INSTRUMENT FOR BLOOD GROUPING ON BLOOD GROUPING CARDS

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Fig. 1

Fig. 2

Fig. 3

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INSTRUMENT FOR BLOOD GROUPING ON BLOOD GROUPING CARDS

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5 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for making blood grouping tests. Four blood-grouping tests are made simultaneously, without danger of cross-contamination by supporting drops of blood or other test liquid on four prongs extending from a common handle, and transferring the drops to, and stirring the resulting test mixture at, separate test areas of a standard test card simultaneously by manipulation of the handle. Optionally, a preliminary stirring step to dissolve the dried test reagent in water is avoided by using a high salt concentration in the dried reagent to cause the water to absorb, without stirring, sufficient salt to prevent adverse effect on subsequently-added blood samples.

Methods are known for carrying out blood grouping on blood grouping cards containing two or more testing areas, by which methods, with or without previous moistening of the area with water, a drop of the blood, which has to be examined, is supplied to every separate area, followed by a stirring. Instead of blood, a salt water suspension of blood corpuscles from the person, whose blood has to be examined, may be used. The cards may contain for example 2—5 testing areas, most frequently 4. Within each testing area the cards generally contain a dried drop of test serum chosen for blood group test with an admixture of control serum and control control substitute and salt.

The general method when using such a card for blood grouping with capillary blood is as follows: at first one drop of plain water is supplied to each of the areas with a drop pipette. Then a stick of glass of plastic is used for stirring first one of the said drops of water, until the reagent contained therein is completely dissolved in the water. The glass stick is then carefully wiped, and the operation is repeated in one after the other of the further areas. Thereafter a drop of blood from the patient is put up, for instance from the ear, on the point of the glass stick; and this drop is added to the dissolved test reagent in the first area and mixed with it.

The glass stick is cleaned, and the operation repeated with the other areas. A suitable, preservative time, which may be for instance 1 minute, after the operation has been carried out as regards the last area, the card is rocked to a completely vertical position in different directions for instance for 2 minutes, the areas of the card are examined and the reaction noted.

This method is on many points unfavourably troublesome and time demanding, especially when it has to be done ambulant, for instance on the scene of an accident, or beside a stretcher, where the essential purpose is to have a blood transfusion established as quickly as possible. Thus the separate treatment with water of the reagent contents of the testing areas, with the wiping if the glass stick in between, takes a considerable time and the same goes for the separate mixing and spreading of the testing blood within the areas. Further the method involves danger of false reactions, if serum is transferred from one section to another.

According to the invention the procedure for this purpose is that the blood is supplied by placing a drop of the patient's blood on each of a number of blood transferring surfaces, which with respect to the number, mutual distance and mutual position thereof correspond to the testing areas of the card, said transferring surfaces being present on the furlations of a furcated instrument, which thereafter is used to transfer the blood samples to the test areas and to effect the separate stirring and distributing operations in a plurality of the said areas at one time.

Hereby the purpose aimed at is obtained, as the individual mixing operations are carried out at one time in a plurality, maybe all of the areas, whereby time consumption is considerably reduced. Moreover false reaction is avoided, as every prong of the instrument contacts only one of the areas, which applies also in the case, where two mixing operations are required, one with water and a following one with blood. Preferably, however, in the latter case two separate instruments are made use of, one for each of the operations, discarding the first instrument before using the other one.

The method may, however, also be carried out so that only one mixing operation is undertaken, viz. in connection with the placing of the patient's blood in the areas. In that case, the water is supplied to the areas in advance without carrying out the operation of stirring the water in order to dissolve the reagent; when carrying out this embodiment of the invention, the distribution of the water does not take place, until the blood sample has been added. This can only be done, when the composition of the serum portions used in the production of the cards for covering each test area has been adjusted to suit this method; on the other hand, the composition required is within limits known per se. Thus the adaption for this embodiment of the method according to the invention may be obtained by altering the salt concentration in the serum portions to be somewhat higher than usual. The specificity of the samples is not affected by the change in composition necessary for obtaining this purpose. When these precautions have been taken at the preparation of the card, a water drop added without stirring is capable of absorbing sufficient salt to prevent the occurrence of agglutination-like or agglutination restraining or hemolyzing (blood corpuscle dissolving) phenomena, when the blood is brought in contact therewith.

In this case, blood grouping can be carried out particularly fast, as the introductory water mixing operation is done away with.

The invention further concerns an instrument for carrying out the method described above, which instrument is characterized in that it has the shape of a comb, the teeth of which have a flat area for the picking-up of a blood drop. As the teeth are elaborated so that the said areas have mutual distances corresponding to the test areas, it is this possible at one time to transfer blood to all test areas, just by placing the teeth of the comb so that the blood gets into contact with the areas or with a drop of water placed on each of them.

According to a particularly advantageous embodiment of the instrument, the flat areas are formed as the end surfaces on the prongs, and the prongs have a bent shape for the creation of short outer sections, wherein are in the same plane and create such an angle with the plane of the comb that the outer sections at the same time conveniently can be placed against each of the blood grouping areas. Hereby it is obtained that the water
and the blood from the end surfaces can simultaneously be mixed and distributed over all test areas. The instrument is preferably manufactured from plastic, thereby using especially a plastic type, which has a good adhesion towards blood.

To illustrate the method and the instrument, the drawing shows:

FIG. 1, an example for the execution on a testing card,

FIG. 2, instrument according to the invention, seen from the side, and,

FIG. 3, same in section.

In FIG. 1, 1 is a card, which, as shown, may contain an area 2 for statement of the data of the patient, such as name, address, age et cetera, and an area 3, in which to sum up the results of the grouping test. 4–7 are test areas, each of which contains a dried drop of test serum. Area 4 may thus contain a test serum, wherein the specific ingredient is anti-A serum, area 5 is a similar drop containing anti-B serum, the area 6 contains anti-D serum, and the area 7 a drop, which contains only an unspecific serum, and which serves as a control to reveal, whether circumstances are present, which can make the reactions obtained in the other areas invalid, for instance in consequence of the patient's blood being panagglutinative.

As mentioned by way of introduction it is known that serum in the grouping areas contains conglutinins or conglutinin substitutes and salt. Blood grouping cards, where 60 mml. reagent consisting of 6 mml. serum and 54 mml. 6% dextrane solution with 0.9% NaCl are dried in each test area, are thus known. If the amount of salts contained in the said quantity of serum is converted into the equivalent quantity of NaCl, the salt concentration in the serum will also be 0.9%, and the salt contents in each reagent dose will correspond to 0.540 mg. NaCl, of which 0.480 mg. originates in the dextrane solution, whereas 0.060 mg. equals to the serum salts. When the cards are to be used in connection with the present method, the quantity of salt ought to be larger. Experiments have shown that the amount of salt is advantageously increased in portion to the usual salt quantity mentioned above, by an extra quantity of about 0.175 mg. NaCl calculated on 60 mml. reagent of the above mentioned composition. Hereby the solution of the reagent dried in the test areas is promoted and a quicker rise of the salt concentration in the measured drop of water is obtained, whereby also the reaction strength of the agglutinations is increased.

In FIGS. 2 and 3 is shown an embodiment of the instrument used in carrying out the method described above and so shaped that it corresponds to the card shown in FIG. 1. The instrument consists of a holding plate 8, from which four teeth 9 are extending, each having a plane end surface 10 and adjacent outer surface 11. The distance between the prongs, and thereby between the outer sections 11, corresponds to the distance between the areas 4–7 mutually. The use of the instrument is described above.

What I claim is:

1. An instrument for simultaneously transferring a plurality of separate drops of test liquid respectively to a plurality of linearly spaced test areas on a blood-grouping test card or the like, comprising a comb-shaped body having a handle and a plurality of spaced prongs extending therefrom, said prongs each having a closed flat face of predetermined area for carrying a drop of liquid and such prongs being spaced and positioned to disposed said liquid-carrying faces in position to be engaged simultaneously with the spaced test areas on the card.

2. An instrument as set forth in claim 1, wherein the prongs have main portions which lie in a common plane and short bent end sections which lie in a common plane at an angle to the plane of the main portions such that the end sections can be placed simultaneously against the test areas, and the liquid-carrying faces are formed as flat end faces on the end sections.

3. In combination, apparatus for simultaneously carrying out a plurality of blood grouping tests, comprising a test card having a plurality of linearly-spaced coplanar test areas each carrying the dried residue of a test serum and conglutinin or conglutinin substitute together with salts in a concentration of least equal to the osmotic equivalent of 0.9 percent sodium chloride, such residue being adapted to dissolve into a drop of water deposited on the test area and admixed with the residue, each moistened test area being adapted to undergo a test reaction with a drop of blood subsequently placed thereon, and an instrument as defined in claim 1, in which the liquid carrying flat faces are spaced to be engaged with the spaced test areas on the card.

4. A combination as set forth in claim 3 wherein the test areas of the test card contain salts in a concentration exceeding the osmotic equivalent of 0.9 percent sodium chloride, the salt content being such that without stirring the water dissolves sufficient salt to prevent the occurrence of adverse reactions when the blood is subsequently added.

5. A combination as set forth in claim 4 in which the instrument prongs have main portions and short bent end sections which lie in a common plane at an angle to the main portions such that the end sections can be simultaneously placed flatwise against the test areas, the liquid carrying faces being formed as end faces on the end sections.

References Cited

UNITED STATES PATENTS
2,770,572 11/1956 Eldon 167—84.5
3,276,847 10/1966 Duff et al. 23—292

FOREIGN PATENTS
393,009 10/1908 France
1,032,410 3/1953 France
82,305 1/1895 Germany
14,874 6/1902 England

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION


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It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 60, "other" should read -- after --;
line 70, "if" should read -- of --. Column 2, line 62, "bye"
should read -- by --. Column 4, line 6, "disposed" should
read -- dispose --.

SIGNED AND SEALED
AUG 26 1969

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents