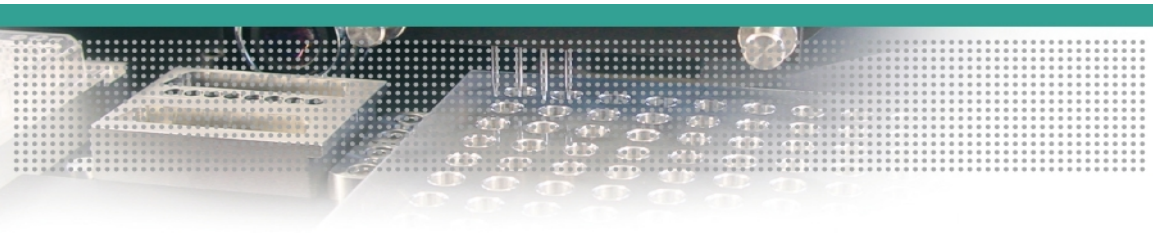

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sciFLEXARRAYER Application Note
No. 08020

RAPCARL: A rapid Carbohydrate Array Lateral Flow Test Technology for simultaneous detection of thirteen different species from *S. pneumoniae*, *N. meningitides* and *H. influenzae*

Diagnostics of infectious diseases based on carbohydrate antigens is a sensitive alternative to commonly used capturing protein agents on lateral flow test strips. Here we describe a rapid test technology for 13 major disease-causing bacteria strains from Streptococcus pneumoniae, Neisseria meningitides and Haemophilus influenzae using polysaccharides on lateral flow membranes. In conventional lateral flow test strips one protein antigen line and one control line are used on a nitrocellulose membrane strip (e.g. classical pregnancy test). Instead of lines, RAPCARL utilizes the parallel analysis of multiple analytes. In addition replicate spots per capture probe allow statistical analysis for each individual analyte detection. Only 10 nanoliters of the capture probes solution per data point is required compared to lines, typically printed from several 100 nanoliters of capture reagent. This allows for a significant reduction of production costs per data point for lateral flow analysis.

Materials and results

Disease relevant capsular polysaccharides (CPS; four of Streptococcus pneumoniae, eight of Neisseria meningitidis and one Haemophilus influenzae antigen) were deposited precisely on nitrocellulose using a sciFLEXARRAYER S11 system. Initially different validated test sera were placed undiluted to the sample pad and a running buffer was added. After three minutes positive signals appear as spots in a red color, using a Protein A/G conjugate. The example shown below describes an intersting clinical background: A positive human reference serum for H. influenzae lights up the H. influenzae positive spots but also those for Meningococcus serotype C, probably related to a former, often asymptomatic infection with N.meningitidis.

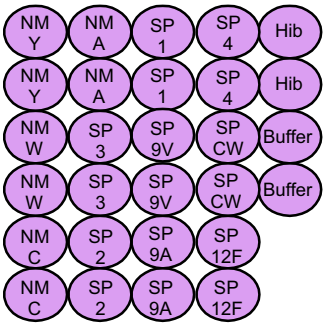

Fig. 1 Array layout.
10 nL of the CPS were spotted in duplicates on the nitrocellulose part of the Lateral Flow strip

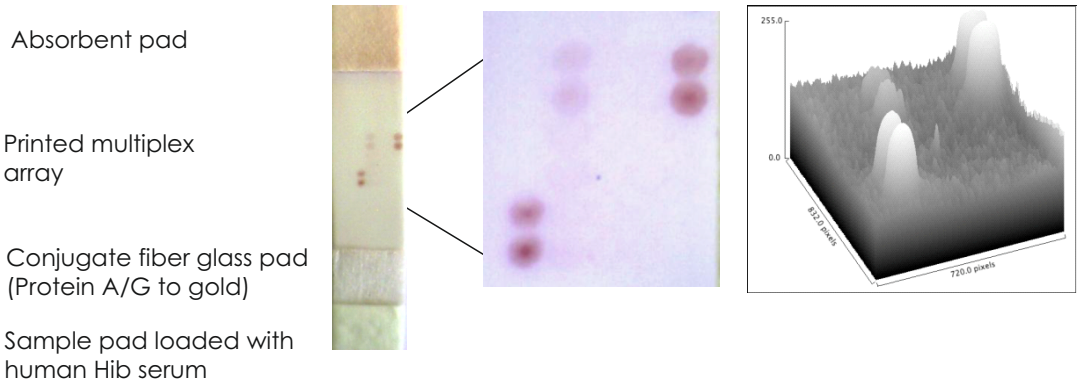

Fig. 2 Blow-up of a lateral flow test strip and a surface plot after incubation with the human reference serum Hib.

Summary

RAPCARL combines several innovative technologies for a new, sensitive and rapid point of care test format.

1. Carbohydrates are used as antigens.
2. Instead of a single line, multiple analytes can be detected in parallel in a printed array format.
3. Printing spots instead of printing lines allow for greater statistical analysis and more controls.
4. Using 10 nanoliter spots instead of several 100 nanoliter lines can reduce the cost of goods for test production by a factor of 50 plus.

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