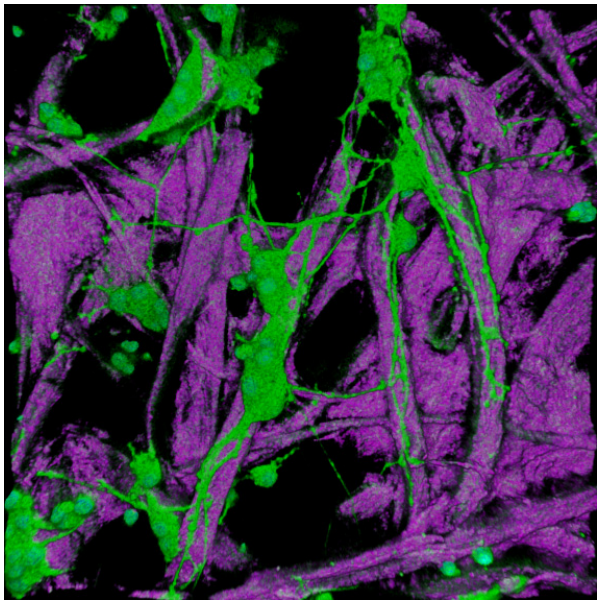
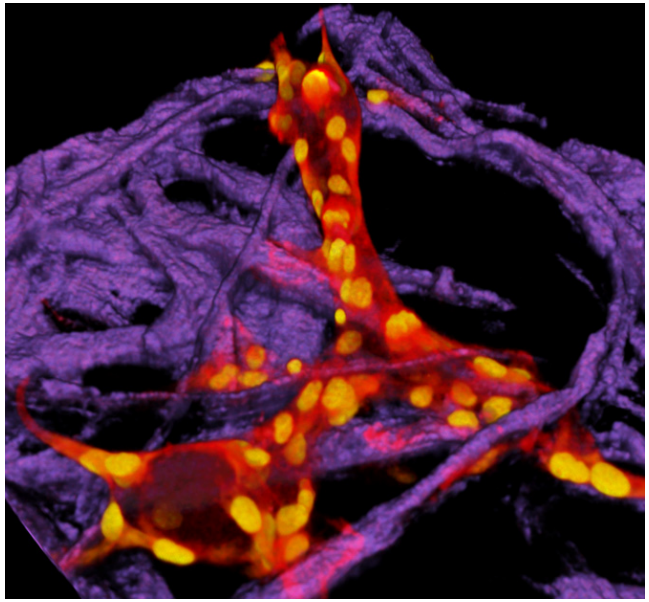
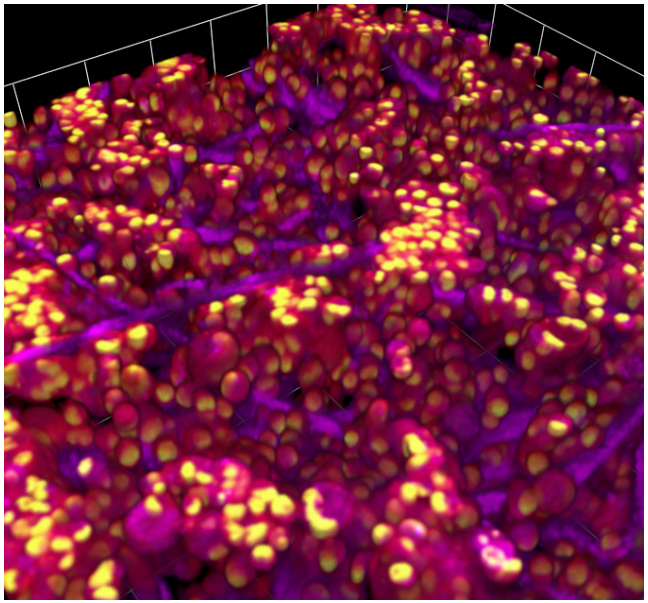
Ratmir Derda

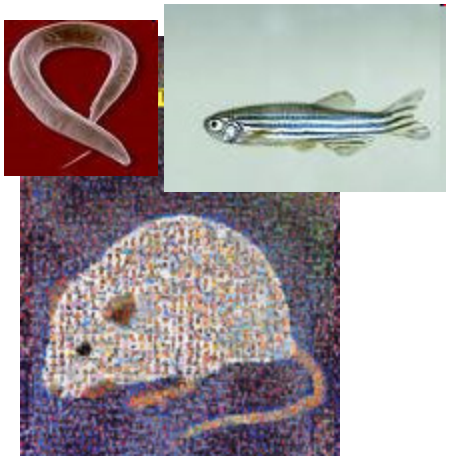
Harvard University

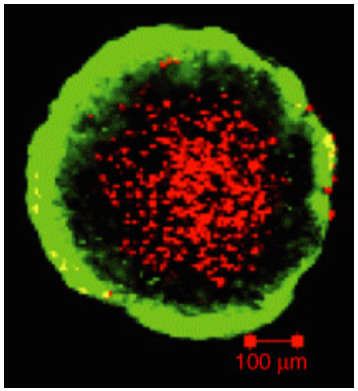
Paper as a platform for assembly and analysis of 3D communities of cells

Ratmir Derda, Whitesides Lab, Harvard University

Experimental models of human organism-like environment

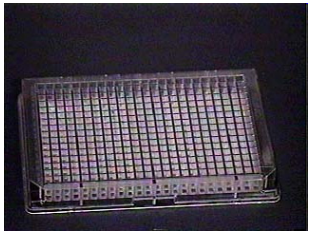


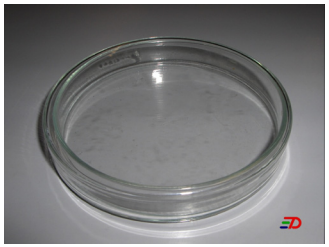
Animals



Ex vivo, tissue-like (3D) assembly of human cells

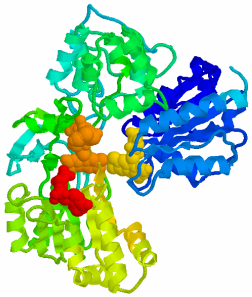
Communities of bacteria





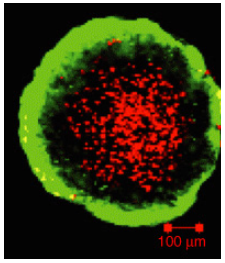
2D culture of human cells

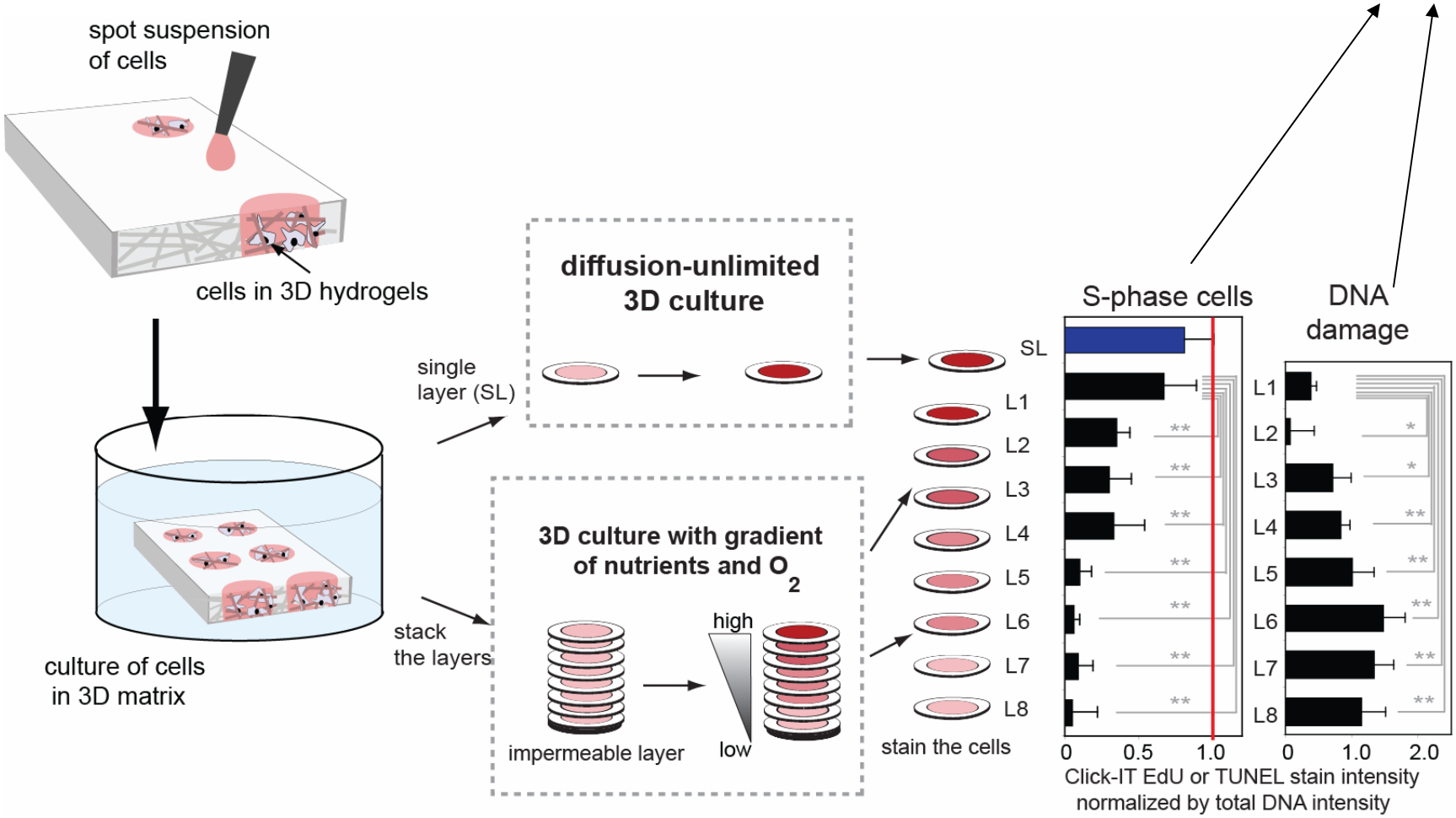
Mono cultures of bacteria



Purified proteins

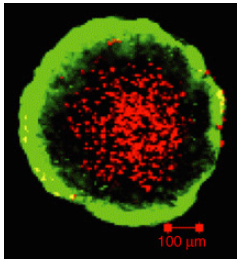
Layer-by-layer approach to generate and analyze 3D cultures

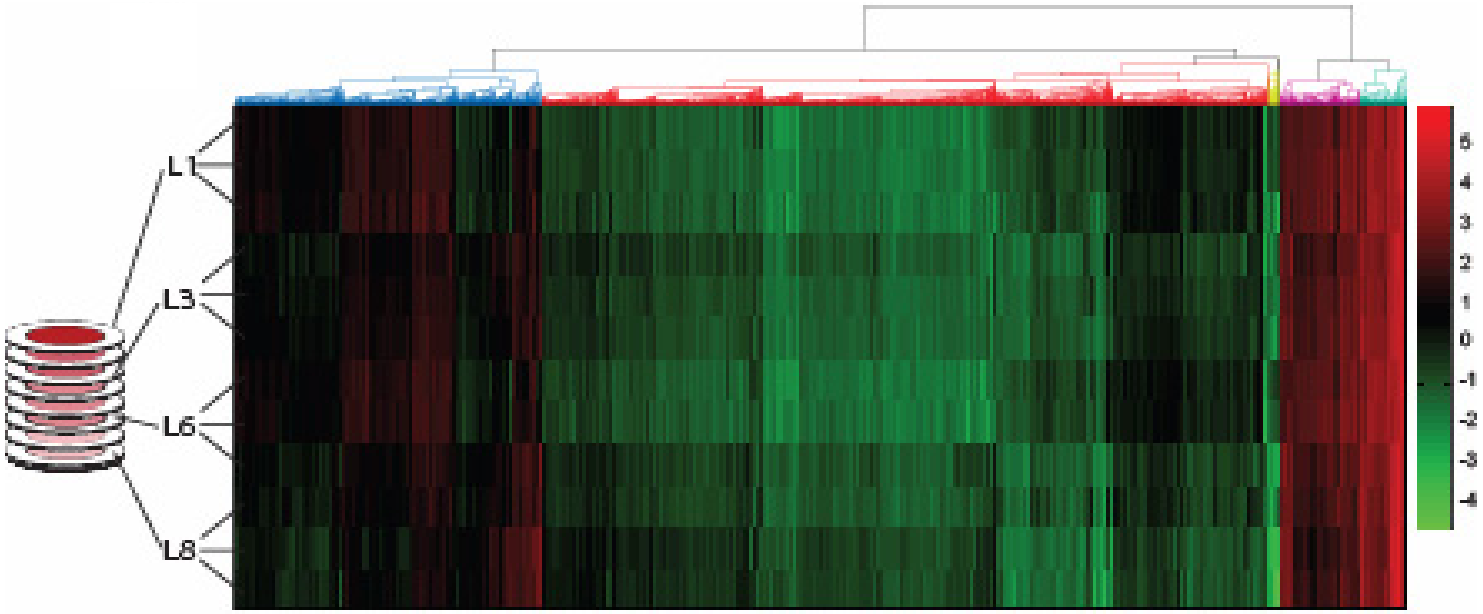




Derda et. al. “Paper-supported 3D cell culture for tissue-based bioassays” PNAS (2009) 106 18457-18462

Isolation of Cells for Whole Genome Analyses





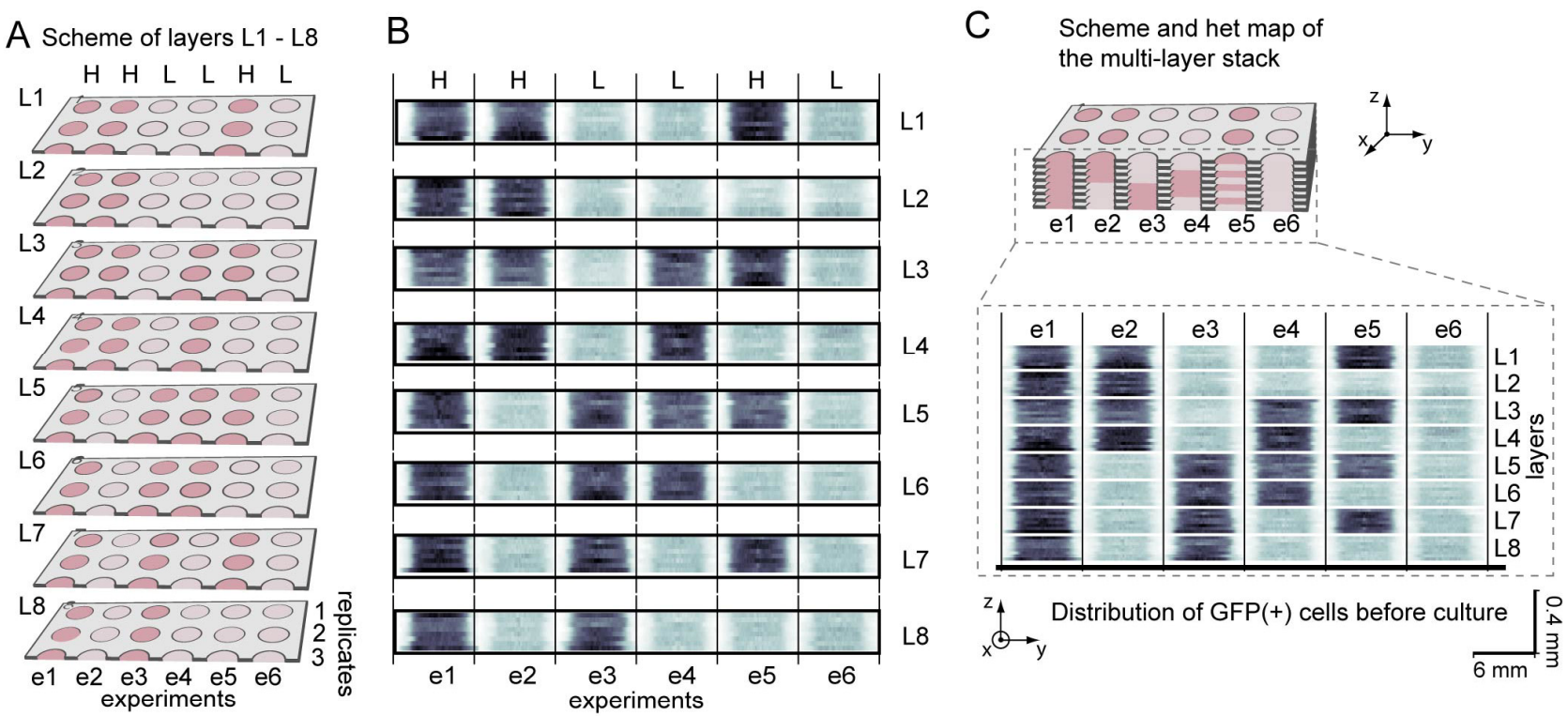
gene chip analysis of different layers

Gene expression analysis

~ 5000 transcripts are differentially regulated in different regions in 3D

With Amy Brock and Donald Ingber

Arrays of 3D cultures of different composition
Investigation of growth of tumor cells



Conclusions

- Paper: simplicity in patterning and analysis
- Geometry vs. proliferation vs. migration vs. differentiation..
- Cost: <1c in materials and production (less than other 3D assays)
- Information content exceeds that of other 3D assays
- Successful design of the platform for high-throughput screening of compounds in 3D cultures.