Bioscience Solutions

Kirkstall | Lonza

The Quasi Vivo® System

Fluidics for Primary Cell Culture

Why Quasi Vivo®?

The Quasi Vivo® System is an advanced interconnected cell culture flow system, specifically designed to provide a solution to the major problems researchers encounter when using conventional *in vitro* cell culture model systems.

Improved Human Relevance

By introducing flow to the *in vitro* cell culture environment, Quasi Vivo® System significantly increases the physiological relevance of your research, enabling you to generate models with increased predictive value, greatly improving confidence in the validity of your results.

Significant Benefits Include:

- Improved cell viability
- Close control of multiple variables
- Flexible and easy to use
- Long term primary cell culture

Quasi Vivo® Systems

The Quasi Vivo® System has 3 different chambers available, each of these have been designed to meet the needs of specific applications.

Product	Feature	Uses
QV500	Single chamber made of silicone	Allows for simple submerged interconnected cell culture and co-culture
QV600	Chamber made of silicone with two flow paths	Compatible with commercially available membrane support inserts, giving users the ability to culture cells at the air liquid interface and create liquid/liquid barrier models
QV900	Six chambers on a standard multi-well plate footprint made with inert plastic	Similar to QV500, but allows higher throughput study designs. Lower non-specific binding means greater compatibility with studies involving chemical and drug treatments

QV500 Cell Culture Chamber

The QV500 Cell Culture Chamber is a highly flexible research tool, ideal for beginning fluid dynamic cell-culture. Produced from medical-grade silicone, the chamber provides a leak proof seal, allowing continuous flow of media across and through cell cultures.

QV500 Features

- Continuous flow of media
- Recirculation of media enables self-conditioning of cells
- Improved cell viability
- User configurability
- Standard well size
- More physiological relevance
- Easy media exchanges
- Sealed system design for sterile operation
- Autoclavable for repeated usage

QV500 Applications

- Adding flow to monolayer cultures
- Prolonging lifespan of primary cells
- Improving differentiation of stem cells
- Multi-cell type connected cell culture

Specifications

Product	Feature
Chamber width	15 mm internal
Chamber depth	10 mm from culture surface to top of chamber base
Materials	Chamber: PDMS Tubing: Tygon Luers and reservoir bottle: Polypropylene
Overall dimensions	23 mm height x 37 mm diameter
Diameter of tubing	Inlet: 1/16" ID Outlet: 3/32" ID
Volume of chamber	2 mL

QV500 Starter Kit

The QV500 Starter Kit supplies the individual parts needed to set up a Quasi Vivo® System. With the addition of a peristaltic pump, the kit enables you to convert your existing 24-well sized static cultures to flow. The kit contains three chambers, a reservoir bottle, ample tubing and connectors, holding trays and a comprehensive user guide.

QV500 Publications

The QV500 Chamber is currently being used by both academic and industrial laboratories worldwide. Here's a selection of the published papers that have used QV500 in their research.

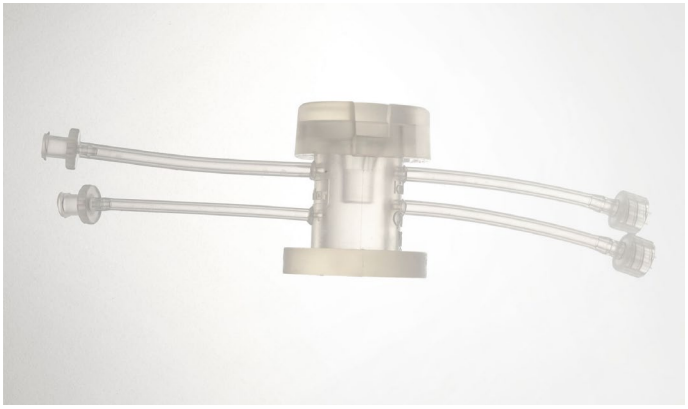
- **Symmetry-breaking in Branching Epithelia: Cells on Micro-patterns under Flow Challenge the Hypothesis of Positive Feedback by a Secreted Autocrine Inhibitor of Motility.** Martin K. *et al.*, 2017. Journal of Anatomy. 2017 March 230: pp.766–774.
- **Physiological Fluid Flow Moderates Fibroblast Responses to TGF-β1.** Nithiananthan, S. *et al.*, 2016. Journal of Cellular Biochemistry, 13(October), pp.1–13
- **Glucose and Fatty Acid Metabolism in a 3 Tissue *In Vitro* Model Challenged with Normo- and Hyperglycaemia.** Lori, E. *et al.*, 2012. PLoS ONE, 7(4), pp.1–9.
- **Design Criteria for Generating Physiologically Relevant *In Vitro* Models in Bioreactors.** Mattei, G., Giusti, S. & Ahluwalia, A., 2014 Processes, 2, pp.548–569.
- ***In Vitro* Generation of Functional Liver Organoid-like Structures Using Adult Human Cells.** Ramachandran, S.D. *et al.*, 2015. PLoS ONE, 10(10), pp.1–14.

QV600 Cell Culture Chamber

The QV600 Chamber* has been designed for air-liquid interface (ALI) surface cultures, such as skin, respiratory epithelium, or cornea.

The QV600 design allows the surface of commercial membrane support inserts to interface with liquid media providing cell cultures with a continuous perfusion of media on one side, and exposure to a controlled gaseous environment on the other.

The QV600 Chamber can also be fitted with an alternative insert to create a liquid-liquid interface (LLI) chamber enabling study of membranes and barrier models.



*Membrane insert not included

The QV600 Features:

- Continuous flow of medium across cell cultures
- Consistent ALI level within chambers – low risk of cells drying due to evaporation
- Configurable for LLI
- Compatible commercially available membrane inserts

QV600 Applications

Commercially available inserts can easily be fitted to the QV600 chambers, giving them great flexibility and a wide variety of applications:

Surface Cultures
- Cornea
- Skin
- Respiratory System

Barrier Models
- Gut model
- Blood-Brain Barrier
- Kidney

Specifications

Product	Feature
Chamber width	15 mm internal
Chamber depth	33 mm, minimum depth 12 mm
Materials	Chamber: PDMS Tubing: Tygon Luers and reservoir bottle: Polypropylene
Overall dimensions	23 mm height x 37 mm diameter
Diameter of tubing	Inlet: 1/16" ID Outlet: 3/32" ID
Volume of chamber	2 mL running as ALI, 2 x 2 mL with barrier insert

QV600 Starter Kit

The QV600 Starter Kit contains 3 ALI chambers, tubing, and a reservoir bottle to form a complete fluid flow circuit. With addition of a peristaltic pump and commercially available membrane inserts, flow-based ALI and LLI experiments are achievable. The kit also contains holding trays and a user guide for a complete system.

QV600 Publications

The QV600 Chamber is currently being used by both academic and industrial labs worldwide. Here's a selection of the published papers that have used QV600 in their research.

- **A Novel Dual-flow Bioreactor Simulates Increased Fluorescein Permeability in Epithelial Tissue Barriers**. Giusti, S. *et al.*, 2014. Biotechnology Journal, 9, pp.1175–1184.
- **Fast-track Development of an *In Vitro* 3D Lung/immune Cell Model to Study Aspergillus Infections** Chandokar. *et al.*, Scientific Reports 7, Article number: 11644 (2017)

QV900 Cell Culture Tray

The QV900 Optical Tray provides a compact, 6-well, disposable unit ideal for high-content experiments and industrial use.

Each QV900 Tray consists of 6 chambers, each with individual lids and connectors, in the same footprint as a standard well plate. This creates a compact unit which supports a range of configuration options. The tray is formed of high-quality optically-clear plastic, allowing for live cell imaging and microscopy of cultures *in situ*.

The QV900 Features:

- Continuous perfusion of media
- Optically clear chambers for live cell imaging
- Compact tray with standard footprint
- Modular chamber connections
- Gas-impermeable chambers
- Low non-specific binding

QV900 Applications

The QV900 6-chamber optical tray provides an ideal research environment for:

- Live Cell Imaging
- Repeat Dosage
- Long Term Exposure
- Hypoxic Conditions

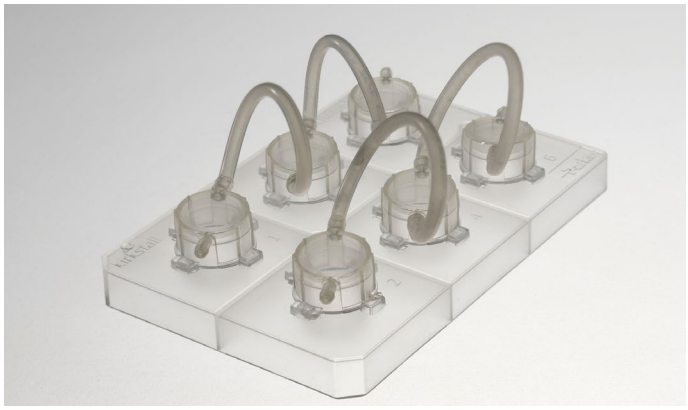
Specifications

Product	Feature
Chamber width	15 mm internal
Chamber depth	22 mm
Materials	Base: Altuglas SG7 – Acrylic Resin Lids: Melifex M8706 – Styrene TEP Tubing: Tygon/PTFE & FEP Luers and reservoir bottle: Polypropylene
Overall dimensions	23 mm height x 37 mm diameter
Diameter of tubing	Inlet: 1/16" ID Outlet: 3/32" ID
Volume of chamber	4 mL

QV900 Publications

The QV600 Chamber is currently being used by both academic and industrial labs worldwide.

- **Fluid Dynamic Modeling to Support the Development of Flow-Based Hepatocyte Culture Systems for Metabolism Studies** Pedersen, J.M. *et al.*, 2016. Frontiers in Bioengineering and Biotechnology, 4 (September), p.72



QV900 Starter Kit

The QV900 Starter Kit provides 3 QV900 trays, 2 reservoir bottles, luer fittings, tubing, and user guide. With addition of the Parker PF600 6-channel peristaltic pump and holding trays, the starter kit enables users to set up multiple QV900 trays in parallel or series for higher throughput fluidic capabilities.

Pumps and Accessories

Peristaltic pumps designed for use with Quasi Vivo® Systems are available.

Parker PF22X0103

Designed specially to work with Quasi Vivo® Systems. The PF22X0103 pump has two independent channels, each with Vernier dials. Both pump heads provide fine control of the flow rate at low ranges, which is ideal for use with Quasi Vivo® System. The pump functions safely within a CO_2 incubator, and the compact, lightweight design makes it easy to handle and easy to set up alongside the Quasi Vivo® System.

Parker PF22X0103

Parker PF600

Designed especially to work with Quasi Vivo® QV900 Trays and provide users with flexibility and ease of use. The PF600 pump comes with attachable trays for holding QV900 trays and reservoir bottles at optimum heights. The entire unit is handled together for ease of transfer in and out of CO_2 incubators.

Parker PF600

Benefits:

- Simple to set up and operate
- Reduced possibility of contamination
- Easy to calibrate
- Compatible with humidified environments
- No valves

Accessories

Quasi Vivo® Accessories include a range of components to expand and develop the system. We supply several packs of components which can be used to modify the Quasi Vivo® System to create more complex systemic models to better replicate the *in vivo* environment.

- Tubing and luer locks
- Multiple sizes of reservoir bottles

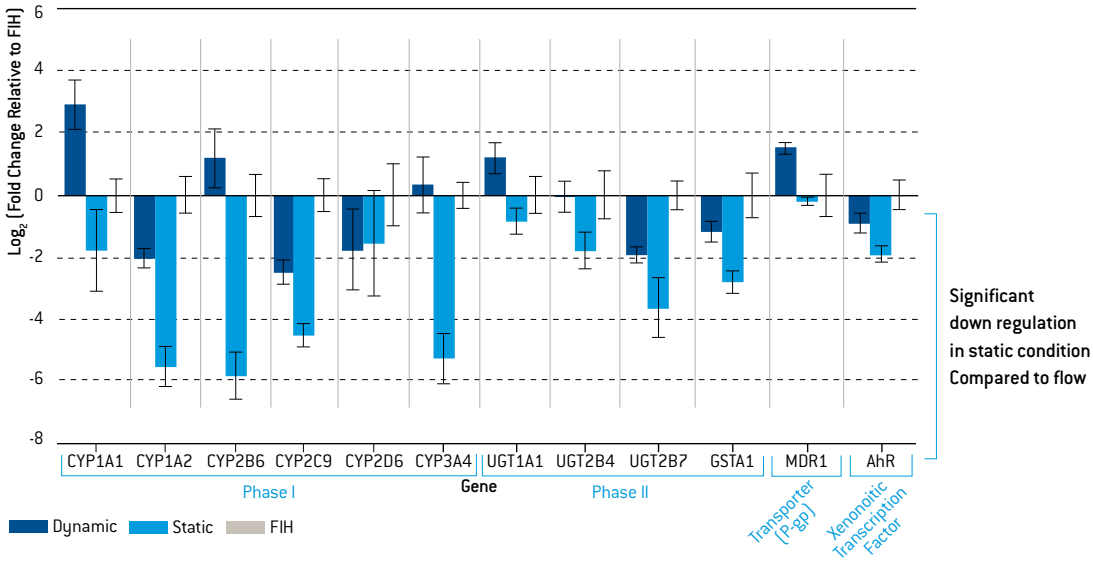
Applications

The Quasi Vivo® System is currently in use in many academic and industry settings. Some examples of cell types used include:

- Hepatocytes
- Endothelial
- Cardiovascular
- Lung
- Airway
- Kidney
- Intestine
- Neural

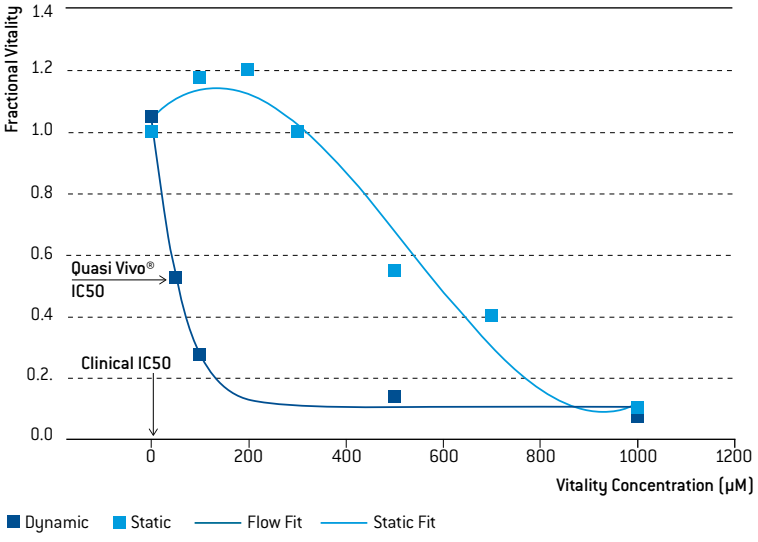
An example of improvement of hepatocyte phenotype and function is provided here.

Gene Expression in Human Primary Hepatocytes Cultured Under Flow or Static Conditions



Changes in gene expression in human primary hepatocytes cultured under flow or static, compared to freshly isolated hepatocytes FIH. Improvements in gene expression over static conditions are seen in Phase I and Phase II detoxification genes, as well as a transporter and xenobiotic transcription factor. Data taken from Vinci, B. *et al*., 2011 Biotechnology Journal, 6, pp.554–564.

Quasi Vivo® Diclofenac IC50 Assay



Dose response curve for rat primary hepatocytes exposed to diclofenac under flow and static conditions. Flow enhances the response or sensitivity of the cells, and brings the culture environment closer to *in vivo* and correctly identifies diclofenac as a risk drug.

Kirkstall's Quasi Vivo® System provides a complete solution for the improvement of predictive value of cell culture experiments.

Along with our flow systems and pumps, onsight training is also available to help you through your experiments, from planning to execution. The Quasi Vivo® System is compatible with many existing 3D cell culture protocols, and can be integrated into your laboratory with ease.

This advanced *in vitro* technique is physiologically relevant, making your data more applicable to the human situation.

Ordering Information

Product Type	Product Name	Cat. No.
Starter Kits	Quasi Vivo® QV500 Culture-well Starter Kit	QVCWSK
	Quasi Vivo® QV600 Trans-well Starter Kit	QVTWSK
	Quasi Vivo® QV900 6-well Starter Kit	QV6WSK
Replacement Culture Chambers	Quasi Vivo® QV500 CW Chambers, 5 per pack	QVCW5X
	Quasi Vivo® QV600 TW Chambers, 5 per pack	QVTW5X
	Quasi Vivo® QV900 6-well Trays, 12 per pack	QVT12X
Replacement and Alternative Reservoir Bottles	Quasi Vivo® Reservoir Bottle, 8 mL	QVRB08
	Quasi Vivo® Reservoir Bottle, 125 mL	QVRB125
	Quasi Vivo® Reservoir Bottle, 250 mL	QVRB250
	Quasi Vivo® Reservoir Bottle, 30 mL	QVRESB
Replacement and Alternative Tubing	Quasi Vivo® Tubing for QV900 6-well Trays	QV6WTU
	Quasi Vivo® Teflon Loops, 4 per pack	QVTSL1
	Quasi Vivo® Teflon Tubing, 6 x 1 m lengths	QVTST6
	Tubing for PF22x Pump with clips, 4 per pack	QVTSPF4
	PF600 Pump Replacement Tubing Set, 6 per pack	QVTS-P6-6
	Replacement Tubing Set for PF 22X	QVTSM12
Accessory Kit	Quasi Vivo® Accessory Kit	QVAP100
Peristaltic Pumps	Quasi Vivo® Peristaltic pump 6-channel	QVPP6C-S
	Quasi Vivo® Peristaltic pump 2-channel	QVPP2C-S

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