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Blood transfusion

Sources of blood

- **Donors**
- **Own blood of patient (autoreinfusion):**
  - **autoreinfusion of blood from cavities (haemotorax, haemoperitoneum) in case of acute blood loss due to traumatic rupture of internal organs**
  - **patient may donate his own blood before surgery should it be needed for transfusion (for elective surgery)**

Whole blood and Blood components

- **Whole blood**
  - **Transfusion of whole blood can lead to sensitization of the patient, formation of antibodies to blood cells or plasma proteins, which can cause complications during subsequent blood transfusion or pregnancies**
  - **So, today NO indications for transfusion of whole blood**
  - **It is recommended that the product for transfusion contain the components of blood that the patients needs most of all**

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Whole blood and Blood components

- **Whole blood**
- **Blood components**
  - **Red blood cells**
    - **Differ from whole blood in the minimal content of plasma and high concentration of red blood cells**

Red blood cells

- Ht - 65-80 %
- Stored at 4-6° C for 35 day
- CDPA (citrate-dextrose-phosphate-adenine) anticoagulant bind calcium ions, prevents blood from coagulating

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Whole blood and Blood components

- **Whole blood**
- **Blood components**
  - **Red blood cells**
  - **Packed red cells concentrates**
    - **Modern and safe red cells component**
    - **Is concentrate of red blood cells without plasma**

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Whole blood and Blood components

- **Whole blood**
- **Blood components**
  - **Red blood cells**
  - **Packed red cells concentrates**
  - **Platelet concentrates**
  - **Granulocyte concentrates**

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Indications for blood transfusion

- acute anemia due to grave blood loss

(25 - 30% of blood volume) with hemorrhagic shock or decrease of Hb level <70-80 g/l and Ht < 25%

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Indications for blood transfusion

- acute anemia
- Chronic anemia (only for correction of anaemia signs)

Plasma

- **Stored at temperature**

  -40^0 C - 3 years

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Indications for Plasma transfusion

- grave blood loss (25 - 30% of blood volume) with hemorrhagic shock
- Diseases of liver with decrease of production plasma's factor of coagulation and its deficiency in circulations
- Plasmaferesis in grave toxity, sepsis

Blood preparations

- **albumin**
  - **High oncotic activity accounts for its ability to keep water within the body and hence increase the circulating blood volume**
  - **Indicated for shock of whatever origin, burns, hypoproteinaemia in oncological patients**

Blood preparations

- albumin
- Cryoprecipitate
  - – contains
    - factor VIII
    - factor XII
    - fibrinogen
  - – Is indicated for patient with haemophilia A

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Blood preparations

- albumin
- Cryoprecipitate
- Prothrombin complex
  - contains factors II, VII, IX, X
  - Is indicated for patient with haemophilia B

Blood preparations

- albumin
- Cryoprecipitate
- Prothrombin complex
- Fibrinogen
  - Is indicated for congenital and acquired hypo- or afibrinogenaemia

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Blood preparations

- albumin
- Cryoprecipitate
- Prothrombin complex
- Fibrinogen
- Thrombin
  - Is used topically in parenchymal and capillary bleeding

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Blood preparations

- albumin
- Cryoprecipitate
- Prothrombin complex
- Fibrinogen
- Thrombin
- Immune preparation
  (γ - globulin)
  – Contain high titres of antibodies

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Main action of physician for blood transfusion

- **Determine if the blood fit for transfusion**
- **Blood grouping**
- **Cross-match (Determine of the donor's and patient's blood compatibility)**
  - **Testing for individual compatibility by ABO system**
  - **Testing for individual compatibility by Rh-factor**
- **Biological compatibility**

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Main action of physician for blood transfusion

- **Determine if the blood fit for transfusion:**
  - **Hermetic of pack**
  - **Rightly of label (donor's code, blood group, amount of blood and the date the blood was taken)**
  - **Assesment of blood quality (if the blood has clots, hemolysis, or blood is turbid- with flakes, films)**

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Main action of physician for blood transfusion

- **Determine if the blood fit for transfusion**
- **Blood grouping**

Blood Grouping

– **With anti A and anti B celiclones**

Agglutination reaction		**Tested blood group**
Celiclone anti A	Celiclone anti B	
- + - +	- - + +	I(0) II(A) III(B) IV(AB)

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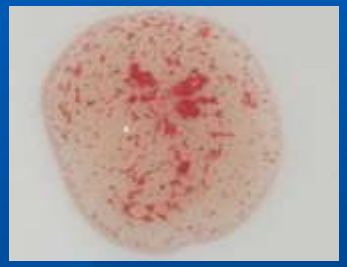
Rhesus factor (Rh) typing

– **With anti D celiclone**



Rh +

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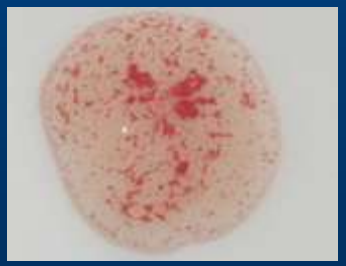
Testing for individual compatibility by ABO system

- 3-5 ml of blood is taken from the patient's vein, this is centrifuged
- Serum of patient and donor blood mixed at the ratio 5:1 – 10:1 on a plate
- Presence of agglutination indicates that blood groups of the patient and the donor are not compatible



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Testing for individual compatibility by Rh-factor

- 2
  33
- G
- In
- C
- E

Presence of agglutination

Blood is not compatible

Absence of agglutination

Blood is compatible

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Main action of physician for blood transfusion

- **Determine if the blood fit for transfusion**
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  - **Testing for individual compatibility by ABO system**
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- **Biological compatibility**

Biological compatibility

- **The first 15-20 ml of blood are allowed to flow fast; the infusion is stopped and patient's response and condition are observed (behaviour, skin colour, pulse and breath rates)**
- **Tachycardia, dyspnoea, facial hyperaemia and hypotension all suggest incompatibility of the donor's and patient's blood**
- **In the absence of signs incompatibility the test is repeated twice**

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Complications of blood transfusion

- **Blood transfusion shock**
  - **Due to incompatibility blood by ABO or Rh-factor system**
  - **Resulting from rapid intravascular haemolysis of the transfused blood**
  - **Periods:**
    1. ***Shock***
    2. ***Oliguria***
    3. ***Restoration of diuresis***
    4. ***Recovery***
  - **Treatment:**
    1. ***Cardiovascular agent (strophantin), antihistamine (suprastin), corticosteroids (prednisolon),***

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Complications of blood transfusion

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    4. ***Recovery***
  - **Treatment:**
    1. ***Cardiovascular agent (strophantin), antihistamine (suprastin), corticosteroids (prednisolon),***
    2. ***To acccelerate the restoration of circulation: Saline solutions***
    3. ***To remove product of haemolysis: lasix***
    4. ***Oxygen therapy***
    5. ***Ineffective drug therapy is indication for haemodialysis***

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Complications of blood transfusion

- **Blood transfusion shock**
- **Homological blood syndrome**
  - **In massive blood transfusions when compatible blood of the same group and Rh, obtained from different donors is transfused, individual incompatibility of plasma proteins**
- **Bacterial-toxic shock**
- **Air embolism**
- **Acute cardiac dilatation of heart**

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Antishock solutions

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Crystalloids (electrolyte solutions): saline, Ringer's, glucose solution)

- Improve rheologic properties of blood and restore microcirculation
- restore and maintain the osmotic pressure in the intestinal space
- Quickly leave circulation

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Colloid solutions:

1) hydroxyethye starch: voluven, volecam, rephortan

2) dextrans: polyglucin, rheopolyglucin

- Increase the circulating blood volume and therefore restore blood pressure
- Stay in the blood stream over a long period and draw fluid from intercellular space

Advantages of colloid and crystalloids (electrolyte) solutions in shock emergent transfusion therapy

- **there is no necessity to waste time (about 20-30 min) to perform blood typing, for its ability to restore circulating blood volume donor blood is not superior to colloid product, therefore therapy is to be initiated with combinations of colloid and crystalloids solutions**
- **No risk of infection**

Restoration of blood loss due to its degree

Degree of blood loss	Volume, ml	Method of restore
mild and moderate	< 1500	Transfusion of crystalloids and colloid in ratio 3:1 - 300% from blood loss volume
severe	> 1500	Transfusion of crystalloids and colloid in ratio 3:1 + plasma + red blood cells

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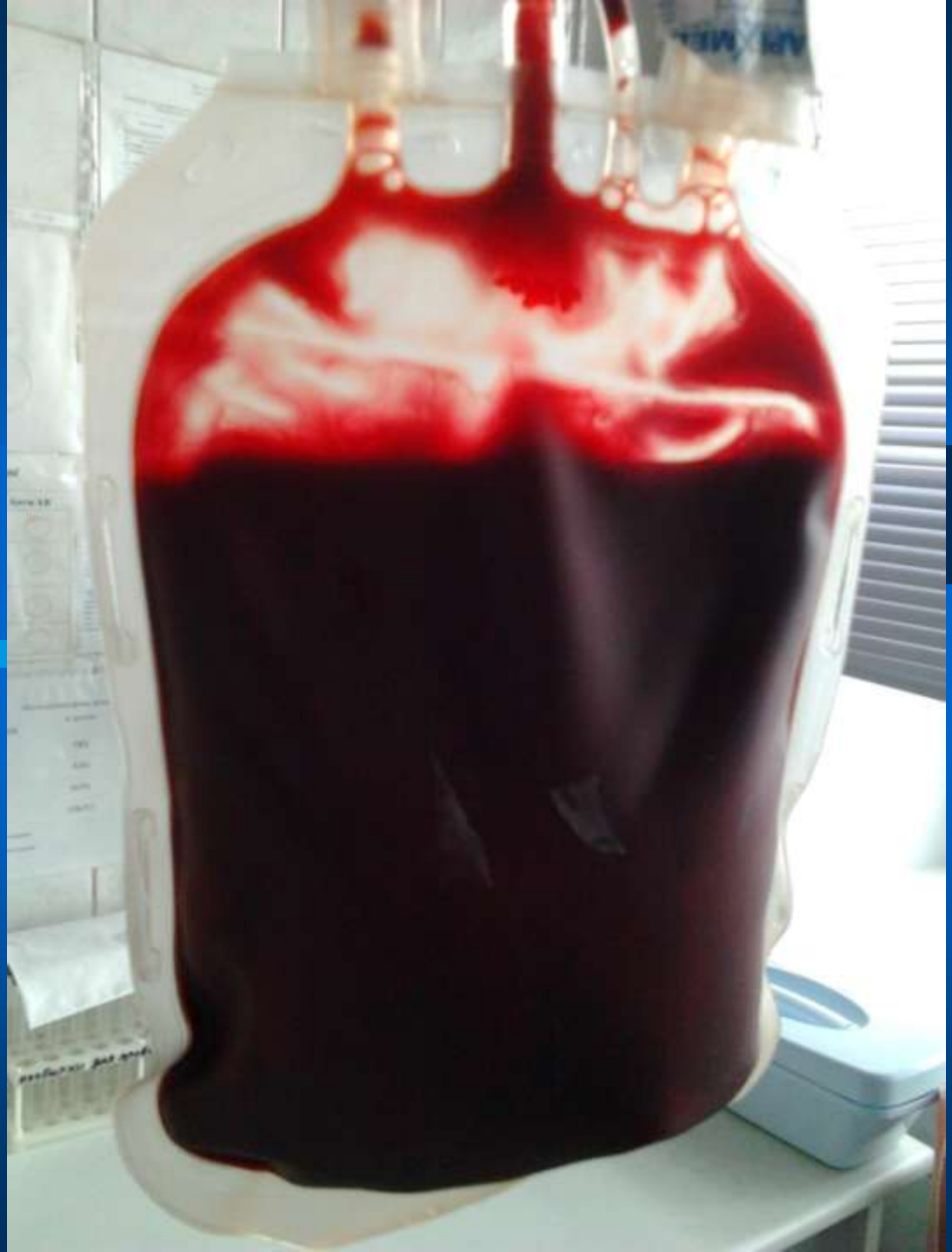


ГУЗ СОСПК
B(III)+
641110 301117 03
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B(III) Rh+
Rh положительная
Плазма
свежезамороженная,
300 мл
29.10.13
Может передать
инфекционные агенты
ГОСТ Р 52938-2008