

COVID-19 Immunodiagnostics and Vaccine Design

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Current status

❖ COVID-19 serology testing

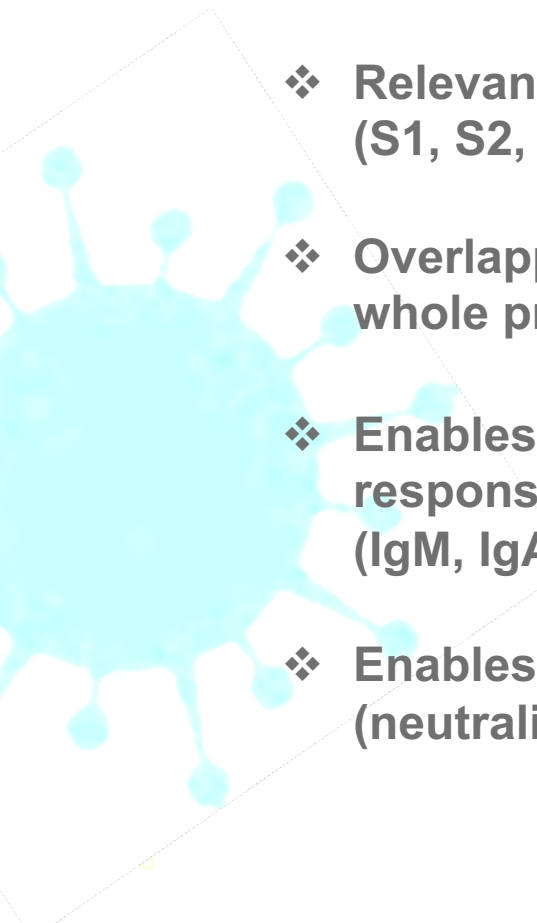
- ❖ Dozens of „quick tests“ based on lateral flow technology are marketed or announced
- ❖ Various ELISA based assays are under development and/or marketed

 **These assays allow only determination of the presence or absence of antibodies to SARS-CoV-2**

- ❖ No prediction of virus neutralization
- ❖ No detection of antigenic determinants, no resolution of immunoglobuline type composition
- ❖ Specificity and selectivity unknown, may produce false negatives and cross-react with antibodies to other coronaviruses

The Viravaxx Approach

- ❖ **Microarray based on Si/SiO₂ technology platform**
 - ❖ **Structural proteins (glycosylated and unglycosylated)**
 - ❖ **Relevant fragments of the structural proteins (S1, S2, RBD, RBM)**
 - ❖ **Overlapping 25-30mer peptide library covering the whole proteome**
 - ❖ **Enables high resolution analysis of the antibody response to SARS-CoV-2 (IgM, IgA, IgE, IgG, IgG1-IgG4)**
 - ❖ **Enables mapping of antigenic determinants (neutralizing and non-neutralizing)**



Technical capabilities

- ❖ History of successful microarray development:
Rhinovirus/RSV microarray marketed (RUO)
- ❖ sciFLEXARRAYER (Scienion) fully installed
 - ❖ ~800 microarrays/week
- ❖ Tecan Microchip Reader
- ❖ Peptide Synthesizer
- ❖ Machine learning algorithms for data analysis provided through collaboration with [Prof. Jan Baumbach](#), Chair of Computational Systems Biology at the University of Hamburg

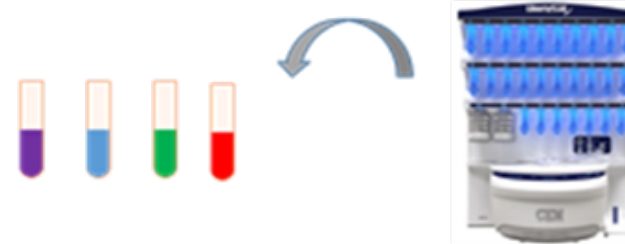
Development of a proteomic microarray for COVID-19

Establishment of chips containing microarrayed COVID-19 proteins and peptides for comprehensive assessment of COVID-19 specific antibody response

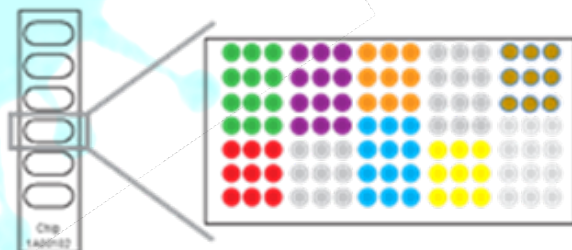
1. Expression of recombinant COVID-19 proteins



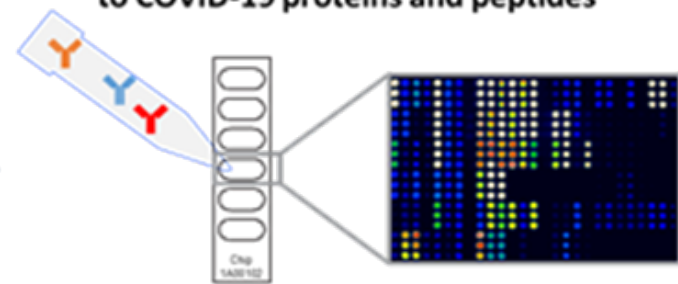
Solid phase synthesis of COVID-19 peptides



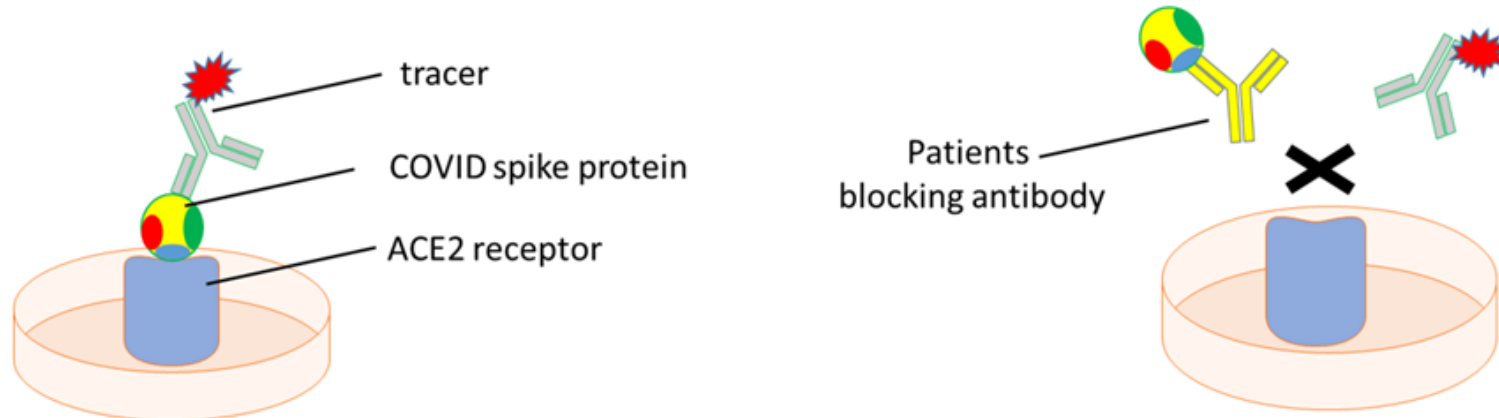
2. Generation of chips containing microarrayed COVID-19 proteins and peptides



3. Mapping of patients antibody response to COVID-19 proteins and peptides



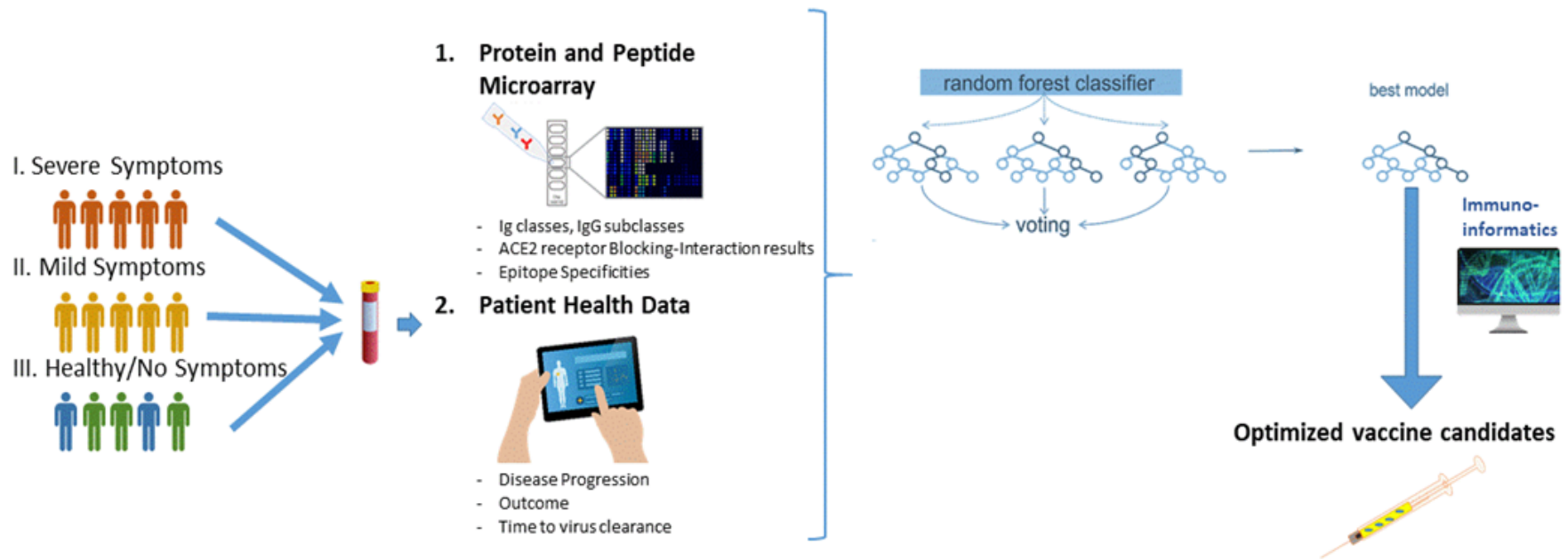
SARS-CoV-2 Interaction Assay



Allergy (2020) Gattinger et al
<https://doi.org/10.1111/all.14523>

- ❖ Mimicks SARS-CoV-2 binding to its receptor ACE2
- ❖ Read-out: antibody signature to assess protective immunity
- ❖ Used in an ongoing clinical trial to analyze neutralizing antibody responses

Antibody signatures and vaccine design using machine learning



❖ Read-out allows correlation of antibody signatures with disease outcome & design of vaccine candidates

The Company

- ❖ **Viravaxx AG, www.viravaxx.com, is an emerging biopharmaceutical company dedicated to the development of innovative antiviral vaccines and immunodiagnostics**
- ❖ **Viravaxx provides innovation in hard-to-treat viral infections, such as respiratory syncytial virus (RSV) and rhinovirus (RV), which have resisted vaccination approaches for a long time.**
- ❖ **Based on it's proprietary microchip technology, Viravaxx develops multiplexed tools for high resolution serum immune diagnostics. These microarrays allow high resolution mapping and identification of epitopes which elicit an immune response following infection.**
- ❖ **The company has a dedicated team of 12 scientists and technicians in cooperation with the Valenta Labs at the Medical University of Vienna. Viravaxx's lead product is the clinical-stage hepatitis B candidate VVX001 for therapeutic and prophylactic vaccination - currently in clinical phase II.**
- ❖ **Contact: Dr. Helmut Brunar, CEO
Mariannengasse 14/9, Vienna, Austria
h.brunar@viravaxx.com**