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Special publication the 70th anniversary of transfusion activity in Slovenia, 2015

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4 JUNE 2015 – 70 YEARS OF BLOOD TRANSFUSION ACTIVITY IN SLOVENIA

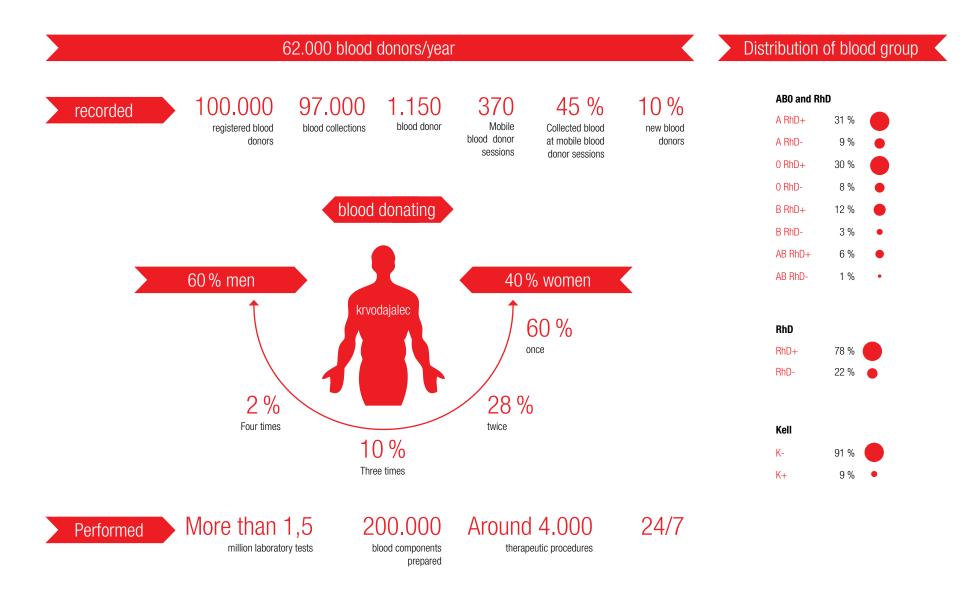
This year, the blood transfusion activity in Slovenia celebrates 70 years of successful operation and development.

Our beginning dates back to 4 June 1945, when the Transfusion Department at the Central Army Hospital collected and conserved the first 19 bottles of blood.

We thank to all blood donors, organisers of blood donations and other supporters, as well as to the medical staff and other colleagues who have supported the blood transfusion activity for 70 years. You have become a part of patients', i.e. blood recipients' lives.

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THANKS TO EVERYONE WHO HAS BEEN A PART OF THE BLOOD TRANSFUSION ACTIVITY AND ITS DEVELOPMENT IN THE 70 YEARS.

NAND

transfusion medicine

TRANSFUSION MEDICINE

Transfusion medicine starts with blood donors and ends with the patients who are treated with blood. The basic task of transfusion medicine is the treatment of patients with blood products. It includes closely connected sets of activities, such as blood supply, therapy with blood components and treatment with blood-derived medicines, and various laboratory and diagnostics tests. Today, transfusion medicine is expanding to the area of therapeutic services for patients where it is becoming a part of the interdisciplinary approach to the treatment by cells and transplantation of cells, tissues and organs. The well-coordinated work of experts from various areas is the key for our successful and effective work.

The beginning of organized transfusion medicine and blood donation dates back to the period before World War II when a few cases of direct blood transfusion, i.e. from a donor's vein to a recipient's vein, were recorded. During World War II, there has been no special transfusion service; so the medical staff who accompanied a surgeon were usually blood donors.

After the World War II, the Transfusion Department opened at the Central Army Hospital in Ljubljana. The date marking the beginning of the transfusion activity in Slovenia is **4 June 1945** when Blood Donor Day is celebrated.

Further the development of the health care system forced into an increased need for blood, which resulted in **the opening of new transfusion department** at hospitals.

In the 1970s, an enviable breakthrough in the area of transfusion medicine was made. We introduced continuous improvements, new products, services and activities to ensure the best possible treatment to recipients of blood product. Our fundamental guideline is to ensure compatible, high-quality and safe blood products, which can only be provided by a sufficient number of compatible and responsible donors. Already since 1953, when the Slovenian Red Cross took over the organisation of blood donors, our blood donors have been donating blood non- remunerated, voluntarily and anonymously, which is the basis to ensure safe blood.

We can say without any doubt that blood-derived products have never been as safe and of such high quality as they are today.

> 1945 The first bottles of blood was collected and preserved.

transfusion service

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THANKS TO EVERYONE INVOLVED IN THE ORGANISATION OF BLOOD DONATIONS.

TRANSFUSION SERVICE

The Blood Transfusion Service in Slovenia (after the merger in 2008-2013) comprises 3 blood establishments:

- Blood Transfusion Centre of Slovenia in Ljubljana (BTC) with its associated Blood Transfusion Units in Novo mesto, Trbovlje, Slovenj Gradec, Izola, Jesenice and Nova Gorica,
- Transfusion Medicine Centre at the Maribor University Medical Centre (TMC) with two Blood Transfusion Units (Ptuj and Murska Sobota)
- Blood Transfusion Centre in Celje General Hospital

These three institutions are independent in terms of organisation and finance.

All of them carry out activities related to **blood collection.** In Slovenia, blood is collected at transfusion institutions (fixed sites) and on mobile sessions. Mobile blood donor sessions are performed by mobile teams of the Blood Transfusion Centre Ljubljana, the Transfusion Medicine Centre Maribor and at the Blood Transfusion Centre Celje.

Blood processing into blood components is carried out at the Blood Transfusion Centre Ljubljana, the Transfusion Medicine Centre Maribor and at the Blood Transfusion Centre Celje. The processed blood products return to centres/units in line with the needs and the supply plan for hospitals in a relevant area.

Blood testing is performed at two locations: the BTC Ljubljana and the Transfusion Medicine Centre Maribor. For all donations NAT testing is only performed at the BTC Ljubljana.

Transfusion service	Founded
BTC Ljubljana	1946
CTM Maribor	1948
BTC Celje	1949
Units	
Novo mesto	1957
Trbovlje	1956
Slovenj Gradec	1954
Izola	1961
Jesenice	1992
Nova Gorica	1977
Blood Transfusion Unit Ptuj	1956
Blood Transfusion Unit Murska Sobota	1956

1953 Beginning of voluntary, nonremunerated blood donation under the RCS THANKS TO EVERYONE WORKING AND CO - OPERATING IN THE FIELD OF BLOOD DONATION.

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ANIMATORNALIONALI Slovenian Red Crossins nationali

SLOVENIAN RED CROSS AS NATIONAL BLOOD SESSIONS ORGANIZER

The year 1953 was an important milestone for blood donation. In this year the Slovenian Red Cross took over the organisation of blood donations and established **non-remunerated**, **voluntary and anonymous** blood donation, equal to that in many other European countries.

With 56 regional units, the Slovenian Red Cross is the national organiser of blood donation sessions. In cooperation with collection responsible transfusion services , the Red Cross ensures an uninterrupted supply of safe blood to the national health system.

Slovenia is self sufficient in their own needs for blood.

More than 5% of the population donate blood in Slovenia, which amounts to around 350 to 400 blood donations every working day to meet the health care system's daily needs for blood.

Majority of us may never need blood, but it is very important that sufficient supplies of safe blood are available. This can be achieved through well-planned blood sessions and well-informed and responsible donors. The **Slovenian Red Cross** organises around 1,150 blood drives in Slovenia every year, of which more than 370 are performed as mobile. Every year around 100,000 donors attend blood drives, which shows that Slovenia has established a kind of a blood donation tradition over the decades. Such success is a result of the orchestrated work of the voluntary blood sessions organisations of the Red Cross, expert services of the Slovenian Red Cross, and most of all over 2,000 dedicated volunteers who annually spend 35,000 hours of work for the organisation of blood sessions, meetings, education, information about blood donations and similar activities.

The Slovenian Red Cross also motivates young people to donate blood via the donors' Clubs, e.g.:

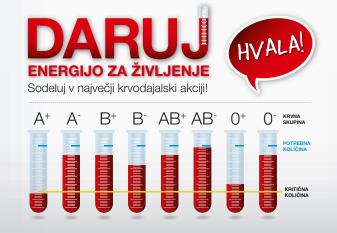
- "Club 25": volunteers who promote blood donation among young people, and - "Club 100 drops": senior donors who help and support young volunteers / donors.

Blood donation remains the noblest form of solidarity in Slovenia, in spite of the social and economic crisis in recent years, and in spite of the organisational changes in the area of blood session organisation and gradual transition from mass to individual blood donation.

Our task is to introduce donors – people with a big and kind heart who unselfishly donate blood once or several times a year – to the broader society. Blood donors are our invisible heroes who save lives every day.

1955 The establishment of the independent Blood Transfusion Centre in Ljubljana





THANKS TO EVERYONE WHO HAS PARTICIPATED IN FIVE SLOVENIAN BLOOD DONATION CAMPAIGNS:

- 1. THE VOLUNTEERS IN "LIVE BILLBOARDS",
- 2. CELEBRITIES,
- 3. "PETROL" ATHLETES,
- 4. MOTORCYCLISTS,
- 5. CAMERMEN AND PHOTOGRAPHERS, AND
- 6. ALL MEDIA WHO HAVE FORWARDED OUR MESSAGES







The cooperation between the Blood Transfusion Centre of Slovenia, the Slovenian Red Cross and Petrol company in the promotion of blood donation in the last five years has contributed to a successful development of new approaches in the area of blood donation and to a more effective balancing of blood stocks. Five years ago, the socially responsible company Petrol made a decision to cooperate with us in the promotion of blood donation. The aim of joint campaigns was to raise awareness among the public about the importance of blood donation, to recruit and retain new blood donors and to improve balance blood stock management. After years of harmonious work, we have proven that such type of cooperation leads to great achievements and finally to social benefit.

By continuously **monitoring blood stocks and blood consumption** and thanks to the continuous engagement of everyone involved in blood supply, we are able to ensure responsible, prudent and rational handling of blood. Despite the non-unified transfusion service, we managed to join supplies of blood throughout Slovenia in 2011. By presenting the total blood stock from all three blood transfusion establishments (BTC Ljubljana, TMC Maribor and BTC Celje) at the websites **www.daruj-kri.si** and **www.ztm.si**, Slovenia has stepped up to a higher level of organising blood donors and inviting them to donate blood in line with the actual needs. Blood donors now cooperate in the balancing of blood stocks, as they decide to donate blood when it is needed. The presentation of blood stocks is a result of the successful promotion of blood donation in a campaign called "**Give Energy For Life**". The new websites **www.daruj-kri.si** and **www.ztm.si** display graphic presentations of the current blood stocks and where potential blood donors can register into the web base, the Facebook profile called "Donate blood" and the mobile application "Donate blood", Slovenia has shifted to a higher level of communication and organisation of blood donors, for which the Blood Transfusion Centre of Slovenia received first prize for the presentation of achievements of blood donation campaigns at the 1st European Congress DOMAINE (Donor Health & Management) in Haag in September 2014.

> 1960 Testing for syphilis

1963 The introduction of the cross-match test THANKS TO EVERYONE WHO ENSURES SUFFICIENT BLOOD SUPPLY.

blood supply

BLOOD SUPPLY

HISTORY OF BLOOD COLLECTION

In the last decade, blood supply activity has been strongly affected by changes, not only in terms of technical advancement in the preparation of higher quality blood components, safer patient care and better organisation of work, but also in the area of legislation, the adoption of standards, the establishment of regular controls by an independent Competent Authority (JAZMP) and by appointment of a person responsible for blood supply.

The Supply of Blood Act (2006) brought along the harmonisation with European Directives. Its implementing regulations have defined the activity by processes, laid down the requirements for the performance of activity, and provided the legal basis, in accordance with which the Agency of the Republic Slovenia for Medicinal Products and Medical Devices (JAZMP) has been implementing regular and extraordinary controls and issuing licenses to carry out the blood supply activity in Slovenia since 2007.

Thanks to the technical advancement, we have gradually **automated** the previous manual procedures. Automated procedures represent not only a uniform implementation, but they also enable complete traceability and increase quality of processes.

Blood has always been collected in transfusion institutions or at mobile blood donor sessions. To ensure the traceability of the collected blood, a **blood donor** provides certain basic information, which is entered into the donor database system. In 1990, computerised data management was first introduced at the Blood Transfusion Centre of Slovenia, and later gradually throughout the entire transfusion service. Until 1991, when the computerised system (DATEC) was introduced, the data about blood donors, collected blood and testing were kept in paper form, i.e. a blood donor's paper file and the book of blood donations. The management of blood donors' data was completely modernised in 2007 by means of technology of a safe transfer of the sensitive personal data of our donors and distance analyses.

The containers for files and the typewriters, which had been used by the administration staff at the Reception Office for Blood Donors for many years, were replaced by portable computers, which ensured a fast and constant access to all the data needed.

The strict EU criteria for the selection of blood donors in 1999 required the introduction of a unified medical questionnaire for blood donors, which includes a standardised type of questions for all blood donors before each blood donation. Privacy and help from medical staff is ensured when completing the questionnaire. Based on the **questionnaire**, donor blood pressure and pulse measurements, the determination of the haemoglobin concentration and the consultation and examination by a doctor, donor's eligibility for blood donation is determined.

1966 The first course of transfusion medicine history of blood collection

SOEDIAN.

310

THANKS TO ALL BLOOD DONORS FOR YOUR RESPONSE, DONATION AND HELP.

The criteria for the selection of blood donors are strict and they prevent donating blood for donors, whose **health** could be at risk due to the donation; at the same time, the criteria prevent the risk of the transmission of any blood-transmitted agents to recipients. For this purpose, we keep up-to-date with the global epidemiologic situation (e.g. the presence of malaria in countries, many viruses and parasites, sudden epidemic outbreaks such as West Nile virus...).

The transmission of such disease by blood transfusion is prevented with temporary deferal of blood donors who have travelled to such destinations or who have been infected. Permanent deferal of blood donors who demonstrate a risky lifestyle prevents the transmission of **hepatitis B**, **hepatitis C, HIV and syphilis**. The voluntary, non remunerated blood donation also contributes to the prevention of any blood-transmitted diseases; if blood donations were paid for, donors might not reveal important information, which could put their and recipients' lives at risk.

The entire process, from the reception of the donor to filling of the blood bag with whole blood and a meal takes a short time (from 30 minutes to 1 hour). Blood donors who are included in **special programmes** where individual cells are collected using cell separators, e.g. the collection of platelets or the liquid part of blood (plasma), need to take a bit more time for the procedure. Such collections are performed using special machines and supervised by competent medical staff who monitor the donor's wellbeing and take immediate action in case of adverse effects of blood donation. Blood donors with certain blood group types, and most of all those who are willing and have the time to help people this way and who meet all additional blood donor selection criteria (proper body weight, appropriate number of platelets in the blood, good vascular access...) are included in special donor programmes.

Today, blood collection is a safe and standardised procedure. Bottles and multiple use needles were long ago replaced by sterile systems of plastic collection bags with good single-use needles for an uninterrupted flow of blood from a vein. The recording of each detail of collection and ensuring the traceability of collection has substantially increased the quality of the collected blood and blood products, as well as enhanced the safety of blood donors.

To ensure standardised preparations, **450ml of whole blood** is today collected from one drawn unit of a donor's blood, which does not cause any risk to the donor's body.

1970 Routine IgG anti-D injections after giving birth

1970

Testing for hepatitis B antigen

1970

The introduction of tissue compatibility tests

blood processing

THANKS TO EVERYONE WHO PROVIDES A HIGH QUALITY AND EFFECTIVE BLOOD COMPONENTS.

BLOOD PROCESSING

Whole blood is used to prepare **blood components**: concentrated erythrocytes, concentrated platelets and fresh frozen plasma, as well as blood-derived medicines.

A collected unit of whole blood is separated to its individual parts using physical methods, such as centrifugation, filtration and similar processes. This way we obtain individual components. Treatment by blood components is more effective and safe than using the whole blood, as patients receive only the needed blood components. Since 2010, filtration is used to remove leucocytes from blood to reduce adverse effects of transfusion.

In 2008, the method of preparing platelets was entirely renewed and automated. To prepare a therapeutic dosage of platelets, we need 4 to 6 units of collected whole blood, from which the buffy coat (platelet-leucocyte layer) is first removed. Then platelets are prepared from these units using entirely automated and controlled special machines, where five units of buffy coat are usually poured together. From there, a suitable additive solution is added, platelets are separated with centrifugation, and then they are poured into the final storage bag through a filter, which retains a majority of the leucocytes. The entire procedure is performed in an **closed** system that prevents contamination with bacteria. Since the majority of leucocytes is removed during the procedure, there are fewer leucocyteinduced adverse effects of transfusion. Due to the use of the special additive solution, the plasma concentration in the new platelet product is reduced by 60% to only 65%, which substantially decreases the frequency of adverse reactions related to plasma after transfusion. Another important advantage of the new platelet product is that it is appropriate for further processing with the psoralen photoinactivation procedure. The addition of amotosalen and the irradiation of the product with UV-A rays are used

to inactivate any viruses, bacteria and parasites if they are present in the product. Such procedure additionally decreases the probability of infectious diseases and septic reactions, which could occur due to the multiplication of bacteria during the storage of platelet products.

Since the remaining leucocytes are inactivated during the procedure, additional **radiation** with gamma rays to prevent transfusion-related graft vs. host disease, is no longer necessary.

After the processing and performed tests, blood products are ready for transfusion. All 11 transfusion institutions and the hospital blood bank (Brežice General Hospital) offer a 24/7 supply of blood products.

To ensure and maintain quality blood components processed in the three transfusion centres in Ljubljana, Maribor and Celje, proper transportation of blood between the transfusion institutions/hospitals is necessary. Since 2005, we have been ensuring the correct transportation chain of blood components in validated temperature-controlled containers.

1986 HIV antibody testing

1988

Fist autologous bone marrow ransplantation

blood testing

THANKS TO EVERYONE WHO ENSURES A HIGH SAFETY LEVEL OF BLOOD PRODUCTS WITH MODERN TESTS.

BLOOD TESTING

In order to ensure the safety and quality of blood products as medicines, they must be properly tested. Each blood unit (as well as the blood donor every time he or she donates blood) is tested for various analytes using various approaches:

Pre-collection testing: the tests before blood collection are used to ensure that blood donors are suitable in terms of health and that they meet the blood donor criteria. Whole blood is not collected from persons who have too low level of haemoglobin. In the case of special collections, detailed haematological tests are performed. The orientation blood group is determined for each new donor and which is confirmed by standardised laboratory methods from the collected bag of blood.

Post-collection testing: After collection, the following tests are performed for each blood unit:

- The blood group is determined in the blood group systems ABO and RhD. This test is used to mark (type) the blood component. During the first and second blood collection, other antigens from the Rh (CcEe) and Kell system for each blood donor are also determined. In a selected group. Typing for some other antigens is performed in a selected group of blood donors.
- The presence of antibodies to erythrocyte antigens is determined in each blood donation.
- A screening tests for transfusion-transmitted infectious agents are performed. Serological tests for HBsAg (hepatitis B), HIV antibodies/ antigen (HIV infection and AIDS), anti-HCV antibodies (hepatitisC) and anti-Treponema Pallidum antibodies (syphilis) are performed.

- The presence of transfusion-transmitted agens can be also determined directly by detecting virus nucleic acids with molecular methods.
- Each blood unit that is reactive for any of tested infection marker, is discarded. A blood donor is informed and referred to further medical examinations.

To ensure safety and effectiveness of the blood components, we carry out the necessary **quality control** by performing specific checks of the input material with a laboratory analysis on a selected number of components for an individual product.

A comprehensive approach to the processing of the collected blood, including the testing, is based on the awareness of the importance of blood products in advance therapy and the necessity to assure the safety, efficiency and quality of such products.

We face high standards in the area of prudence, which has always been an important drive for continuous development and improvements. In every decade of blood supply and treatment by blood, there has been strong progress made in the area of 1990 knowing the immunogenic properties of blood and infectious diseases and their agents.

We have always successfully met global guidelines by introducing new approaches, new testing techniques and automated procedures.

Taking into consideration all procedures for the safe production, selection and transfusion of blood, we have made transfusion therapy one of the safest medical treatment methods nowadays. This way we have obtained and kept

1990 The Slovenija Donor register was established

1992

The introduction of the DATEC software system

therapeutic activity

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THANK YOU TO EVERYONE WHO TRUSTS US WITH BLOOD TREATMENT.

THERAPEUTIC ACTIVITY

In addition to blood supply, the Blood Transfusion Centre of Slovenia has a long tradition in the area of therapeutic services. Collection of blood for autotransfusion before a planned operation and therapeutic blood collecting were supplemented with procedures of apheresis, a special method of collectiong individual blood components already in the 1980s. These procedures are used to collect blood components from blood donors (plasma, platelets, and granulocytes), as well as from patients for whom individual blood components must be removed. In December 1988, autologous **bone marrow** for transplantation was collected and frozen for the first time. The bank of frozen haematopoietic stem cells was established and new treatment procedures for various types of cells and tissues were developed. In 1994, we performed the first collection of peripheral haematopoietic stem cells using a cell separator; up to now this procedure has almost entirely replaced the classic method for collection of bone marrow. In 1999, we started to process and freeze umbilical cord blood, and in 2008 the public bank of umbilical cord blood started operating. The activity is constantly expanding and developing; we are continuously introducing new cell collection processes, processing procedures and preparation of medicines for advanced therapies. In accordance with the legislation, all procedures are registered, and the Blood Transfusion Centre of Slovenia has obtained license for distribution. Thanks to the development of new therapeutic services, we ensure advanced therapies for patients in their domestic environment.

In line with global trends, therapeutic services at the Blood Transfusion Centre of Slovenia have in recent years experienced a significant improvement; this activity is recognised as one of the key strategic policies in the Blood Transfusion Centre of Slovenia. In May 2014, we established the new Therapeutic Services Department, which includes the cell and tissue supply activities which had previously been dispersed among various organisational units. The task of the department is to ensure high-quality cell products for **advanced therapies**, such as the collection and transplantation of haematopoietic stem cells, extracorporeal phototherapy, heart failure treatment with stem cells and the treatment of certain cancers (cancer vaccines). Moreover, we collect granulocytes as support treatment for immunocompromised patients, also perform therapeutic leukaphereses in cases of leukaemia and therapeutic collection of whole blood in cases of iron overload and other diseases.

The **Centre for Apheresis** carries out all activities directly with patients (including those on hospital wards with the mobile team) or cell and tissue donors at the Blood Transfusion Centre of Slovenia. The Therapeutic Services Out-Patient Clinic carries out autologous blood collection for preoperative autotransfusion, therapeutic collection of whole blood, collecting of autologous blood for the preparation of the serum for chondrocyte growth, consultation examinations with patients and healthy donors before the planned collection of haematopoietic stem cells with apheresis, as well as consultations for volunteer donors of haematopoietic stem cells before the entry into the registry and for pregnant women before donating umbilical cord blood to the public bank. At this centre we also radiate blood components, cells and tissues with gamma rays for the purposes.

The **Cryobiology Centre** is responsible for all activities connected with the processing and storage of cells and tissues intended for clinical use. Cells and tissues are processed for further storage or clinical use. We carry out the immunomagnetic selection of cells, photoinactivation of mononuclear cells collected with apheresis, the concentration of umbilical

1993 The Blood Transfusion Centre becomes a research

1993 HCV antibody

institution

testing

THANKS TO EVERYONE WHO PERFORMS DIAGNOSTIC SERVICES TO HELP TREAT MANY DISEASES.

laboratory lignostics

LABORATORY DIAGNOSTICS

cord blood, bone marrow purging, and the freezing of various cells and tissues. Certain cell and tissue processing procedures are performed in clean production premises in accordance with the highest standards (the preparation of platelet plasma and the processing of amniotic membrane). **Haematopoietic stem cells**, umbilical cord blood, lymphocytes and amniotic membrane are stored in the bank of frozen cells and tissues. In 2014, we collected a sufficient number of umbilical cord blood units in the public bank of cord blood, therefore the activities are now focused on high resolution typing of the collected units, which are available through international registries to all patients who need such treatment.

Further development of the activity is focused on the area of cell therapies, regenerative medicine and immunotherapy. The development and research work in the area of advanced therapies is managed and coordinated by the Centre for The Development of Advanced Therapies, where pre-clinical and clinical trials are performed, as well as research of cell medicines and tissue engineering products, the preparation for the registration of new products and the translation of services into routine work.

Certain therapeutic services such as pre-operative autotransfusion and therapeutic drawing of blood are also performed for patients in other transfusion institutions.

FROM ERYTHROCYTE TO PLATELET AND GRANULOCYTE SEROLOGY TO MOLECULAR BIOLOGY TESTS

Parallel with blood donation, the immunohaematologic laboratory activity has experienced rapid development over the last decades. New knowledge in the area of the human genome has enabled us to introduce molecular biology methods into routine practice; today such methods represent an important supplement or, in certain cases, even a substitute to serological tests. All this has enabled safe blood transfusion and transplantation of haematopoietic stem cells, and it prevents certain adverse immune responses to transfusion, transplantation and during pregnancy, as well as in the diagnostics and treatment of many diseases.

When treatment with blood started, the erythrocyte serology had the most important place in the transfusion laboratory; initially, only blood groups were determined, but we introduced the so-called cross-match test into routine practice before each transfusion by 1963. The cross-match test performed under laboratory conditions is used to check the compatibility between a blood donor's erythrocytes and a patient's plasma and the presence of antibodies in the patient's blood (with the Indirect Coombs test – ICT or other complex procedures). Such tests are performed to prevent hemolysis of transfused erythrocytes. Based on the discovered specificity of erythrocytes have no antigens on their surface against which patient would produce antibodies.

1994 The introduction of IgG anti-D injection before giving birth

HVALA VSEM, KI STE STROKOVNO – MEDICINSKEMU DELU V PODPORO IN POMOČ.

laboratory diagnostics

Determination of platelet antibodies is a part of the diagnostics in patients with thrombocytopenia; screening tests include the direct test to determine antibodies on platelets of the patient, and the indirect test to determine the presence of platelet antibodies in plasma. If the screening test result is positive, specificity of platelet antibodies is performed.

The second large group of patients examined in the platelet serology laboratory is those suspected of suffering from heparin-induced thrombocytopenia, HIT. HIT is an immune reaction that appears in a small number of patients who are administered heparin, and it may result in arterial or venous thrombosis, therefore if HIT is suspected, the heparin treatment must be immediately stopped.

At the Blood Transfusion Centre of Slovenia, we use various screening tests to determine granulocyte antigens and also the presence of granulocyte antibodies and their specificity. The most common indication for tests is neutropenia caused by various factors and the suspicion of transfusion related acute lung injury, **TRALI**, which is one of the most severe transfusion reactions. The cause for TRALI can be passive transmission of a donor's granulocyte and HLA class I antibodies, which react with the recipient's leucocytes. To prevent the immune TRALI, Slovenia many years ago removed women plasma from clinical use as probability of the presence of such antibodies is higher due to previous pregnancies.

To determine erythrocyte, platelet and granulocyte antigens, we use **serological tests**, and in recent years also an increasing number of **molecular biology tests**, which enable the typing of antigens at the DNA level. Blood groups are usually determined on the genetic level when it is impossible to determine them with the ordinary serological phenotyping for various reasons (e.g. it is serologically impossible to determine the patient's own antigens due to the presence of the donor's erythrocytes in the patient's blood after many transfusions). The introduction of genetic typing has significantly improved the determination of platelet and granulocyte antigens.

1999 The health questionnaire for blood donors

1999

The start of processing and freezing of umbilical cord blood

prinatalitists

THANKS YOU TO EVERYONE WHO LOOKS AFTER THE HEALTH OF PREGNANT WOMEN AND NEWBORN BABIES.

29

PRENATAL TESTS AND PREVENTION OF HAEMOLYTIC DISEASE OF THE FOETUS AND NEWBORN

During pregnancy, the blood groups ABO, RhD, Kell and the indirect Coombs test are determined for each woman. The purpose of these tests is to find antibodies in the pregnant woman's blood which could cross the placenta and cause a disease called the **haemolytic disease of the foetus and newborn (HDFN)**.

The pregnant women who have such antibodies are properly observed. We are also involved in therapy when a fetus or a newborn needs a transfusion treatment. This means we prepare blood for transfusion during pregnancy (intrauterine transfusion) or after the birth of a newborn (exchange transfusion).

In addition of early detection of erythrocyte antibodies during pregnancy, our tasks include the prevention of their production during pregnancy or transfusion. The production of anti-D antibodies is prevented with the injection of Ig-antiD in the 28th week of pregnancy and after birth, at the termination of pregnancy, bleeding or intrauterine procedures during pregnancy. The production of antibodies during transfusion is prevented by transfusing ABO, RhD and Kell identical or compatible blood components.

The routine injection of IgG anti-D to RhD-negative pregnant women who have given birth to an RhD-positive baby started in 1970 in Slovenia. This was followed by IgG anti-D injection after each termination of pregnancy and after intrauterine procedures. In 1994, we introduced prenatal injection of IgG anti-D to all RhD-negative pregnant women in the 28th week of pregnancy.

The main weakness of the current system of prenatal protection against the haemolytic disease of the foetus and newborn is that the pregnant women carrying an RhD-negative foetus also receive IgG anti-D protection in the 28th week of pregnancy. To prevent this, we are preparing a programme for **prenatal determination of the presence of the fetal RhD gene** in mothers' blood, which will enable selective injection of IgG anti-D for those RhD-negative pregnant women who carry RhD-positive foetus.

DISTANCE TESTS SYSTEM – TELETRANSFUSION

The national telemedicine system has been successfully operating as a part of the Slovenian transfusion service since 2005. Using teleconsultation, it enables distance work for transfusion medicine specialists. By means of telemedicine we carry out distance pre-transfusion tests. A specialist of transfusion medicine from his or her location (e.g. the BTC in Ljubljana) checks, reads pre-transfusion tests, orders additional tests and allows the issue of blood at other locations (e.g. BTC units) where a lab medicine engineer carries out pre-transfusion tests. The teleconsultation software covers the entire transfusion service in Slovenia. Annually, we render around 21,000 telemedicine services.

Currently, the work of a transfusion medicine specialist at nine locations is covered by two centres (Ljubljana and Maribor) at a distance; this ensures the same quality of services but a significant savings in the health system. 2000 Obtained EFI accreditation

TANKS TO ALL DONORS OF HAEMATOPOIETIC STEM CELLS AND TRANSPLANTATION TEAMS AT HOME AND ABROAD.

transplantation supporting activities

In agreement with clinical hospitals, the Blood Transfusion Centre of Slovenia established the Immunologic Laboratory in 1969. The basic task of the laboratory was to introduce histocompatibility testing for patients with kidney failure and their relatives who were willing to donate a kidney.

The precondition for a successful transplantation is the matching for the tissue antigens HLA (Human Leucocyte Antigen) between a recipient and a donor. The introduction of histocompatibility testing in the Immunologic Laboratory and other activities related to it enabled the first kidney transplantation of a related donor in Slovenia in 1970.

The laboratory continued to develop in accordance with the national organ and tissue transplantation programme. After 1980, it was renamed as the Tissue Typing Centre (TTC), and in 1988 it moved to its current location in the park at Zaloška cesta. As a part of the TTC, the Cell Laboratory was established and in 1990 started to perform regular tissue compatibility testings in cell cultures prior to the transplantation of haematopoietic stem cells (HSC). The transplantation of HSC was becoming an increasingly successful method to treat primarily leukaemia and similar malignant blood diseases, where incompatibility with regard to HLA was the primary reason why many patients do not have suitable donors. In recent times, many HSC from unrelated donors were successfully transplanted with help to unrelated donor registries.

We established the Slovenian registry of unrelated haematopoietic stem cell donors called **Slovenija Donor in 1992** and included it in the Bone Marrow Donors Worldwide BMDW registry. Today the latter includes more than 50 national registries; in March 2015 it celebrated the entry of the 25 millionth donor; 16,000 of its registered donors are members of Slovenija Donor. The construction and development of such national registry required a significant amount of interdisciplinary cooperation by experts from all three departments of the Blood Transfusion Centre of Slovenia as well as external experts, primarily

from the Clinical Department of Haematology of the University Medical Centre Ljubljana and the Paediatric Clinic in Ljubljana.

The key milestone in the area of R&D is the start of tissue antigen determination at the DNA level in 1992. The first application in the histocompatibility testing prior to kidney transplantation in Slovenia took place in 1994. Today, the HLA typing is performed almost exclusively at the DNA level.

The TTC made a big step towards the improvement of the quality of work in 2000 when it successfully passed the audit by the European Federation for Immunogenetics (EFI) and obtained a certificate for carrying out its work in accordance with the standards of the organisation. We have kept the **EFI accreditation** to date.

The year 2000 is also a milestone for our activity because in that year Slovenia joined the non-profit international organisation for exchange of donor organs **Eurotransplant**. An EFI accredited laboratory for tissue compatibility testing such as the TTC was one of the conditions to join Eurotransplant. It has contributed to the development of the TTC laboratories as well as the wide-spread development of the national organ transplantation programme.

At the TTC, we work using experience obtained in foreign laboratories. We kindly transfer such experience to many colleagues who visit us in the framework of the EFI scholarships. Today, the TTC is a modern centre for histocompatibility testing, that offers high-quality services to patients who need organ and haematopoietic stem cell transplantations. We also support diagnostics of autoimmune and other diseases. We perform around 15,000 different tests every year. By continuously upgrading our know-how and conducting R & D studies we endeavour to keep our good reputation in Slovenia and abroad.

2004 The BTC obtained the ISO 9001 certificate

THANKS TO EVERYONE WHO ENSURES THE UNINTERRUPTED SUPPLY OF BLOOD-DERIVED MEDICINES TO PATIENTS.

copzmp-farmacija

ZAVOD REPUBLIKE SLOVENIJE ZA SLOVENIJE MEDICINO

supply of blood-derived medicines

SUPPLY OF BLOOD-DERIVED MEDICINES

The beginnings of the Pharmaceutical Department on the Blood Transfusion Center date back to time when it was established for the production of anticoagulant solutions for blood and medical devices for the needs of the BTC and other health services at that time. With the development of transfusion medicine and pharmacy, the activity of the department developed primarily in the area of pharmaceutical technology. We implemented modern verified production of infusion solutions and the production of single-use medical devices in accordance with the requirements of good manufacturing practice. We were successful on the Slovenian market with all our products.

In line with the changed market situation in Slovenia, we later transferred from the production of infusion solutions and medical devices to the wholesale of blood-derived medicinal products and recombinant coagulation factors. In 2005, we received the first wholesale marketing authorization by the Agency of the Republic of Slovenia for Medicinal Products and Medical Devices.

The Center for the Supply and Distribution of Medicinal Products and Medical Devices includes two activities.

1. The wholesale of blood-derived medicinal products from human plasma donated by non-remunerated blood donors from the Republic of Slovenia, other blood-derived medicinal products and recombinant coagulation factors.

For the supply of Slovenian hospitals we respond to their public tenders/ procurements. We successfully supply all hospitals with human albumin, as well as human normal and specific immunoglobulins. We also supply haemophiliacs with coagulation factors.

The Agency of the Republic of Slovenia for Medicinal Products and Medical Devices conducts regular inspections over the wholesale of medicinal products.

2. Supply of the Blood Transfusion Center of Slovenia and its associated blood transfusion centers with all medical devices or diagnostic reagents. The control laboratory still produces laboratory solutions, performs sterilisation services and the production of demineralised water for the needs of the Blood Transfusion Center of Slovenia.

Our task is continuing to ensure the supply of blood-derived medicinal products prepared from Slovenian plasma and a high-quality and fast supply of all medical devices and services within the Blood Transfusion Center of Slovenia, all in accordance with the law.

2005

The introdustion of the national telemedicine system

2005

The Blood Transfusion Centre of Slovenia received the verification decision from the Agency of the RS for Medicinal Products and Medical Devices

2005

TMC MB Received the ISO 9001 certificate THANKS TO EVERYONE INVOLVED IN THE QUALITY SYSTEM IMPLEMENTATION.

continuous care for quality

CONTINUOUS CARE FOR QUALITY

The European directive of the quality and safety standards for human blood and blood components (Directive 2002/98/EC) represents a milestone in the development of transfusion medicine. When Slovenia joined the EU, it meant that blood supply in Slovenia had to be harmonised with the requirements of the directive. The quality management system has thus become mandatory for all transfusion centres.

Between 2002 and 2008 we introduced the quality management system to all three transfusion centres: the Blood Transfusion Centre of Slovenia, the Transfusion Medicine Centre at the Maribor University Medical Centre and the Blood Transfusion Centre in Celje General Hospital.

Blood Transfusion Centre of Slovenia

In 2001 and 2002 and until the ISO 9001 certificate was obtained in 2004,

intensive work was performed in the area of documentation preparation and setting up the requirements of the ISO 9001 standard. Quality officers were appointed, and in May 2003 we organised the first set of lectures for them about the quality system documentation.

We obtained the **ISO 9001 certificate** for the area of blood supply, the activity of immunohaematologic tests, determination of infection markers, assurance of safe organ and tissue transplantation, preparation of diagnostic reagents, distribution of blood-derived medicines and development in these areas. In 2008, the Agency of the Republic of Slovenia for Medicinal Products and Medical Devices launched the verification audits of blood supply activity and the supply of human tissues and cells, and in the same year they issued us the first license for blood supply. A year later, we obtained the license for the supply of tissues and cells.

From 2008 to 2013, the following transfusion departments joined the Blood Transfusion Centre of Slovenia: Novo mesto, Slovenj Gradec, Trbovlje, Izola, Jesenice and Nova Gorica, and they were renamed into Blood Transfusion Units. The Quality Management Service had an important role in the reorganisation and introduction of changes, as a unified **quality management system** had to be implemented in all newly joined units to ensure high-quality and safe blood components. After joining, all units were verified by the Agency of the Republic of Slovenia for Medicinal Products and Medical Devices, and they received their license for work. They also successfully passed the audit by the SIQ.

We have successfully maintained and improved the quality management system for 10 years. The anniversary was celebrated by organising a two-day education event called Days of Quality in November 2014. The event was attended by employees in transfusion service throughout Slovenia; lectures were held by various experts from the fields of quality management, transfusion medicine, IT and laboratory work.

In 2006, the Quality Management Service was designated as a WHO **Collaborative Centre** for the Quality Management System in Transfusion Medicine for the first time. From 2006 to 2010 we took part in the organisation of various international events and meetings. In 2014, the redesignation has been approved by WHO for the next two years.

2006

BTC became a collaborative centre of the WHO

2007

The introduction of NAT (HBV DNA, HCV RNA, HIV RNA

THANKS TO EVERYONE INVOLVED IN BLOOD THERAPY AND HANDLING BLOOD WITH CARE AND RESPONSIBILITY.

henovigilance

HEMOVIGILANCE

Transfusion Medicine Centre at the Maribor University Medical Centre

The Transfusion Medicine Centre at the Maribor University Medical Centre fulfilled the conditions to obtain the ISO 9001 certificate for the introduced quality management system in September 2005. The first verification audit by the Agency of the Republic of Slovenia for Medicinal Products and Medical Devices was conducted in May 2008; based on this, a licence for blood supply was issued. The Centre successfully maintains the quality management system, which is annually checked by Bureau Veritas.

Blood Transfusion Centre in Celje General Hospital

The Blood Transfusion Centre in Celje General Hospital underwent the certification audit by Bureau Veritas in 2008 and received the ISO 9001 certificate. The verification audit by the Agency of the Republic of Slovenia for Medicinal Products and Medical Devices was conducted in June 2008. The Agency of the Republic of Slovenia for Medicinal Products and Medical Devices issued a licence for blood supply. The Centre continues to successfully maintain the quality management system.

Transfusion medicine carries out many activities to ensure a high level of quality and safe blood that meets the specific needs of blood recipients. These activities include the **haemovigilance** system, which is used to monitor adverse effects of transfusion.

A large majority of transfusions are performed without complications, although they still sometimes occur. In order to become familiar with these complications and, if possible, prevent them by introducing measures to increase the safety of transfusion, we collect data about adverse reactions and events in the entire blood chain, from the blood donor to the blood recipient.

The collection of data about **adverse reactions and events** connected with blood is necessary, but the system must be constantly improved and upgraded. We must be aware that reporting about reactions and events is not the objective by itself. The goal is to ensure high-quality support to hospitals in treating patients.



THANKS TO EVERYONE WHO PASSES ON KNOWLEDGE AND EXPERIENCE TO THE FUTURE GENERATIONS.

education

EDUCATION

Educational activity is the basis for effective and high-quality work as well as for the achievement of the set goals in the area of blood supply and transfusion medicine; therefore we develop an effective education and training system for our employees as well as our future and current business partners in the area of health care.

The Blood Transfusion Centre of Slovenia is the central educational institution in the area of transfusion medicine for all transfusion activity and employees.

Throughout the last decade, we have gradually extended our cooperation with educational institutions in Slovenia where we educate students of medicine, biomedicine, biochemistry, biotechnology, laboratory biomedicine, health care and midwifery. Our know-how in the area of transfusion medicine and other activities is today included in the study programms of the following faculties and schools:

- Faculty of Medicine in Ljubljana and Maribor,
- Faculty of Pharmacy in Ljubljana,
- Faculty of Chemistry and Chemical Engineering in Ljubljana,
- Faculty of Biochemistry in Ljubljana,
- Faculty of Health Sciences in Ljubljana and Maribor,
- Faculty of Health Care in Jesenice,
- College of Health Sciences in Slovenj Gradec,
- College of Nursing in Celje.

Transfusion medicine experts are habilitated at faculties as professors, assistant professors, assistants, senior lecturers and experts. In the last ten years, we have held on average around 100 hours of lectures and 600 hours of practical work for around 700 students every year.

In recent years, the number of residents whose specialist study programme includes transfusion medicine has increased. We organise a **post-graduate school of transfusion medicine** for doctors, pharmacists and employees at laboratories at the Blood Transfusion Centre of Slovenia three times a year. The first education course for doctors at clinical departments of hospitals was organised in 1996. Until the end of 2014, we organised 32 post-graduate schools of transfusion medicine for 1061 doctors and other residents.

The Blood Transfusion Centre of Slovenia also organises a transfusion medicine course for nurses and laboratory staff of transfusion institutions and hospitals. From 1966, when the first course was organised, and until the end of 2014, we held a total of 30 courses for 672 participants.

Moreover, we organise educational events for interns – health care employees, mandatory placement for students, and education for drivers of blood products.

2010 On-line web blood stocks

research and development

THANKS TO EVERYONE WHO IS DEVELOPING NEW TECHNOLOGIES, PRODUCTS AND SERVICES.

RESEARCH AND DEVELOPMENT

Research and development is the driving force of transfusion medicine progress, therefore it is included in our daily activity and focused on the area of blood transfusion and transplantation medicine and the support activities to help patients.

The Blood Transfusion Centre of Slovenia has been registered as a research organisation since 1993 although lively research work was performed in the area of transfusion medicine already before that date. The foundations for such work were laid most of all by Miran Hočevar, MD., Professor Ljerka Glonar, Professor Mateja Bohinjec and Professor Edvard Glaser who were role models to the next generation of researchers with the passion for science and medicine.

In the 1990s, three research groups were established under the Slovenian Research Agency:

311 - 01 Tissue typing centre311 - 02 Transfusion medicine311 - 04 Biomedicine

Today, 37 employees at the Blood Transfusion Centre of Slovenia are approved researchers holding at least a university degree, and five are technical assistants. Five researchers are habilitated professors at the University of Ljubljana.

The Blood Transfusion Centre of Slovenia has less chances to obtain state resources for carrying out the R&D activity than those of some other institutions, but we have ensured sufficient equipment and conditions for the performance of the R&D work over the last two decades, and obtained all necessary licenses from supervisory authorities. In the area of scientific research and development activity, the Blood Transfusion Centre of Slovenia carries out epidemiologic and sociologic studies and develops new technologies, products and services, which enable safer transfusion of blood and transplantations, new cell and tissue therapies, and improved diagnostics. Our fundamental and applied research refers to medical and natural sciences, and biotechnology and is a part of permanent education of employees.

The scientific research and development activity carried out at the Blood Transfusion Centre of Slovenia is an important and necessary basis for the professional as well as educational work in which the Blood Transfusion Centre of Slovenia is an important partner, especially to the University of Ljubljana.

In the past twenty years, the Blood Transfusion Centre of Slovenia carried out six international projects (SYSTHER, European Blood Inspection System, DOMAINE, COST, Trans2Care, BESSY), 39 national research projects, three national research programmes and six projects for industry. Within the national programme we trained 20 young researchers who were later employed by public institutions and the industry in Slovenia and abroad. In addition, internal development projects are continuously in progress; these are intended for training the next generation of established researchers and consequently teachers and assistants – both are important for the reputation and positioning of our field of expertise in Slovenian and abroad.

Our achievements were presented at Slovenian and international conferences and have been published in Slovenian and foreign scientific and expert journals with impact factor; in recent years, many of our publications in such journals have been categorised in the upper quartile. In the past 20 years, 173 original scientific articles, 32 scientific reviews, 11 short scientific contributions and 30 expert articles were published. We have reported at scientific and expert meetings 662 times. 14 scientific and 23 expert chapters in monographic publications were published in the last

2013 mobile application Donate Blood



CONTACTS

20 years. We were co-authors of patents or patent applications eight times. Moreover, our scientific work has been quoted more than 3,500 times.

During this time we have presented ourselves in public media (interviews in newspapers, radio and TV, polemics, discussions, peer reviews). We have also cooperated in the preparation of learning materials for students; in the past 20 years, we have been authors and co-authors of eight university textbooks with peer review, (co-)authors of four dictionaries and encyclopaedias, and we have edited various publications (39). We have been mentors for doctoral dissertations on thirteen occasions (and co-mentors two times), five times for master's theses (and co-mentors two times), and 36 times for diploma papers (and co-mentors 38 times). Three of our graduates have received the Prešeren's award at the University of Ljubljana.

The above-mentioned **achievements** are the basis to obtain status as a tertiary institution, and they prove that the Blood Transfusion Centre of Slovenia has done an important work over the last two decades, having built the environment for the research and development work that has helped our researchers obtain international recognition. Due to international respect and connections, we have received invitations to organise international meetings in Slovenia and host the most prominent foreign experts.

We are very proud of the work we have performed, as we have developed new products and diagnostic and therapeutic services in addition to academic achievements. This way we help to improve the care of Slovenian patients. We are also developing the next generation of researchers who will continue our way and proceed to develop the area of transfusion medicine, since it offers a number of opportunities that cannot be missed.

BLOOD TRANSFUSION CENTRE OF SLOVENIA

Šlajmerjeva 6, 1000 Ljubljana Telephone: +386 (0)1 543 81 00 Website: www.ztm.si; E-mail: central@ztm.si

Director: Danijel STARMAN, PhD, BA in Econ. Medical director: Professor Primož ROŽMAN, MD, transf. med. spec. Health Care Assistant Director: Zvone NAGODE, BSc. in Health Care

TRANSFUSION MEDICINE CENTRE AT THE MARIBOR UNIVERSITY MEDICAL CENTRE

Maribor University Medical Centre Ljubljanska 5, 2000 Maribor Tel: +386 (0)2 321 22 75

Head of: Lidija LOKAR, MD., transf. med. spec.

BLOOD TRANSFUSION CENTRE AT CELJE GENERAL HOSPITAL

Celje General Hospital Oblakova ulica 5, 3000 Celje Telephone: (03) 423 35 92

Head of: Janja PAJK, dr. med., spec. transf. med.

BLOOD TRANSFUSION SERVICE IN NUMBERS

2,914

18,680

8,980

84,962

3,195

19,022

9,080

84,017

BTU Ptuj

BTC Celje

Slovenia

total TMC Maribor

NUMBER OF REGISTERED	year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
BLOOD DONORS	BTC Ljubljana	45,712	44,969	45,770	46,487	49,788	53,142	52,400	55,036	52,320	49,567	45,144
	BTC Izola	5,146	5,270	5,409	5,496	5,377	5,785	6,383	6,843	5,952	5,994	5,861
	BTC Jesenice	345	1,391	2,372	2,598	3,419	3,472	2,254	2,178	1,969	1,982	2,003
	BTC Nova Gorica	4,405	3,913	3,815	3,366	3,752	3,661	3,663	3,886	3,757	3,690	3,613
	BTC Novo mesto	4,376	4,303	4,285	4,440	4,746	5,662	6,041	6,846	6,602	6,616	6,586
	BTC Slovenj Gradec	3,165	3,018	3,018	2,907	2,840	3,290	3,379	3,328	3,010	2,861	2,873
	BTC Trbovlje	1,442	1,433	1,458	1,350	1,477	1,322	1,360	1,318	1,154	993	998
	Total BTC	64,591	64,297	66,127	66,644	71,399	76,334	75,480	79,435	74,764	71,703	67,078
	TMC Maribor	13,010	13,284	12,578	12,457	13,600	14,726	15,121	15,739	14,823	15,195	15,377
	BTU Murska Sobota	4,699	4,781	4,741	4,680	4,929	4,765	4,642	4,687	4,686	4,538	4,366
	BTU Ptuj	3,026	3,555	3,296	3,374	3,535	3,638	4,203	4,167	4,276	3,938	3,883
	total TMC Maribor	20,735	21,620	20,615	20,511	22,064	23,129	23,966	24,593	23,785	23,671	23,626
	BTC Celje	9,609	9,606	9,625	9,900	10,711	11,345	11,051	11,061	10,953	9,863	9,704
	Slovenia	94,935	95,523	96,367	97,055	104,174	110,808	110,497	115,089	109,502	105,237	100,408
NUMBER OF NEW	year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
NUMBER OF NEW Blood Donors	year Slovenia	2004 9,222	2005 10,812	2006 11,870	2007 10,271	2008 10,589	2009 12,677	2010 12,503	2011 12,781	2012 10,706	2013 10,369	2014 9,596
BLOOD DONORS Number of whole blood	1 C C C C C C C C C C C C C C C C C C C											
BLOOD DONORS	Slovenia	9,222	10,812	11,870	10,271	10,589	12,677	12,503	12,781	10,706	10,369	9,596
BLOOD DONORS Number of whole blood	Slovenia	9,222 2004	10,812 2005	11,870 2006	10,271 2007	10,589 2008	12,677 2009	12,503 2010	12,781 2011	10,706 2012	10,369 2013	9,596 2014
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana	9,222 2004 39,621	10,812 2005 37,780	11,870 2006 37,339	10,271 2007 37,516	10,589 2008 41,470	12,677 2009 42,581	12,503 2010 42,491	12,781 2011 44,205	10,706 2012 41,945	10,369 2013 39,242	9,596 2014 36,817
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana BTC Izola	9,222 2004 39,621 4,768	10,812 2005 37,780 4,852	11,870 2006 37,339 5,008	10,271 2007 37,516 5,496	10,589 2008 41,470 5,054	12,677 2009 42,581 5,785	12,503 2010 42,491 5,991	12,781 2011 44,205 6,329	10,706 2012 41,945 5,523	10,369 2013 39,242 5,227	9,596 2014 36,817 5,354
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana BTC Izola BTC Jesenice	9,222 2004 39,621 4,768 312	10,812 2005 37,780 4,852 1,310	11,870 2006 37,339 5,008 2,214	10,271 2007 37,516 5,496 2,478	10,589 2008 41,470 5,054 3,218	12,677 2009 42,581 5,785 3,285	12,503 2010 42,491 5,991 2,050	12,781 2011 44,205 6,329 1,842	10,706 2012 41,945 5,523 1,777	10,369 2013 39,242 5,227 1,778	9,596 2014 36,817 5,354 1,816
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana BTC Izola BTC Jesenice BTC Nova Gorica	9,222 2004 39,621 4,768 312 4,240	10,812 2005 37,780 4,852 1,310 3,708	2006 37,339 5,008 2,214 3,605	2007 37,516 5,496 2,478 3,069	10,589 2008 41,470 5,054 3,218 3,476	12,677 2009 42,581 5,785 3,285 3,446	12,503 2010 42,491 5,991 2,050 3,436	12,781 2011 44,205 6,329 1,842 3,630	10,706 2012 41,945 5,523 1,777 3,475	10,369 2013 39,242 5,227 1,778 3,432	9,596 2014 36,817 5,354 1,816 3,382
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana BTC Izola BTC Jesenice BTC Nova Gorica BTC Novo mesto	9,222 2004 39,621 4,768 312 4,240 4,179	2005 37,780 4,852 1,310 3,708 4,087	2006 37,339 5,008 2,214 3,605 3,798	2007 37,516 5,496 2,478 3,069 3,900	10,589 2008 41,470 5,054 3,218 3,476 4,140	12,677 2009 42,581 5,785 3,285 3,285 3,446 4,765	12,503 2010 42,491 5,991 2,050 3,436 5,472	12,781 2011 44,205 6,329 1,842 3,630 5,954	10,706 2012 41,945 5,523 1,777 3,475 5,710	10,369 2013 39,242 5,227 1,778 3,432 5,800	9,596 2014 36,817 5,354 1,816 3,382 5,760
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana BTC Izola BTC Jesenice BTC Nova Gorica BTC Novo mesto BTC Slovenj Gradec	9,222 2004 39,621 4,768 312 4,240 4,179 2,776	2005 37,780 4,852 1,310 3,708 4,087 2,789	2006 37,339 5,008 2,214 3,605 3,798 2,816	2007 37,516 5,496 2,478 3,069 3,900 2,768	10,589 2008 41,470 5,054 3,218 3,476 4,140 2,769	12,677 2009 42,581 5,785 3,285 3,446 4,765 2,915	12,503 2010 42,491 5,991 2,050 3,436 5,472 3,116	2011 44,205 6,329 1,842 3,630 5,954 3,049	2012 41,945 5,523 1,777 3,475 5,710 2,721	2013 39,242 5,227 1,778 3,432 5,800 2,503	9,596 2014 36,817 5,354 1,816 3,382 5,760 2,461
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana BTC Izola BTC Jesenice BTC Nova Gorica BTC Novo mesto BTC Slovenj Gradec BTC Trbovlje	9,222 2004 39,621 4,768 312 4,240 4,179 2,776 1,406	10,812 2005 37,780 4,852 1,310 3,708 4,087 2,789 1,389	2006 37,339 5,008 2,214 3,605 3,798 2,816 1,420	2007 37,516 5,496 2,478 3,069 3,900 2,768 1,302	10,589 2008 41,470 5,054 3,218 3,476 4,140 2,769 1,411	12,677 2009 42,581 5,785 3,285 3,446 4,765 2,915 1,263	12,503 2010 42,491 5,991 2,050 3,436 5,472 3,116 1,316	12,781 2011 44,205 6,329 1,842 3,630 5,954 3,049 1,250	10,706 2012 41,945 5,523 1,777 3,475 5,710 2,721 1,116	10,369 2013 39,242 5,227 1,778 3,432 5,800 2,503 934	9,596 2014 36,817 5,354 1,816 3,382 5,760 2,461 973
BLOOD DONORS Number of whole blood	Slovenia year BTC Ljubljana BTC Izola BTC Jesenice BTC Nova Gorica BTC Novo mesto BTC Slovenj Gradec BTC Trbovlje Total BTC	9,222 2004 39,621 4,768 312 4,240 4,179 2,776 1,406 57,302	10,812 2005 37,780 4,852 1,310 3,708 4,087 2,789 1,389 55,915	2006 37,339 5,008 2,214 3,605 3,798 2,816 1,420 56,200	2007 37,516 5,496 2,478 3,069 3,900 2,768 1,302 56,529	10,589 2008 41,470 5,054 3,218 3,476 4,140 2,769 1,411 61,538	12,677 2009 42,581 5,785 3,285 3,446 4,765 2,915 1,263 64,040	12,503 2010 42,491 5,991 2,050 3,436 5,472 3,116 1,316 63,872	12,781 2011 44,205 6,329 1,842 3,630 5,954 3,049 1,250 66,259	10,706 2012 41,945 5,523 1,777 3,475 5,710 2,721 1,116 62,267	10,369 2013 39,242 5,227 1,778 3,432 5,800 2,503 934 58,916	9,596 2014 36,817 5,354 1,816 3,382 5,760 2,461 973 56,563

3,195

18,234

9,340

84,103

3,316

19,686

10,055

91,279

3,360

20,819

10,531

95,390

3,831

21,489

10,240

95,601

3,831

21,912

10,136

98,307

3,824

20,942

9,890

93,099

3,922

23,109

8,611

90,636

3,502

21,112

8,934

86,609

3,113

18,419

9,141

83,760

	NUMBER OF	year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PLASMA -	A P H E R E S E S	BTC Ljubljana	540	1,074	1,099	593	430	717	512	711	623	902	100
		TMC Maribor	4	7	5	17	7	25	65	10	0	0	0
		BTC Celje	0	0	0	0	0	0	0	0	0	0	0
		Slovenia	544	1,081	1,104	610	437	742	577	721	623	902	100
	NUMBER OF	year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
DIAMPIN		DTOLLU	770	000	005	1 00 1	1 0 1 5	1 0 10	1 011	1 704	0 1 0 1	1 000	1 015

NUMBER OF	year	2004	2000	2000	2007	2000	2009	2010	2011	2012	2013	2014
PLATELET - APHERESES	BTC Ljubljana	773	908	995	1,034	1,345	1,248	1,611	1,724	2,104	1,999	1,915
	TMC Maribor	96	194	249	173	129	127	135	192	239	115	76
	Slovenia	869	1,102	1,244	1,207	1,474	1,375	1,746	1,916	2,343	2,114	1,991

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NUMBER OF	year	2004	2005	2006	2007	2008	2009	*2010	2011	2012	2013	2014
CONCENTRATED ERYTHROCYTES UNITS	BTC Ljubljana	44,121	42,721	43,268	45,534	54,039	59,418	63,992	65,351	61,645	58,694	56,273
PREPARED FROM	BTC Izola	4,620	4,718	4,957	5,514	5,090	4,171	/	/	/	/	/
WHOLE BLOOD	BTC Novo mesto	4,108	3,999	3,704	2,211	/	/	/	/	/	/	/
	BTC Slovenj Gradec	2,702	2,743	2,739	1,842	/	/	/	/	/	/	/
	Total BTC	55,551	54,181	54,668	55,101	59,129	63,589	63,992	65,351	61,645	58,694	56,273
	total TMC Maribor	19,034	19,034	18,113	19,430	21,263	20,809	21,217	21,620	20,704	20,775	20,762
	BTC Celje	9,064	9,037	9,107	9,276	9,856	10,394	10,053	9,782	9,719	8,325	8,819
	Slovenia	83,649	82,252	81,888	83,807	90,248	94,792	95,262	96,753	92,068	87,794	85,854

* since 2010 the filtration procedure before storage / processing is performed at the BTC after the association

year	2004	2005	2006	2007	*2008	2009	2010	2011	2012	2013	2014
BTC Ljubljana	23,864	25,236	24,826	26,539	4,440	4,947	5,289	5,799	6,004	6,165	5,995
BTC Izola	157	209	324	293	83	45	/	/	/	/	/
BTC Novo mesto	96	108	156	41	/	/	/	/	/	/	/
BTC Slovenj Gradec	449	243	187	67	/	/	/	/	/	/	/
total ZTM	24,566	25,796	25,493	26,940	4,523	4,992	5,289	5,799	6,004	6,165	5,995
TMC Maribor	5,720	7,221	7,337	9,162	2,482	2,791	2,582	2,700	2,571	2,644	2,413
total CTM Maribor	5,720	7,221	7,337	9,162	2,482	2,791	2,582	2,700	2,571	2,644	2,413
BTC Celje	3,665	2,976	3,646	4,096	694	760	832	734	694	650	783
Slovenia	33,951	35,993	36,476	40,198	7,699	8,543	8,703	9,233	9,269	9,459	9,191

NUMBER OF POOLED PLATELETS UNITS PREPARED FROM WHOLE BLOOD

* since 2008, 5-6 units together

year	2010	2011	2012	2013	2014
BTC Ljubljana	19,154	20,934	19,420	17,849	14,157
TMC Maribor	11,414	11,419	9,492	10,524	7,907
BTC Celje	2,905	2,318	2,879	2,592	1,502
Slovenia	33,473	34,671	31,791	30,965	23,566

NUMBER OF FRESH FROZEN PLASMA UNITS - CLINICAL USE

NUMBER OF FRESH FROZEN
PLASMA UNITS - FOR
FRACTIONING

year	2010	2011	2012	2013	2014
BTC Ljubljana	43,945	44,457	40,033	40,541	40,245
TMC Maribor	11,189	10,410	10,620	10,620	12,038
BTC Celje	7,095	7,451	6,840	5,730	7,223
Slovenia	62,229	62,318	57,493	56,891	59,506

NUMBER OF CONCENTRATED ERYTHROCYTES UNITS ISSUED

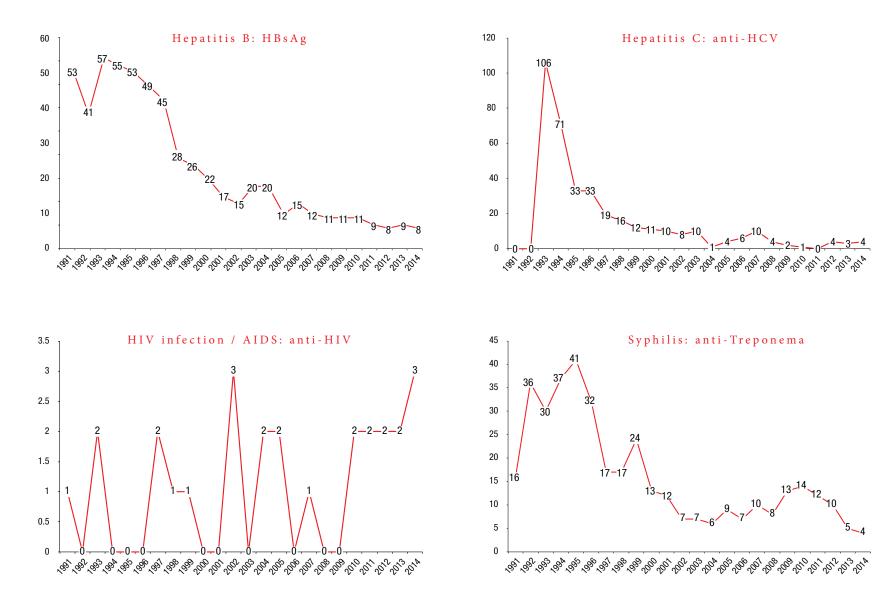
year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
BTC Ljubljana	34,219	34,708	33,728	33,453	37,425	39,674	41,066	40,824	40,430	36,682	35,147
BTC Izola	4,976	4,858	5,529	5,249	5,115	5,339	5,039	5,665	5,548	5,686	5,020
BTC Jesenice	1,627	1,343	1,685	1,690	1,941	2,304	2,289	2,248	2,423	2,193	2,307
BTC Nova Gorica	3,246	3,311	3,332	3,385	3,379	3,735	3,340	3,590	3,585	3,170	3,150
BTC Novo mesto	3,378	3,499	3,289	3,911	3,784	3,736	3,986	4,015	4,044	3,817	4,186
BTC Slovenj Gradec	2,379	2,354	2,509	2,728	2,535	2,275	2,421	2,345	2,351	2,335	2,044
BTC Trbovlje	1,431	1,387	1,208	1,392	1,463	1,521	1,429	1,792	1,528	1,429	1,616
Total BTC	51,256	51,460	51,280	51,808	55,642	58,584	59,570	60,479	59,909	55,312	53,470
TMC Maribor	14,023	12,643	12,828	12,395	14,186	14,682	15,130	16,017	15,162	14,821	15,076
BTU Murska Sobota	2,694	2,937	2,821	2,826	3,705	3,795	3,795	4,088	3,708	3,626	4,065
BTU Ptuj	1,519	1,725	1,556	1,757	1,643	1,966	1,783	2,188	1,957	2,248	2,191
Total TMC Maribor	18,236	17,305	17,205	16,978	19,534	20,443	20,708	22,293	20,827	20,695	21,332
BTC Celje	8,138	7,575	7,792	7,583	7,554	8,028	7,173	7,510	8,055	7,062	8,398
Slovenija	77,630	76,340	76,277	76,369	82,730	87,055	87,451	90,282	88,791	83,069	83,200

NUMBER OF POOLED	year	2004	2005	2006	2007	*2008	2009	2010	2011	2012	2013	2014
PLATELETS UNIT ISSUED	BTC Ljubljana	13,892	16,458	16,900	15,582	2,080	3,985	3,739	4,032	4,209	4,576	4,214
	BTC Izola	144	263	359	328	160	81	75	117	152	148	178
	BTC Jesenice	18	55	65	68	8	0	89	67	99	51	76
	BTC Nova Gorica	459	690	532	844	329	111	125	237	130	177	271
	BTC Novo mesto	937	1,027	584	936	453	429	412	372	489	408	291
	BTC Slovenj Gradec	559	297	312	125	120	49	87	141	204	138	126
	BTC Trbovlje	155	132	247	190	75	34	42	40	57	53	82
	Total BTC	16,164	18,922	18,999	18,073	3,225	4,689	4,569	5,006	5,340	5,551	5,238
	TMC Maribor	5,152	4,199	4,225	6,266	1,480	1,774	1,531	1,786	1,850	1,716	1,532
	BTU Murska Sobota	210	300	419	137	215	360	237	250	175	209	253
	BTU Ptuj	126	152	169	178	90	32	48	56	65	72	79
	Total TMC Maribor	5,488	4,651	4,813	6,581	1,785	2,166	1,816	2,092	2,090	1,997	1,864
	BTC Celje	2,634	1,962	2,175	2,710	306	329	416	550	485	514	624
	Slovenia	24,286	25,535	25,987	27,364	5,316	7,184	6,801	7,648	7,915	8,062	7,726

* since 2008, 5-6 units together

NUMBER OF APHERESIS- PLATELETS UNITS ISSUED	year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PLATELETS UNITS ISSUED	Total BTC	1,283	1,664	1,868	1,990	2,496	2,098	2,355	2,484	3,120	2,891	2,611
	Total TMC Maribor	107	219	259	177	243	122	122	158	236	117	76
	BTC Celje	4	5	3	6	1	1	1	1	4	0	0
	Slovenia	1,394	1,888	2,130	2,173	2,740	2,221	2,478	2,643	3,360	3,008	2,687
NUMBER OF FRESH FROZEN	year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
PLASMA UNITS ISSUED	Total BTC	18,819	19,899	17,588	18,810	17,042	19,775	18,595	19,147	19,143	17,029	13,356
	Total TMC Maribor	10,959	10,726	9,881	9,293	9,576	9,124	9,187	9,398	9,354	9,089	8,431
	BTC Celje	3,210	2,794	2,795	2,850	2,892	2,394	2,097	1,762	2,074	1,767	1,145
	Slovenia	32,988	33,419	30,264	30,953	29,510	31,293	29,879	30,307	30,571	27,885	22,932

FREQUENCY OF DETECTING INFECTION MARKERS IN BLOOD DONORS BETWEEN 1991 AND 2014



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year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
cross-match tests	109,326	121,558	118,831	117,364	127,974	133,317	135,766	143,288	136,792	132,575	131,464
determination of blood group ABO, RhD and Kell	73,264	67,845	77,607	79,383	89,955	83,655	74,898	76,789	71,384	66,650	83,538
indirect Coombs tests	39,738	41,526	33,027	48,994	50,974	55,075	55,994	74,642	76,623	81,424	83,642
direct Coombs tests	9,718	10,265	9,205	12,610	11,171	12,767	14,299	16,194	17,647	14,759	10,918
erythrocyte antibodies specifications	2,475	2,413	2,204	2,846	2,599	2,217	1,925	2,553	2,512	2,729	2,607
tests before Ig anti-D injection		4,472	4,370	5,023	5,949	6,191	6,624	6,851	8,387	8,553	8,354
*platelet tests		749	833	1,067	1,134	1,175	1,152	1,247	1,063	914	962
*granulocyte tests		31	66	46	65	72	59	459	84	184	181
*molecular-biologic tests	*	293	95	99	176	124	229	351	189	328	439

*erformed only by the BTC of Slovenia

year	2008	2009	2010	2011	2012	2013	2014
organ transplantation supporting services	8,714	9,103	10,565	9,681	8,591	11,035	10,430
haematopoietic stem cell transplantation supporting services	3,214	3,299	3,187	1,735	1,905	1,858	3,005
HLA typing for the Slovenija Donor registry	1,219	1,348	1,602	2,117	1,499	1,000	3,071
diagnostic services (for autoimmune diseases)	322	395	828	717	408	132	155
Slovenija Donor registry services	739	656	635	559	264	257	304

PERFOMED FOR PATIENTS IN SLOVENIA * performed only by the BTC of Slovenia

HISTOCOMPATIBILITY TESTS

NUMBER OF

*NUMBER OF

IMMUNOHAEMATOLOGIC TESTS PERFORMED FOR PATIENTS IN SLOVENIA

NUMBER OF PERFORMED THERAPEUTIC SERVICES IN SLOVENIA

*NUMBER OF PERFORMED SPECIAL THERAPEUTIC SERVICES IN SLOVENIA

* performed by the BTC of Slovenia

year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
drawing of autologous blood (autotransfusion)	1,930	2,035	1,798	1,784	1,502	2,272	2,024	2,115	1,226	855	526
therapeutic drawing of whole blood	846	1,047	1,228	1,253	1,327	1,284	1,369	1,488	2,036	1,352	1,148

year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
autologous haematopoietic stem cell donation	61	76	125	107	106	154	147	162	181	177	121
allogeneic haematopoietic stem cell donation	13	9	17	23	26	21	25	18	16	14	16
granulopheresis	0	0	0	0	26	27	31	37	84	86	67
lymphopheresis	0	0	0	0	4	0	1	3	3	0	1
umbilical cord blood collection and storage procedures	2	3	1	3	41	248	270	171	172	115	62
therapeutic thrombopheresis	0	0	0	0	0	5	0	0	0	0	0
therapeutic leucopheresis	4	6	1	0	0	1	5	13	16	4	4
therapeutic plasmapheresis	4	1	12	2	/	/	/	/	/	/	/
bone marrow concentration procedure	3	3	3	1	0	0	1	2	0	4	2
transfusion of haematopoietic stem cells	48	60	85	87	86	83	90	79	75	79	69
freezing of cells	70	82	129	101	107	145	141	148	157	157	130
isolation of CD34+ cells	0	0	3	14	8	16	17	27	39	32	33
photopheresis	/	/	/	/	/	/	/	/	1	214	446

SLOVENIA BONE MARROW	year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
DONOR REGISTRY (SD)	number of SD donors for patients abroad	1	2	2	6	4	3	6	2	4	0	0
	number of haemat. stem cells donors for Slovenian patients:	9	5	7	11	15	13	17	21	25	29	26
	- foreign	9	5	7	10	11	9	15	20	25	27	22
	- SD				1	4	4	3	1	0	2	4
	Number of umbilical cord blood units for Slovenian patients								2	2	2	0
	Number of registered SD haematopoietic stem cell donors			7,985	9,069	11,112	14,466	16,231	16,435	16,605	16,029	16,275

NUMBER AND TYPEO	F
REPORTED ADVERSEREACTION	S
TO BLOOD TRANSFUSION II	Ν
SLOVENIA / HAEMOVIGILANC	E

Reaction	2010	2011	2012	2013	2014
Haemolysis	4	3	7	1	1
GVHD					
TRALI		1	1	2	1
TACO	12	10	13	9	8
PTP					
allergy	74	57	66	49	58
anaphylaxis	1	7	5	3	3
NHFR	70	52	60	34	38
Bacterial infection	1				1
Viral infection		1		3	2
hypotension	2		2	1	1
dyspnea	2	4	3		1
other	4	7	5	11	5
Total	170	142	162	113	118

OTHER EXAMINED PERSONS BY INDIVIDUAL TESTS IN SLOVENIA

year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
hepatitis B virus	44,199	48,130	52,688	56,202	59,696	57,823	59,122	57,743	53,906	58,619	59,445
hepatitis C virus	14,067	16,216	17,696	17,750	18,367	20,982	21,772	22,275	20,001	19,756	20,917
HIV antibodies	14,082	14,560	15,243	17,258	18,794	20,085	20,600	21,378	19,076	19,271	20,192
Treponema Pallidum antibodies+	9,858	11,324	13,312	13,606	15,464	17,554	17,916	17,837	21,373	21,232	21,956
hepatitis A virus	5,039	5,292	5,538	6,124	7,002	5,999	5,117	5,295	5,782	5,334	5,661
CMV antibodies	260	227	273	280	366	1,103	1,743	1,540	1,003	961	751



Zavod Republike Slovenije za transfuzijsko medicino Blood Transfusion Centre of Slovenia