

Technical performance of a miniaturized chip platform for measuring specific antibody responses to antigens and peptides from respiratory viruses

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Abstract text

Text: Background: Respiratory virus infections are a cause and/or trigger factor for multiple acute and chronic respiratory diseases from early childhood to senescence. Nucleic acid-based detection systems only indicate the presence of virus in samples but do not allow to measure virus-specific immune responses and/or immunity.

Aim:To develop microarrays allowing the simultaneous measurement and quantification of antibody subclasses levels to a large panel of structural, non-structural proteins and peptides thereof of important respiratory viruses in microliter sample volumes

Materials & Methods: The long-term performance of microarrays printed in 2018 until 2024 was determined with standardized serum samples. Quantification levels were ensured by standard curves using monoclonal human antibodies. Determination of antibodies in different body fluids (serum, plasma, breast milk, mucosal secretions) was evaluated. Different proteins and peptides from human rhinovirus (HRV), respiratory syncytial virus (RSV), Bocavirus, SARS-CoV-2 were printed onto pre-activated glass slides or silicium oxid (SiO₂). We evaluated the technology by determining the most important parameters of an immunoassay being detection limit, dynamic range, repeatability and reproducibility.

Results: Long-term stability studies performed with impregnated micro-arrays stored for more than 5 years showed high repeatability and reproducibility of antigen-specific antibody levels as determined by correlation of early and late measurements (r² equal or greater 0.90). The analytic sensitivity was in the range of 100picogram/ml with a dynamic range until approximately 300ng/ml. Reliable results were obtained for all isotypes and IgG subclasses when measuring blood samples, breast milk or mucosal samples

Conclusion: The micro-array containing antigens and epitopes from multiple respiratory viruses is a highly sensitive tool to measure virus-specific antibody responses in microliter amounts of human body fluids to monitor the impact of respiratory viral infections in acute and chronic respiratory diseases from early childhood to senescence enabling personalized treatments.

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Conflict of Interest statement

Do you have any conflict of interest to declare?: No

Affirmation

- 1. Consent to participate and present onsite:** Yes
- 2. Consent to publication publication:** Yes
- 3. Consent on treatment of contact details saved in this system:** Yes