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Editorial

PCR detection and new therapies for COVID-19

Takanori Iwata

Department of Periodontology, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Tokyo, Japan

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***Correspondence:**
Takanori Iwata
Department of Periodontology, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), 1-5-45 Yushima, Bunkyo-ku, Tokyo 113-8549, Japan.
E-mail: iwata.peri@tmd.ac.jp
Tel: +81-3-5803-5488
Fax:+81-3-5803-0196

ORCID iDs
Takanori Iwata
https://orcid.org/0000-0002-5461-7298

Coronavirus disease 2019 (COVID-19) continues to pose a major threat to the world. Polymerase chain reaction (PCR) has received particular attention as a testing technology in this turmoil. This technology, which was invented in 1983 by Kary Banks Mullis (1944–2019, Nobel laureate in 1993), is a technique for nucleic acid amplification that has become indispensable in biology since its invention. PCR has been used to analyze gene expression and to detect bacteria in periodontal research for the past 30 years, but this term has spread to the general public during the COVID-19 pandemic.

Although members of the general public may consider PCR testing to be an absolutely reliable method, false positives and false negatives can take place. False positives due to carryover can occur if there are splashes around the technician between samplings. In contrast, false negatives can occur if the throat swab collection is insufficient. False negatives and false positives can also take place during subsequent procedures, such as RNA extraction, synthesis of the complementary DNA, and PCR itself. In addition, since PCR testing only detects the RNA fragments of severe acute respiratory syndrome coronavirus 2, the virus that causes COVID-19, it is impossible to distinguish whether the virus is viable using PCR. In fact, a clinical study showed that the sensitivity of a PCR test was significantly lower than that of chest computed tomography [1]. Nonetheless, PCR assists in the diagnosis of COVID-19 and has played an important role in monitoring the spread of the infection.

Antiviral drugs have attracted attention as possible treatments of COVID-19, and symptomatic therapies against acute respiratory distress syndrome (ARDS) have also been investigated, using anti-interleukin-6 antibody drugs or mesenchymal stem cells (MSCs). Some clinical trials have been conducted to investigate MSC therapy for COVID-19 [2]. Not only MSCs themselves, but also exosomes secreted from allogeneic MSCs, were shown to be effective for treating severe COVID-19 patients[3]. Although further randomized controlled trials are needed, these findings suggest that the multi-functional effects of MSCs and their secretions diminish the host cytokine storm, enhance wound healing, and reduce the likelihood of fatal ARDS.

It now seems that we can overcome this pandemic by avoiding the “3 C's”: closed spaces with poor ventilation, crowded places with many people nearby, and close-contact settings such as close-range conversations. Nonetheless, these steps will dramatically change our lifestyle. Many meetings and congresses have been canceled or held online recently; as such, it has become difficult to have small conversations or chats where one can communicate frankly. These changes have led me to realize how important it is to meet and talk with people.

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