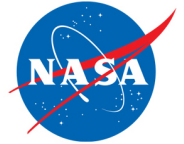




National Aeronautics and  
Space Administration



## TECHNOLOGY SOLUTION

### Health, Medicine and Biotechnology

# Ionic Magnetic Resonance Tailors Animal Cells/Tissues

[Design and method allows culture regulation](#)

Innovators at NASA Johnson Space Center have designed an apparatus and method that controls the growth and proliferation of 3D biological cells and mammalian tissue in the presence of a pulsating, alternating ionic magnetic resonance field (AIMR). The present technology applies a spectrum of electromagnetic fields to control the growth of all mammalian cells and tissues while simultaneously enabling cellular dedifferentiation and lifespan extension through the control of ionic transport and particular ion frequency resonances.

The innovation "AIMR Multiple-Chambered, Apparatus for the Culture of Cells, Tissues and Organoid Bodies and Method of Use" is at technology readiness level (TRL) 3 (which means analytical and experimental critical function and/or characteristic proof of concept has been derived) and the related issued patent is now available for your company to license.

#### BENEFITS

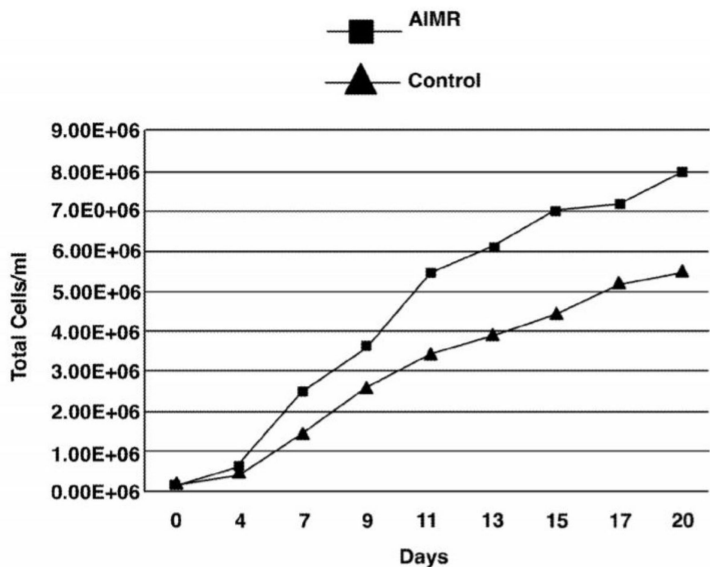
- Can reduce reliance upon in vitro testing
- Enhanced control of cell differentiation/dedifferentiation over prior art
- Pre-sterilized disposable device modules maintain homeostatic parameters
- Apparatus and method speeds optimized cell growth



## THE TECHNOLOGY

The apparatus comprises a randomized gravity vector multiphasic culture system with a self-feeding growth module, an optionally disposable nutrient module, and a removable AIMR chamber that delivers a pulsating multivariant field to the contents of the culture system. It produces overlapping or fluctuating alternating ionic magnetic resonance frequencies at one or more modal intervals ranging from about 7.8 Hz to about 59.9 Hz to the cell chamber. The apparatus may yield better regulation that can be manipulated to allow for increased rate of cell growth, faster differentiation, increased cell fidelity, and the induction or suppression of selective physiological genes involved in directing cellular differentiation and dedifferentiation.

The use of an AIMR field may provide a significant improvement over existing bioreactors, including pulsating electromagnetic field (PEMF) and time-variance electromagnetic field (TVEMF) cellular growth induced systems, in that AIMR incorporates the modulation of cellular transcription. The AIMR system utilizes pre-sterilized disposable modules and a removable alternating ionic magnetic resonance chamber, reducing the hazard for contamination, allowing scientists to implement physiological and homeostatic parameters similar to a naturally occurring physiological system.



Shown is a cell growth and tissue assembly curve for human bronchial tracheal cells (HBTC) with and without exposure to AIMR over a twenty-day growth period.

## APPLICATIONS

The technology has several potential applications:

- Medical: Vaccination studies for diseases; tissue replacement
- Cosmetics: Product development and testing
- Textiles: Testing physiological tolerance to substance

## PUBLICATIONS

Patent No: 9914920

[technology.nasa.gov](https://technology.nasa.gov)

More Information

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MSC-25545-1, MSC-TOPS-100