

# In Vivo just moved closer

## CLINOSTAR™

CONNECTING YOUR RESEARCH TO REALITY

You can control the temperature, CO<sub>2</sub>, O<sub>2</sub> (optional), and individual rotational speed of the 6 clinostat axles.

You can monitor your constructions in each reactor through six live feed cameras

Integrated automatically adjusted fan ensures a uniform environment within the chamber.

## CELVIVO CLOUD

CONNECT YOUR CLINOSTAR TO THE CLOUD

Access your ClinoStar through multiple devices from anywhere.

Keep an eye on your cultures and adjust individual rotational speeds as they progress.

Keep a register of changes and updates through the event-log.

## CLINOREACTOR™

CONNECT YOUR RESEARCH TO IN VIVO

Up to 29 million cells in one reactor.

Multiple access ports allow easy access to constructs and media exchange.

The inbuilt humidification system minimises the risk of infections and secures constant media volume.

See through design allows direct macro and micro observation.



Find out more about our products, the science behind them and the applications at [www.celvivo.com](http://www.celvivo.com)

# The Clinostat Principle

**The majority of human cells never encounter shear stress.**

## Why should your constructs?

Shear stress is a mechanical force exerted by fluid flow on cells. When cells encounter excessive shear stress, they undergo mechanotransduction, triggering changes in gene expression and protein synthesis.

Excessive shear stress has been found to induce changes in expression of specific membrane proteins, such as adhesion molecules (e.g., selectins, integrins) and mechanosensors (e.g., ion channels). This can disrupt cellular functions and lead to adverse effects on cell health.

“Critical/lethal shear stress for different mammalian cell types are in the range of 0.3–1.7 Pascal (Pa)”.<sup>1</sup>

“Mimetic tissue culture in a clinostat bioreactor provides very low shear forces (at 20 rpm, ca. 0.01 Pa on the suspended spheroids. Higher shear forces (and cellular effects) are seen for stirred suspension bioreactors (100–200 rpm, 0.3–0.66 Pa) and for orbital shakers (20–60 rpm, 0.6–1.6 Pa)”.<sup>2</sup>

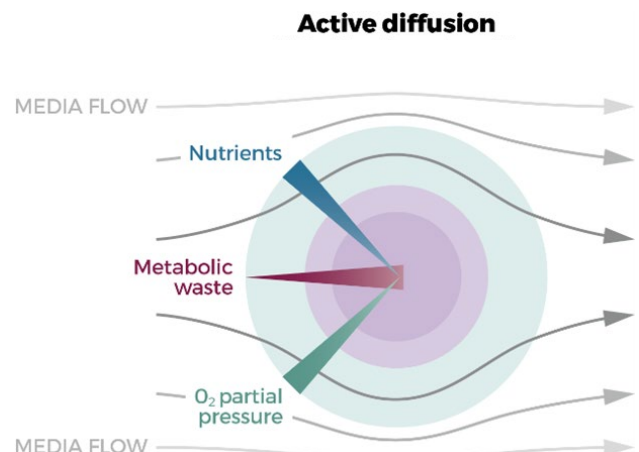
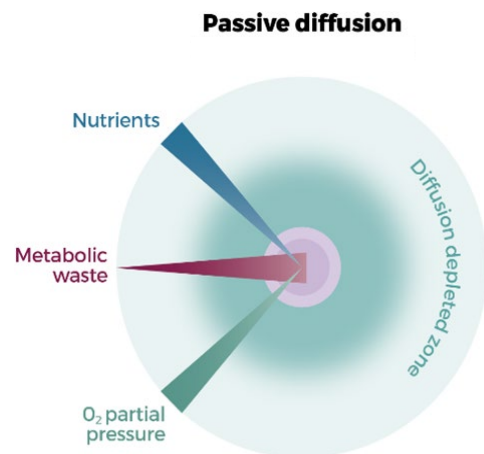
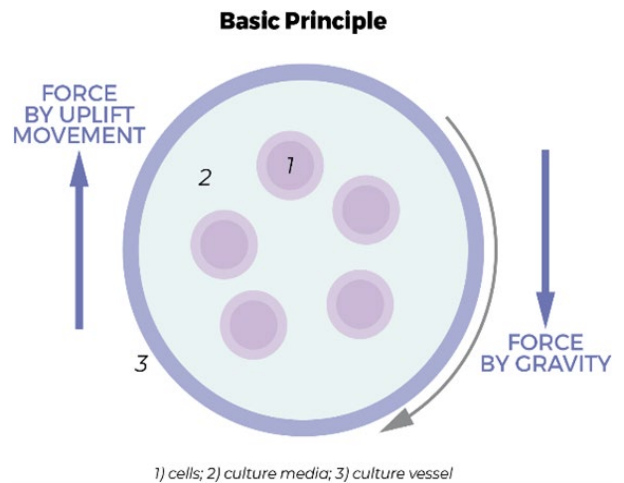
## The technology behind the ClinoStar

The ClinoStar is a clinostat bioreactor, providing low shear forces within physiological levels. The system promotes long term intercellular contact and communication allowing formation of organized and functional tissue constructs.

## Passive diffusion vs. Active diffusion

When the media surrounding cells remains still (static conditions), cellular metabolism creates a depleted zone due to the consumption of nutrients and oxygen and production of metabolites.

The rotation of the ClinoReactor generates a mild media flow (active conditions) that diminishes this depletion zone, leading to a notable enhancement in the lifespan, organization level and size of the constructs



1: Croughan M. S., Wang D. I. Biotechnology 1991;17:213-49.  
doi:10.1016/b978-0-409-90123-8.50015-x

2: Wrzesinski K. and Fey S.J.; Bioengineering 2018 Mar 7;5(1):22.  
doi:10.3390/bioengineering5010022.