Anti-IFN-α2 autoantibodies rapid detection using a new automated VIDAS® Assay Prototype

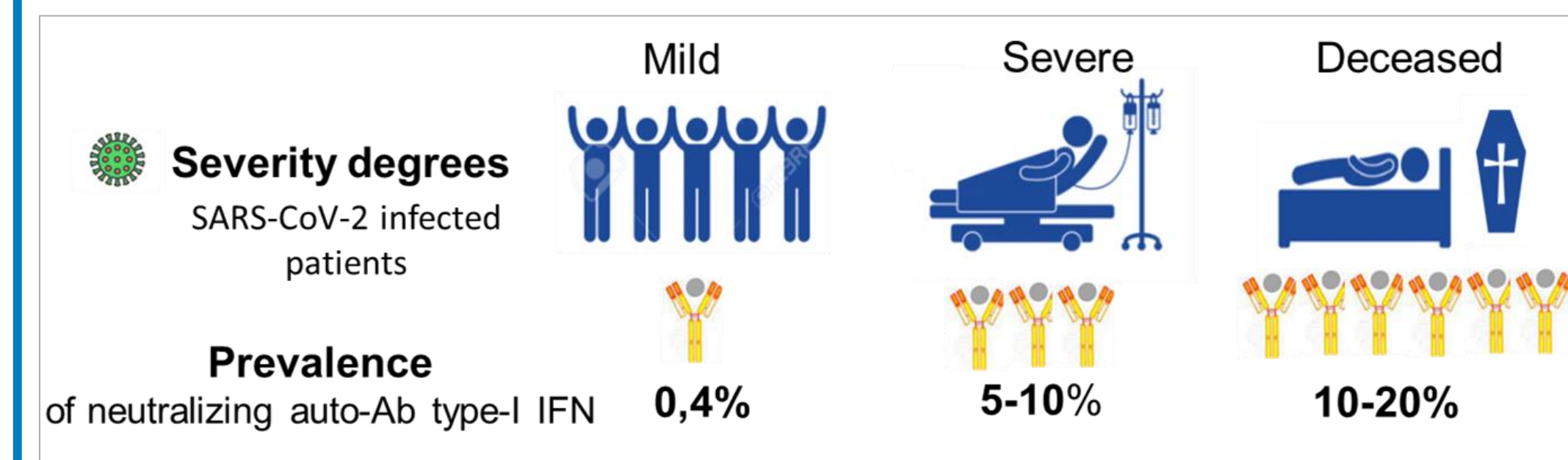Sylvie Pons[1], Valérie Guyot[2], Cécile Vinit[2], Laurence Generenaz[1], Kahina Saker[1], Sophie Trouillet-Assant[1], Nathalie Renard[2], Karen Brengel-Pesce[1]

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Introduction

Impairment of type-I interferons (IFN-I) has been observed in about 20% of subjects with a severe form of COVID-19. The deficiency in IFN response is mainly due to the presence of autoantibodies (auto-Abs) neutralizing IFN-I according to the severity degree.

	Mild	Severe	Deceased
Severity degrees SARS-CoV-2 infected patients			
Prevalence of neutralizing auto-Ab type-I IFN	0,4%	5-10%	10-20%

The development of diagnostic tools for the detection of Anti-IFN-I auto-Abs assays is crucial for epidemiology and identification of patients at risk of severe viral infections.

Objective

To develop an automated prototype immunoassay unitary test for the detection of serum auto-Abs (IgG type) to type I IFNs using the bioMérieux VIDAS® platform. A comparative evaluation was performed against the commercially available RUO ELISA kit (Thermo Fisher, Catalog #BMS217).
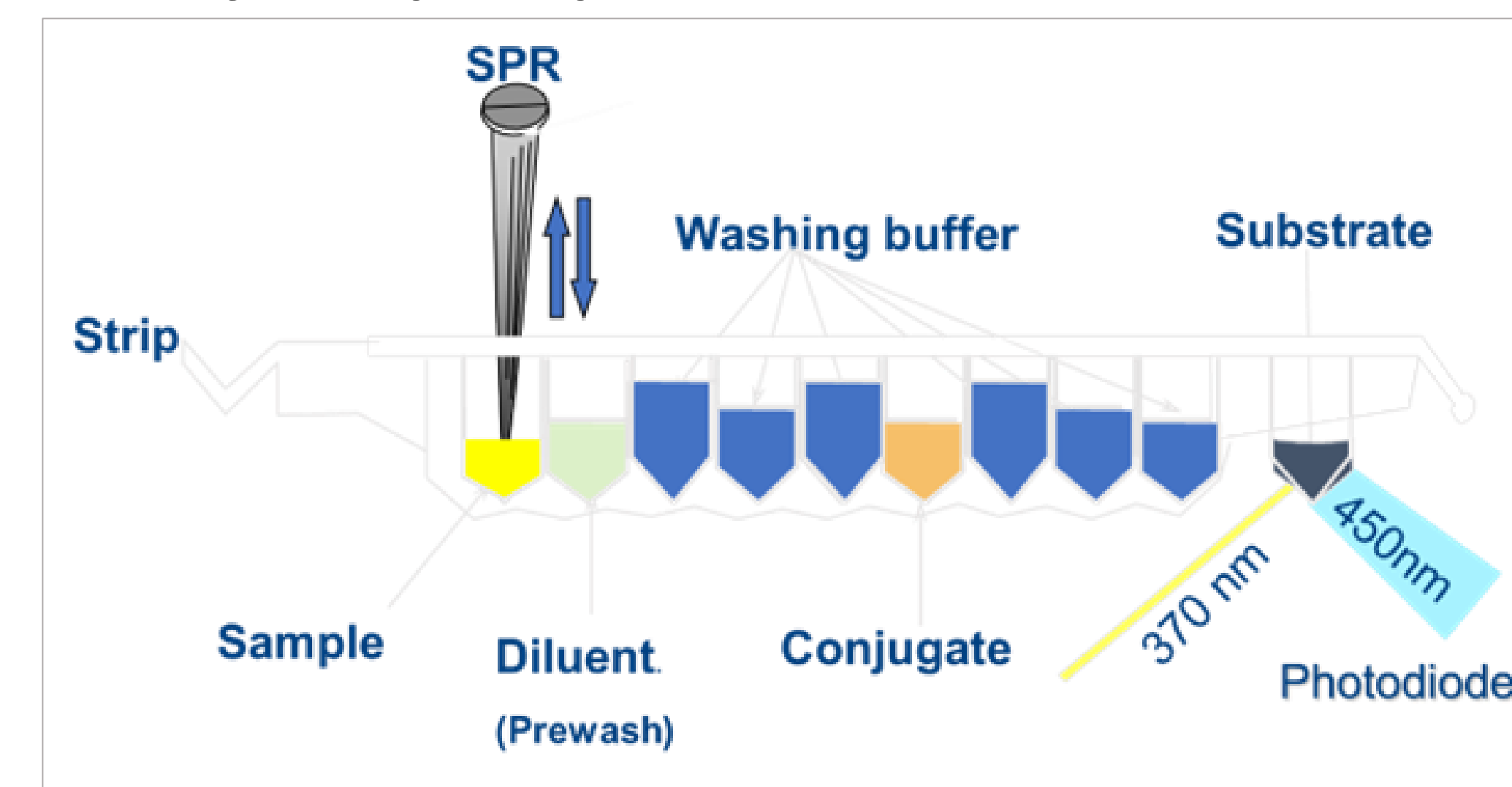
Material & Methods

- VIDAS®: an automated immunoassay platform
  - → Ready to use
  - → Single-use test (1 patient=1 test=1 result)
  - → Reliable
  - → Rapid time to result (20 to 45 min)

VIDAS ® = Vitek Immuno Diagnostic Assay System

- Analytical principle :

1 TEST =
- → **1 Solid Phase Receptacle** (SPR): coated with the antigen or antibody serves as both solid-phase and pipetting device.
- → **1 STRIP**: ready to use reagents allowing a two-steps enzyme immunoassay combined with an enzyme-linked fluorescent assay (ELFA) detection technology.

- Sandwich format for auto-Abs IFN-α2a IgG type assay:
  - → SPR coated with recombinant IFN-α2a (Miltenyi Biotec)
  - → Capture of IgG type Auto-Abs anti IFNα2a specific
  - → Human IgG detection by mouse monoclonal Abs conjugated to alkaline phosphatase
  - → Incubation with the substrate
  - → Detection by measurement of fluorescent product at 450 nm (Relative Fluorescent Value generated)
  - → Concentration automatically calculated by the instrument: standard curve with a recombinant Abs anti IFN-α (Miltenyi Biotec)
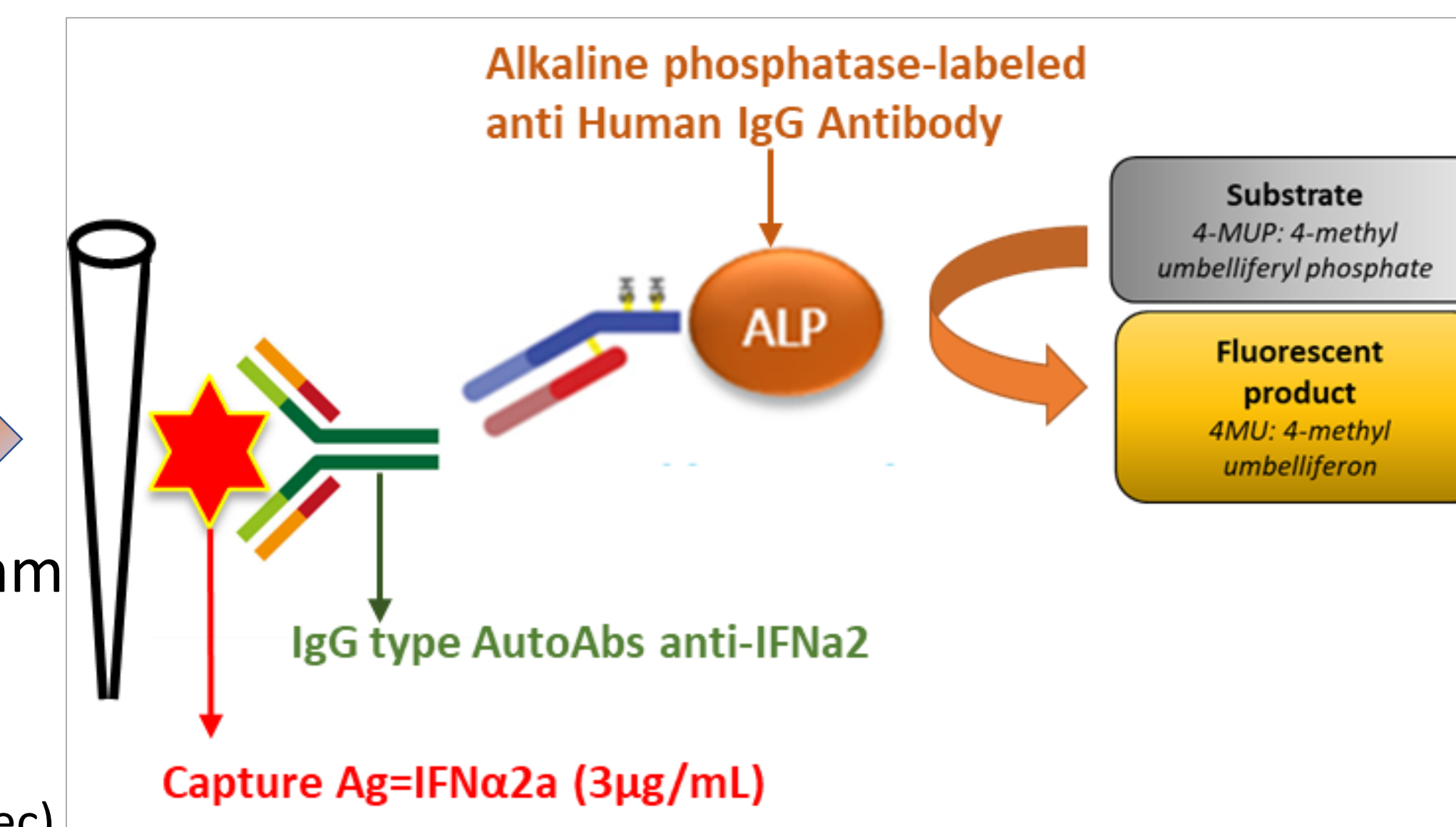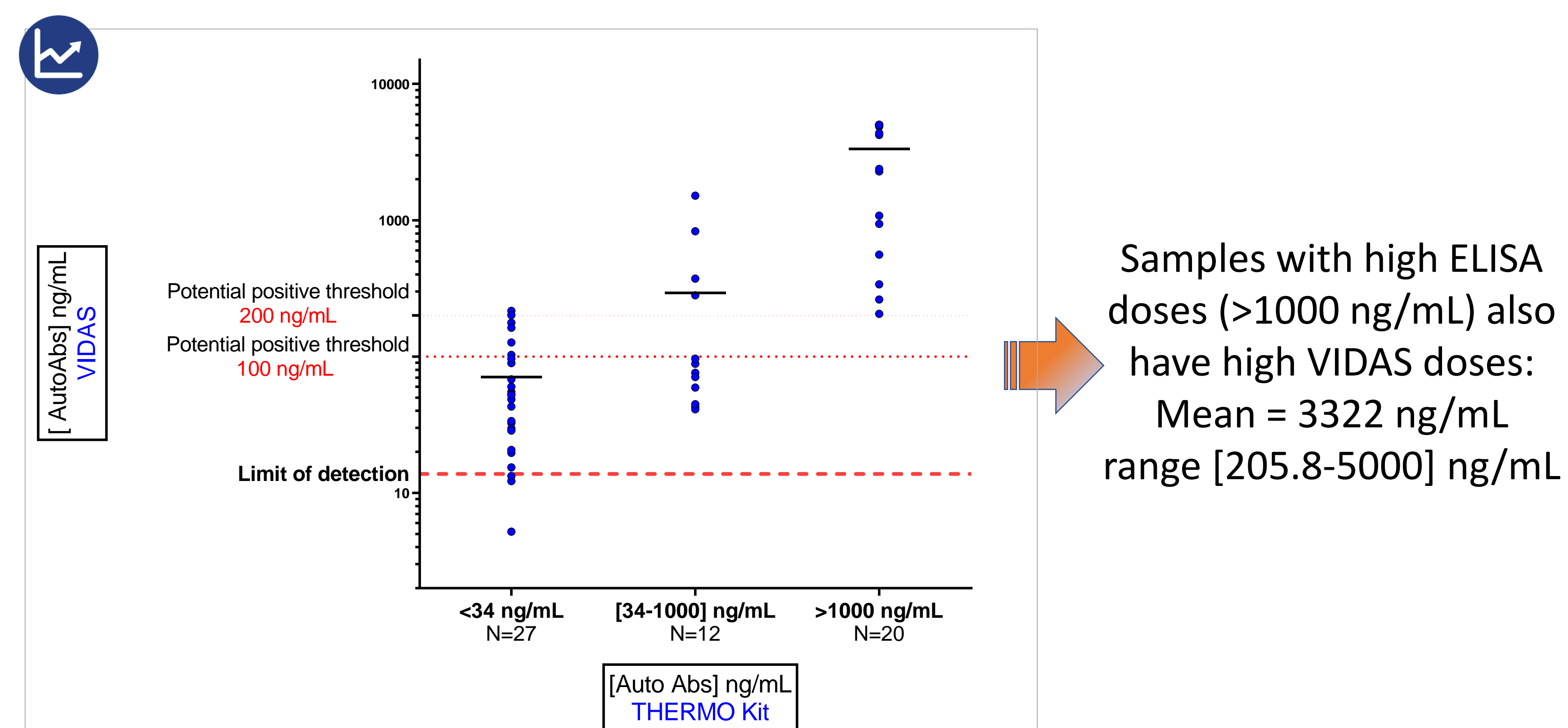

Results

- **Assay characteristics and analytical performance** for auto-Abs IFN-α2a IgG type

Assay type:	**Semi quantitative** (standardized with recombinant anti- IFN-α Ab)
Sample type:	Serum or EDTA plasma
Sample Volume:	**100 μL**
Assay duration:	**42 min**
Detection limit:	**LoD=15 ng/mL**
Precision:	**CV < 10%**
Linearity:	**15 – 5 000 ng/mL** (measuring range)
Standard/Control:	Liquid
Stability:	12 months at 2-8°C
Comparison method:	ELISA Thermo Fisher kit

Analytical performance reached all expected requirements.

- **Method comparison** on 59 clinical samples (severe Covid-19 patients) using the positive cut-off of 34 ng/mL* and 1000 ng/mL* for neutralizing threshold with the ELISA kit:

Samples with high ELISA doses (>1000 ng/mL) also have high VIDAS doses: Mean = 3322 ng/mL range [205.8-5000] ng/mL

* According to *Goncalves et al*, 2021, Clinical & Translational Immunology

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Conclusion

VIDAS® auto-Abs IFNα2a IgG type prototype assay is a single-sample automated test using a solid reagent strip and receptacle. It is easy to use and suitable for rapid on demand test results with a time to results in 42 minutes

This new VIDAS® prototype assay showed adequate analytical performance and a good agreement with the Thermo Fisher RUO kit regarding clinical samples doses. However, the preliminary results for clinical performance need to be confirmed in a larger number of samples to assess the determination of the positivity threshold of the VIDAS assay.