

Federal Office of Public Health FOPH
Public Health Directorate Communicable
Diseases Division
Schwarzenburgstrasse 157
3003 Berne
Switzerland

Geneva Centre for
Emerging Viral Diseases

Division of Infectious
Diseases

Department of Medicine

Laboratory of virology

Division of Laboratory
Medicine

Diagnostic Department

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SARS-CoV-2 genomic surveillance in Geneva: weekly update

Highlights:

- Since the end of week 5, we start to observe the first signs of a **decrease in the absolute number of positive SARS-CoV-2 tests** at the HUG laboratory of virology (Figure 1). **The mean positivity rate at our outpatient symptomatic testing center stayed stable around 60%. However, the overall positivity rate of tests performed at HUG is clearly decreasing (currently around 30%), and so is the positivity rate among asymptomatic health care workers (5%).**
- **The “S Drop out”** (a test used as a proxy for Omicron BA.1 detection) **started to decrease over week 5 and currently is displayed in slightly less than 95% of SARS-CoV-2-positive samples** (see Figure 2). **This is due to the progressive increase in the number of BA.2 infections** (assessed by SNPs RT-PCR S371L/S373P aiming to differentiate between Delta and BA.2).
- **The predominance of Omicron was confirmed by WGS and showed that more than 97% of all sequences retrieved from Geneva residents were BA.1 sub-lineage up to week 4.** (Figure 3).

Figure 1: Number of SARS-CoV-2 tests performed at the HUG laboratory of virology (per day). Positive tests are displayed in light blue (top). SARS-COV-2 positive tests over 7 sliding days (bottom left) and mean SARS-COV-2 tests performed over 7 sliding days (bottom right).

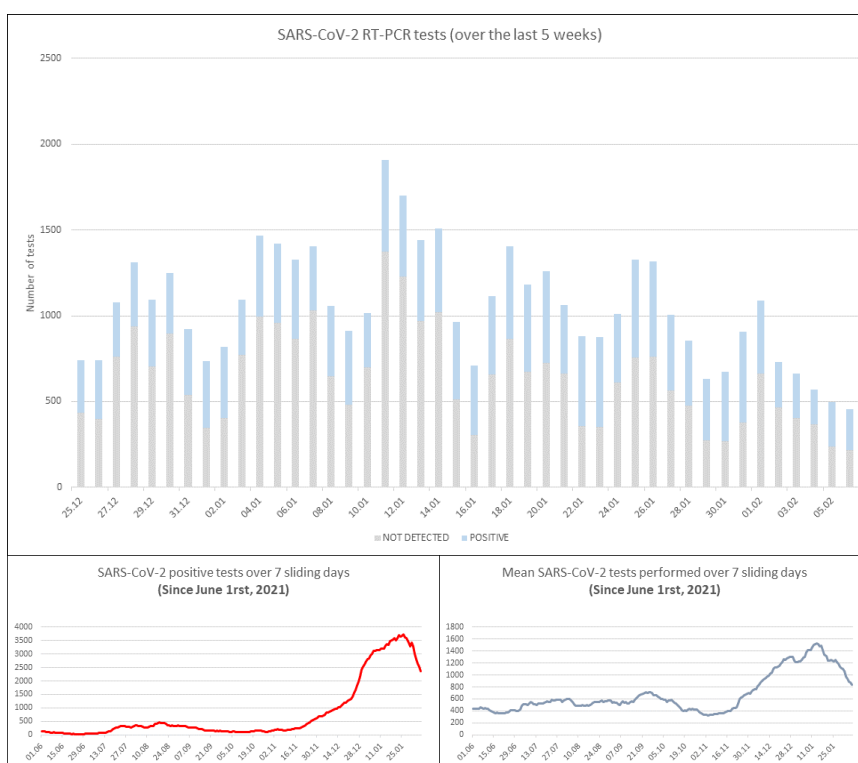


Figure 2: Weekly evolution of the different variants determined by RT-PCR : the presence of the S DropOut is used as a proxy for Omicron BA.1, and among samples not displaying the S Dropout, the SNPs RT-PCR S371L/S373P allows for differentiation between Delta and BA.2. Note that specimen collection shifted towards hospitalized patients during week 1.

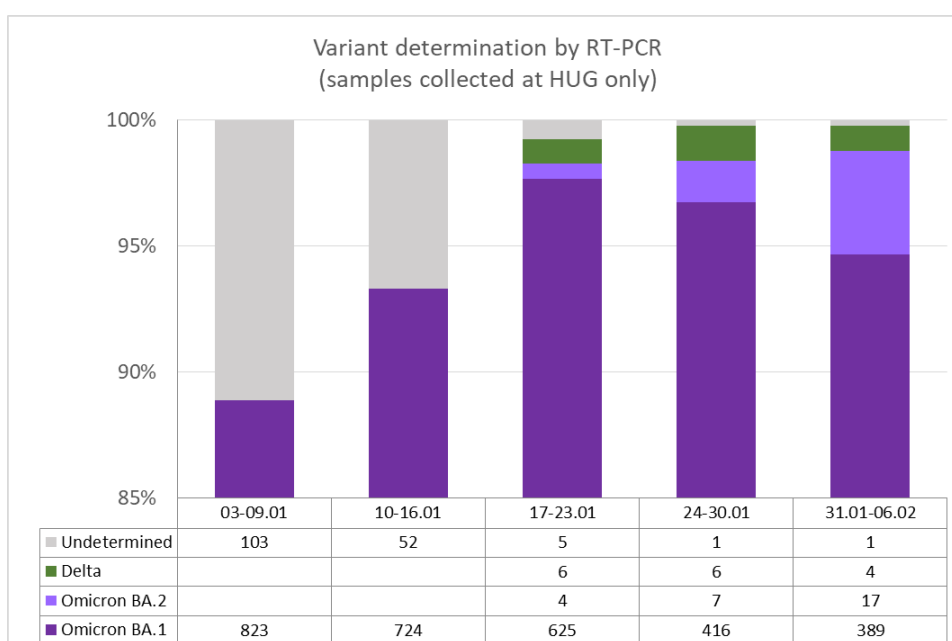
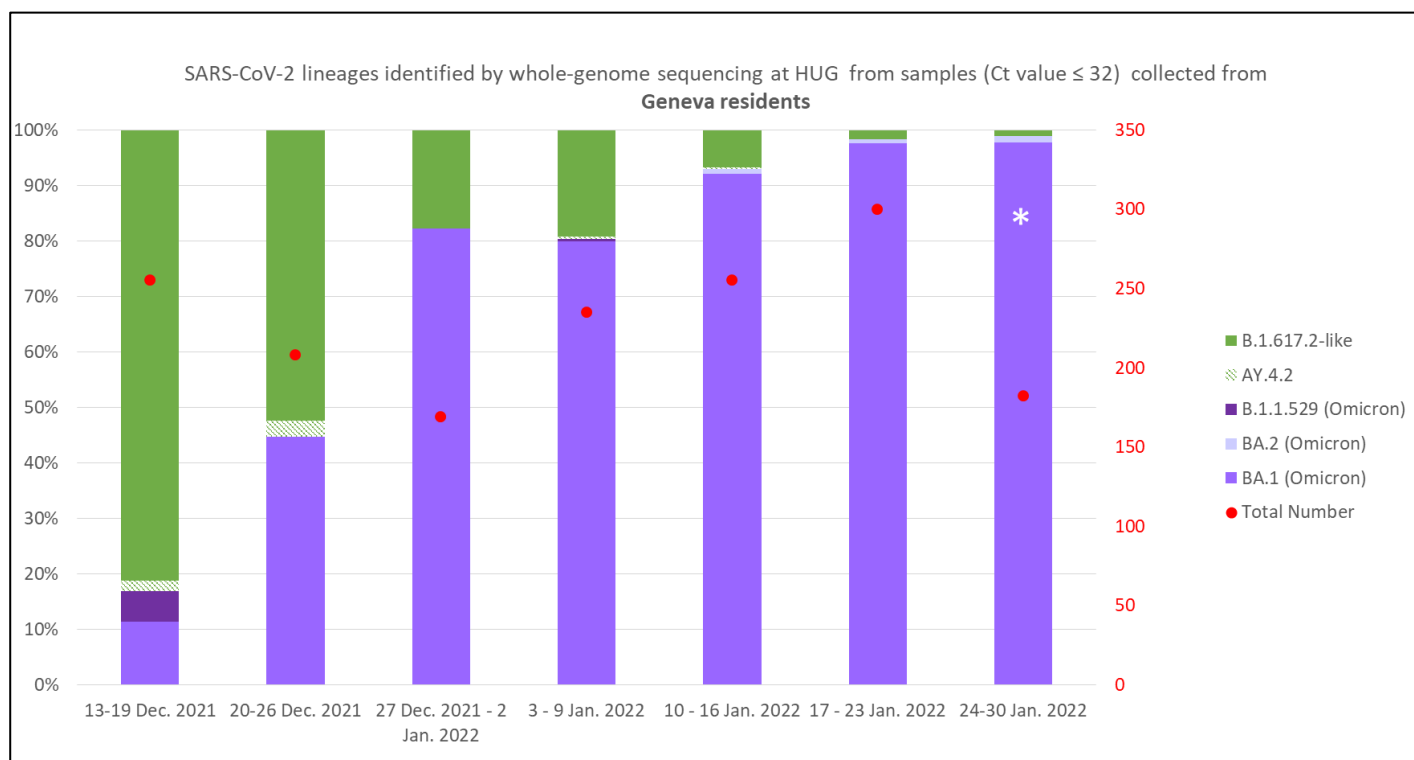


Figure 3: SARS-CoV-2 lineages identified by whole-genome sequencing at HUG from samples (Ct-value ≤ 32) collected from Geneva residents (Sentinella specimens excluded). Sequencing is still ongoing for week 4 (January 24 to 30, 2022). A total of 1549 sequences are counted in this analysis. Note that specimen collection for WGS shifted towards hospitalized patients during week 1, explaining the rebound in the number of Delta cases over this week, due to the delay between what is observed in the community and hospitalizations.



Laurent Kaiser, Samuel Cordey, Manuel Schibler and Pauline Vetter for HUG.
Pauline Brindel for the Geneva Cantonal Physician team.

The laboratory of virology of the Geneva University Hospitals as a sentinel site for the Geneva area

The number of tests (PCR and antigen tests) performed at the Geneva University Hospitals represented around 20% of the total number of tests performed in the canton of Geneva during the whole 2021 year. Roughly 25% of the positive specimens collected in the Geneva area were processed at HUG during this period. Samples collected at our outpatient testing center are RT-PCR-based for symptomatic individuals. Specimens analyzed in our laboratory originate from ambulatory and hospitalized patients as well as symptomatic and/or asymptomatic health care workers.

The number of positive tests in the canton and the total number of tests done during the surveilled week are available on the website from Federal Office of Public Health ([COVID-19 Suisse | Coronavirus | Dashboard \(admin.ch\)](https://www.bfs.admin.ch/bfs/fr/topics/santite/infec/covid19)). During week 5 in the canton of Geneva, the number of RT PCR tests decreased below 5000 tests per day. The proportion of positive tests decreased to be around 40-50%.

Methods and collaborations

Screening for the “S drop out” was implemented at HUG on SARS-CoV-2 positive specimens with a Ct-value ≤ 32 that were tested for primary diagnosis in our laboratory on November 28 (Taqpath RT-PCR assay). The “S drop out” corresponds to the S-gene PCR target being not amplified (“dropping out”), while the two other PCR targets are still detected, and serves as a proxy for Omicron.

All positive specimen were tested for the S drop out between December 1 and 31, 2021. Since January 2022, all specimens originating from hospitalized patients and a selection of specimens collected from ambulatory patients are tested for the “S Drop out”.

The SNPs RT-PCR S371L/S373P allows for differentiation between Delta, BA.1 and BA.2 Omicron sublineage, and was tested at HUG on a random selection ($n=13$) of SARS-CoV-2 “S Drop out” negative samples collected since week 3. It is currently used to screen for BA.2 Omicron sublineage circulation. Whole genome sequencing performed on SARS-CoV-2 positive samples allows for definitive sublineage/variant identification.

WGS is carried out in close collaboration with the Health 2030 Genome Center in Geneva and Philippe Le Mercier from the Swiss Institute of Bioinformatics. Since March 1, 2021, the sequencing has been done within the Swiss national SARS-CoV-2 genomic and variants surveillance program. Specimens collected at HUG with a Ct-value ≤ 32 are sequenced. In some instances, sequencing can be done on specimens sent by other laboratories in Switzerland within the surveillance program or by request of the cantonal physician team. Phylogenetic analysis data are produced by Nextstrain, in collaboration with Richard Neher’s group at the University of Basel. In addition, partial Sanger sequencing may be done by our laboratory.

Geographic distribution, transmission advantage estimates and detailed number of available sequences over time in the canton of Geneva is available on the covSPECTRUM platform, run by Tanja Stadler’s group at ETH Zurich.

These reports are produced in collaboration with the Geneva Cantonal Physician team, which provides information on epidemiological links. For epidemiological data, please refer to the weekly report of the cantonal physician team.