Do Quantitative Levels of Anti-Spike-IgG Antibodies Aid in Predicting Protection from SARS-CoV-2 Infection? Results from a Longitudinal Study in a Police Cohort

Parham Sendi[1], Nadja Widmer[2], Mattia Branca[3], Marc Thierstein[4], Annina Elisabeth Büchi[5], Dominik Güntensperger[3], Manuel Raphael Blum[5], Rossella Baldan[1], Caroline Tinguely[2], Dik Heg[3], Elitza S. Theel[6], Elie Berbari[7], Aaron J Tande[7], Andrea Endimiani[1], Peter Gowland[2], and Christoph Niederhauser[1]

[1]Universitat Bern Institut fur Infektionskrankheiten
[2]Blutspende SRK Schweiz AG
[3]Universitat Bern
[4]Kantonspolizei Bern
[5]Insel Gruppe AG
[6]Mayo Clinic Division of Clinical Microbiology
[7]Mayo Clinic Division of Infectious Diseases

March 27, 2023

Abstract

Objectives In a COVID-19 sero-surveillance cohort study with predominantly healthy and vaccinated individuals, the objectives were (i) to investigate longitudinally the factors associated with the quantitative dynamics of anti-spike IgG antibody levels, (ii) to evaluate whether the antibody levels were associated with protection from SARS-CoV-2 infection and (iii) to assess whether the association was different in the pre-Omicron compared with the Omicron period. **Methods** The QuantiVac Euroimmun ELISA test was used to quantify anti-S1 IgG levels. The entire study period (16 months), the 11-month pre-Omicron period and the cross-sectional analysis prior to the Omicron surge included 3219, 2310 and 895 reactive serum samples from 949, 919 and 895 study participants, respectively. Mixed-effect linear, mixed-effect time-to-event and logistic regression models were used to achieve the objectives. **Results** Age and time since infection or vaccination were the only factors associated with a decline of anti-S1 IgG levels. Antibody levels were significantly associated with protection from SARS-CoV-2 infection, and the association was higher for the Omicron than for the Alpha and Delta variants. In a prediction model, it was estimated that >8000 BAU/mL anti-S1 IgG was required to reduce the risk of infection with Omicron variants by 20% to 30% for 90 days. **Conclusions** Anti-S1 IgG antibody levels are associated with protection from infection. The levels in the pre-Omicron periods were less significant than during the Omicron surge, which in turn required very high levels for protection in a statistical model.

Hosted file

`PoliCoV-19 QuantiVaC Version 24032023.doc` available at https://authorea.com/users/600154/articles/631891-do-quantitative-levels-of-anti-spike-igg-antibodies-aid-in-predicting-protection-from-sars-cov-2-infection-results-from-a-longitudinal-study-in-a-police-cohort