Case Study: Interim Report On The Screening Test Performance

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INTERIM REPORT ON THE SCREENING TEST PERFORMANCE STUDY
COVID-19 IgG/IgM Rapid Test (HealGen/Orient Gene)
CONFIDENTIAL
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1. **Rational**

COVID-19 is responsible for a pandemic whose mortality rate appears to be between 1 and 5%.

Asymptomatic or pauci-symptomatic forms represent an undetermined number of cases due to a lack of diagnoses and in particular the absence of serology reflecting previous contact with this virus.

The health, social and economic consequences are significant, leading to confinement of populations. In the world of work, new ways of doing business are being deployed in order to avoid contact between individuals and an overly rapid spread of the epidemic, the consequences of which would be an influx of patients into hospitals, overwhelming resuscitation services and difficult management of deaths.

It is important to have a serological test to measure the proportion of asymptomatic and pauci-symptomatic cases and also to provide information about semi-recent contacts with COVID-19, reflecting the appearance of acquired immunity and the disappearance of a subsequent risk for the person. Immunized individuals could, in light of a positive result, resume activity without risk to themselves or others.

Detection methods for this virus are based on PCR on nasopharyngeal, respiratory or fecal samples. It is therefore an invasive method for the diagnosis of active COVID-19 infection in the presence of suggestive symptoms.

In addition, the current recommendations exclude from the scope of PCR symptomatic patients who do not require hospitalization, other than frail patients and health care personnel with fever above 38°C and/or respiratory symptoms.

There are several immunochromatographically-based rapid tests for the detection of antibodies specific to COVID-19, similar to theTDRs used for the detection of antibodies to HAV, HBV, HCV etc. The test is performed on a microdrop of blood taken from the fingertip and gives a result in 2 to 10 minutes.

As in any infectious disease, antibodies appear in a staggered manner with respect to the contamination and the appearance of the first symptoms. The first results obtained either on sequential samples or cross-sectionally from patients diagnosed positive by PCR tend to indicate a positive result between D8 and D23 after the appearance of the first symptoms. These tests are therefore not adequate to diagnose COVID-19 infection, although we have observed the case of a patient who had 2 successively negative PCR tests for digestive symptoms, followed by a positive rapid test followed by a positive stool/LBA/nasopharyngeal PCR.

The objective of this study is to measure the sensitivity and specificity of a COVID-19 IgG/IgM Rapid Test (HealGen / Orient Gene) in a population of PCR-positive patients and a negative control population.

The secondary objective is to determine, for each of the tests, the silent serological window after the onset of symptoms in patients diagnosed positive by PCR at COVID-19.

2. **Objectives**

Main objective:

Assess sensitivity 14 days after the end of clinical symptoms of the rapid test in patients with a previously confirmed diagnosis of COVID-19 infection by PCR.

Assess specificity at the onset of rapid test symptoms in patients whose diagnosis of COVID-19 infection has been refuted by PCR.

Secondary objective(s) :

Evaluate the time to test positive after symptom onset on sequences D7-J14-J21 in COVID-19 + patients.

3. **Test used**

The COVID-19 IgG/IgM Rapid Test distributed by Laboratoires AAZ, (Boulogne-Billancourt France) is a lateral flow immuno-chromatographic test. The test uses antibodies to

Human IgM (IgM test line), anti-human IgG antibodies (IgG test line) and rabbit IgG (control line (C)) immobilized on a nitrocellulose strip. The Conjugate, COVID-19 recombinant antigens labeled with colloidal gold is also incorporated into the strip.

When the blood sample is added to the sample well (S) and then the buffer is added to the buffer well (B), IgM and/or IgG antibodies, if present, bind to COVID-19 conjugates, forming antibody-antigen complexes.

These complexes migrate onto the nitrocellulose membrane by capillary action. When the complexes meet the line of the corresponding immobilized antibody, anti-human IgM antibody and/or anti-human IgG antibody, the complexes are trapped and form a burgundy band which confirms the reactivity of the test. The absence of a colored band in the test region indicates a negative result.

4. **Results**

It is planned to include at least 100 COVID+ patients for sensitivity measurement and 50 COVID- patients for specificity measurement.

To date, 42 COVID+ patients and 28 COVID – patients have been tested.

Sensitivity:

In the 42 patients with COVID+ identified by PCR, 47 tests were performed. Tests at D7, D14 and D21 were planned.

In practice, sampling was staggered with a subsequent cessation of sampling when the sample became positive (e.g. a patient positive at D14 was no longer sampled at D21).

28 patients had a single test (some are still waiting for the second sample if the first was negative), 6 patients had 2 successive tests about 7 days apart and only 1 patient had 3 tests and the last test was positive.

The results by time interval after the first symptoms are as follows:

	13-17	**J8-J12**	**J13-J16**	**J17-J21**
	Positive: 1 Negative:	Positive: 12	Positive: 6 Negative:	Positive: 9 Negative:
Sensitivity	**8%**	**75%**	**86%**	**100%**

The difference between IgM and IgG is not detailed at this stage of the study. IgM appears from D8 and IgG from D14.

Specificity

28 people were tested: 25 with early symptoms that led to a COVID19 PCR nasopharyngeal swab that was negative, and 3 people who had had no respiratory or digestive symptoms for at least 21 days.

100% of the AAZ rapid tests were negative.

5. **Conclusion**

The COVID-19 IgG/IgM Rapid Test appears to perform very well for use in mass screening to determine the level of population immunity in asymptomatic individuals or those who have had symptoms beyond 14-21 days of age.