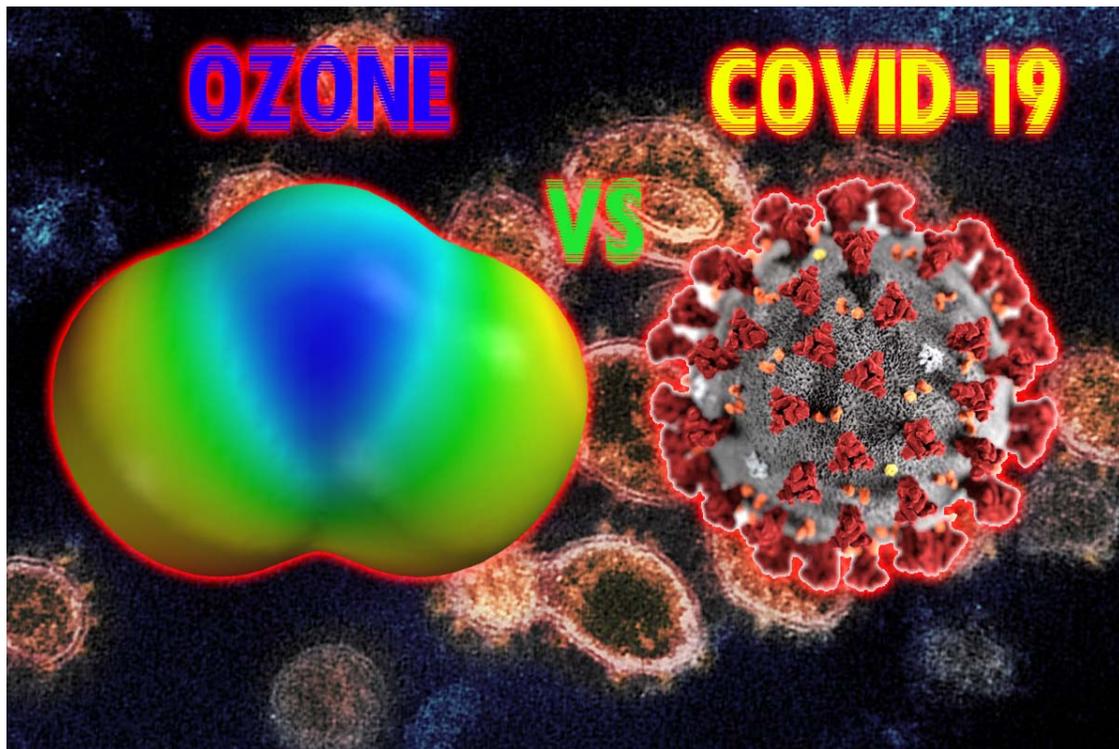


# Nara Medical University study confirms that ozone inactivates COVID-19

By **admin** - Giugno 2, 2020



Nara Medical University (Professor Toshikazu Yano, Director of Infectious Diseases, Takashi Kasahara, Director of Infectious Diseases) and MBT Consortium (members of the Subcommittee on Infectious Diseases: Quorl Holdings Co., Ltd., Sanyu Shoji Co., Ltd., Tamuratec Co., Ltd., Marusan Pharmaceutical Biotech Co., Ltd.)

**The company's research team was the first in the world to confirm the inactivation of the new coronavirus by exposure to ozone gas.**

"We also demonstrated academic practicality by experimentally clarifying the inactivation conditions"

The need to sterilize environments and equipment as a consequence of COVID-19 involves a lot of effort and time for manual cleaning.

One of the tools available to solve this problem was sterilization with ozone gas, but without clear scientific evidence, it was not possible to certify its use.

**A research team led by Nara Medical University has been**

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In this report, we report that ozone inactivation of the new coronavirus has been conducted and the relationship between ozone concentration and exposure time and ozone inactivation has been clarified experimentally.

Ozone (chemical formula: O<sub>3</sub>) is an allotropic form of oxygen, with a characteristic garlic-like odor. Its molecules are made up of three oxygen atoms.

It has the strongest oxidative power close to fluoride and destroys cells like bacteria and decomposes the chemical bonds between substances.

It is effective in deodorization, sterilization and cleaning and is used in various fields such as medical care, nursing care, breeding and in the food sector.

As for the effectiveness of ozone, the bactericidal power of 7 times that of chlorine and has been considered "particularly effective" for the control of infectious diseases.

In Japan, the fire department of the Ministry of Internal Affairs and Communications introduced it to Japan for the first time in 2008, when it identified it as part of the measures to prevent the new flu infection and authorized its use in main airports.

Since then, application on medical sites has progressed and the number of medical institutions introducing ozone generators for the purpose of preventing the spread of healthcare associated infections has been increasing.

The bactericidal ozone-based approach has also been accepted as a measure against new coronavirus infection (COVID-19).

Since January of this year, when COVID-19 infection was spreading around the world, not only medical institutions, but also ambulances, hospitals, hotels, etc. have adopted ozone generators.

Ozone has definitely gained widespread use as an effective sterilization method comparable to manual alcohol cleaning.

## Experiment content and procedure

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- Cultivate a new cell line of coronavirus,
- place a stainless steel plate in an ozone-proof hermetic box installed in a safety cabinet,
- apply the new coronavirus to be tested.
- Use an ozonator (medical device certified by PMDA: ozone generator) installed in the ozone-proof hermetic box, the ozone concentration in the ozone-proof hermetic box is controlled and maintained from 1.0 to 6.0 ppm.  
The amount of ozone exposure is set by the CT value. (The CT 330 value is used, which is a verification test value for the certification of medical devices by the PMDA of the Ministry of Health, Labor and Wellness).
- After exposure, inoculate the cells with the virus,
- determine if the virus has infected the cells and calculate the amount of virus.

This experiment was possible because the University has a biosecurity level 3 laboratory and virus culture technology.



1. With a CT value of 330 (55 minute exposure to an ozone concentration of 6 ppm), it was inactivated from 1 / 1,000 to 1 / 10,000.
2. At a CT value of 60 (60 minutes of exposure to an ozone concentration of 1 ppm), it was inactivated from 1/10 to 1/100.

Experimental device

In this study, we confirmed that ozone can inactivate up to 1 / 10,000.

**This shows that in real conditions and using ozone, the new coronavirus can be inactivated on all surfaces and**

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But ozone therapy as a medical therapy, validated by the numerous world scientific researches, has an anti – bacterial / viral / fungal power and in particular anti inflammatory.

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## MECHANISM OF ACTION

Inactivation of bacteria, viruses, fungi, yeast and protozoa:

- Ozone therapy disrupts the integrity of the bacterial cell envelope through oxidation of the phospholipids and lipoproteins.
- In fungi, O<sub>3</sub> inhibits cell growth at certain stages.
- With viruses, the O<sub>3</sub> damages the viral capsid and upsets the reproductive cycle by disrupting the virus-to-cell contact with peroxidation.
- The weak enzyme coatings on cells which make them vulnerable to invasion by viruses make them susceptible to oxidation and elimination from the body, which then replaces them with healthy cells.[26]

Stimulation of oxygen metabolism: Ozone therapy causes an increase in the red blood cell glycolysis rate.

This leads to the stimulation of 2,3-diphosphoglycerate which leads to an increase in the amount of oxygen released to the tissues.

Ozone activates the Krebs cycle by enhancing oxidative carboxylation of pyruvate, stimulating production of ATP.

It also causes a significant reduction in NADH and helps to oxidize cytochrome C. There is a stimulation of production of enzymes which act as free radical scavengers and cell-wall protectors: glutathione peroxidase, catalase and superoxide dismutase.

Production of prostacyline, a vasodilator, is also induced by O<sub>3</sub> [Figure 1].[25]

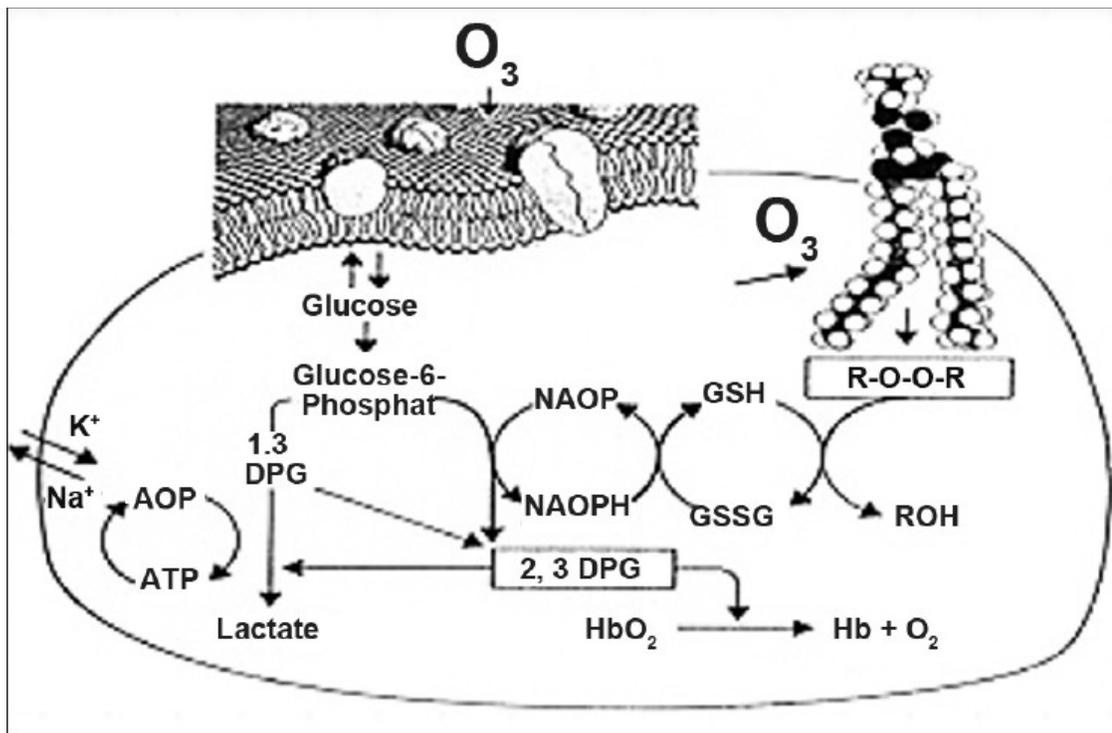


Figure 1 – Action of ozone on RBC Metabolism[27]

Activation of the immune system: Ozone administered at a concentration of between 30 and 55 µg/cc causes the greatest increase in the production of interferon and the greatest output of tumor necrosis factor and interleukin-2.

The production of interleukin-2 launches an entire cascade of subsequent immunological reactions.[27]

### ADVANTAGES OF OZONE THERAPY

- Diabetic complications are attributed to the oxidative stress in the body, O<sub>3</sub> was found to activate the antioxidant system affecting the level of glycemia.
- Ozone prevented oxidative stress by normalizing the organic peroxide levels by activating superoxide dismutase.[36–37]
- Ozone was found to completely inactivate the HIV in vitro, this action of O<sub>3</sub> was dose-dependent.
- Concentration used for inactivation was found to be non-cytotoxic. The inactivation was owing to the reduction of the HIV p24 core protein.[38]
- Ozone was also found to increase the host immunity by increasing the production of cytokine.[39]
- In an in vitro study, it was observed that O<sub>3</sub> is very effective in reducing the concentrations of *Acinetobacter baumannii*, *Clostridium difficile* and methicillin-resistant *Staphylococcus aureus* in dry as well as wet samples, hence it can be used as a disinfectant.

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## (世界初) オゾンによる新型コロナウイルス不活化確認

- [プレスリリース \(PDF: 757KB\)](#)

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