

## **Infection control in disasters using low-concentration chlorine dioxide gas**

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Means to prevent infectious diseases is a serious problem in many disasters. Chlorine dioxide gas has long been approved to be used to bleach pulp and wheat, and to disinfect tap water in many countries. We recently developed a method to generate minute quantities of chlorine dioxide gas in a precisely controlled manner and to detect it with extremely high sensitivity and accuracy. Consequently, we can control its gas concentrations. We developed gels and generators that can generate chlorine dioxide gas. We can control gas concentrations to disinfect floating microbes without a need to evacuate humans during the disinfection. Furthermore, we performed basic researches concerning its animal toxicity, its effect against culture cells and its mechanisms of action against microbes. We obtained clues to reduce human air-borne infections in living places using the gas. Japan Chlorine Dioxide Industry Association showed a guideline of 0.01 ppm as a chlorine dioxide gas concentration, in which it has no harmful effect against humans. We reported in an academic paper that 99% of *Staphylococcus aureus* and 99% of  $\phi$ X174 virus floating in air were eliminated by 0.01 ppm chlorine dioxide gas in 2-3 h. Furthermore, we found that running a chlorine dioxide gas generator could reduce occurrence of influenza and absenteeism of school pupils. In the 2009 influenza pandemic, air-conditioners equipped with a chlorine dioxide gas generator could reduce infectious diseases in workplaces. We donated chlorine dioxide gas generators during the 2011 East Japan Great Earthquake. Interesting enough, in Miyagi prefecture where the generators were donated, incidence of human infectious diseases was lower than that in other prefectures where generators were not donated. We propose that chlorine dioxide gas-generating systems are appropriate preventive means in disaster evacuation facilities where ventilation is not enough.