



Test report of Dopair filtration system of ATA  
company: *Pseudomonas aeruginosa* and *Escherichia*  
*coli*.

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## 1. Scientific and technological background

VirNext is a technological platform of service and innovation with the aim to answer to scientific and technological needs of manufacturers in the fields of virology and microbiology. VirNext is specialized in the evaluation of physical, chemical and biological technologies for indoor air, surface and water decontamination.

ATA Company commissioned VirNext technological platform to evaluate the efficiency of the “Dopair/Room Dopair” indoor air purification system for the decontamination of Gram negative bacteria. This purification system is composed of a filter system.

Confined space indoor air favours exposition to chemical and biological harmful compounds; which can have a hard sanitary impact. Pollutants in confined space are known to be involved in respiratory deficiency, cardiovascular diseases, rhinitis, allergies and cancer. The nature of these pollutants depends on environmental confined spaces. For medical and paramedical sectors, the main biological pollutants are microorganisms, and notably Gram negative bacteria. They present an ovoid form of 2 at 6  $\mu\text{m}$ . They possess a peptidoglycan poor layer in cell wall and an extern membrane composed of double phospholipid layer. Among them, we can point *Enterobacteriace* family (*Escherichia coli*, *Klebsiella pneumonia*, *Citrobacterspp*, *Enterobacterspp*, *Proteusspp*, *Salmonella typhimurium*, *Shigella dysenteriae*), *Pseudomonas aeruginosa*, *Acinobacter baumannii*, *Legionella pneumophila* and the MDR stains (*Multy Drug Resistance*). They are responsible for skin, urinary and serious pulmonary diseases, blood poisoning, and nosocomial infections.

VirNext has developed experimental procedures in order to evaluate the efficiency of Room Dopair/Dopair filter system to decontaminate confined space. This confined space was contaminated with strains of Gram negative bacteria *Pseudomonas aeruginosa* and *Escherichia coli*.



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## **2. Methodology**

The experimental strategy consists of the evaluation of the capacity of “Room Dopair/Dopair” system, developed by ATA-Medical Company, to decontaminate a confined space with microorganisms. This confined space was materialised by a nebulization chamber with a volume of 2.5m<sup>3</sup> where an artificial atmosphere containing microorganisms can be generated. These atmospheres were obtained by nebulization of concentrated solutions containing the microorganisms. Test samples were harvested by suction of total volume of chamber using cyclonic movement (Coriolis, Bertin Technologies). During this suction, the harvested microorganisms were resuspended in a collection buffer.

### 3. Evaluation of purifier efficiency

#### 3.1 Experimental conditions

**Date:** 28/01/2014 (*Pseudomonas aeruginosa*) and 13/02/2014 (*Escherichia coli*)

**Temperature:** 20°C

**Flow of Room Dopair/Dopair filter system:** 160m<sup>3</sup>/h

**Functioning time:**

Functioning time of Room Dopair system has been defined in order to evaluate decontamination efficiency on confined space after passage of 5 chamber volumes (12.5m<sup>3</sup> in 5 minutes), 10 chamber volumes (25m<sup>3</sup> in 10 minutes), 20 chamber volumes (50m<sup>3</sup> in 20 minutes).

**Number of samples** 14 for each microorganism

**Concentration of microorganism solutions:**

- *Pseudomonas aeruginosa* 10<sup>8</sup>CFU/mL
- *Escherichia coli* 10<sup>8</sup> CFU/mL

**Collection parameters:** 10 minutes (2.5 m<sup>3</sup>) in 8 mL of collection medium (phosphate buffer)

**Evaluation method:** seeding on PCA medium, incubation at 37°C during 24 hours then counting.

### 3.2 Results :

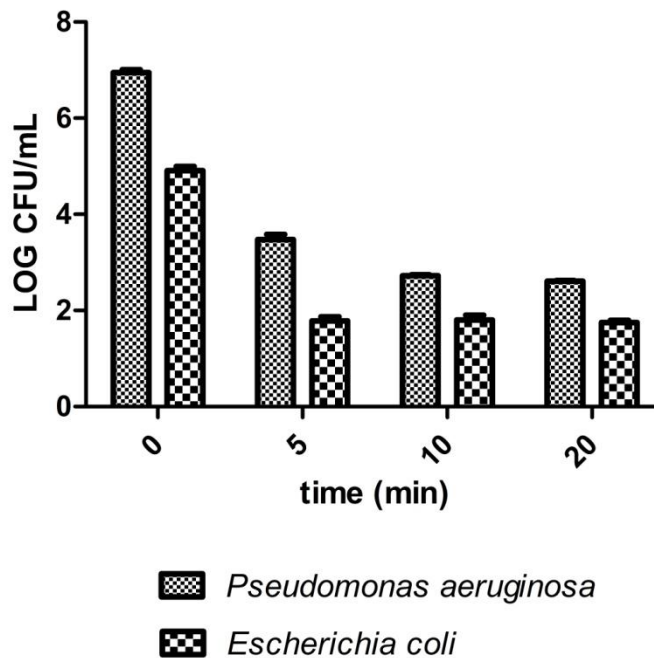


Figure 1: Evaluation of « Room Dopair » filter system on Gram negative bacteria: *Pseudomonas aeruginosa* and *Escherichia coli*.

The collecting data allow to define the efficiency of the « Room Dopair » system on decontamination of confined space with Gram negative bacteria.

- Reduction Log CFU/mL *Pseudomonas aeruginosa* :
  - $3,4 \pm 0,1$  Log in 5 minutes
  - $4,2 \pm 0,1$  Log in 10 minutes
  - $4,3 \pm 0,1$  Log in 20 minutes
  
- Reduction Log CFU/mL *Escherichia coli* :
  - $3,1 \pm 0,1$  Log in 5 minutes
  - $3,1 \pm 0,2$  Log in 10 minutes
  - $3,2 \pm 0,1$  Log in 20 minutes

### 3.3 Conclusion

The « Room Dopair/Dopair » system developed by ATA-Medical Company allows the decontamination of a confined space of a volume of 2.5m<sup>3</sup> in 5 minutes with efficiencies of 99.965% and 99.925% for *Pseudomonas aeruginosa* and *Escharichia coli* respectively. The « Room Dopair/Dopair » filter system allows to decontaminate air of confined space containing Gram negative bacteria.

Lyon the 5 mars 2014,

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