Kinetics of SARS-CoV-2 IgG responses among hospitalized patients with COVID-19

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Background

The kinetics of antibody responses to SARS-CoV-2 infection are not fully understood. We analyzed IgG responses to the SARS-CoV-2 spike protein receptor binding domain (RBD) in COVID-19 patients admitted to VA Greater Los Angeles (VAGLA) and correlated with clinical outcomes.

Methods

Serially admitted patients from March 20-May 10, 2020 with at least one available residual serum specimen were included in this analysis. Serum samples selected for analysis included first, last, and intermediaries spaced ≥ 5 days apart, as available.

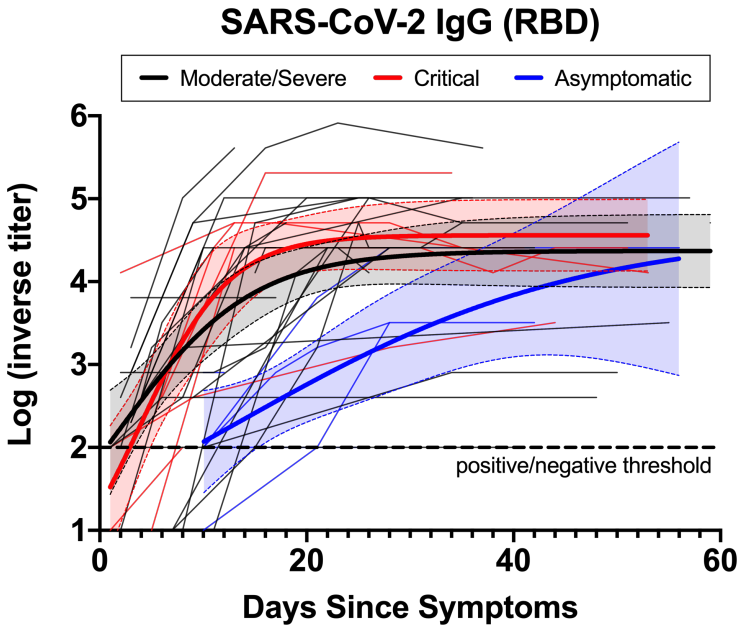
Anti-RBD IgG was detected with an enzyme immunoassay (EIA) using recombinant RBD protein. Serum from an uninfected individual collected April 2019 was used as control. The average optical density of the control in triplicate plus 3 standard deviations was considered the threshold positive/negative value. The highest dilution above the threshold value was considered the IgG titer.

Clinical groups were defined as: asymptomatic, moderate/severe (no ICU) or critical (mechanical ventilation, cytokine storm and/or death).

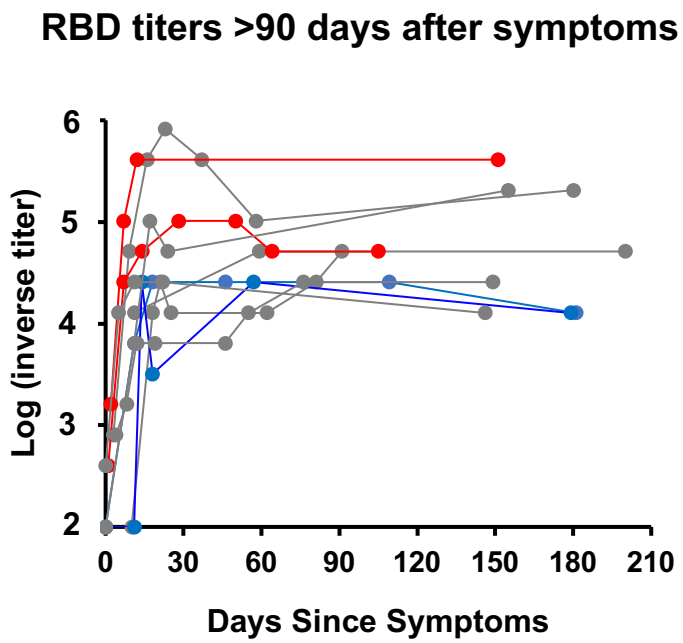
Results (1)

Of the 42 consecutive patients admitted to VAGLA with COVID-19 in this analysis, 40 developed detectable RBD IgG responses with maximum inverse titers (MIT) ranging 100-819,200, geometric mean 12,152.

The center figure depicts RBD IgG titers over time after onset of symptoms. Asymptomatic patients had a more gradual rate of increase and lower peak titers, while critical patients had the fastest rate of rise and the highest peak titers.



Clinical group	n	MIT (IQR)	Days to +IgG (IQR)
Asymptomatic	5	3,200 (800-3,200)	10 (10,10)
Moderate/severe	2 5	25,600 (6,400-102,400)	4 (3,15)
Critical	1 0	38,400 (8,800-51,200)	7 (3.5, 14.5)



Results (2)

There were 10 patients that had samples available >90 days (mean 154, range 91-202) after symptom onset. As can be be appreciated in the above figure, there were no significant changes in RBD IgG titers over this period. In this group, 2 had been asymptomatic (blue) and 2 were critical (red).

Conclusions

Following infection with SARS-CoV-2, disease severity correlates with both the rate of increase and peak in RBD IgG titers.

Anti-RBD titers did not notably decrease over the observation period (up to 202 days).