Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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A novel coronavirus — officially named as severe acute respiratory syndrome (SARS)-CoV-2 by the authorities — emerged in Wuhan, China, toward the end of 2019 [1,2]. Just four months later, more than 100,000 cases have been diagnosed with the resulting disease, COVID-19, in more than 100 countries at the time of writing this paper [3]. Not only does mainland China have the most number of reported cases (94.4%), but its case-fatality rate is also relatively higher than that of other countries as of February 28, 2020 (China: 3.5%, 2791 deaths among 78,961 confirmed cases; other countries: 1.4%, 67 deaths among 4691 confirmed cases) [4]. In an attempt to restrict the outbreak, China quickly implemented an unprecedented measure of quarantining 35 million people in Wuhan and several other cities, but its impact on slowing the global spread of the virus now seems inadequate. In fact, the number of cases in local human-to-human transmission kept soaring in several countries as of March 25, 2020: Italy 63,927 cases, United States of America 42,164 cases, and Spain 33,089 cases [3]. In Japan, 1128 cases were confirmed based on positive viral nucleic acid test results, and the overall case-fatality rate was 3.7% (i.e., 42 deaths) [3].

Quite some information about the viral biology of SARS-CoV-2 and clinical characteristics of COVID-19 has been reported in the past few weeks [1,2].

The genetic analysis of SARS-CoV-2 revealed that this virus is a new Betacoronavirus in close proximity to bat-derived SARS-like coronaviruses, and that SARS-CoV-2 has clear zoonotic origins, probably arising through adaptations caused by genetic mutation and recombination between different strains of coronaviruses in pangolins whose scales are used in traditional Chinese medicine [5,6]. The genomic characterization also showed that SARS-CoV-2 shares angiotensin-converting enzyme 2 (ACE2) receptors with SARS-CoV, which was the Betacoronavirus responsible for the global outbreak in 2002 [1,2]. For both coronaviruses, binding to ACE2, which is expressed on ciliated bronchial epithelial cells and type II pneumocytes, may be a critical determinant not only for clinical manifestations (i.e., pulmonary involvement) but also for transmission capacity. In fact, a strain of SARS-CoV with higher affinity for ACE2 was proved to have higher efficiency of infection in human cells and transmission between humans [7]. The binding affinity for ACE2 may explain why SARS-CoV-2 is more easily transmissible than SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV). The basic reproduction number ($R_0$, the expected number of secondary cases produced by one infected case) for SARS-CoV-2 is estimated to be more than 2 [3,8].

Clinical data from hospitals in China have revealed that 87% COVID-19 patients were aged 30–79 years and approximately 10% of the patients had severe disease requiring intensive care. Additionally, such patients with severe clinical manifestation are typically characterized by older adults with comorbid conditions such as cardiovascular disease, chronic respiratory disease, or diabetes [9–11]. Because of the lack of
epidemiologic data regarding diagnostic tests for COVID-19 on a population level, this figure may overlook many infected patients with subclinical or mild disease who are unlikely to seek health care, representing just the tip of a possibly large iceberg [1,2]. Substantially greater epidemiologic information is the key to get an accurate handle on whether COVID-19 is less alarming than what has been portrayed so far. Moreover, even carriers with no or few symptoms appear to possess transmission potential of COVID-19 infection by shedding the virus [1,2]. Owing to the ineffective containment of the outbreak due to such asymptomatic transmission, there is an urgent need to accelerate the development of rapid point-of-care diagnostic tests, vaccines, and therapeutics for COVID-19 that is proving to be an epidemic in the human population.

Declaration of Competing Interest

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References

[1] Del Rio C, Malani PN. COVID-19-New insights on a rapidly changing epidemic. J Am Med Assoc 2020.
[2] Münster VJ, Koopmans M, van Doremalen N, van Riel D, de Wit E. A novel coronavirus emerging in China - key questions for impact assessment. N Engl J Med 2020;382:692-4.
[3] World Health Organization. Coronavirus disease 2019 (COVID-19) situation report – 64. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200324-sitrep-64-covid-19.pdf?sfvrsn=703b2c40_2. [Accessed 25 March 2020].
[4] World Health Organization. Coronavirus disease 2019 (COVID-19) situation report – 39. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200228-sitrep-39-covid-19.pdf?sfvrsn=aa1b80a7_2. [Accessed 28 February 2020].
[5] Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. Lancet 2020;395:565-74.
[6] Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020;382:727-33.
[7] Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. Nat Rev Microbiol 2019;17:181-92.
[8] Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med 2020.
[9] Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020.
[10] Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.
[11] Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72214 cases from the Chinese center for disease control and prevention. J Am Med Assoc 2020.