In Vivo just moved closer

CLINOSTAR ™

CONNECTING YOUR RESEARCH TO REALITY

You can control the temperature, CO2, O_2 (optional), and individual rotational speed of the 6 clinostat axles.

6 live feed cameras allow you to monitor your constructs in each reactor.

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

Integrated variable speed 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**

CELVIVO STRESS-FREE 3D™

The Clinostat Principle

The majority of human cells never encounter shear force.

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 cellular and membrane protein expression alterations that may disrupt cellular functions and lead to adverse effects on cell health. Under excessive non physiological shear stress conditions, cells will alter the expression of specific membrane proteins like adhesion molecules (e.g., selectins, integrins) and mechanosensors (e.g., ion channels).

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.

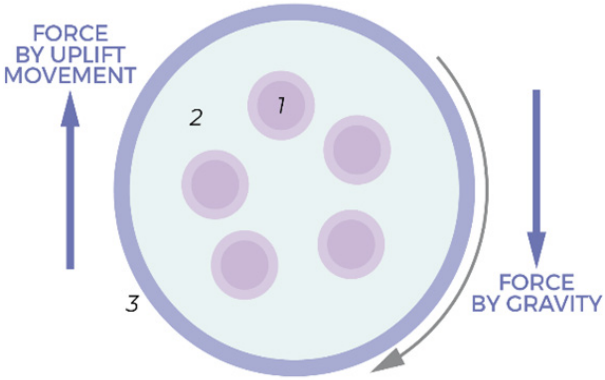
"Critical/lethal shear stresses for different mammalian cell types are in the range of 0.3–1.7 Pascal
(Pa)". [1]
"*Mimetic tissue culture in a clinostat bioreactor provides very low shear forces (at 20 rpm, ca. 0.01 Pa on the suspended spheroids. Higher shear forces (and cellular effects) are seen for stirred suspension bioreactors (100–200 rpm, 0.3–0.66 Pa) and for orbital shakers (20–60 rpm, 0.6–1.6 Pa)*".[2]

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

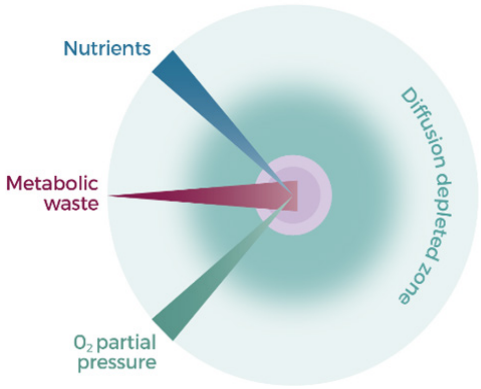
Basic Principle



1) cells; 2) culture media; 3) culture vessel

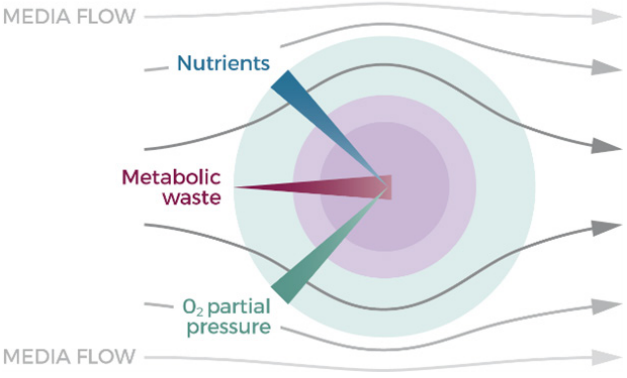
Rotational force counter balance gravity.

Passive diffusion



Limit spheroid to 175µM radius to avoid anoxic core

Active diffusion



Limit spheroid to 450µM radius to avoid anoxic core

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

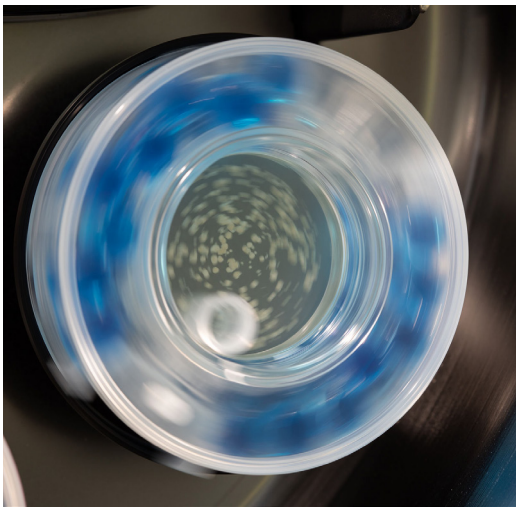
2.: Wrzesinski K. and Fey S.J.; Bioengineering 2018 Mar 7;5(1):22.
doi: 10.3390/bioengineering5010022.

ClinoStar Hypoxia Unit

Using hypoxia for 3D Cell Culture Research

Accurately establishing and monitoring oxygen levels during the culture period is crucial to mimic in vivo physiological conditions of tissues or organs. In the majority of traditional cell culture experiments, a standard cell culture incubator atmosphere of 5% CO2 in air is used, resulting in approximately 19% oxygen and creating non-physiological conditions.

Oxygen concentrations in the human body vary, ranging from around 12% in the lungs to 5% in the brain, and as low as 0.1% in tumor tissues. The ClinoStar hypoxia unit enables the manipulation of in vitro atmospheric composition to tailor it to the specific physiological needs of tissues or organs.



Advantages of using hypoxia in the ClinoStar

- ◊ Ability to regulate level of oxygen from atmospheric to 2%
- ◊ Rapid attainment of the media's oxygen level set point is achieved through active gas exchange between the ClinoStar and the ClinoReactor humidification chamber.
- ◊ The ClinoReactor semi-closed environment temporarily preserves hypoxic conditions for operations within a normal (21%) atmospheric oxygen environment. This simplifies short-term handling procedures, such as microscopy observation and documentation.

Learn more about hypoxia at
CelVivo.com/products/clinostar

CELVIVO
STRESS-FREE 3D™

Working with the hypoxia module in the ClinoStar

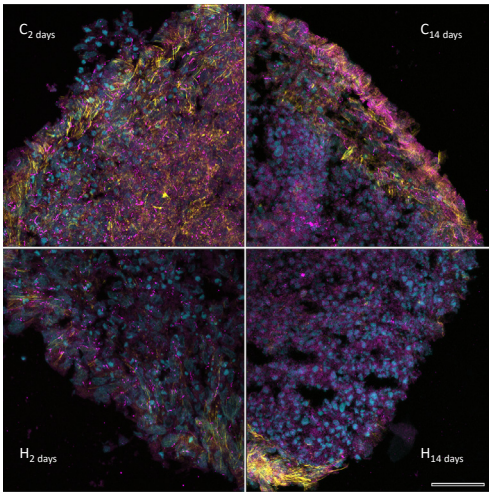
Anne Agger
Doctoral Fellow,
Centre of Functional Tissue Reconstruction, University of Oslo

When the ClinoStar met FUTURE

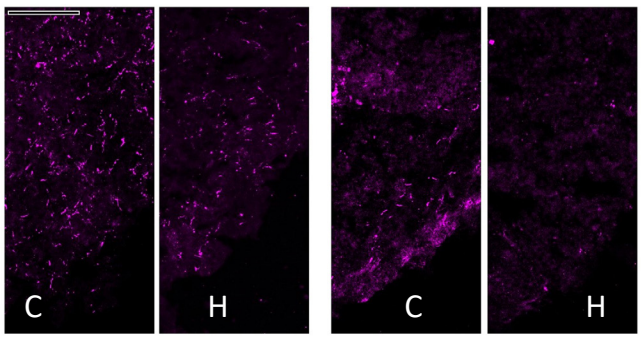
At the Centre of Functional Tissue Reconstruction (FUTURE) at the University of Oslo, Professor Reseland and Dr Samara have employed the ClinoStar platform and have been working towards several lineages of innovative models to study hypoxia.

Anne Aggar, shares here in this preliminary presentation of our findings, the structural changes in fibroblast spheroids cultivated for 14 days under both normoxic and hypoxic conditions. Through immunofluorescent labeling, the magenta-acetylated tubulin staining enables the visualization of reduced primary cilia, suggesting downstream molecular effects of targeted hypoxia.

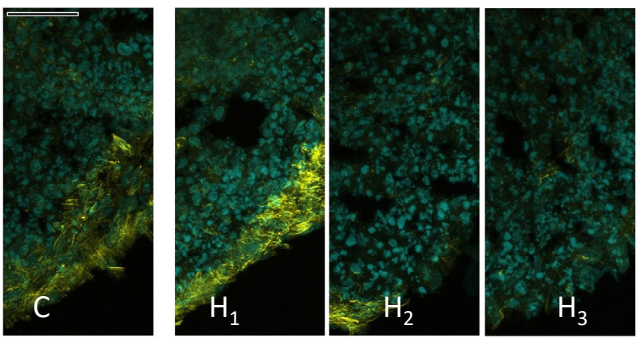
Meanwhile, actin in yellow vividly illustrates the heterogeneous morphological transformation of the rim of the spheroid. Notably, hypoxia exerts significant effects on various cytokine profiles, underscoring its substantial impact on cellular responses and signaling pathways. This impact is particularly pronounced in the secretion of cytokines like VEGFa, MCP1, IL6, IL8, and more, as demonstrated in the graph where we monitored cytokine secretion over time.
These findings underscore the importance of valid in vitro models that can shed light on the intricate cellular responses to hypoxia.



C: Control; H: Hypoxia. All scale bars = 50 µm



2 DAYS 14 DAYS



14 DAYS

future
center for functional tissue reconstruction