

# The living chamber, an innovative and customizable 3D in vitro model for bone implant evaluation

*Commonly used acronym: Living chamber*

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## Organisation

**Name of the organisation** Antleron

**Department** Bio-incubator Leuven

**Country** Belgium

**Geographical Area** Flemish Region

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Animal health, Human health, Other: In vitro modelling, replacing animal models
<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>	Immortalized human bone-marrow derived mesenchymal stem cells

## DESCRIPTION

### Method keywords

bone-cartilage unit

3D in vitro model

3D printing  
3D Cell culture  
3D model  
differentiation  
mesenchymal stem cell  
bone model

### **Scientific area keywords**

in vitro 3D modelling  
Bone tissue engineering  
3D organoid models  
differentiation  
organ-on-chip  
3D culture

### **Method description**

A proprietary designed lab-scale bioreactor containing a substrate for adherent cells and customized conditions, enabling the differentiation of MSCs into osteogenic lineage. The cell-substrate interaction can be assessed after prolonged 3D cell culture. Customizable and tunable to the experimental needs and cells, for example for testing bone-implants for bone-related studies (testing implant coatings, implant materials, etc.) in healthy and diseased conditions.

### **Lab equipment**

Standard lab-scale *in vitro* Eukaryotic cell culture equipment, materials and facilities.

### **Method status**

Internally validated

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

### **Advantages**

3D-environment representing better the *in vivo* situation. Results obtained in the Living Chamber in a perfusion set-up are superior compared to cells cultured and differentiated either onto TCP support or even 3D support. Allows the use of human

cells with relevant physiological function instead of xenogeneic (i.e. animal origin) cells . Bioreactors are customizable to the needs and the intended use (size, functionalities, (parallel) testing needs). Approach enables *in vitro* prioritization and thus avoids iterative animal testing in so far possible.

## Challenges

Cell donor variability is not controllable in this methods, similarly at what is observed for other established methods. While this reflects a clinical reality, for the sake of reproducibility the initial testing may be done using immortalized modified MSC lines, allowing a robust evaluation of the tested parameters before initiating testing with primary cells.

## Modifications

Modification can easily be done as the bioreactor and cell support is customizable to the desired experimental needs.

## Future & Other applications

Cartilage repair research, in vitro cell expansion, organoid culture, production of biologicals, etc.

## REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

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