【Test Report】

Efficiency of inactivation of airborne influenza virus in a closed space with an air purification device set in a room air conditioner

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1. The aim of work

To confirm that the air purification device can decrease activity of airborne influenza virus.

2. Client

Mitsubishi Electric Corporation Living Environment System Laboratory

5-1-1 Ofuna, Kamakura, Kanagawa

3. Influenza virus strain used in this study

Influenza virus A/Aichi/2/68(H3N2)

4. Materials & methods

1) Virus

Influenza virus, propagated in embryonated chicken eggs, was used for this study.

2) Device

The air purification device in Mitsubishi Electric Room air conditioners KIRIGAMINE MSZ-LN SERIES (Indoor unit only)

3) Conditions

Air flow rate 12.4 m^3/min

① Control (Natural time course)

② Room air conditioner on (device on)

4) Test room and equipments

Test room volume: 25m^3

Temperature & Humidity: 20-23℃, 26-32%

Equipment used: Medical nebulizer (OMRON, NE-C28)

Fan (YAMAZEN, YAR-VJ19)

Virus sampling system

5) The procedure for the experiments

Synopsis of procedure for the experiment is shown in Table.1. Fig.1 shows schematic diagram of the test room and the settings of the apparatus there.

① Atomize 9mL of viral liquid by three set medical nebulizers, for 10 minutes in the room.(3mL per one medical nebulizer)

② Collect airborne influenza virus to gelatin filter membrane by the virus sampling system: sampling of 80L-air (40L/min×2min).

③ Start to operate the air conditioner, attached on the wall in the test room.

④ Collect airborne influenza virus repeatedly at regular intervals.

6) Quantitation of the active virus

The viability of collected influenza virus was titrated by plaque assay using MDCK (Madin-Darby canine kidney) cells.

Table.1. The procedure for the experiment.

	Devices used	Time after the air purification device started on (minutes)				
		0	※	※	120	
Circulation in the air	Fan	→				
Atomization of influenza virus	Medical nebulizer	10minutes →				
Operation of room air conditioner	room air conditioner		→	→	→	→
Collection of influenza virus	Gelatin filter membrane	2minutes →		2minutes →	2minutes →	2minutes →

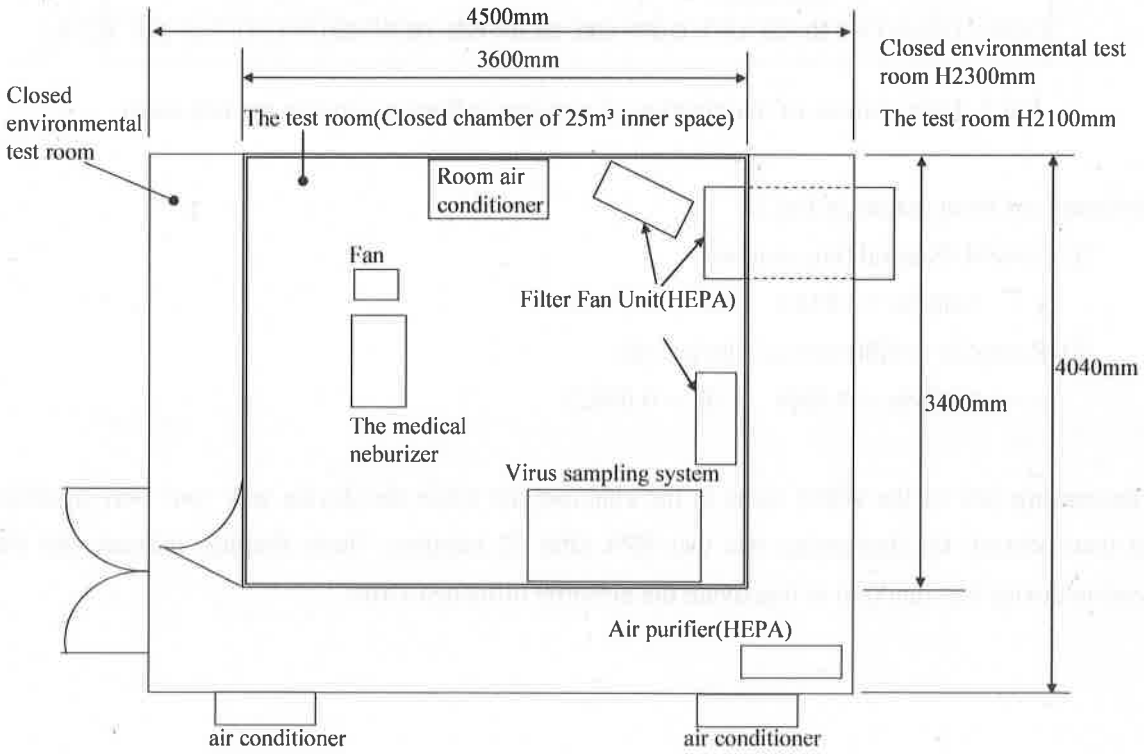

Fig.1. Schematic diagram of the test room and settings of the apparatus.

5. Results

Fig.2 shows the time course of inactivation of the airborne influenza virus.

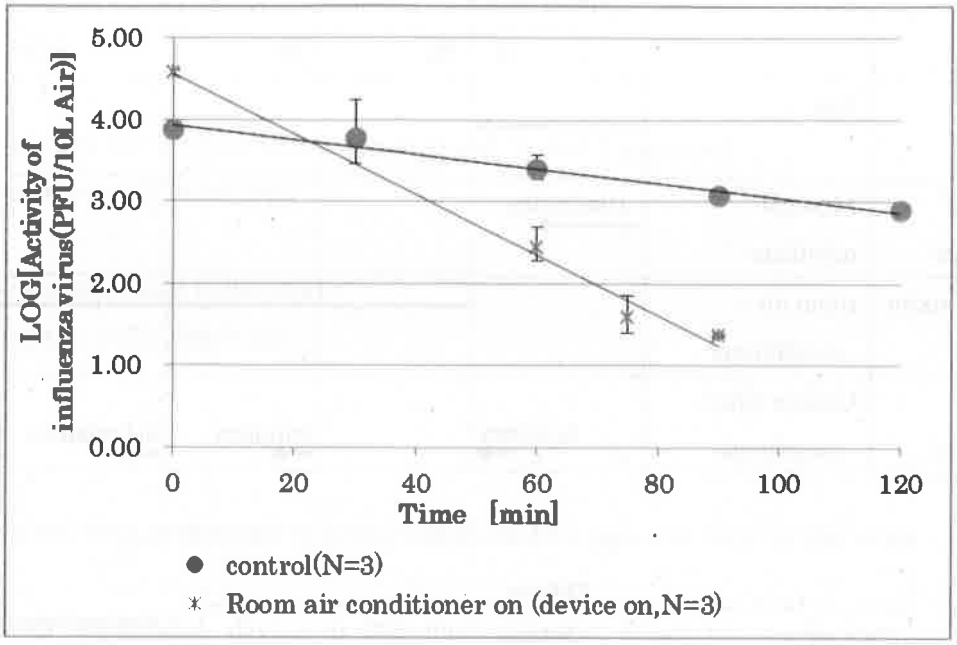

Fig.2. Time courses of inactivation of airborne influenza virus in the test room.

Approximations from graphs in Fig.2.

① Control (Natural time course)

$y = -0.0089x + 3.9349 \quad (R^2 = 0.9744)$

② Room air conditioner on (device on)

$y = -0.0369x + 4.5664 \quad (R^2 = 0.9902)$

The decreasing rate of the active virus in the chamber air while the device was "on" was significantly greater than control: the decreasing rate was 99% after 72 minutes. These findings indicate that the air purification device has function to inactivate the airborne influenza virus.