

CAPILLARY CENTRIFUGATION FOR BLOOD GROUP SEROLOGY DIAGNOSTICS WITH DISTINCT AREAS FOR POSITIVE AND NEGATIVE REACTIONS*

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Purpose: Gel techniques and Column agglutination techniques are well established in blood group serology diagnostics. Ease of handling, stable endpoint, and no need for washing steps in the indirect Antiglobulin Test (IAT) are key strengths of these systems [1,2]. However, weak positive results are sometimes difficult to discern from negatives.

The purpose of this study was to develop an agglutination format with distinct areas for positive and negative reactions, which furthermore allows for an IAT without washing steps.

Methods: A plastic chip, similar in size with an ID-Card (DiaMed), containing an intrinsic microcapillary system, was constructed with the following top to bottom design (see figure 1):

- 1) Reaction chamber;
- 2) reagent channel;
- 3) capillary system;
- 4) flash-sized chamber.

The capillary zone and the flash-sized chamber are the compartments of positive and negative reactions, respectively.

Forward Typing: 10 µl of diluted whole blood are pipetted into the reaction chamber of a chip carrying reagent channels filled with anti-A or anti-B. The chip is centrifuged in an ID-Centrifuge.

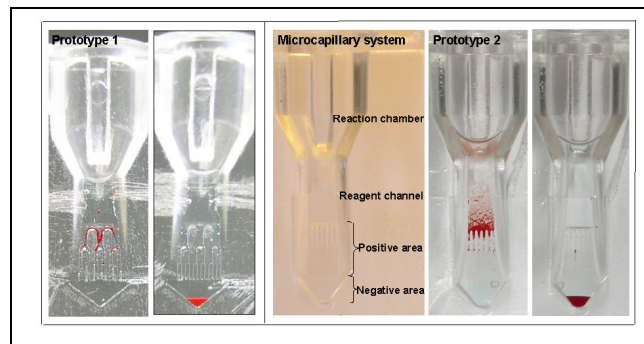


Figure: Top to bottom design of the Capillary centrifugation tube with typical positive and negative results. Note the “interface” between positive and negative area in the upper part of the negative chamber.

Antibody Screening with IAT: 25 µl of 0.8 % Screening Cells and 10 µl of patient plasma are pipetted into the reaction chamber of a chip containing Coombs reagent. The chip is incubated for 15 minutes at 37 °C and then centrifuged in an ID-Centrifuge.

Positive and negative results are recognized as haemagglutinates that are retained within the capillary system or as a button of red cells in the negative chamber (see the figure).

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Results: 20 blood samples have been tested in a prototype chip containing anti-A or anti-B reagent. 10 patient plasma containing irregular antibodies against blood group antigens and 10 plasma of blood donors without detectable irregular antibodies have been tested in a prototype Coombs chip. All results were in agreement with the results received with similar ID-Cards.

Conclusions: The results of this feasibility study indicate that the here presented capillary centrifugation technique may resolve inconveniences of gel and column agglutination techniques, i.e. ease of interpretation of very weak positive reactions and lot-to-lot variances. Further, reagent consumption is lower and the technique has the potential to reduce centrifugation times. To enhance flexibility, it can also be used as a system with empty cards in an automated workstation, where the reagents are added in a first step according to the specific needs of the customer. In addition, the capillary centrifugation format seems to be suitable for particle agglutination tests by using ligand-coated standard synthetic particles.

References:

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- [2] Rumsey DH, Ciesilski DJ: New protocols in serologic testing: a review of techniques to meet today's challenges. *Immunohematology* 2000;1:131-137