

XVIVO INCUBATION SYSTEM *model X3*

FIRST CELL INCUBATION SYSTEM
ACTUALLY DESIGNED FOR CELLS INSTEAD
OF PEOPLE ...*CYTOCENTRIC BY DESIGN*

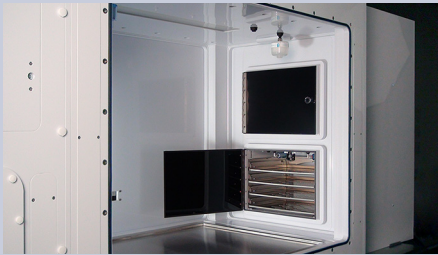
Cells need more than conventional incubators provide. This cutting edge incubation technology is the first that can satisfy those needs. More than a typical incubator, it is a comprehensive system of modular interconnecting incubation chambers, sub-chambers, and co-chambers with advanced controls. Modules can be fitted together like building blocks, and configured for virtually any application, large or small. If needs change, you can easily modify and upgrade your incubator by adding or removing modules or controls. Your incubator will never again constrain your research. Your investment will never become obsolete. Now do experiments not possible in conventional equipment. Your cells will benefit...



Xvivo incubators can be configured with one large, two medium, or three small incubation chambers. Each chamber can have different conditions to optimize different protocols.



Same incubator can perform multiple functions, or accommodate different culture vessels with different purposes. For example, one chamber can optimize conditions for a single large multilayer Corning Hyperstack vessel with high O₂ and low CO₂ for expansions, while simultaneously optimizing conditions for a dozen flasks with low O₂ and high CO₂ to simulate a pathophysiologic hypoxia experiment in another chamber. Opening one chamber does not disturb the other.



One dual chamber incubator (outer door removed) bolted to end of a processing chamber before glove front of processing chamber is mounted. Incubators can bolt to back or end of processing chambers.



Two single chamber incubators bolted to the rear of a processing chamber. Technicians are sealed outside and can't contaminate the inside, where the cells are.

... If Your Cells Need Their Own Protocol



Unlike conventional incubators with one chamber and one protocol, the X3 has the option of multiple independent chambers per incubator. Each can have different conditions simultaneously. That means different culture protocols can run in one incubator at the same time. The **Xvivo Incubation System** can culture up to 15 different protocols in one integrated system! Don't be fooled by conventional incubators with multiple doors on the same chamber. It is still one protocol.

... If Your Cells Need Full Time Protection and Optimization

Unlike conventional incubators that open only into the room, exposing cells inside to suboptimal conditions and contamination risk, **Xvivo** incubators can open into the room or be configured to open only into aseptic gloved processing chambers with the same CO₂, O₂, and temperature as the incubator. Optimum conditions are never disturbed, even during handling. People and contaminants in room air are kept safely outside.

- Contamination problems are significantly reduced.
- Experimental variability is significantly reduced.
- Cell proliferation may significantly improve.
- Differentiation and phenotypic integrity may significantly improve.



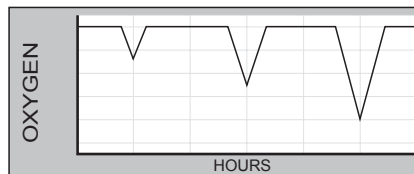
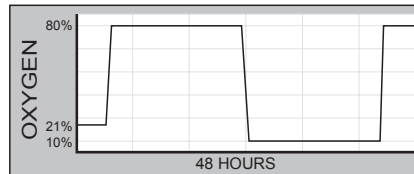
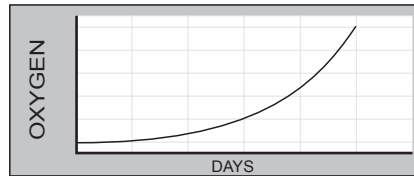
Xvivo is the first incubator that can expand into a processing chamber. Just remove the outer door of the free standing version, and replace with a gloved processing chamber. Now incubator opens only into an aseptic atmosphere, the same atmosphere as inside the incubator!



Regardless of how many independent incubation chambers are integrated into the same processing chamber, all with different conditions, that processing chamber can replicate the unique conditions of that incubator before it is opened. Optimum conditions are never interrupted, regardless of how numerous and varied they might be.

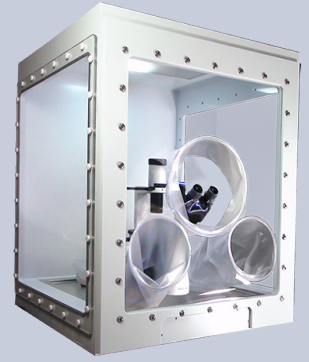
Cells Need Dynamics

Unlike conventional incubators with just static conditions, **Xvivo** incubators also offer new *dynamic* control of cell parameters. After all, cells are dynamic. They grow over time. Their metabolic rate changes over time. There is only one way to keep up with these changes. Plus dynamics give you unprecedented capability to create and model many pathophysiologic conditions, such as ischemia, reperfusion, acidosis, etc.



Cells Need Accountability

Every cell parameter is not only controlled but can be data-logged and visualized over time on comprehensive trend plots. Always know what happened over night, or over the weekend. One interface can operate over a dozen incubators and processing chambers.



Any 3rd party cell equipment can be integrated inside, including microscopes (shown above), centrifuges, cell sorters, refrigerators, etc.



Even conventional CO₂ incubators can be integrated inside **X3** processing chambers, effectively converting people-centric CO₂ incubator (Thermo model 3351 shown above) into a cytotocentric system with full time optimization of O₂/CO₂ during all incubation and handling and full time protection in an aseptic environment.



X3 processing chambers with temperature, O₂, and CO₂ control can serve as the incubator for certain applications that do not require high RH control.



Many **X3** processing chambers can be used to configure large systems. Fit the entire lab inside!



For economy most **X3** processing chambers have translucent light panels to let in ambient light, or permit you to shine in specialty lights.



Cells can be safely moved in and out of **Xvivo System** inside transport chambers and subchambers without exposure to room contaminants or disturbances to O₂ and CO₂.



For extreme economy and flexibility, **X3** processing chambers and buffer chambers can be controlled with modular independent controls such as ProOx and ProCO₂.



Entire cell culture and processing lab can fit on suitable bench/table tops.

Cells Need Physiologic Simulation

Compared to conventional CO₂ incubators with oxygen fixed at 20%, the **Xvivo System** has full range oxygen control (0.1 - 99.9%) in every incubation chamber, and in every processing chamber. Simulating physiologic O₂ and simulating pathophysiologic hypoxia or hyperoxia is easy. And the newly recognized critical requirement for preventing oxygen fluctuations during handling is built in. No other system can compare when it comes to oxygen.

Cells Need to Protect Their Caretakers

Cells incubated and handled in a closed system reduce the risk of transmitting infectious disease to the technicians who work with cells. Absolute isolation is not offered in the **Xvivo Incubation System model X3** and no biological safety rating is claimed, but clearly the risk to humans is reduced over conventional open incubators and hoods.



Cells Need to Fit

Xvivo System is extremely modular and can be configured to fit most budgets, fit most available lab spaces, fit any research needs.



A couple **X3** processing chambers can immediately and economically convert the core of any existing cell culture lab to *cytocentric*.



Buffer chamber has two main functions. It acts as an airlock, isolating inside from outside ...



... and it is sufficiently sized to dock transport chambers and remote culture chambers.



Incubation chamber efficiently placed for maximum floor space.

Xvivo System special configuration

X3 HYPOXIA HOOD AND CULTURE COMBO

The **Hypoxia Incubator and Glovebox Configuration** of the Xvivo System model X3 is a simple but sophisticated hypoxia cell culture system. It is the most economical X3 configuration available with identical incubation and handling oxygen tensions. Modular, independent controls and components deliver all essential functions, yet offer unlimited upgrade options.

Unlike bacteria glove boxes cobbled up for cells, the X3 system was designed for cells. It is economically competitive with all bacteria hypoxia glove boxes, but offers much more capability including active particle clearing to ISO 5. Features comfortable, soft glove sleeves as opposed to hard, uncomfortable holes. Ample head room allows for easy pipetting and use of other equipment and accessories.

Docking for remote culture chambers and transport chambers allows you to transport cells from the closed hood to other areas without risk of contamination. Expand culture capacity infinitely. Use culture chambers to receive cells from every incubator in your lab.

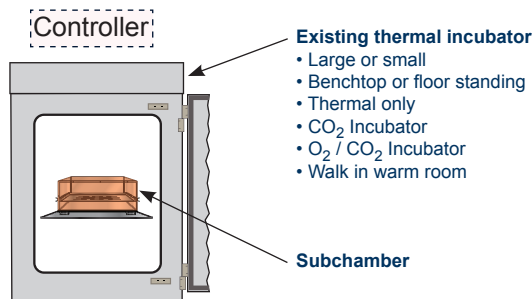
Upgrading Conventional Incubators With Cytocentric Features

Cells outside the body have needs that cannot be met by conventional incubators and hoods. Rethinking the relationship between incubator and hood led to the **Xvivo System** which essentially combines the two into one seamless system. Better for cells in every way, Cytocentric by design is likely to be the equipment of choice when the cells are valuable or the research is important.

However, it is also possible for any lab to meet any particular need of cells by simply upgrading conventional incubators. Our practical and powerful new line of Cytocentric upgrade accessories and retrofits for incubators, based upon the subchamber/superchamber concept, can make your existing incubators capable and efficient at meeting any or all the needs of cells. Here's how:

SUBCHAMBER CULTURE SYSTEMS

A subchamber is one chamber inside the other. Subchambers go inside your incubator. Subchambers are a way to add Cytocentric improvements to the **cell incubation** step. Subchambers and a variety of controllers bring many new enhancements to an incubator.



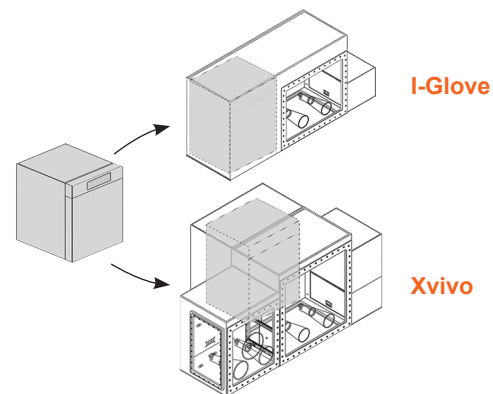
Subchambers can provide multiple protocols in the same incubator. They make it easy to simulate physiologic or pathophysiologic extremes. They prevent disturbances to cells when the host incubator door is opened. They are space efficient. They are gas efficient. They make it easy to transport cells in and out of the incubator without disturbing optimal and aseptic conditions.

Our incubator subchambers, called **C-Chambers**, are simple translucent plastic boxes with a hinged semi-sealed door. They sit on a shelf inside your incubator. Cells are cultured inside. With the proper controller you can meet many needs of cells, far beyond what incubators can normally do on their own.

SUPERCHAMBER CULTURE AND HANDLING SYSTEMS

A superchamber is a chamber that encloses another chamber. Superchambers can surround your incubator, and can enclose other chambers as well. Superchambers are a way to add Cytocentric improvements to the **cell manipulation and handling** steps. They bring many enhancements to an incubator.

Inserted into an **I-Glove** or **Xvivo System**, your incubator becomes immersed in and opens only into an aseptic environment that is also O₂/CO₂ optimized for cells. Cells can be handled under the same conditions as inside the incubator. Incubator gas consumption and incubator contaminations are eliminated. Think of superchambers as the Cytocentric alternative to conventional hoods.



SUBCHAMBERS + SUPERCHAMBERS WORK TOGETHER

Cells Cytocentrically incubated in remote subchamber culture systems can be transported to and from superchambers for Cytocentric handling and manipulation. Avoid suboptimal exposures in conventional hoods.

