

# MICROFLUIDIC PERFUSION ARRAY FOR 3D CULTURE

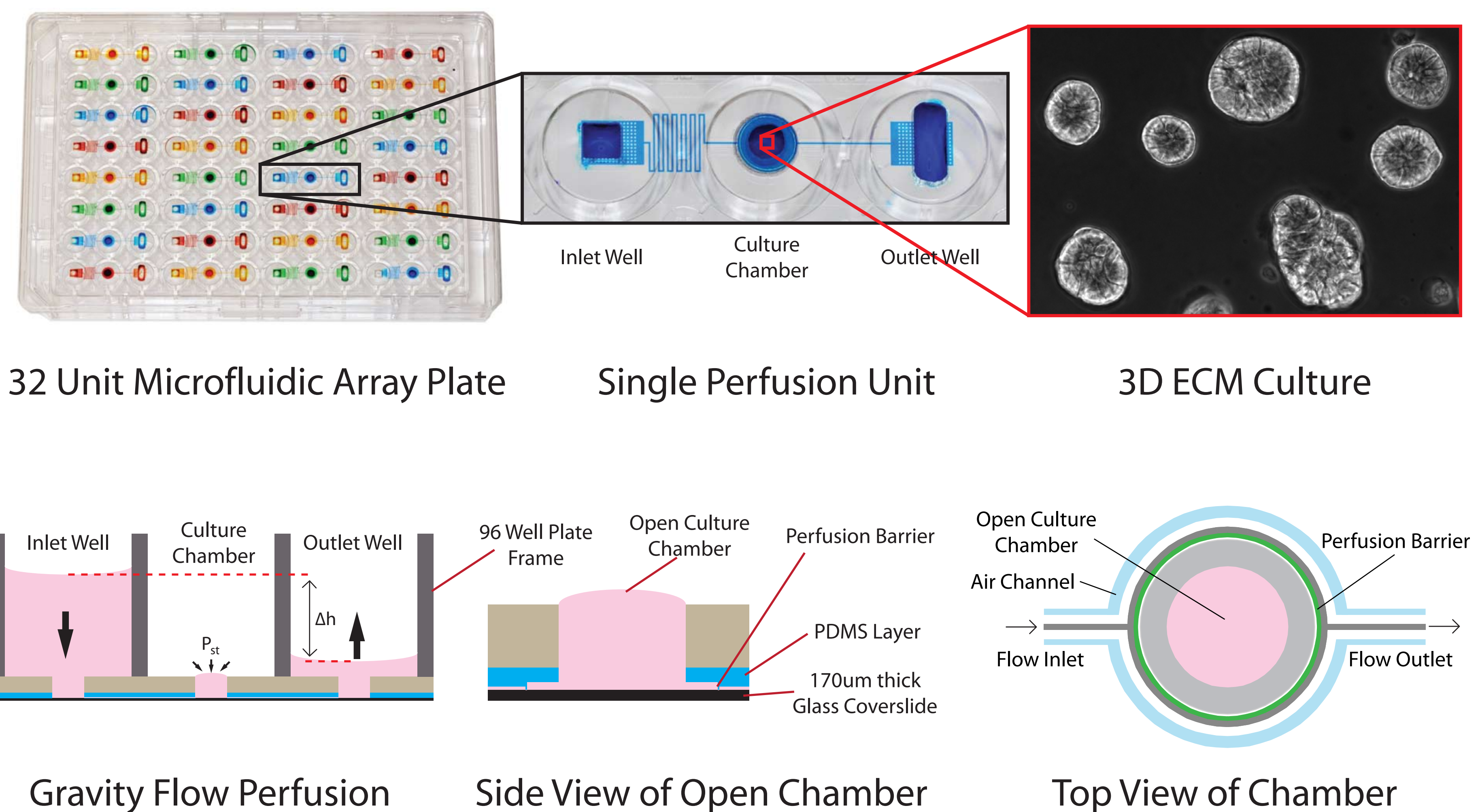
CellASIC Corp., Hayward, CA, USA

## Microfluidic Array Plate

We developed a microfluidic array plate for long-term 3D ECM culture. The plate contains 32 parallel flow units in a standard 96 well layout. The open top chambers allow direct loading of cell/gel solutions with a pipette. A gravity driven perfusion method enables continuous flow without any external pumps.

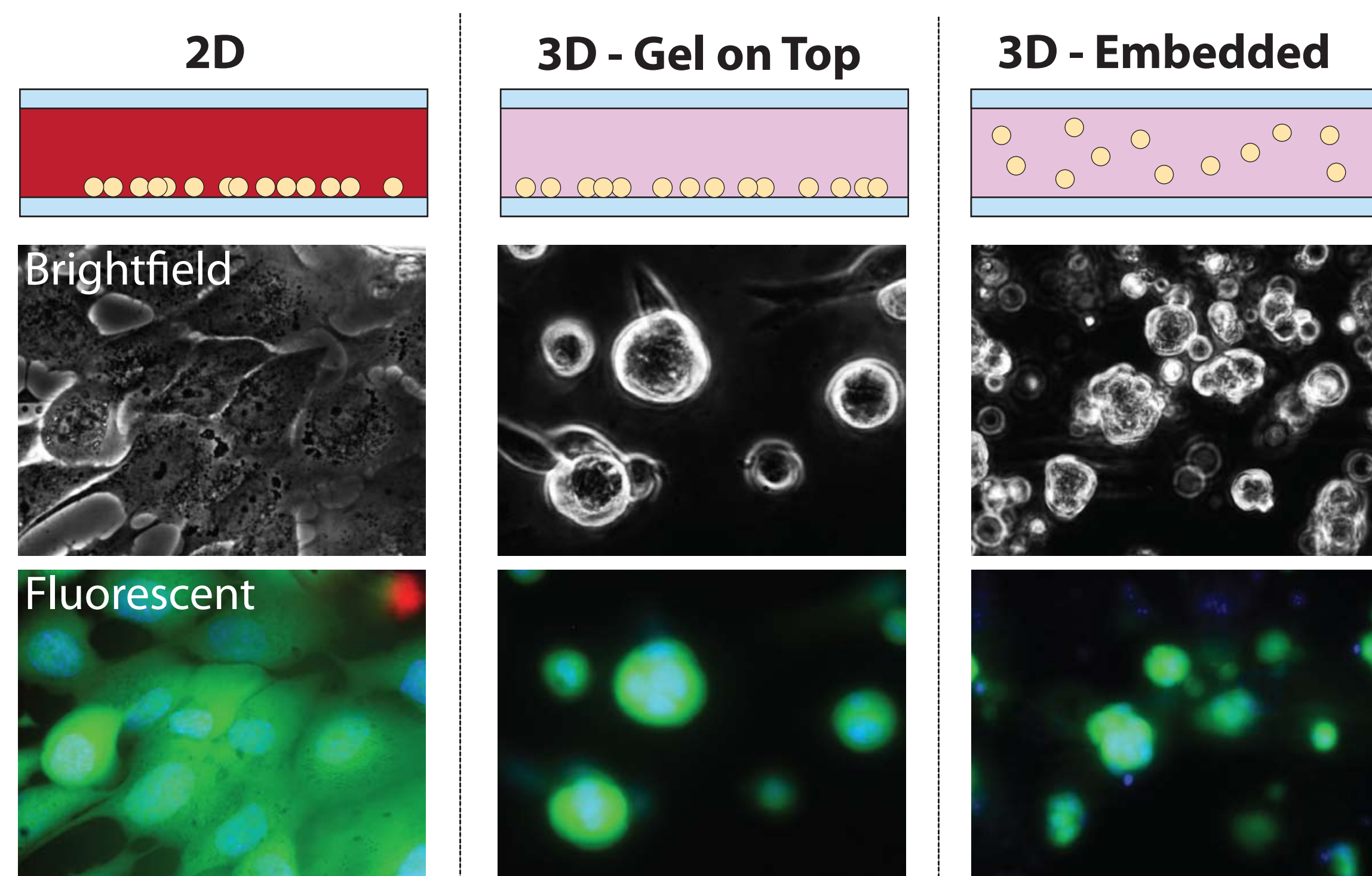
### Key Features

- 3D ECM culture with continuous medium perfusion
- Clear optics with #1.5 thickness (170  $\mu\text{m}$ ) glass coverslide bottom
- Open top culture chamber access for cell/gel loading and recovery



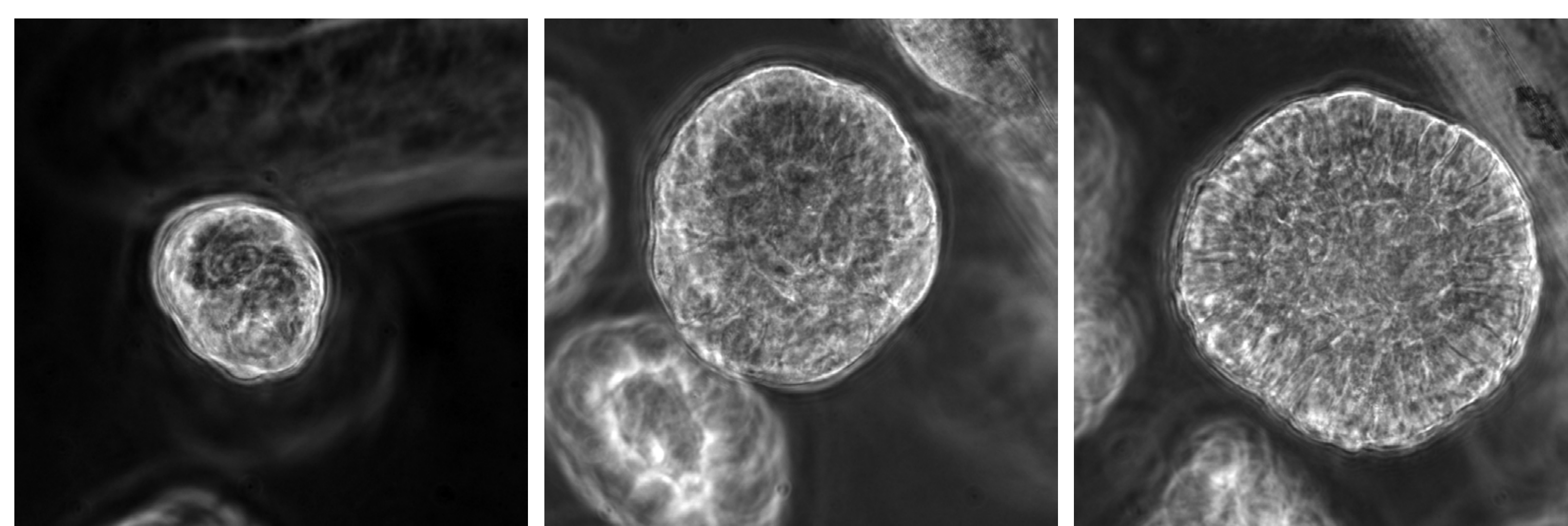
## 3D Perfusion Culture

### Cell Culture Configurations



The open top chamber allows flexibility of cell loading configurations: allowing 2D, 3D gel on top (overlay), and 3D embedded. In all cases, continuous perfusion of medium feeds the cells for long term culture.

### Perfusion Culture of MCF-10A Mammary Cells in Matrigel



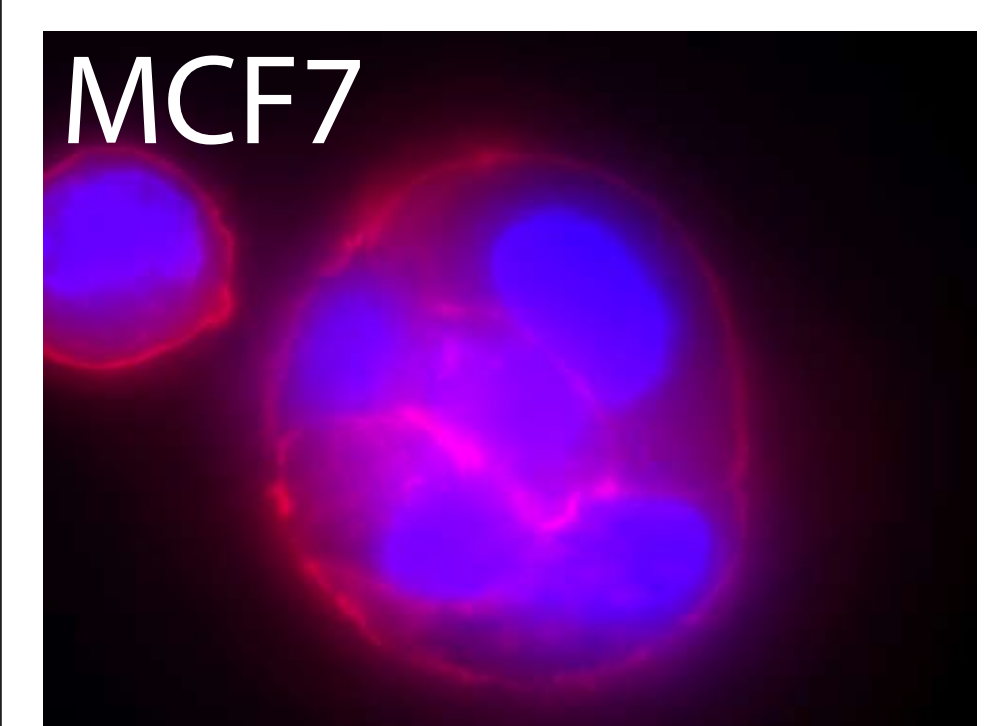
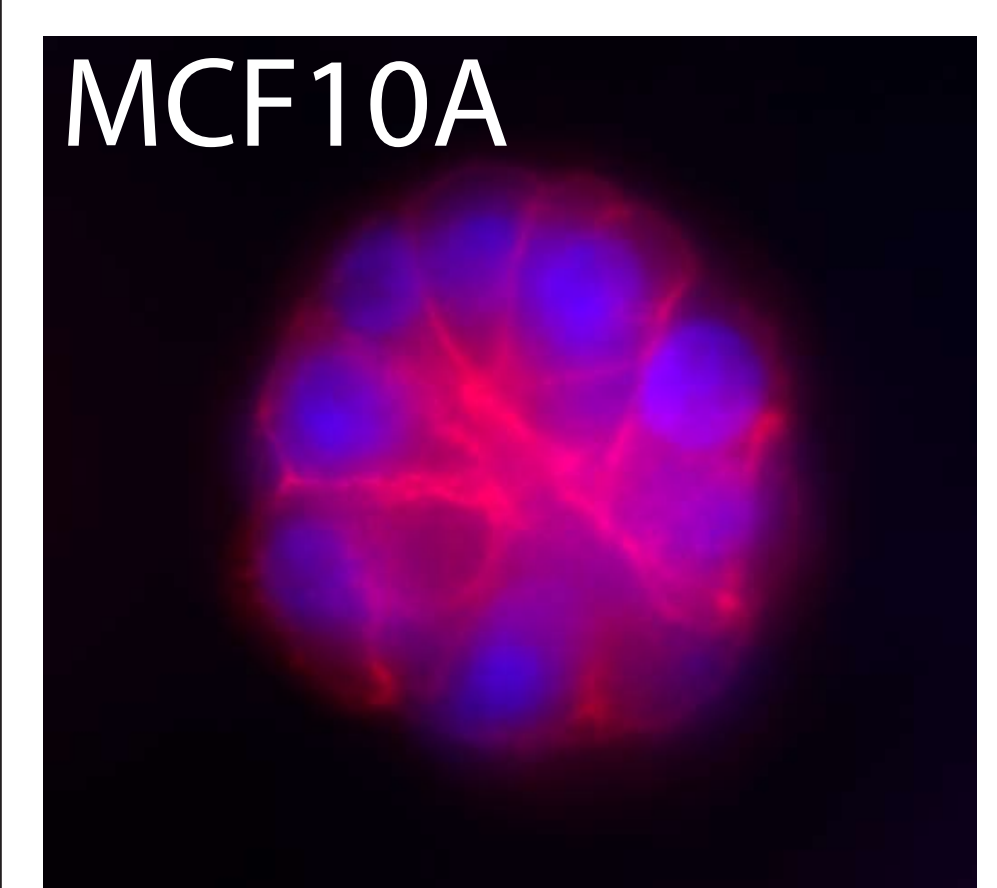
Day 3

Day 6

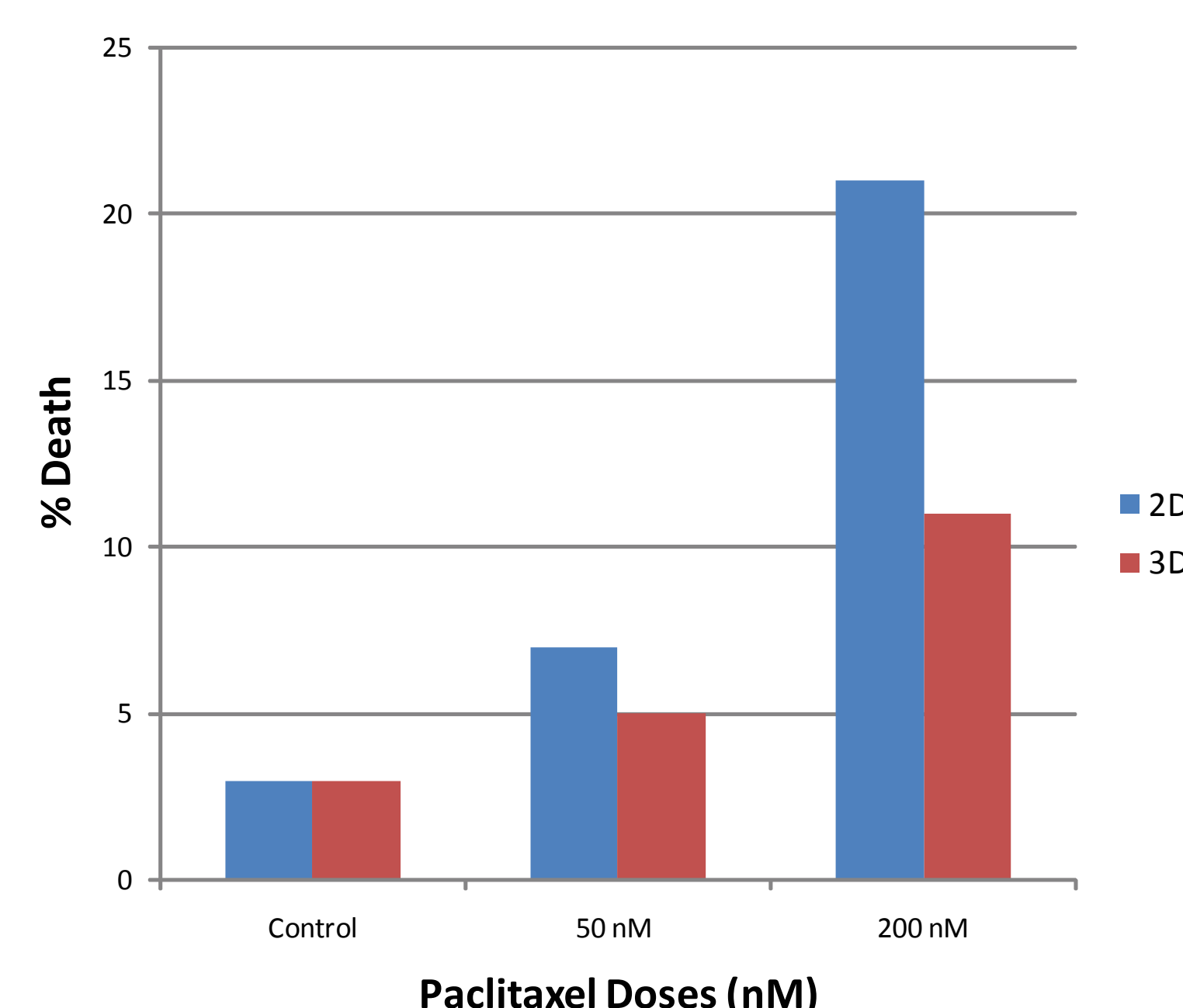
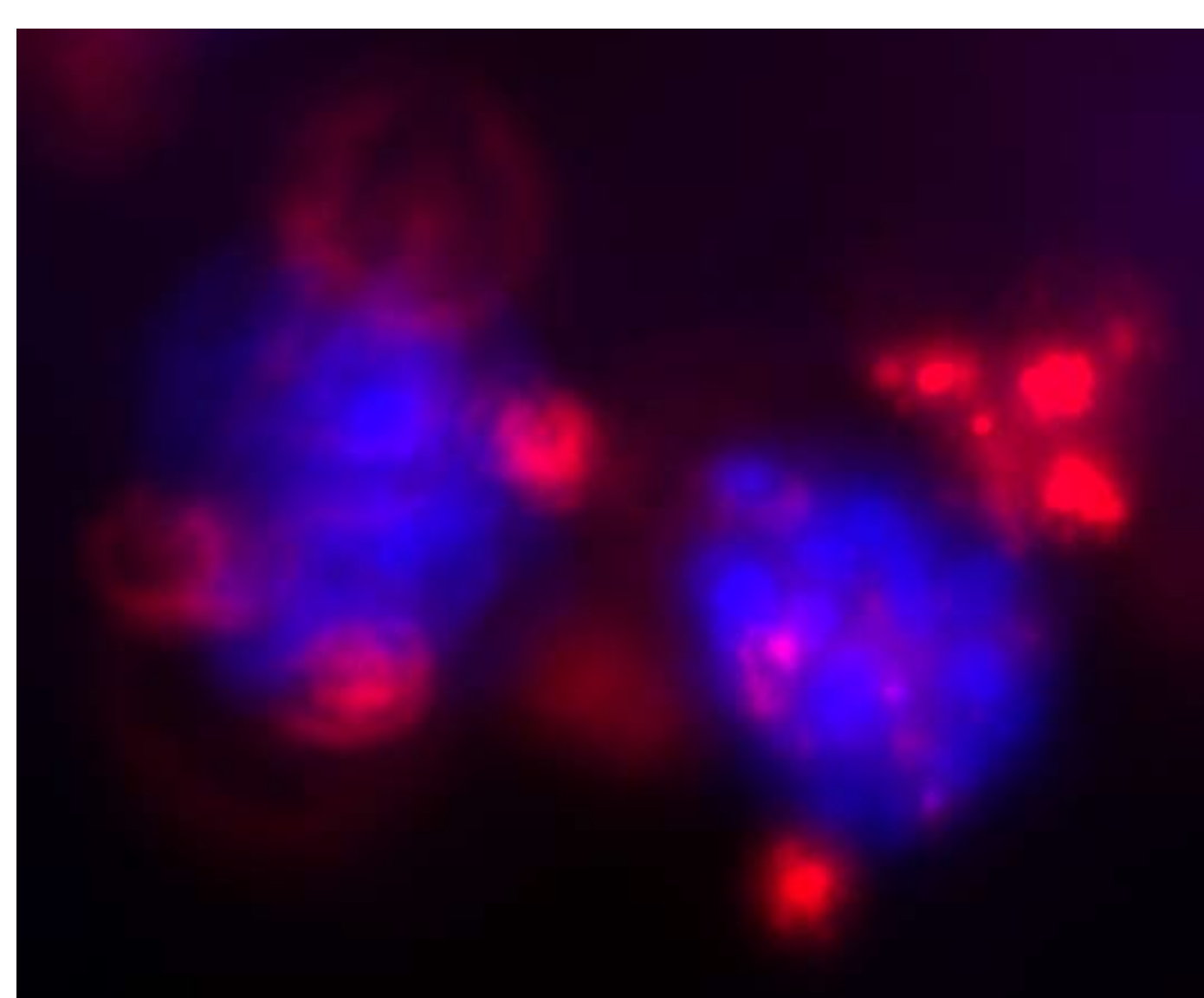
Day 9

(Above) MCF-10A human breast epithelial cells were cultured in laminin rich extracellular matrix (BD Matrigel) in the microfluidic array. Cells adopt an acinar morphology consistent with previous studies. Continuous perfusion of medium through the gel prevents nutrient starvation. (Right) Cells cultured in Matrigel and stained with nuclear (blue) and actin (red) dyes. Note the different morphologies between the MCF-10A and MCF7 cell lines.

### 3D Morphology



## Drug Exposure Screening



### Example 3D Culture Applications

- Anti-cancer drug screening
- Angiogenesis assay
- Cell invasion and migration
- Live cell imaging, immunostaining, and high content analysis assays

(Left) Microscope image of MCF-10A cells cultured in Matrigel and exposed to paclitaxel (200 nM) for 2 days. Blue stained for nucleus and red for cell death (ethidium homodimer). (Right) Toxicity of MCF-10A cells exposed to paclitaxel when cultured in 2D and 3D (Matrigel) in the microfluidic array.

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