Effectiveness of hypochlorous acid water against new type coronavirus

Pneumonia and its pathogens that occurred in Wuhan, China in November 2019, and were reported to the World Health Organization (WHO) on December 31 were named the new coronavirus infection (COVID-19) and the new coronavirus (SARS-CoV-2). Major outbreaks were confined to mainland China by late January 2020, but spread rapidly worldwide in February, with 80,000 cases and 3,000 deaths in early March (In Japan, the cruise ship Diamond Princess has 706 people and about 300 people other than that.).

※The new coronavirus was classified as SARS coronavirus (SARS-CoV) and named SARS-CoV-2 by the International Commission on Virus Classification (ICTV). WHO recommends the name 2019-nCov.

Various precautions have been taken to prevent the spread of infection. The Ministry of Health, Labor and Welfare has announced the importance of disinfection along with hand washing, masks and gargles. The use of disinfecting alcohol and 0.1% sodium hypochlorite is recommended for disinfection. However, hypochlorous acid water *(generated by electrolysis of NaCl or hydrochloric acid) that has a bactericidal activity that is not inferior to them and extremely safe for the human body and the environment is expected to be very useful for preventing infection.

1. Effect of hypochlorous acid water on bacteria and viruses

Hypochlorous acid water (effective chlorine concentration from 10 to 80 ppm) shows high bactericidal and inactivating activities against various pathogenic bacteria and viruses. Their activity is higher than rubbing alcohol (70%) and is equivalent to 0.1% sodium hypochlorite. Generally, it is known that those with an envelope such as influenza virus are weak (low resistance) and those without an envelope like norovirus are strong (high resistance) against disinfectants (refer Figure1). Coronaviruses, including the new coronaviruses, have an enveloped particle structure like influenza viruses (Figure 2). Therefore, it can be inferred that hypochlorous acid water is also effective against the new coronavirus. The inactivation test for the new coronavirus does not appear to have been performed with either disinfecting alcohol or 0.1% sodium hypochlorite.

Attention is focused only on new coronavirus infections at present, but in reality, influenza is much more prevalent. Other pathogens are also present in various places. Based on these circumstances, hypochlorous acid water, which is highly safe for humans and the environment and has an effectiveness of a wide range of bacteria and viruses, is the most suitable for disinfection and sterilization of instruments and the environment. In addition, washing hands with hypochlorous acid can be expected to have the desired effect, as hands are not rough.

*Hypochlorous acid water is electrolyzed water containing hypochlorous acid (effective chlorine) that is generated directly from the anode side by electrolyzing dilute NaCl or hydrochloric acid with an electrolytic device. The concentration of the generation (effective chlorine concentration) is specified by the capacity of the electrolyzer, and the concentration exceeding that is not generated.

Hypochlorous acid water is approved as a food additive disinfectant in combination with an electrolyzer.

Sodium hypochlorite (a strong alkali with an effective chlorine concentration of 4% or more; a powerful drug) diluted and acidified with hydrochloric acid, etc., is marketed as hypochlorous acid water, but it is not approved as a food additive disinfectant.

2. The Drug Resistance of Coronavirus

Figure 1 shows the resistance of various pathogens to disinfectants. The following is known about viruses. Viruses without an envelope (norovirus, adenovirus, enterovirus, poliovirus, etc.) are highly resistant. Viruses with an envelope (influenza virus, coronavirus, herpes virus, measles virus, etc.) are less resistant.

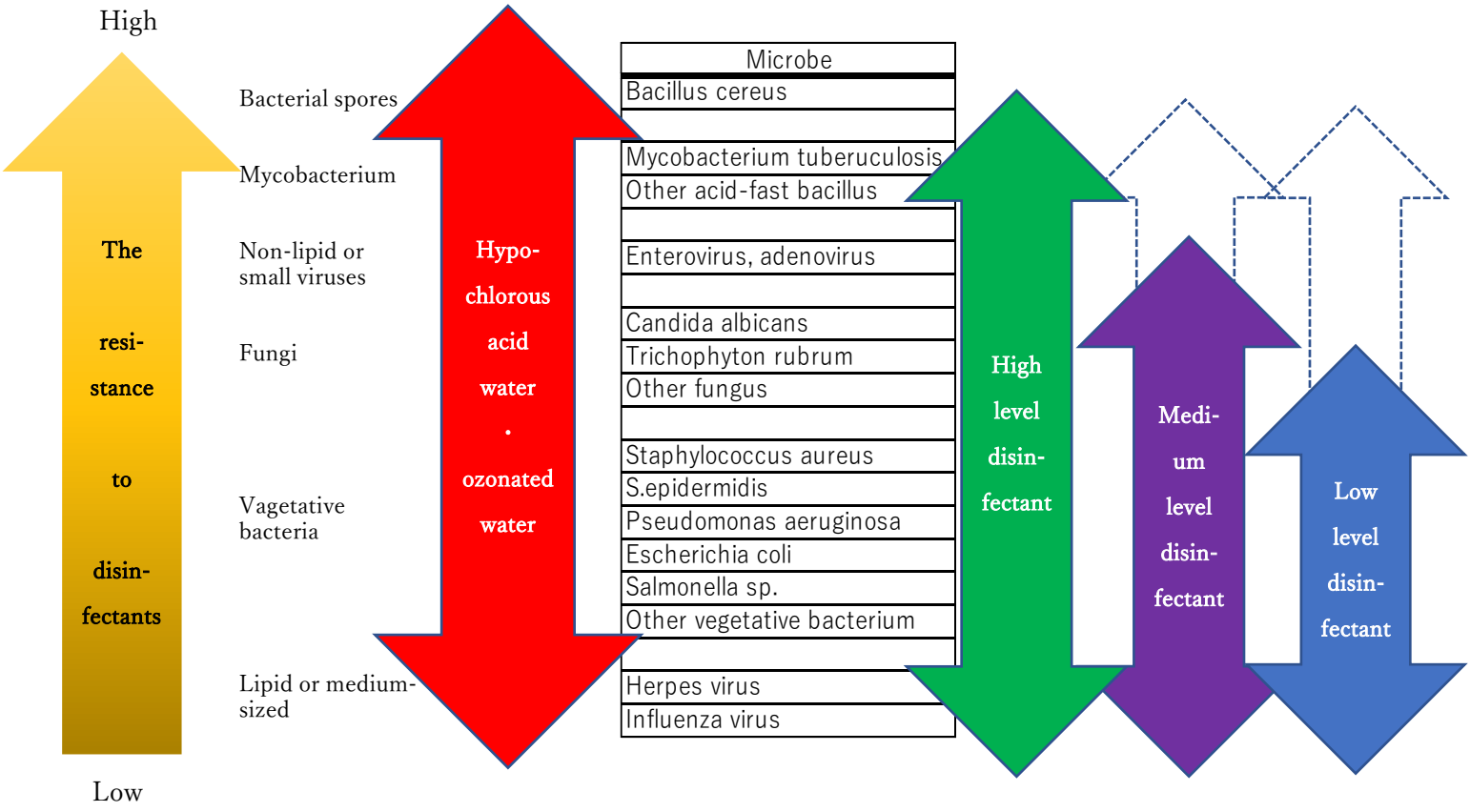


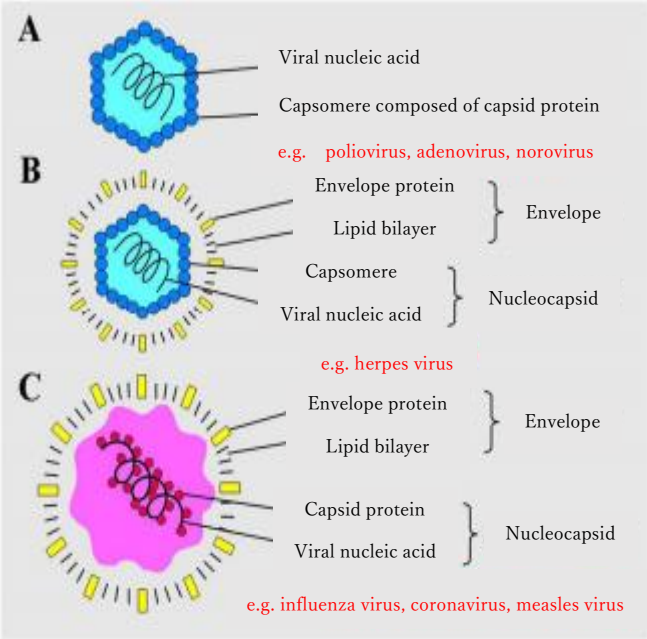
Figure 1. The Resistance of Various Pathogens to Disinfectants

3. The Basic Structure of Coronavirus Particles

Virus particles have three basic structures (Figure 2). Virus particles are broadly classified according to whether they have an envelope (A) or not (B,C). In addition, those with an envelope are classified according to whether the nucleic acid of the nucleocapsid has a protein (C) or not (B). Representative examples of the A structure are poliovirus, adenovirus, and norovirus. Representative examples of the B structure is herpes virus. The C structure is influenza virus, coronavirus, measles virus, etc. The new coronavirus is classified as the C structure.

On the other hand, virus particles can be classified according to whether the nucleic acid at the center of the virus particle is DNA or RNA (refer Figure 1). Coronaviruses are RNA viruses, the same as influenza and noroviruses.

From the above, it can be seen that the particle structures of coronavirus and influenza virus are very similar.



Virus particles can be divided into DNA viruses and RNA viruses depending on the nucleic acid at the center.

・DNA viruses
Smallpox virus
Herpes virus (B)
Adenovirus (A), etc

・RNA viruses
Influenza virus (C)
Poliovirus (A)
Measles virus (C)
Coronavirus (C)
Norovirus (A), etc

RNA viruses are easy to mutate.
e.g. Influenza virus
Coronavirus

Figure 2. The Basic Structure of the Viruses

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