



TECH TO BUSINESS

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EQUIWELL – A disposable culture dish for pulsatile fluid flow

TECH ID #: 836.3

Background

Many cells types are known to be sensitive to their immediate fluid flow environment. Fluid flow induces shear stress which modulates a variety of cellular processes: cell growth, differentiation, gene expression and migration. Researchers often culture or test cells under deliberate fluid flow conditions. For example in biofilm studies, hydrodynamic forces influence protein production and antibiotic response. Many endothelial cell studies also show that hemodynamic forces affect atherosclerotic plaque formation.

Existing techniques for studying cell populations under fluid flow conditions comprise pump, tubing and flow chamber configurations which are expensive, difficult to set-up and replicate. They also include dish and orbital shaker configurations, which although fast and cheap have complex and non-uniform hydrodynamics.

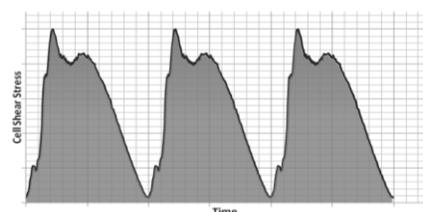
Researchers at the University of Calgary have developed a disposable culture dish which can grow cells under fluid flow conditions and which can be tuned to mimic physiologically relevant fluid flows. The EQUIWELL has a unique internal geometry which creates a uniform and well-characterized fluid flow environment when loaded on an orbital or gyratory shaker. Shaker parameters can be adjusted to give steady flow or physiologically relevant pulsatile flow, including flows which mimic arterial blood flow (see Figure).

Areas of Application

Biofilm fluid flow studies and Cell culture fluid flow studies including: Endothelial, Bone and Stem Cells

Competitive Advantages

- The EQUIWELL dishes are cheap and disposable
- Setup is fast, easy and reproducible
- Cell-to-cell variability within a dish is minimal giving greater population homogeneity
- Identical replicates can be done on the same shaker
- Efficient use of media with no unused volume
- Easy access for microscopy or other cell analysis
- EQUIWELL and the shaker can fit in an incubator for temperature control



Shear stress in EQUIWELL tuned to mimic arterial blood flow

Stage of Development

The EQUIWELL internal geometry has been optimized. Fluid flow at all points within the dish has been characterized using CFD. A prototype has been developed.

Intellectual Property Status

- PCT application filed

TECHNOLOGY



Publications

[Annals of Biomedical Engineering. 2012; Volume 40 \(3\): 707-728](#) Salek MM, Sattari P, Martinuzzi RJ

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