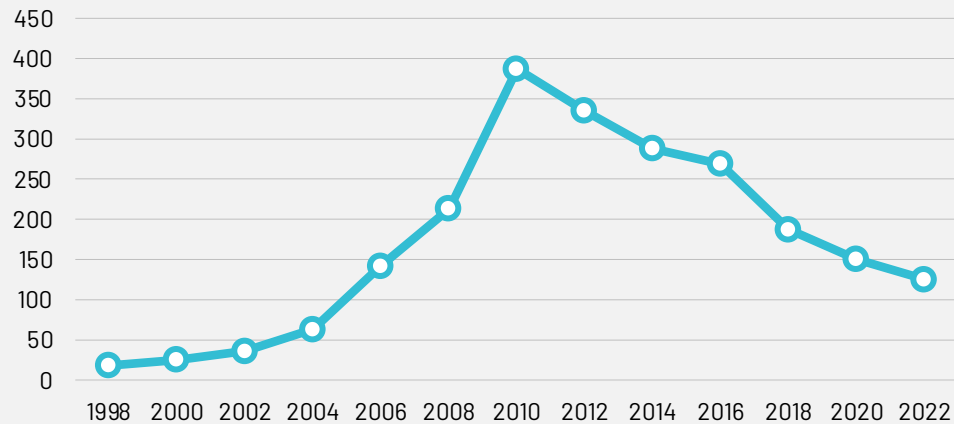


# Umbilical cord blood units

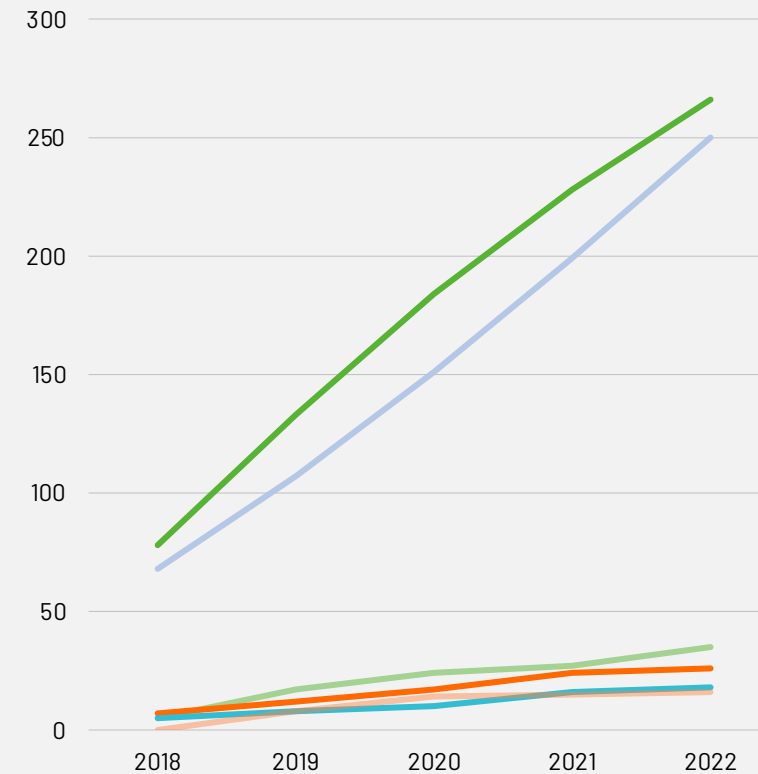
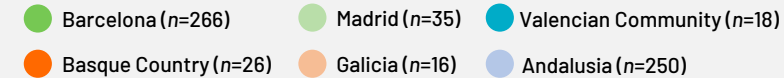
Evolution of requests for reservation of Spanish umbilical cord blood units.



Evolution of umbilical cord blood unit shipments (UCB).



Cumulative evolution of shipments by banks in the last five years.



Since 1997, Spanish banks have supplied 3,627 cord blood units for patients across the world: 740 for national patients and 2,887 for international patients from 38 different countries.

The top five recipient countries for these units were the **United States** (21%), **Spain** (20%), **France** (16%), **Colombia** (10%) and the **United Kingdom** (6%). 2010 was the year when most units were sent ( $n = 342$ ).

The blood cord bank in Catalonia supplied 55% of these units and the bank in Andalusia 26%. In 2022, the cord bank that sent the most units was Andalusia (51).



# Figures for 2022

## Patients:

The most notable aspect relating to the coordination of procedures for Spanish patients was the rise in interrupted processes. Almost half (44%) of requests for lymphocyte transplantation or donation for our patients were postponed or cancelled. This not only increased the amount of work, but also made it more complex, since the donation process had to be resumed with the same or an alternative donor.

In addition, it is notable that **10% of these interruptions were due to Covid-related reasons** (infections in both donors and patients).

Another aspect worth noting in this regard was the number of transplants coordinated with donors from outside Europe, especially in the United States and Brazil.

With respect to the patient profile, the age of adult patients both at the beginning of the search process and during transplantation increased significantly; now they are 20 years older than in the early 2000s.

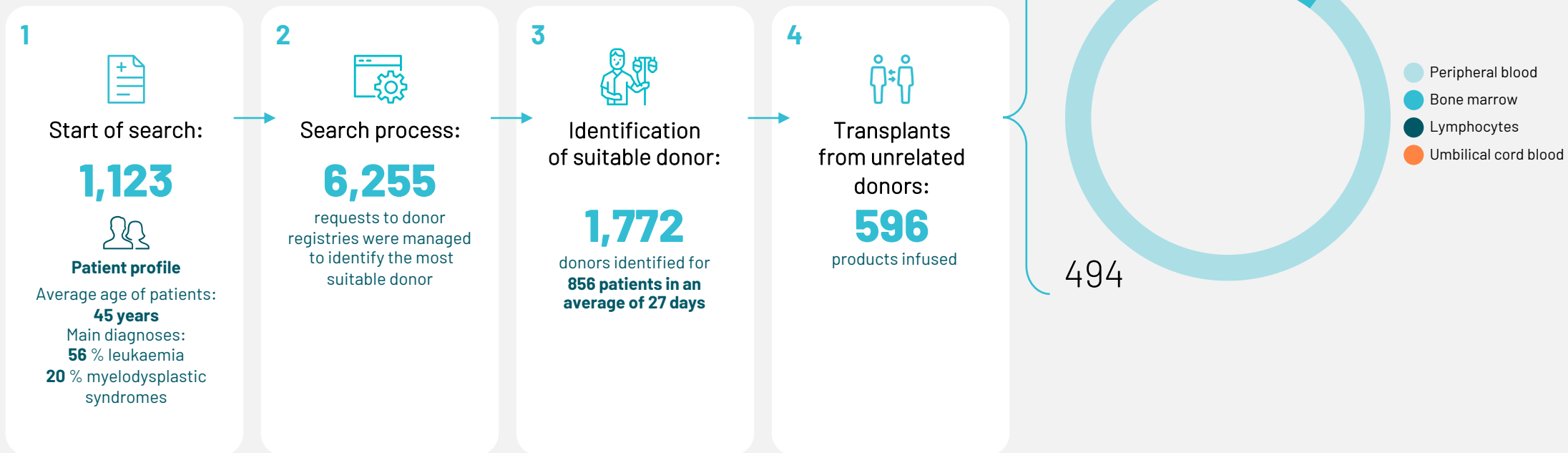
However, despite the fact that the number of searches initiated continued with the same upward trend seen in previous years, the number of donors identified decreased by 8% compared to 2021.

The reasons for this are diverse and require more in-depth analysis. The time taken to identify donors remained stable, as did the self-sufficiency rate, understood as the number of transplants carried out with donations from a REDMO donor.

Lastly, although the total number of transplants decreased compared to 2021 (which was a record year), the figure was still considerably higher than in pre-pandemic years, which highlights the upward trend in transplants from unrelated donors.



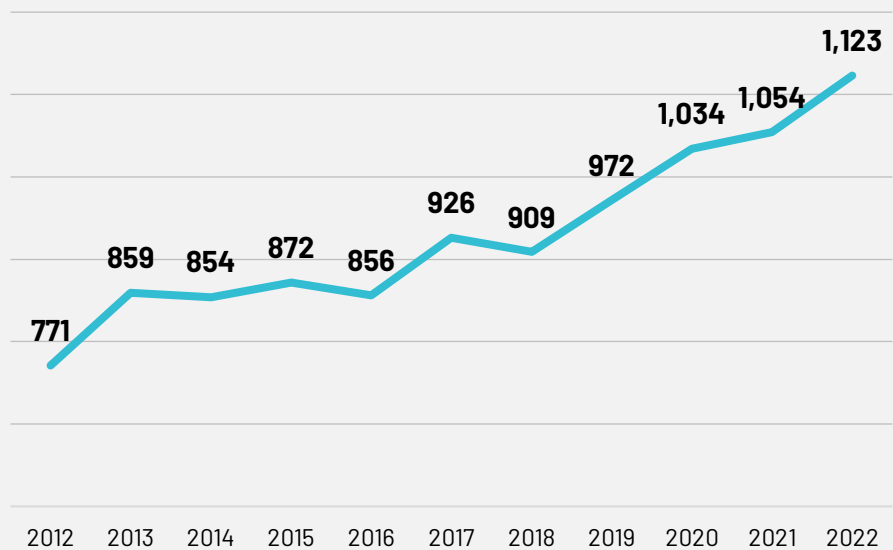
# A patient's journey





## 1. Start of search

**1,123** searches initiated  
(7% increase)



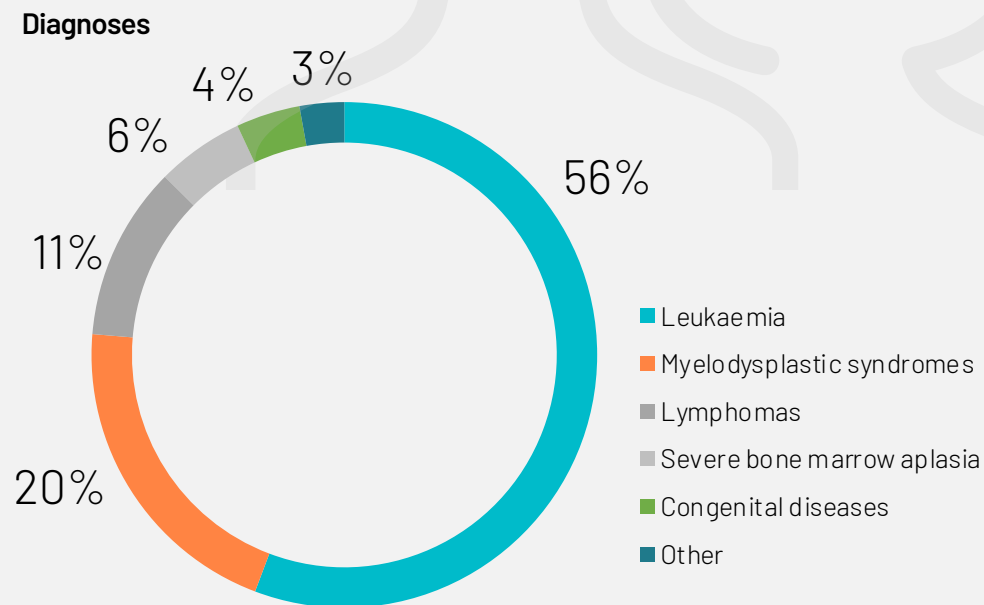
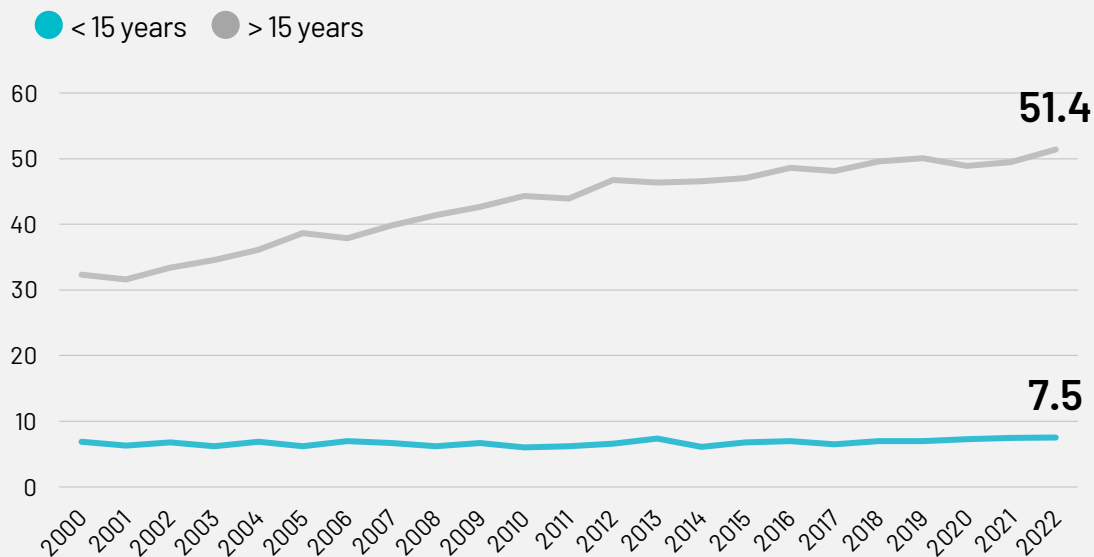
# 1. Start of search - Patient profile

A comparison between 2012 and 2022 patient profiles reveals **two major changes**:

The average age of adult patients receiving transplants rose from 44 to 50 years (it was 29 years in 2000).

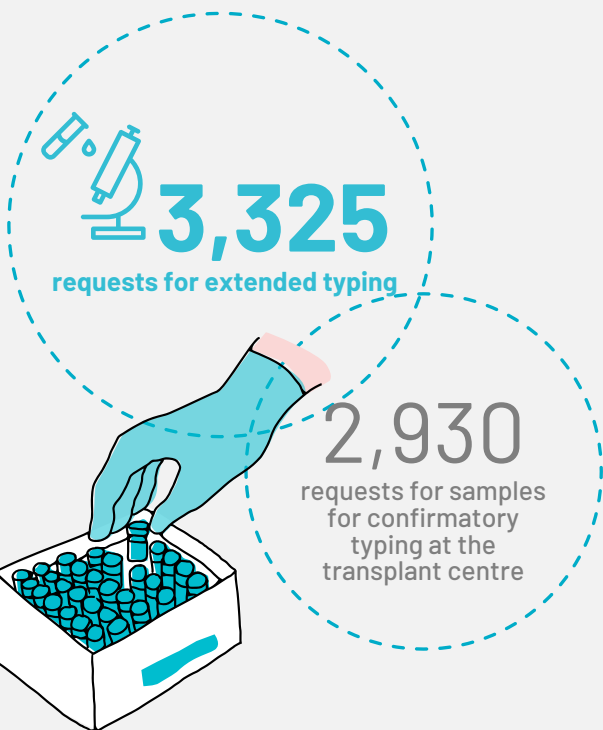
With respect to diagnoses, it is also clear that transplants for patients with leukaemia or lymphoma decreased by 3% and 5%, respectively. However, myelodysplastic syndromes increased by 10% and bone marrow aplasia by 2%.

## Evolution of patient age



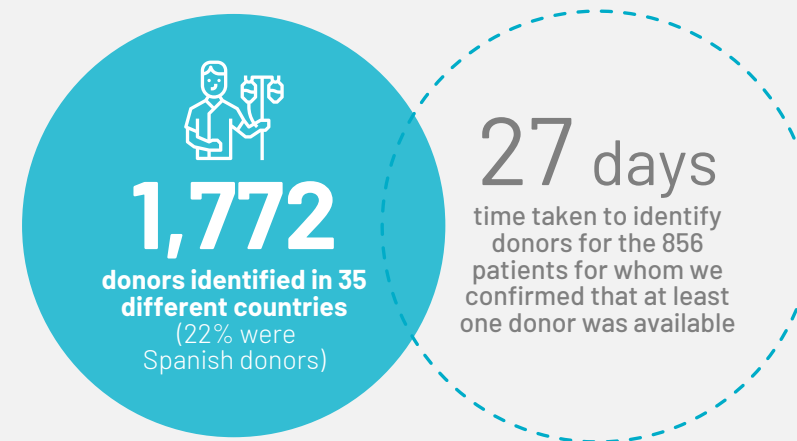
## 2. Search process

During the search process, the patient coordination team selects potential donors for each patient. If necessary, extended donor typing is carried out, samples are requested for confirmatory typing and information is requested on the viability and availability of donors with the aim of offering suitable donor(s) for each patient in the shortest possible time.

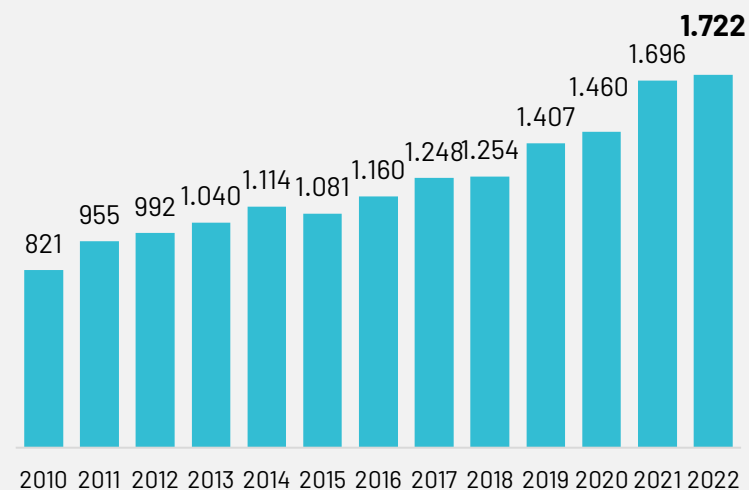


## 3. Identification of donors

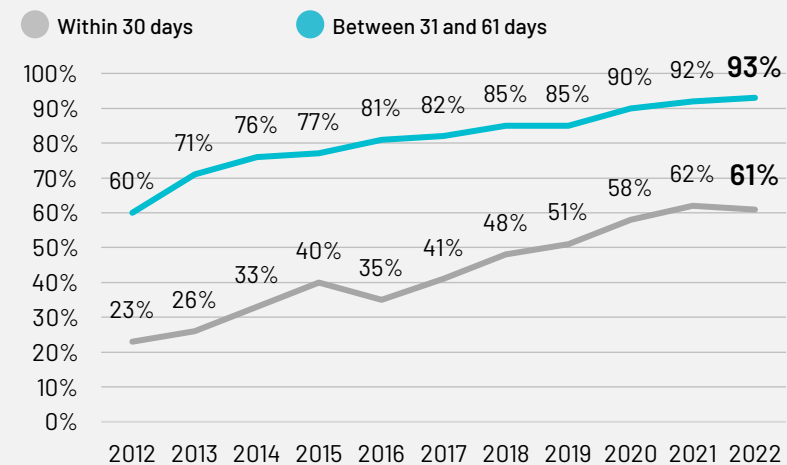
«Identification of a donor is considered to be the moment when donor typing is confirmed at the laboratory associated with the transplant centre and the registry confirms that the donor is viable and willing to proceed with the donation process. At that moment, we inform the transplant centre that we have found a donor for their patient».



Número de donantes localizados por año.



Time taken to identify donors.



## 4. Transplants from unrelated donors

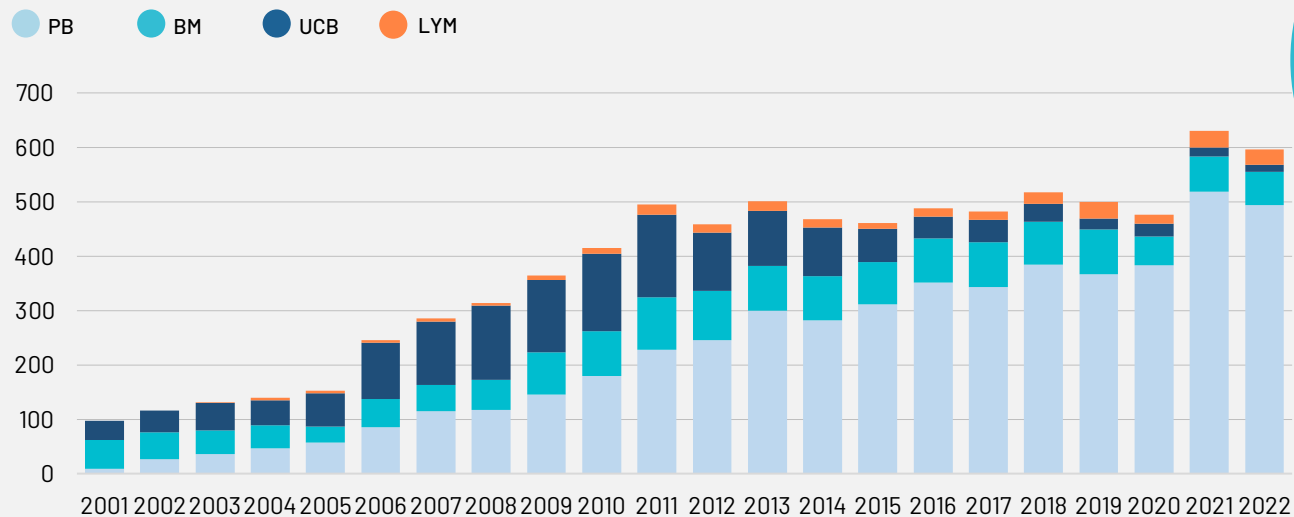
Coordinating a transplant process involves arranging the donation dates requested by the transplant centre with the donor's registry and the cell transport company. Since the beginning of the pandemic, all these processes have been continuously affected, so 2022 was the year with the highest number of disruptions.

In 2022, more than 450 processes were interrupted. Just 32% of these resulted in the definitive cancellation of the transplant.

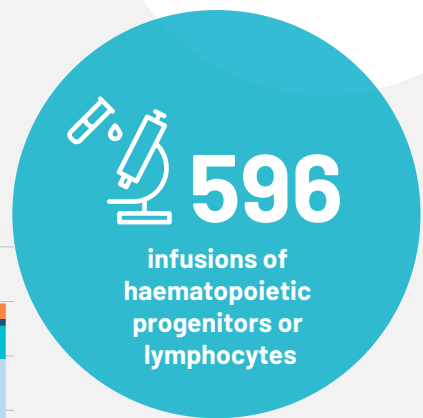
More than half of the cancellations (52%) were due to reasons related to the patient's health. Of the 48% related to donor causes, 27 were cancelled for health reasons and 26 donors decided that they no longer wished to proceed with the donation.

Despite this, 568 transplants and 28 lymphocyte infusions were performed in 2022. Although this represented a small decrease (5%) compared to 2021, these figures remain very positive compared to those of the last 10 years.

### Haematopoietic transplants in 2022

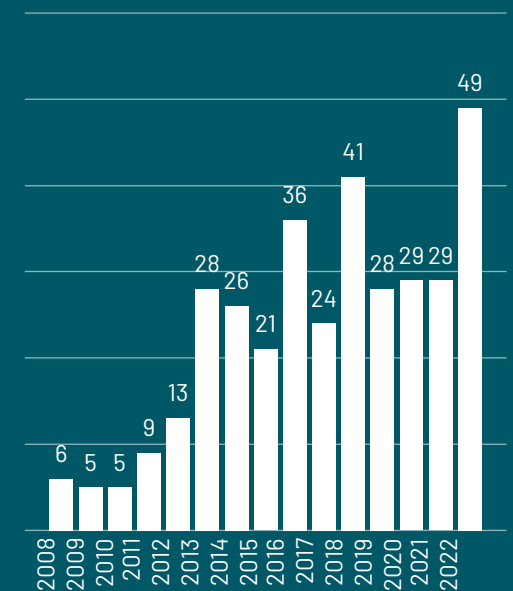


**BM:** bone marrow; **PB:** peripheral blood; **UCB:** umbilical cord blood; **LYM:** lymphocytes



The **transplant unit at the Hospital de Donostia** (San Sebastián) performed 49 transplants in one year, a record for Spain.

The transplant unit in San Sebastián began working on transplants from unrelated donors in 2008, and has already performed **349 transplants** and **16 lymphocyte infusions** since then.



## 4. Transportation of haematopoietic progenitors

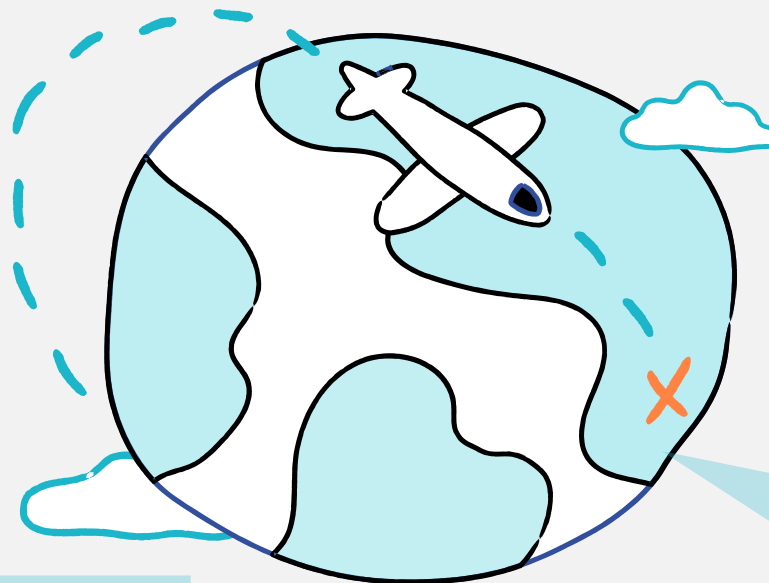
### Transporte de progenitores

Transportation of cells must be carried out by specialised staff who comply with international standards.

In Spain, 99% of shipments are carried out by four companies that are authorised to carry out this type of transportation (Otime, time:matters, NOPC and May Courier).



The average distance from Earth to the Moon is about 384,400 kilometres, so 1,748,081.63 kilometres is the equivalent of **travelling to the Moon more than four times.**



In 2022, these specialised transport companies travelled

# 1,748,081.63 Km

The circumference of the Earth at the equator is about 40,075 kilometres, so 1,748,081.63 kilometres is the equivalent of **travelling round the world more than 43 times.**



# REDMO's impact

Every week in 2022, REDMO managed to:



Conduct  
**30 medical questionnaires**  
for potential donors  
registered with REDMO.



Coordinate  
**6 actual donations**  
from Spanish donors.



Send  
**2 cord blood units**  
from our banks to transplant  
centres around the world.



Offer  
**33 suitable donors**  
for different patients in need  
of donors at Spanish  
transplant centres.

Register  
**421 new donors**



Deliver  
**11 donations** from all  
over the world to patients  
being treated at Spanish  
transplant centres.



Send  
**22 blood samples**  
from Spanish donors to  
transplant centres around the  
world so they could confirm  
the suitability of our donors.



Carry out  
**22 new searches**  
for unrelated donors for  
Spanish patients.



Our courier  
companies travelled  
**33,617 km** to  
deliver donations to  
our patients.

# THANKS TO:

Donors

Donor referral centres

Immunology laboratories

Donor collection centres

Transplant centres

World Marrow Donor Association

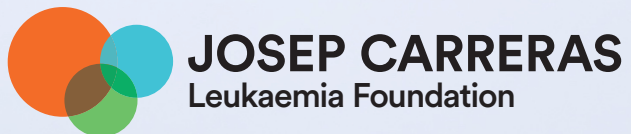
Transport companies

Cord blood banks

Regional Transplant Coordinators

Organización Nacional de Trasplantes

National Transplant Organisation



**REDMO**  
Bone Marrow  
Donors Registry