Related topics
Blood groups, AB0-system, antigen, rhesus antigen, monoclonal antibodies

Principle
With the discovery of the blood groups of the AB0-system by Karl Landsteiner in 1900 and the Rh-system in 1940, it has been possible to carry out blood transfusions with high success rates for the first time. A precise determination of the blood group prior to the transfusion is essential for the recipient. Banked blood which is not matched properly may cause haemolysis of the erythrocytes and lead to the death of the recipient. ELDONCARD™2511 is a primary test for erythrocyte antigens.

Equipment

- **Student’s set**
  - 1 Microliter pipette 10 -100 µl 47141-03
  - 1 Tips, palletized in box 47148-11
  - 1 Disposable gloves, medium size, latex 46359-00
  - 1 Disposable stirring spatulas, 500 pcs. 38835-00
  - 1 Water, distilled, 5 l 31246-81
  - 1 Eldon-cards for the blood-group determination 87973-01

Tasks
1. Determine the blood group in an EDTA-blood specimen.
2. Determine the blood group in a capillary blood specimen.

Fig. 1: P5921700
Procedure

Material for the examination:
EDTA-blood

Task 1: Examination of capillary blood

Open the pack and remove one card. Check whether all test fields have coloured spots of the same size.

1. Label the card with the data of the patient (important – risk of confusion may arise otherwise!)

2. Pipette 10 µl of water onto each test field (Fig. 2)

3. Pipette 30 µl of the blood specimen onto each test field (Fig. 3).

4. Take a stirring spatula and thoroughly stir water and patient specimen on the first test field, in order to dissolve the dried antibodies. Subsequently distribute the mixture over the first test field (Fig. 4).

5. Apply the same procedure to the blood specimens on the other test fields.

6. Carefully swivel the Eldon-card in a circular movement for 40 sec.; then read the result (Fig. 5).

Task 2: Examination of capillary blood
Only steps 2 und 3 are different, refer to Fig. 6:

2. Pipette 20 µl of water onto each test field of the Eldon-card.

3. For the withdrawal of capillary blood, follow the instructions in the chapter “Pre-Analytics”.

Catch an emerging drop of blood with the stirring stick (Eldon-stick) and transfer it onto the first test field. Follow the same procedure with a new stirring stick (Eldon-stick) for every one of the other test fields.

The following steps are identical with those in method 1.

**Basics**

With the discovery of the blood groups of the AB0-system by Karl Landsteiner in 1900 and the Rh-system in 1940, it has been possible to carry out blood transfusions with high success rates for the first time.

Landsteiner named the blood groups he had discovered by the antigens located on the surface of the erythrocytes, i.e. A, B, AB and 0 (no antigens against blood groups). He found out that antibodies against the missing antigens will always be generated in the blood (Landsteiner rule).

Blood group A → antibodies against B-antigens
Blood group B → antibodies against A-antigens
Blood group AB → no antibodies
Blood group 0 → antibodies against A and B-antigens

Rhesus-positive is used as description for the presence of rhesus antigen D, e.g. blood group A pos. (+). A precise determination of the blood group prior to the transfusion is essential for the recipient. Banked blood which is not matched properly may cause haemolysis of the erythrocytes and lead to the death of the recipient.

Nowadays, washed erythrocyte concentrates are transfused almost exclusively. When required, plasma or thrombocyte donations are possible, of course. In these cases too, careful blood group determinations have to be applied on account of antibodies!

ELDONCARD™2511 is a primary test for erythrocyte antigens. Depending on the legislation of the respective country, another test of a different type than the first one has to be performed for confirmation purposes.

ELDONCARD™2511 does not record the antibodies present in the plasma. For a correct determination of the blood group, a second test to determine these is thus imperative!

Method:
Direct antigen antibody reaction. The monoclonal antibodies (type IgM) deposited on the Eldon-card react directly with the antigens on the erythrocytes in the blood specimen.

Evaluation

Agglutination proves the existence of the antigen. Figure 7 clearly shows that agglutination has only occurred on the first field (with the antibodies against A). Anti-B, Anti-D and also the control field show no reaction.

The tested blood specimen is thus of blood group A rhesus-negative (A Rh neg.)

The control field contains no antibody but only the same phosphate buffer that has also been applied to the other test fields. Agglutination in this control field is unspecific and means that the test cannot be evaluated. In this case, a determination of the blood group can only be carried out with a different system. As the test does not cover all D-variances, the patient specimen has to be tested in further analyses in the event of a rhesus-negative result.

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Test field Anti-A</th>
<th>Test field Anti-B</th>
<th>Test field Anti-D</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 pos.</td>
<td></td>
<td>+</td>
<td></td>
<td>—</td>
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<tr>
<td>A pos.</td>
<td>+</td>
<td>+</td>
<td></td>
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<tr>
<td>B pos.</td>
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<td>+</td>
<td>+</td>
<td>—</td>
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<tr>
<td>AB pos.</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>—</td>
</tr>
<tr>
<td>0 neg.</td>
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<td>—</td>
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<tr>
<td>A neg.</td>
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<tr>
<td>AB neg.</td>
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<tr>
<td>The result</td>
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<td>is not valid</td>
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Fig. 7: Evaluation and documentation
Questions:

- Which blood groups can be detected with the Eldon-card?
  
  Blood group A  
  Blood group B  
  Blood group AB  
  Blood group 0  
  Rhesus positive  
  Rhesus negative

- Which plasma antibodies are detected by the ELDONCARD™2511?
  
  None of the antibodies existing in the plasma are detected, only the erythrocyte antigens of the AB0-system and the rhesus antigen D.

- What is the control test field used for? How does it work?
There are no antibodies on the control test field, only a phosphate buffer with a colour marking. When agglutination of the blood specimen is observed on the control field, this signifies an unspecific reaction and the test is not valid.

- What does agglutination on the Anti-B test field mean, when all other test fields show a homogenous distribution of the blood specimen?

Agglutination on the Anti-B test field shows the reaction of the antibodies deposited on the test field against the blood group antigen B. As no reaction is indicated by the other test fields, the blood specimen belongs to the blood group B Rh negative.
Lab Report
You may enter your results in the following table

<table>
<thead>
<tr>
<th>Patient</th>
<th>Test field Anti-A</th>
<th>Test field Anti-B</th>
<th>Test field Anti-D</th>
<th>Control</th>
<th>Result</th>
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Questions
- What does agglutination on the Anti-B test field mean, when all other test fields show a homogenous distribution of the blood specimen?
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

- What is the control field used for? How does it work?
_____________________________________________________________________________
Which plasma antibodies are detected by the ELDONCARD™2511?

Which blood groups can be detected with the Eldon-card?