*Commentary to QJM: An International Journal of Medicine*

**Title:** Challenges of community point-of-care antibody testing for COVID-19 herd-immunity in Japan

**Authors:**

Morihito Takita, MD, PhD[1*], Tomoko Matsumura, MD, PhD[1], Kana Yamamoto MD[1,2,3], Erika Yamashita[2], Kazutaka Hosoda MD[4], Tamae Hamaki MD[2] and Eiji Kusumi[1,2]

**Affiliations:**

[1]Department of Internal Medicine, Navitas Clinic Tachikawa, 3-1-1 Shibasaki 4th floor of Ecute Tachikawa Bldg, Tachikawa, Tokyo, 190-0023, Japan

[2]Department of Internal Medicine, Navitas Clinic Shinjuku, 4-1-6 Shinjuku 7th floor of Newoman Bldg, Shinjuku, Tokyo, 160-0022, Japan

[3]Department of Reproductive, Developmental and Aging Sciences, Graduate School of Medicine, University of Tokyo, 4-6-1 Shirokanedai, Minato, Tokyo, 108-0071, Japan

[4]Department of Pediatrics, Navitas Clinic Tachikawa, Tachikawa, 3-1-1 Shibasaki 4th floor of Ecute Tachikawa Bldg, Tachikawa, Tokyo, 190-0023, Japan

**Corresponding Author:**

Morihito Takita, MD, PhD

Department of Internal Medicine

Navitas Clinic Tachikawa

Address: 3-1-1 Shibasaki, Ecute Tachikawa 4th floor

Tachikawa, Tokyo, 190-0023, Japan

Phone: +81-42-521-5334

Fax: +81-42-521-5329

Email: takita-ygc@umin.ac.jp

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'What should I do for the preparation of the second wave of the coronavirus disease (COVID-19) pandemic in the future?' – this is a common question we are now frequently asked by patients with flu symptoms or metabolic diseases at community clinics in Tokyo, Japan. Major cities have implemented their strategy to lift the emergent status of COVID-19, including the release of the lockdown of the city, and planned how to resume the emergent measures if they detect the second outbreak (1, 2). The governments and public resources already provided the general answers to prevent COVID-19, such as washing hands, social distancing and refraining from going outside (3). Clinical evaluation of the first outbreak of COVID-19 at the community level would suggest more personalized ways to prevent the second rather than the re-lockdown of cities or provinces, which causes a significant social impact. Herein, we initiated a clinical program of measurement of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-specific IgG antibody using the point-of-care test kit to assess the magnitude of COVID-19 in the community clinic setting under the approval of the institutional review board (IRB) (Approval Number: NC2020-01 of the ethical review board of Navitas Clinic, Tokyo, Japan). This is a report describing issues and challenges we faced during the implementation of the antibody test for COVID-19.

Our preliminary result included a total of 202 participants, including 55 healthcare workers (physicians, nurses, pharmacists, and laboratory technicians), participated in this study between April 21 and 28, 2020（Supplemetary table 1）. Asymptomatic subjects have been recruited by web posting of our clinic, and written consent was obtained from all participants prior to the test. The SARS-CoV-2 IgG-specific antibody was measured with a point-of-care rapid test (SARS-CoV-2 Antibody Testing Kit IgG RF-NC002, Kurabo Industries Ltd, Osaka, Japan).

The overall positive rate of SARS-CoV-2 IgG antibody was 5.9% (95% confidence interval[CI]: 3.1-10.1), consisting of six males (4.9% [1.8-10.3]) and six females (7.6% [2.8-15.8]). The positive rate in healthcare workers was higher than the others (9.1% [3.0-20.0] and 4.8 [1.9-9.6] in healthcare workers and the others, respectively). The age distribution of antibody-positive participants indicated two peaks of under 39 and over 60 years old (Supplementary table 2). Six out of 52 participants (12%) who had a history of fever within a month from the antibody test showed positive for SARS-CoV-2 IgG. The regional difference of the antibody-positive rate is 6.7% (95% CI: 3.4-11.6) and 2.7% (0.1-14.2) in Shinjuku of central Tokyo and Tachikawa of the suburban, respectively.

A common idea on the antibody test for the contagious disease is a public health purpose, which is a benefit to predict the population already infected based on the proportion of persons with positive results. Delay in the expansion of the capacity for the diagnostic PCR test to detect SARS-

CoV-2 in Japan has made difficulties in evaluating the COVID-19 pandemic, in turn, caused obstacles planning the recovery measures (4). In this context, the reliability of the test and selection of subjects are of importance when we generalize the results of antibody measurement. The discrepancies in the results of rapid test kits with immunochromatography have been reported in comparison with the laboratory tests with enzyme-linked immunosorbent assay (ELISA) (5). The primary issues are the *false-negative* due to low sensitivity and *false-positive* due to cross-reaction to past coronavirus infection. We focused on the measurement of IgG with a single product available in Japan to keep consistency in the results and to prevent difficult situations due to less sensitivity and specificity of IgM measurement. The selection bias is a tough problem unless a full survey includes all residents is performed. Our IRB also mentioned that careful interpretation is necessary when we analyze the positive rate of the antibody test. The random selection is an alternative way for the prediction of the outbreak at the regional level; however, we think that the benefit of the antibody test at the community level can be maintained by characterizing the subjects, which may help to identify the risk group of COVID-19 outbreak.

Of note, the disease control in the medically vulnerable population is another major issue (6). We tried to approach such people, including those living in the streets, to improve their accessibility to medical care and recognized their strong unwillingness to participate in the health survey of COVID-19. The reason for their reluctance is the fear that the history of COVID-19 may cause prejudice for their daily living and employment. There is a dilemma to balance between disease control at the community level and respect of individual thoughts.

The '*Immune Passport*' or '*Immune License*' is an idea to utilize the results of the antibody test at a personal level although the concept has not been established yet (7). We currently return the results of the antibody test to the participants individually with physicians' advice of personalized interpretation to minimize the confusion and misunderstanding of results. The longitudinal investigation to see the incidence of the COVID-19 infection in the SRAS-CoV-2 IgG-positive cohort compared to those negative would provide evidence of *Immune Passport* or *License*.

In conclusion, the antibody test of COVID-19 have benefits to understand the spreading of the virus in individual regions or communities although there are several issues to overcome such as reliability of the test, selection bias for the interpretation of the positive ratio and biological meaning of the existence of IgG antibody especially for the risk of the second infection. We are continuing the antibody test at the community level to identify the risk group of COVID-19,

which would suggest more personalized measures of disease control. Robust healthcare policy to efficiently monitor COVID-19 spread is warranted.

**Acknowledge Section**

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**References**


1. New York State. Industries Reopening by Phase. 2020. https://forward.ny.gov/industries-reopening-phase (17 May 2020, date last accessed).
2. Mayor of London. Mayor of London statement on Prime Minister's announcement. 2020. https://www.london.gov.uk/press-releases/mayoral/mayors-statement-on-prime-ministers-announcement (17 May 2020, date last accessed).
3. WHO. Connecting the world to combat coronavirus. 2020. https://www.who.int/news-room/campaigns/connecting-the-world-to-combat-coronavirus (17 May 2020, date last accessed).
4. Hayasaki E. Covid-19: how Japan squandered its early jump on the pandemic. BMJ. 2020;369:m1625.
5. Montesinos I, Gruson D, Kabamba B, Dahma H, Van den Wijngaert S, Reza S, et al. Evaluation of two automated and three rapid lateral flow immunoassays for the detection of anti-SARS-CoV-2 antibodies. J Clin Virol. 2020;128:104413.
6. Patel JA, Nielsen FBH, Badiani AA, Assi S, Unadkat V, Patel B, et al. Poverty, Inequality & COVID-19: The Forgotten Vulnerable. Public Health. 2020.
7. WHO. "Immunity passports" in the context of COVID-19. 2020. https://www.who.int/news-room/commentaries/detail/immunity-passports-in-the-context-of-covid-19 (17 May 2020, date last accessed).

Supplementary Table 1. Participant Characteristics.

| | Healthcare Workers (*n* =55) | Non-Healthcare Workers (*n* =147) | Total (*n* =202) |
|---|---|---|---|
| Age(year) | *n* (%) | *n* (%) | *n* (%) |
| 20-29 | 0 (0) | 9 (6) | 9 (4) |
| 30-39 | 5 (9) | 30 (21) | 35 (17) |
| 40-49 | 20 (36) | 58 (39) | 78 (39) |
| 50-59 | 9 (16) | 30 (21) | 39 (19) |
| 60-69 | 17 (31) | 15 (10) | 32 (16) |
| 70-80 | 4 (7) | 5 (3) | 9 (4) |
| Gender-Female | 19 (35) | 60 (41) | 79 (39) |
| History of fever within a month | 10 (18) | 42 (29) | 52 (26) |
| Existence of cohabitant diagnosed with COVID-19 | 0 (0) | 2 (1) | 2 (1) |
| History of PCR test for COVID-19 | 2 (4) | 7 (5) | 9 (4) |
| Positive Rate of SARS-CoV-2 IgG antibody -n, (%, [95% Confidence Interval]) | 5 (9.1 [3.0-20.0]) | 7 (4.8 [1.9-9.6]) | 12 (5.9 [3.1-10.1]) |

Supplementary Table 2. Characteristics of participants positive for SARS-CoV-2 IgG.

| | Number (*Percentage*) of participants positive for SARS-CoV-2 IgG (*n* =12) |
|---|---|
| Age(year) | |
| 20-39 | 5 (*11*) |
| 40-59 | 2 (*2*) |
| 60-80 | 5 (*12*) |
| Gender-Female / Male | 6 (*8*) / 6(*5*) |
| History of fever within a month | 6 (*12*) |
| Existence of cohabitant diagnosed with COVID-19 | 1 (*50*) |
| History of PCR test for COVID-19 | 3 (*33*) |

Percentages show proportions of participants positive for SRAS-CoV-2 IgG among all participants in individual categories.

List of Abbreviations

COVID-19; Coronavirus Disease 2019

ELISA; Enzyme-Linked Immunosorbent Assay

IRB; Institutional Review Board

PCR; Polymerase Chain Reaction

SARS-CoV-2; Severe Acute Respiratory Syndrome Coronavirus 2