

**ARE YOUNG INDIVIDUALS TRANSMITTING SARS-COV-2 INFECTION?****Takuma Hayashi<sup>\*1,2</sup> and Ikuo Konishi<sup>1,3,4</sup>**<sup>1</sup>National Hospital Organization Kyoto Medical Center, Kyoto, Kyoto, Japan.<sup>2</sup>Business Using Advanced Technology, Japan Science and Technology Agency (JST), Chiyoda-ku, Tokyo, Japan.<sup>3</sup>Kyoto University School of Medicine, Kyoto, Kyoto, Japan.<sup>4</sup>Former Director of the Japanese Society of Obstetrics and Gynecology.**\*Corresponding Author: Dr. Takuma Hayashi**

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**ABSTRACT**

Previous studies on coronavirus disease 2019 (COVID-19) mainly focused on epidemiological, clinical, and radiological features of patients with confirmed infection. However, in SARS-CoV-19 infected people, many cases have not been reported whose transmission route has not been determined. We report a small cluster of novel coronaviruses disease-2019 (COVID-19) to evidence that a potential transmission of the COVID-19 during the incubation period. The first patient in this small cluster was identified in presymptomatic period, as a close contact of a confirmed patient. The participants of the music festival held at the live house had close contact with the first patient during their incubation period, participants were confirmed to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in the subsequent sampling test.

**KEYWORDS:** COVID-19, SARS-CoV-2, Expert Committee, transmission.

A novel human coronavirus that is now named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (formerly called 2019-nCoV), which was probably transmitted from bats, emerged in Wuhan, China, in late 2019 and is now causing a pandemic.<sup>[1]</sup> It was rapidly shown to be caused by a novel coronavirus that is structurally related to the virus that causes severe acute respiratory syndrome (SARS). As in two preceding instances of emergence of coronavirus disease in the past 18 years - SARS (2002 and 2003) and Middle East respiratory syndrome (MERS) (2012 to the present) - the COVID-19 outbreak has posed critical challenges for the public health, research, and medical communities.<sup>[2]</sup> The full spectrum of COVID-19 ranges from mild, self-limiting respiratory tract illness to severe progressive pneumonia, multiorgan failure, and death.<sup>[3-6]</sup> Thus far, there are no specific therapeutic agents for coronavirus infections.<sup>[7]</sup>

An Expert Committee of Japanese Government Officials considered the national spread of the new coronavirus, SARS-CoV-2. Based on the spread of infection in Hokkaido in Japan and the outbreak of SARS-CoV-2 infection in small patient populations (called as clusters), such as those who visited live houses in Osaka city in Japan, young individuals in their teens and thirties were identified as potential sources transmitting COVID-19 (Figure 1). Therefore, on March 2, 2020, the avoidance of poorly ventilated places, such as live houses and clubs, was strongly recommended. The Expert

Committee reported that young individuals are frequently infected, but may be asymptomatic or only exhibit mild symptoms. Therefore, asymptomatic young individuals may transmit the infections to the elderly, who are more susceptible.

Based on estimations of the number of individuals confirmed to be infected with SARS-CoV-2 after visiting Hokkaido in Japan, the actual number of individuals infected with SARS-CoV-2 in Hokkaido in Japan was proposed to be approximately 10-fold higher than the previously reported number of 77. Individuals in their teens and thirties account for 20% of all infected individuals. A member of the Expert Committee stated that "although there is no medical evidence of widespread transmission among young individuals, asymptomatic young individuals may be transmitting the infection to the elderly".

SARS-CoV-2 has spread among young individuals in urban areas at high risk of COVID-19, and young individuals infected with SARS-CoV-2 are found in all areas of Hokkaido in Japan with mild symptoms. Based on analyses of infected individuals in Japan to date, it is estimated that 80% of those infected with SARS-CoV-2 have not transmitted the infection to others. However, if individuals spend time in a closed indoor space, such as a live house, gym, or buffet restaurant, a small group of individuals infected with SARS-CoV-2 may form a cluster. The route of transmission does not appear to be

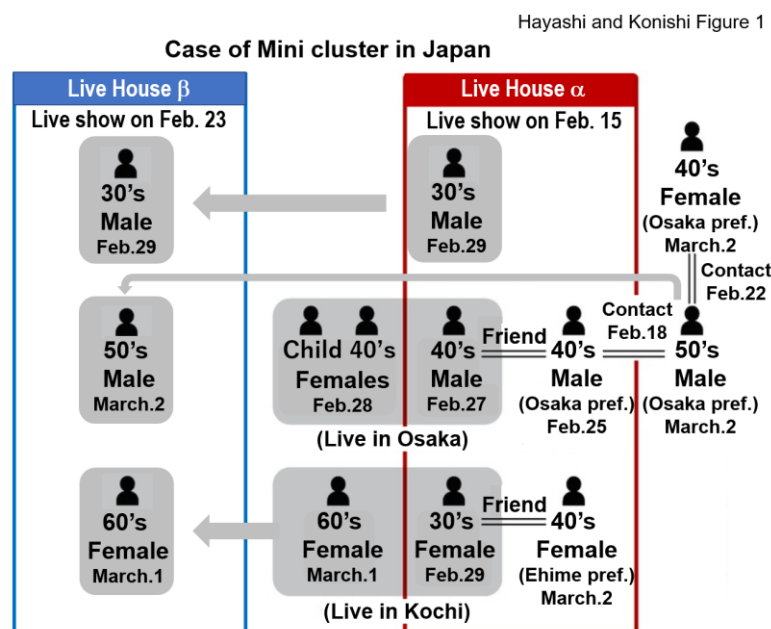
limited to droplet infection caused by coughing or sneezing or by contact infection through a contaminated body part. Even if an infected individual does not cough or sneeze, airborne infection may occur in poorly ventilated areas.

The new coronavirus, SARS-CoV-2 may be dispersed in the air to some extent, and, thus, airborne infection appears to be a more common route of transmission than droplet infection. Since individuals in closed spaces are at a higher risk of infection, ventilation, such as by opening windows, is important. Countermeasures based

on the presence of airborne SARS-CoV-2 are needed. The Expert Committee also stated that if appropriate actions were taken at this time, the rate of infection may be reduced. Therefore, many lives may be saved by young individuals avoiding poorly ventilated places.

#### Disclosure of potential conflicts of interest

The authors declare no potential conflicts of interest. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.



**Figure 1:** On the issue of the spread of the new coronavirus, SARS-CoV-2 to the participants of the music festival held at the Live House □ in Osaka on February 15 and 16, 2020, three of the participants and acquaintances who were found infected were participating in an event held at another Live House □ in Osaka on 19 and 23 of the same month. Osaka Prefecture called on the participants of the event to contact the nearest public health center, considering that a new cluster (small infected population with SARS-CoV-2) might be emerging.

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#### Author Contributions

T.H. performed most of the experiments and coordinated the project; T.H. conceived the study and wrote the

manuscript. I.K. gave information on clinical medicine and oversaw the entire study.

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