

# RAPID MULTI-PARAMETER TYPING OF 10 BLOOD GROUPS WITH STABLE END-POINT\*

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**Purpose:** Current simple methods for blood typing, such as slide techniques, do not have stable end-points. Sophisticated techniques, which provide more objective and stable results, are rather slow and need a centrifugation step [1, 2]. All these methods have in common that only one parameter at once can be determined.

The purpose of this study was to develop a blood grouping format on the basis of known lateral flow assays [3] with multi-parameter testing in a single assay and stable end-point, but with no need of a centrifugation step.

**Methods:** A credit-card sized lateral flow test device was constructed with a membrane equipped in a cassette housing. The device has a central application zone and 2 equidistant detection areas printed with parallel lines of antibody reagents directed against blood groups A, B, D, D, K and C, C<sup>w</sup>, c, E, and e, respectively.

Further, both detection areas contain two control spots: 1) A **flow validation spot (val)**, which confirms that red cells have been applied and have migrated correctly; 2) an **auto control spot (ctl)**. The result is valid, when the **val** shows a positive result (red spot) and the **ctl** shows a negative result (no signal). Reagent verification can be performed with a set of two control cells, cell 1 (blend) being positive for all parameters, whereas cell 2 is positive for none except the flow validation.

## Figures:

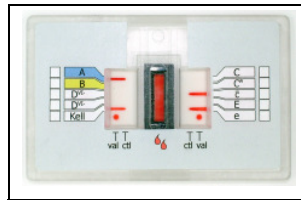


Figure 1

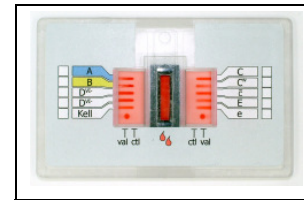


Figure 2

Lateral flow blood grouping devices for the determination of: A-B-D<sup>(M-)</sup>-D<sup>(M-)</sup>-K--C-C<sup>w</sup>-c-E-e.

**Figure 1:** Donor Blood: Blood group A ccddee K

**Figure 2:** Control Cell 1 (blend): Blood group AB CC<sup>w</sup>cD.Ee K

## Test procedure:

1. Mix 50 µl of anticoagulated blood with 200 µl of diluent.
2. Pipette 100 µl of the resulting suspension into the application zone of the device.
3. Add 300 µl of diluent to the application zone.
4. Read and record results after 5 minutes. Positives are recognized as distinct red bands, negatives by the absence of the respective band.

**Acknowledgements:** We are grateful to M. Wegmeyer from raro plastics GmbH (Berlin) for manufacturing of the plastic device, and to Dr. C. Scheuch from Haema AG/Helios (Berlin-Buch) for providing the patient samples.

(\* Poster presentation at the „37. Jahreskongress der Deutschen Gesellschaft für Transfusionsmedizin und Immunhämatologie“ (DGTI) 2004 in Mannheim, Germany).

**Results:** The bloods of 1415 donors, previously typed for the respective blood groups with the Olympus PK-80, have been tested with the new lateral flow test. The results for all antigens were in agreement with those of PK-80. Results were stable for at least 4 weeks after testing. Typical results are illustrated in the figures.

**Conclusions:** A simple, rapid and flexible method for blood typing with a stable and for the naked eye visible end-point is presented, providing considerable advantages compared to other methods:

- 1) Simple: 2 pipetting steps for 10 parameters
- 2) Rapid: ABO and Rh subgroup typing in 5 minutes
- 3) No centrifuge
- 4) Minimal exposure to potentially infectious material
- 5) Convenient documentation
- 7) Suitable for use in non-laboratory situations

## References:

- [1] Sinor LT, Rachel JM, Beck ML, Bayer WL, Coenen WM, Plapp FV: Solid-phase ABO grouping and Rh typing. *Transfusion* 1985; 25, 21-23.
- [2] Lapiere Y, Rigal D, Adam J, Josef, D, Meyer F, Greber S, Drot C. The gel Test : a new way to detect red cell antigen-antibody reactions. *Transfusion* 1990; 30: 109-113.
- [3] Zuk RF, Ginsberg VK, Houts T, Rabbie J, Merrick H, Ullman EF, Fischer MM, Sizto CC, Stiso SN, Litman DJ: Enzyme immunochromatography - a quantitative immunoassay requiring no instrumentation. *Clinical Chemistry* 1985; 31, 1144-1150.