

# 3D lung epithelial models to study host-pathogen interactions

*Commonly used acronym: 3D lung models*

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## Organisation

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**Geographical Area** Flemish Region

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Human health
<b>The Method is situated in</b>	Basic Research, Translational - Applied Research
<b>Type of method</b>	In vitro - Ex vivo
<b>Specify the type of cells/tissues/organs</b>	alveolar epithelial cells, bronchial epithelial cells from patients with lung disease or healthy individuals

## DESCRIPTION

### Method keywords

in vivo-like models

organotypic

host-pathogen interactions

inflammation  
Pseudomonas aeruginosa  
microbiome  
cytotoxicity  
host-associated biofilms  
preclinical drug development  
antibiotic activity

### **Scientific area keywords**

microbiology  
antibiotics  
cystic fibrosis  
Chronic obstructive pulmonary disease  
infectious disease  
biofilm  
lung disease

### **Method description**

Three-dimensional (3D) lung epithelial cell models mimic key aspects of the parental tissue, including apical-basolateral polarity and barrier function (Barrila et al. 2010, PMID: 20948552). These 3D cultures are generated using the rotating wall vessel (RWV) bioreactor system, allowing host cells to grow and differentiate on porous ECM-coated microcarrier beads in an optimized suspension culture. Upon differentiation, cultures can be transferred into multi-well plates, to enable targeted throughput and high reproducibility. 3D lung cell cultures can be applied to study various aspects of the infectious disease process, enabling to evaluate both host and bacterial behavior during host-pathogen interactions under physiologically relevant conditions. The developed models are also useful for testing new or existing antimicrobial agents, as bacterial susceptibility to antimicrobials is different in the 3D lung models compared to conventional assays (Crabbé et al. 2017, PMID: 28256611; Rodriguez-Sevilla et al. 2018, PMID: 29648588; Grassi et al. 2019, PMID: 30800115; Crabbé et al. 2019, PMID: 31034512).

### **Lab equipment**

In addition to basic cell culture equipment, specialized bioreactors are needed to

generate the described 3D lung cell cultures.

### **Method status**

Published in peer reviewed journal

## **PROS, CONS & FUTURE POTENTIAL**

### **Advantages**

- *In vivo*-like characteristics ;
- Targeted throughput ;
- High reproducibility.

### **Challenges**

- More expensive than conventional (2D) assays ;
- Expertise and equipment needed.

## **REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION**

### **References**

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