

Donation, collection and transplantation of hematopoietic cells

Collection of hematopoietic cells

Currently, hematopoietic cells are obtained in two ways:

Bone marrow collection

- From the **pelvic bones** (puncture into the pelvic bones and suction of the bone marrow - maximum **1500 mL**, according to the weight of the donor), **under anesthesia**, 2-3 days in the inpatient department of a specialized collection center; convalescence,
- after collection, **punctures** in the pelvic bones hurt, and the donor's condition returns to normal within **7-14 days**.



A needle used for collection of the bone marrow from the pelvic bones

Collection of stimulated stem cells from peripheral blood

- Outpatient without anesthesia,
- collection is preceded by **stimulation of hematopoietic cell production** (four evenings before the collection, the donor receives 1-2 injections of a **stimulant**, resulting in hematopoietic stem cells being flushed into the bloodstream),
- then, the hematopoietic stem cells are removed from the vein using a device called **separator** (this procedure takes several hours),
- in case of there being an insufficient number of collected cells, it is necessary to perform a shorter additional collection the following day,
- the donor may have different reactions to the stimulant, usually bruising in the bones and lower back, headaches, tiredness (symptoms are similar to those of a flu),
- the problems caused by the stimulation disappear shortly after collection..

Transplantation procedure

Hematopoietic stem cells are **given through a vein** (similar to a transfusion) and **end up in the bone marrow**, where they settle. Before the transplant, the patient must be prepared by chemotherapy or whole-body irradiation to **destroy their bone marrow**. After the **allogenic transplant**, the patient must receive **immunosuppressants**.



Bone marrow collection from the pelvic bone (performed under anesthesia)

Czech Registry of Hematopoietic Cell Donors

Formerly called the Czech Register of Bone Marrow Donors, * it was established in 1991 at the **Institute of Clinical and Experimental Medicine (IKEM)** (<https://www.ikem.cz/cs/>) in Prague. Registry records and searches for potential donors for Czech and foreign patients on the basis of tests known as "typing MHC" (**Human Leukocyte Antigen** - a system of hereditary character on white blood cells, which **very diverse** and significantly affects the mutual compatibility of the transplanted cells and the body of the patient; it is therefore necessary to have a wide range of possible combinations of HLA traits available to find the same donor, which in practice means having a sufficient number of donors). There are more than 60 registries in the world, in which almost 19 million people are already registered.



Collection of "stimulated" stem cells from a vein using a separator

Conditions for entering the register

- Age **18-35 years** (records in the register **up to 60 years of age**, unless a person requests exclusion or there are circumstances preventing the possible donation of hematopoietic stem cells),
- **good health** and **no serious diseases** (infectious jaundice, tuberculosis, severe asthma, AIDS, serious diseases of the blood, blood vessels, heart, chronic diseases of the internal organs, diabetes),
- if a person does not take certain drugs for a long time,
- weight of **at least 50 kg**,
- initial blood collection and provision of contact details to the registry database..

How to find a donor for a patient

- **Genetic markers on white blood cells (MHC)** are determined from a blood sample taken at entry into the registry,
- in case of agreement in the basic genetic traits with the patient, **further blood collection** follows - **more detailed blood tests** that specify the degree of agreement with the patient,
- if the necessary degree of agreement between the donor and the patient is confirmed on the basis of blood tests, preparations for hematopoietic stem cell collection will begin (**detailed medical examination**: blood collection for laboratory tests, heart and lung X-ray - in case of a bone marrow collection, also a pelvic X-ray, ECG, internal examination, possibly additional examination).

Links

Related articles

- Major Histocompatibility Complex
- Genetics of transplants, transplant laws

Source

- NEZNÁMÝ AUTOR,. *Český registr dárců krvevorných buněk : O registru* [online]. ©2008. [cit. 2012-01-06]. <<http://www.darujzivot.cz/o-nas/o-registru>>.
- DOUBEK, Michael. *Příprava a postup při transplantaci* [online]. ©5. 1. 2007. The last revision 6. 7. 2010, [cit. 2012-01-06]. <<https://www.linkos.cz/pacient-a-rodina/lecba/jak-se-lecit/transplantace-krvetvornych-bunek/priprava-a-postup-pri-transplantaci/>>.