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Comparison of diagnostic tests for SARS-CoV-2 infection: anti-S IgG versus neutralizing antibodies

Guilherme Moreno R de Souza, Júlia Takahara Marini, Christian Sedemaka da Silva, Maria Cristina De Martino, Soraya S de Andrade, Débora R Ramadan, Sérgio Tufik.

Contact: *guilherme.souza@afip.com.br*

Associação de Fundo de Incentivo à Pesquisa - AFIP

INTRODUCTION AND AIMS

The structure of SARS-CoV-2 involves an important trimeric glycoprotein in the envelope named Spike (S), which is expressed on the vírion surface. This protein is the main target of vaccines, as it binds to the host cell, coupling to the angiotensin-converting enzyme 2 (ACE2), its receptor on the cell surface. Neutralizing antibodies are able to block the interaction between the S protein's RBD (Receptor-Binding Domain) and the ACE2 receptor, preventing the virus from entering the cell. A virus can induce a multifactorial immune response including, among other factors, the production of different antibodies that will act together to limit viral infection. However, only a fraction of these antibodies are able to neutralize the virus and prevent the infection of new cells. Those are considered "neutralizing antibodies", produced in response to natural viral infection or vaccination. This study aimed to compare the results of diagnostic tests for the detection of SARS-CoV-2 anti-S IgG and neutralizing antibodies to SARS-CoV-2 from clinical samples processed at a large clinical laboratory in the city of São Paulo, Brazil.

METHODS

Immunoglobulin G quantification tests were performed by Abbott® SARS-CoV-2 IgG II chemiluminescence Quant (Non-Reagent: less than 50.00 AU/mL - Reagent: greater than or equal to 50.00 AU/mL) and neutralization capacity by GenScript® cPass™ Competitive Immunoenzymatic Assay SARS-CoV-2 Neutralization Antibody Detection Kit (Non-reagent: less than 30% - Reagent: greater than or equal to 30%). Comparative analysis was performed between the methods.
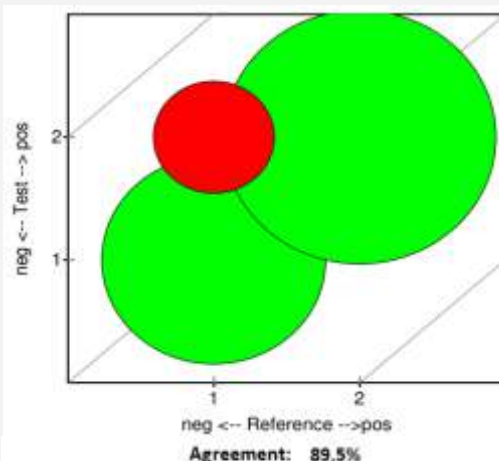
RESULTS

A total of 86 samples were included in the study, from individuals between 4-89 years old. A total of 53.48% (n=46) were positive for both tests, while 34.88% (n=31) were considered negative. Among positive results, an increasing trend in the percentage of neutralizing antibodies were detected, when compared to the quantitative results of Immunoglobulin G. When comparing the positive/negative results for both assays, a Kappa index of 78.5% was obtained, with an agreement of 89.5%. No relevant agreement was observed between anthropometric data on age results.

Statistical Summary

	Negative Reference	Positive Reference	Total
Negative Test	31	--	31
Positive Test	9	46	55
Total	40	46	86

Cohen's Kappa: 78,5%

neg <-- Test --> pos

neg <-- Reference -->pos

Agreement: 89,5%

CONCLUSION

The Abbott Immunoglobuline G Quantitative Anti-S and GenScript Neutralizing Antibodies assays revealed significant agreement between results.

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