# Disappearance of Antibodies to SARS-Associated Coronavirus after Recovery

**TO THE EDITOR:** Previous studies have demonstrated that IgG and neutralizing antibodies against coronavirus associated with the severe acute respiratory syndrome (SARS) may persist, in spite of a decline in titer, for 2 years in patients who have recovered from SARS.[1,2] For 3 years, we followed

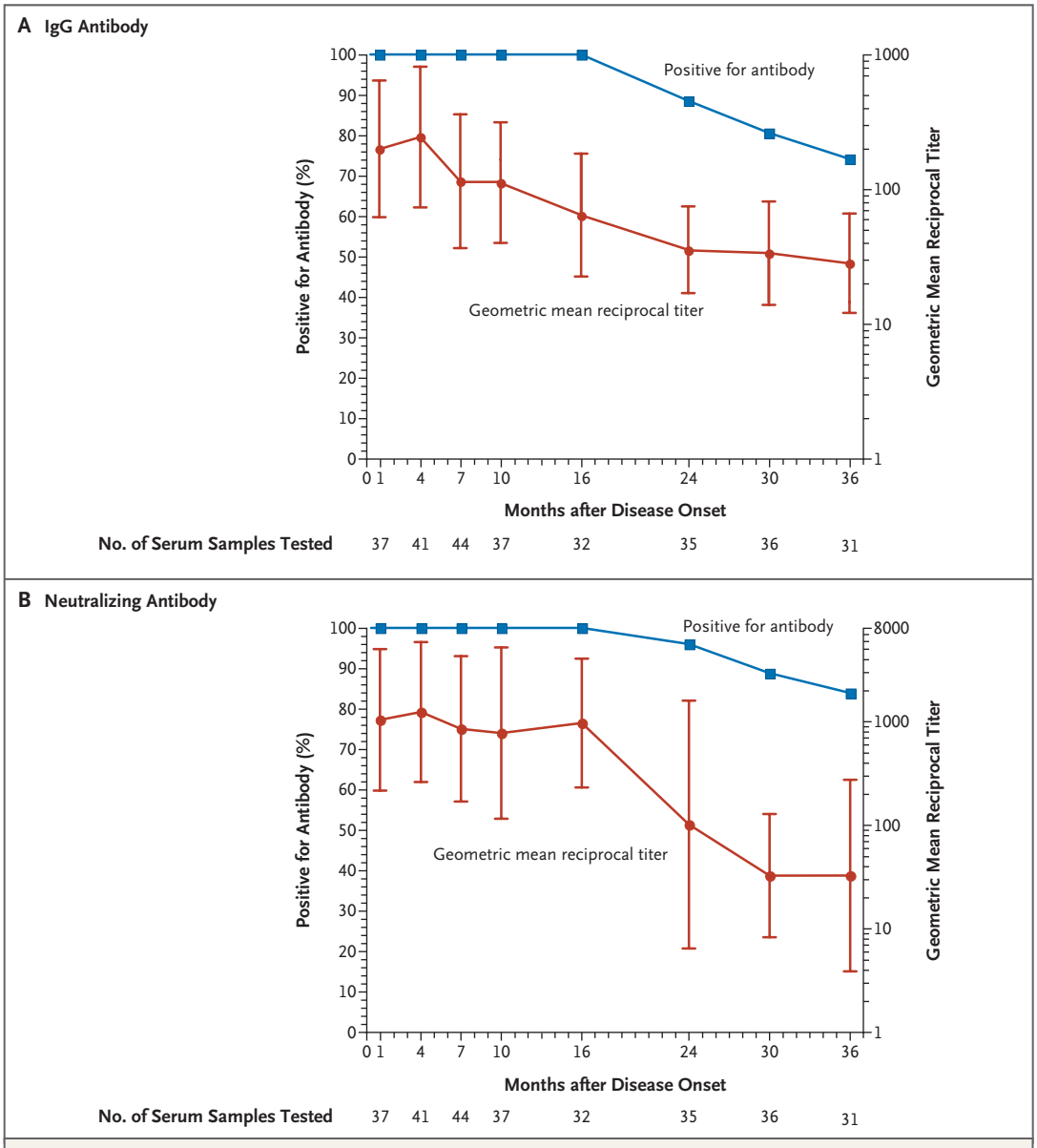


**Figure 1. Temporal Changes in IgG and Neutralizing Antibodies against SARS-Associated Coronavirus among Patients Who Recovered from SARS.**

The IgG and neutralizing antibodies against SARS-associated coronavirus were detected with an enzyme-linked immunosorbent assay and a conventional neutralization assay, respectively, of SARS-associated coronavirus BJ01 strain (GenBank accession number AY278488) from tissue cultures.[1] The percentages of serum samples that were positive for the antibody (blue line) and the geometric mean reciprocal titers (red line) are shown for the IgG antibody (Panel A) and for the neutralizing antibody (Panel B). The IgG and neutralizing antibodies were considered positive when their titers were greater than 1:10. I bars indicate standard deviations.

patients who had recovered from infection with SARS-associated coronavirus, to measure the longevity of specific antibodies.

Fifty-six patients who were positive for serum IgG and neutralizing antibodies against SARS-associated coronavirus at the time of recovery from acute SARS infection were included in this study.[1] The titers of IgG and neutralizing antibodies were significantly correlated during the 3-year follow-up period (Spearman's correlation coefficient, 0.905; P=0.002). The titers peaked at month 4 and diminished thereafter (Fig. 1). IgG and neutralizing antibodies were undetectable in 19.4% and 11.1% of serum samples, respectively, at month 30, and in 25.8% and 16.1%, respectively, at month 36. For the IgG antibody, the geometric mean reciprocal titers dropped from 244 at month 4 to 34 at month 30 and 28 at month 36. For the neutralizing antibody, the geometric mean reciprocal titers dropped from 1232 at month 4 to 32 at month 30 and remained at that value through month 36. There were no significant differences in the kinetics of specific antibodies according to disease severity, duration of hospitalization, type and number of coexisting conditions, or use or nonuse of corticosteroids. However, the 19 patients with subsequent aseptic femoral neck necrosis had significantly lower neutralizing antibody levels than the 37 without the sequela (P<0.001, from mixed-linear random-effects models).

Experiments in animals indicate that IgG and neutralizing antibodies, along with T-cell mediated immunity, are essential for protection against live-virus challenge.[3,4] Our data suggest that immune protection may wane over time, as demonstrated in patients infected with human coronavirus 229E.[5] How this waning humoral immunity may affect future SARS-associated disease in the context of reexposure to SARS is unknown. In the absence of another SARS outbreak, we do not know whether lower or even undetectable levels of specific antibodies would be adequate to protect a person from reinfection due to a potential anamnestic response, as seen with other viral infections such as measles and hepatitis A. The implications of the lower neutralizing antibody levels in patients with aseptic femoral neck necrosis are unclear.

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