

Longitudinal development of the antibody response against SARS-CoV-2, statistical aspects

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In the talk the statistical aspects of a study will be presented where time-related changes in the anti-SARS-CoV-2 antibody concentration of a clinically homogeneous cohort of individuals that recovered from a mild course of COVID-19 not requiring hospitalization were investigated.

325 PCR-confirmed COVID-19 convalescent individuals took part in the study at the Medical University of Graz between June 2020 and February 2022. Anti-SARS-CoV-2 pan-Ig antibodies were measured in plasma with a qualitative and quantitative assay at five different time points. Participants filled in a clinical questionnaire about COVID-19 symptoms during the baseline visit. Samples collected after the date of first vaccination were censored. The longitudinal development of the antibody concentration was modeled using three different approaches: 1) Linear Mixed Effect Models; 2) Generalized Additive Mixed Models with a smoothing term; 3) Latent Growth Models with time-invariant and time-varying covariates.

Most of the participants (62% female, median age = 42 years, IQR: 31 – 52) had core symptoms (299/325, 92%), at least one among fever, cough, dyspnea, ageusia and anosmia during the course of the disease. Results of the three statistical approaches were generally consistent and indicated a positive relation between the antibody level and the time since diagnosis. The time between diagnosis and baseline sampling varied notably between subjects (median = 64 days, IQR: 39 - 111) and was controlled for in the statistical analyses. Individuals who came to the baseline visit more than six weeks after diagnosis had higher baseline antibody concentrations, but experienced a lower increase through time as compared to individuals who came to the baseline visit earlier.

Our results reveal an enduring immune response against SARS-CoV-2 in convalescent individuals who underwent a mild course of COVID-19. A relevant source of heterogeneity that should be accounted for in future studies is the time lag between diagnosis and baseline sampling.