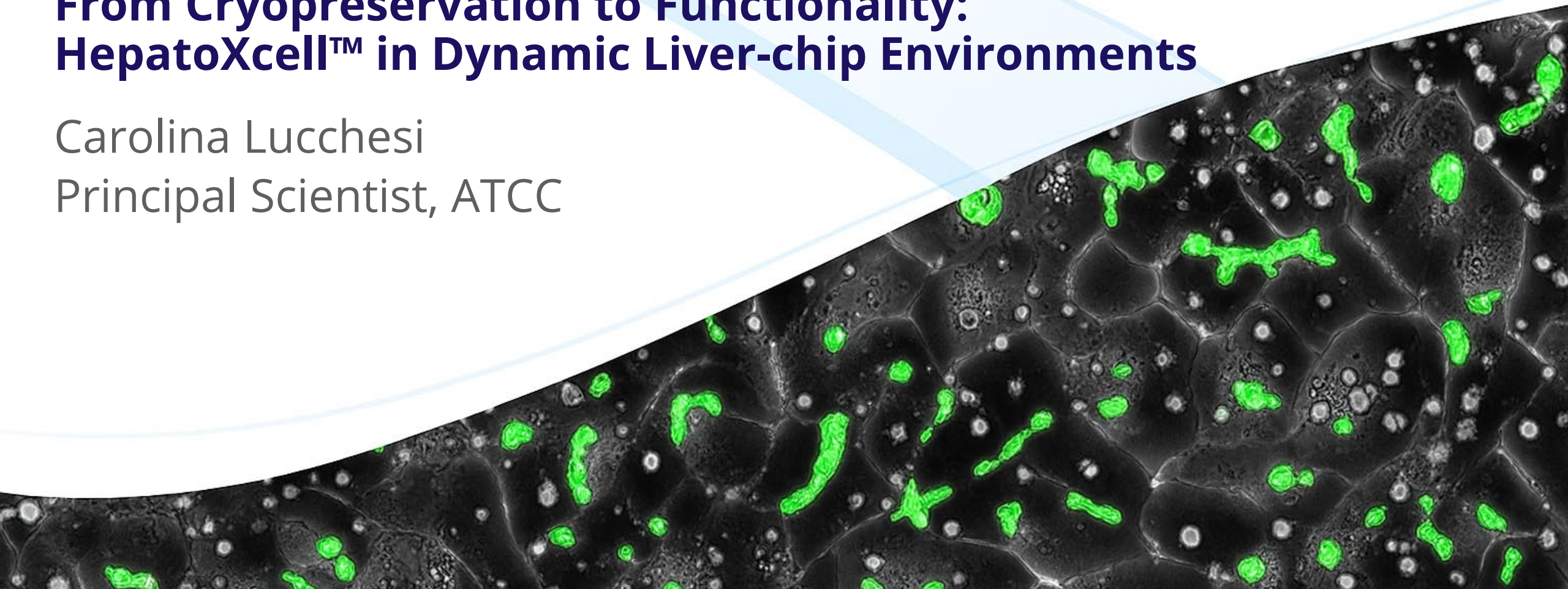
From Cryopreservation to Functionality: HepatoXcell™ in Dynamic Liver-chip Environments

Carolina Lucchesi
Principal Scientist, ATCC



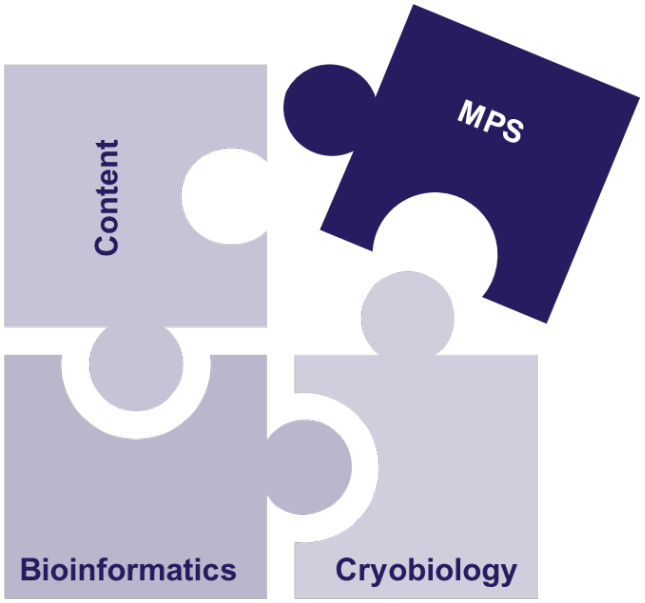
Modernization of the ATCC in vitro cell model portfolio

Past ATCC cell and micro collections were historically deposited by academic and other research scientists

Present ATCC R&D teams are actively developing new products to meet the needs of the scientific community

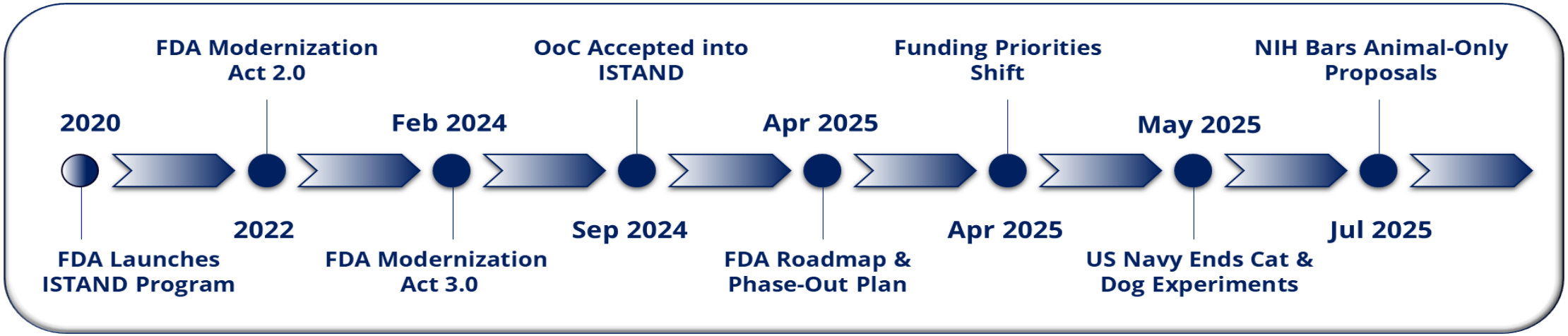
Ensuring the Future ATCC is investing in key technologies to ensure its products and services remain the definitive standards in biological research

ATCC LEADING BIOLOGICAL STANDARDS

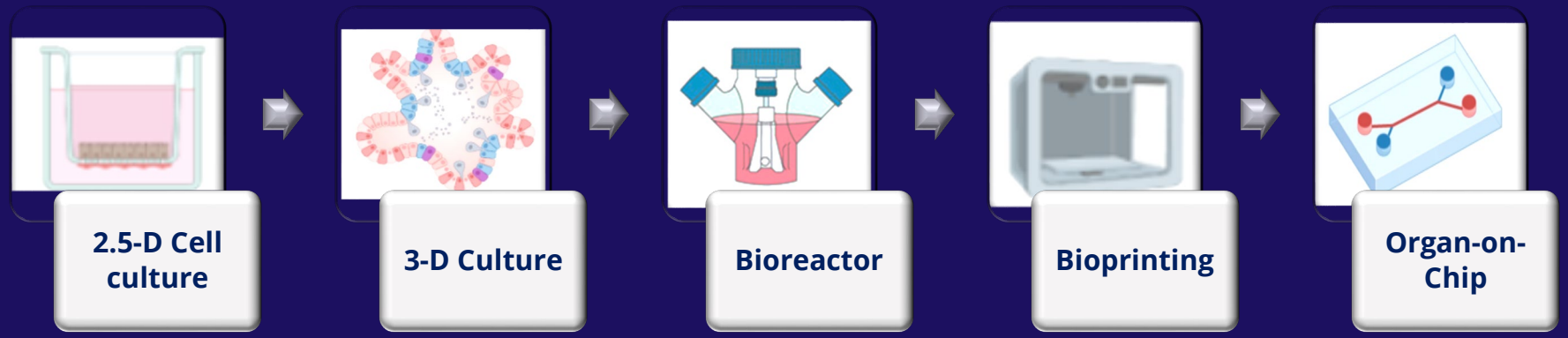


Research & Development

Overview



Microphysiological systems (MPS) comprise a number of bioengineering breakthroughs that reproduce organ architecture and function in vitro. (International MPS Society)



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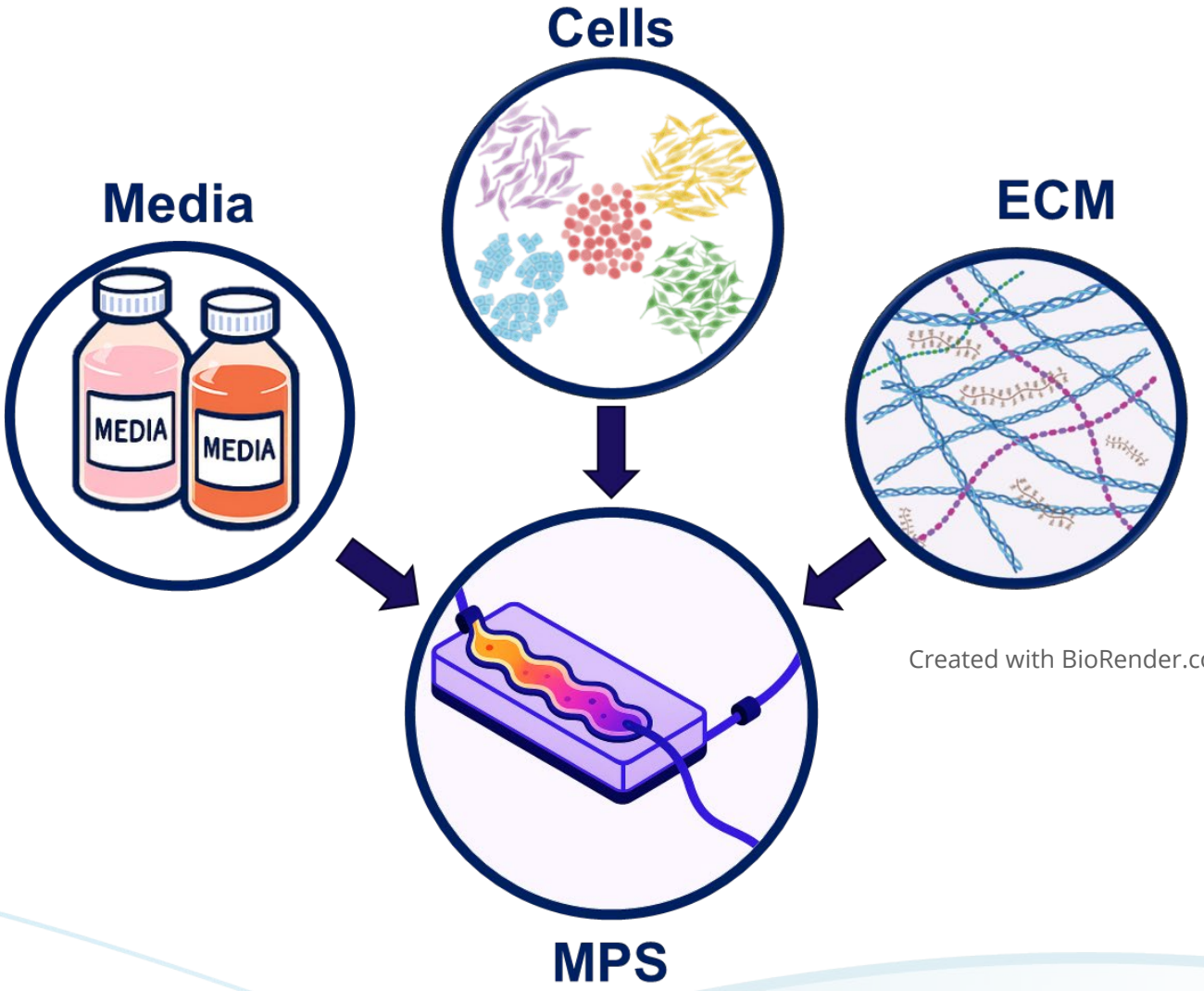
Required biological resources



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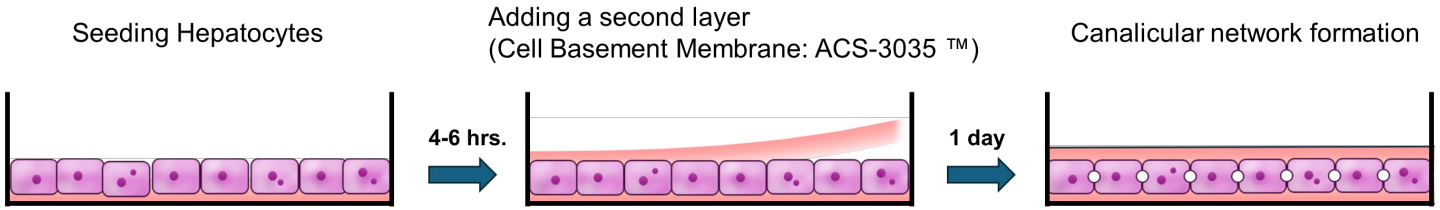
HepatoXcell™ by ATCC

Primary Human Hepatocytes

ATCC® premium hepatocyte offering

Hepatocyte Premium Offering	**HepatoXcell™ Pro**: 7-day plateable hepatocytes
Application	Toxicology testing, ADME, drug development, disease research, advanced cellular modeling, co-culture, microphysiological system
Assays	Metabolism, hepatotoxicity, TEER, induction of CYP mRNA, transporter efflux, transporter uptake, metabolite formation, compound stability, inhibition, gene expression, clearance assay

Sandwich-cultured hepatocytes are a traditional 2-D in vitro model of liver cells grown in a unique configuration



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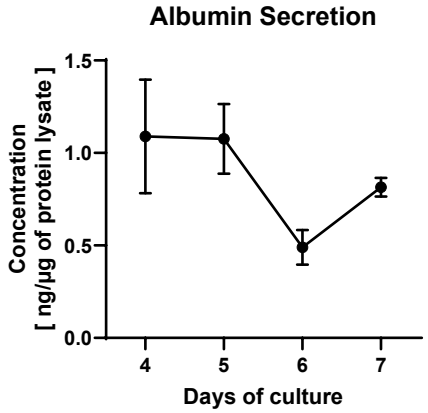
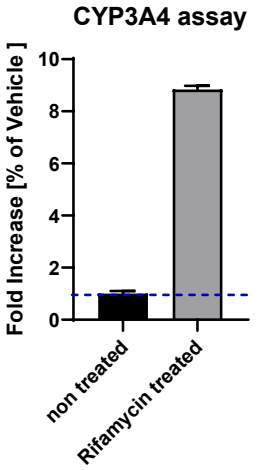
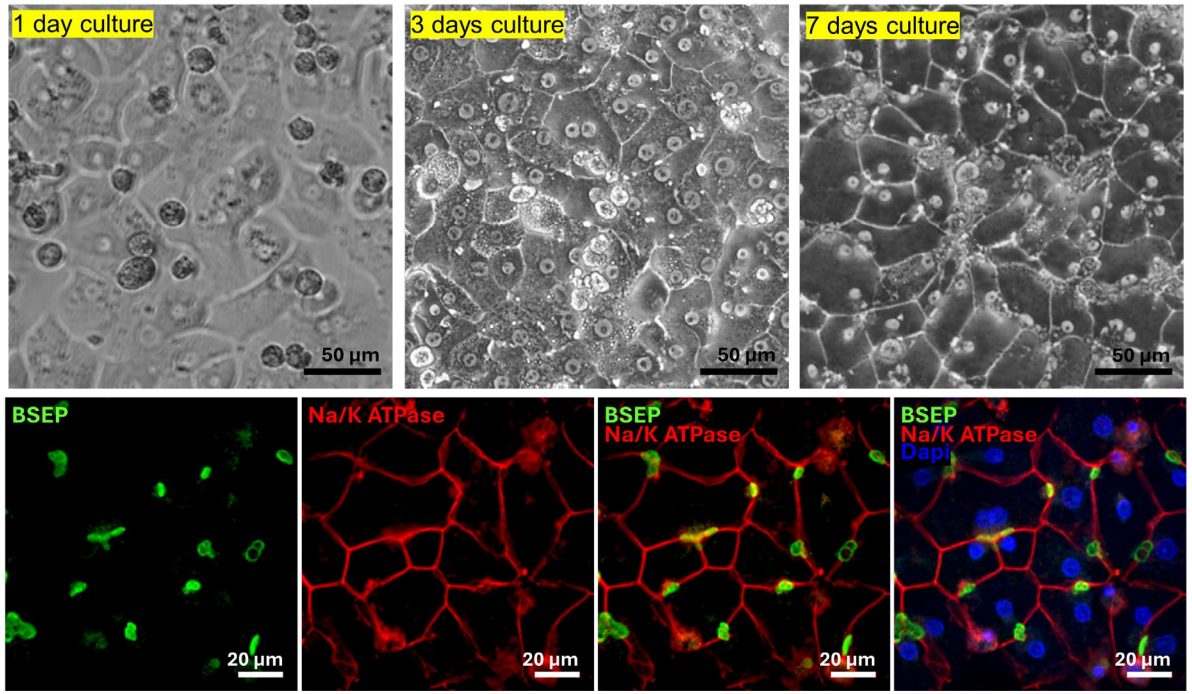


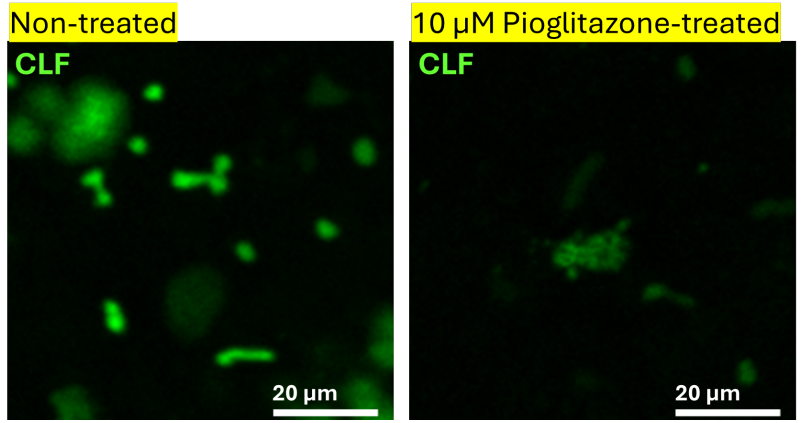


Sandwich-cultured HepatoXcell™ Pro



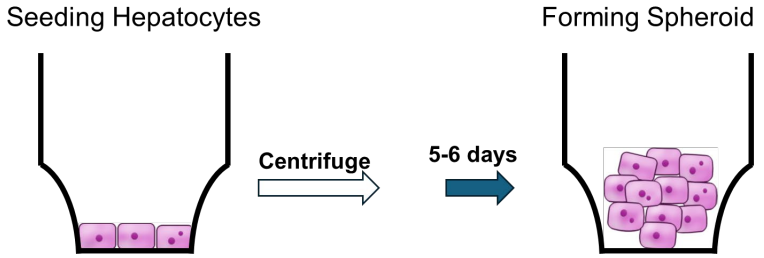
*BSEP (Bile Salt Export Pump); located on the canalicular membrane and transport to bile salts. Na/K ATPase; located on the lateral membrane

CLF efflux assay



Hepatic transporters and functional efflux of bile canaliculi
*CLF (Cholyl-Lysyl-Fluorescein); fluorescent bile acid analog

HepatoXcell™Pro forms 3-D Spheroid without matrix



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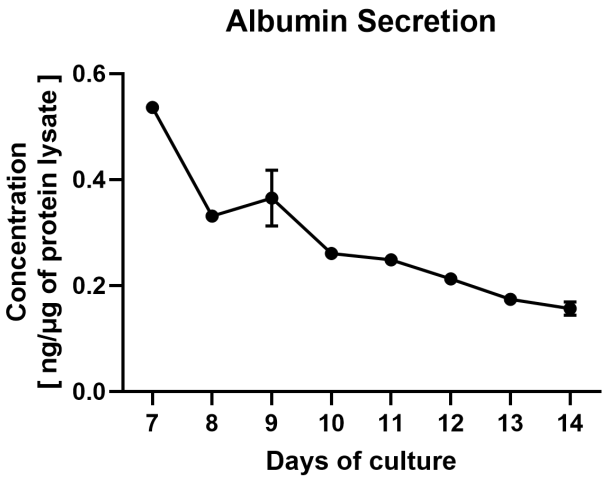
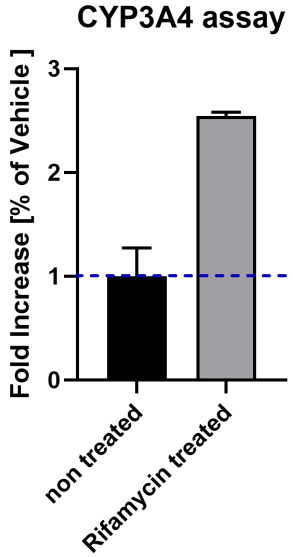
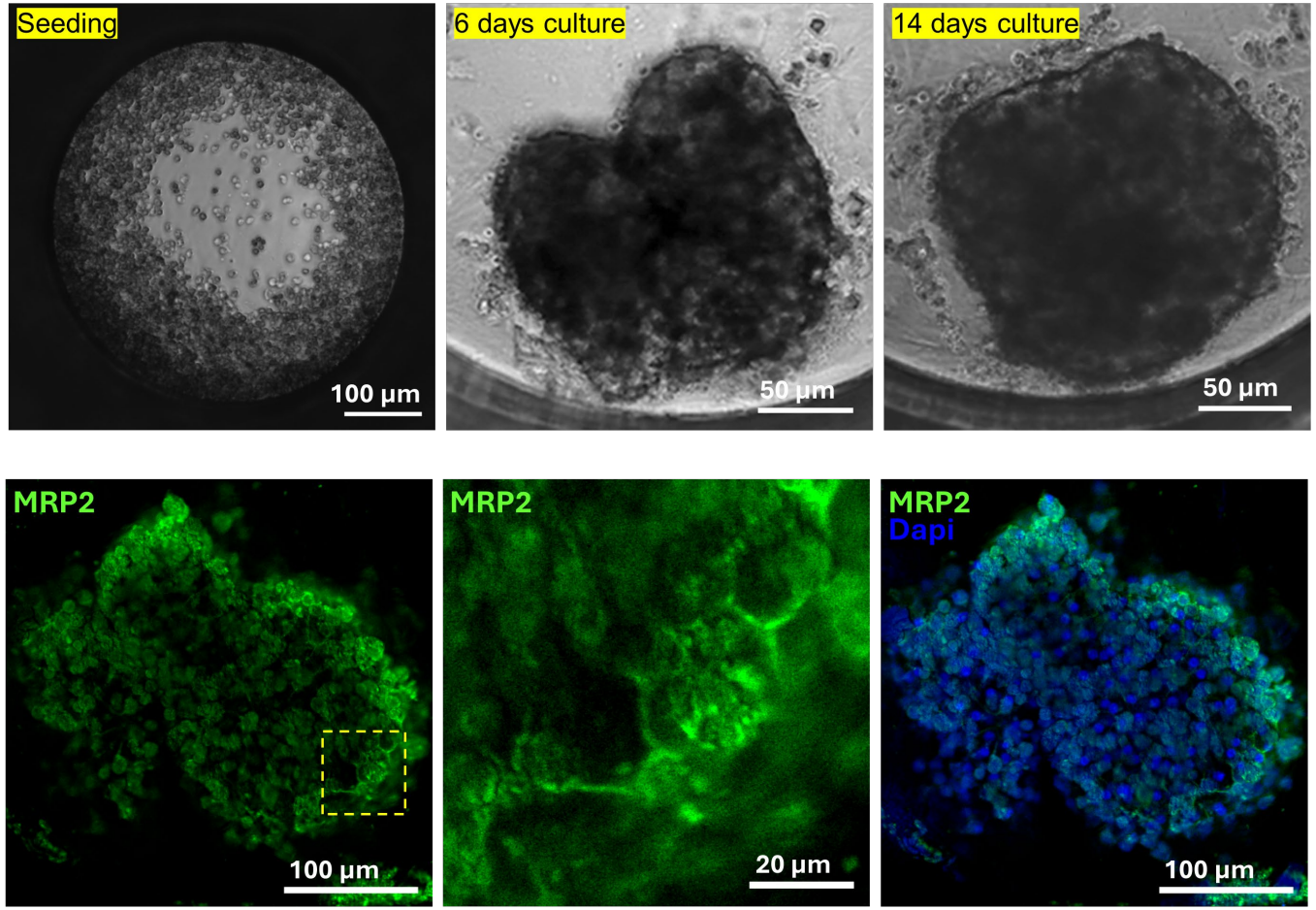
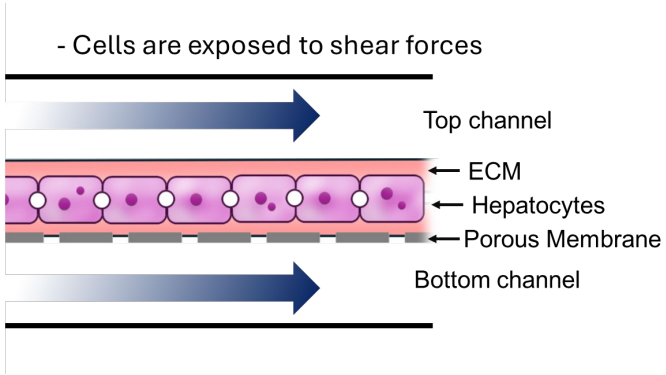


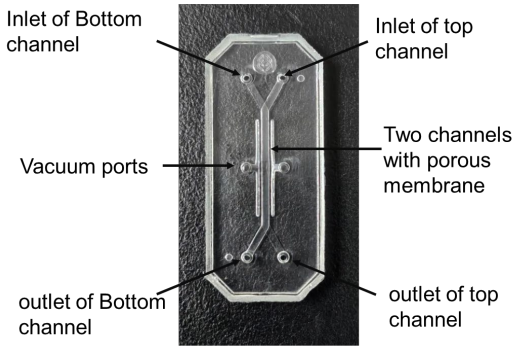


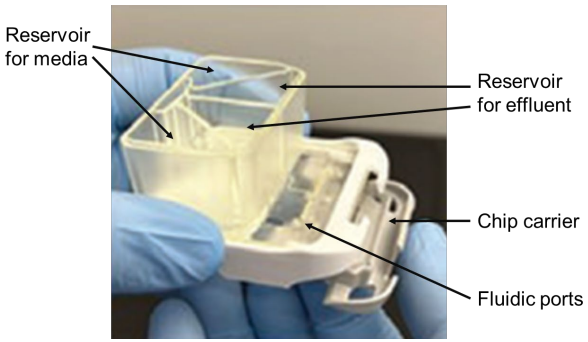


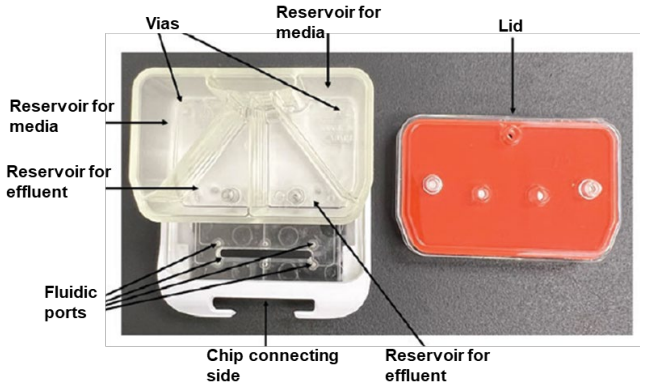
HepatoXcell™ Pro were applied for MPS technology

Flat-bed design

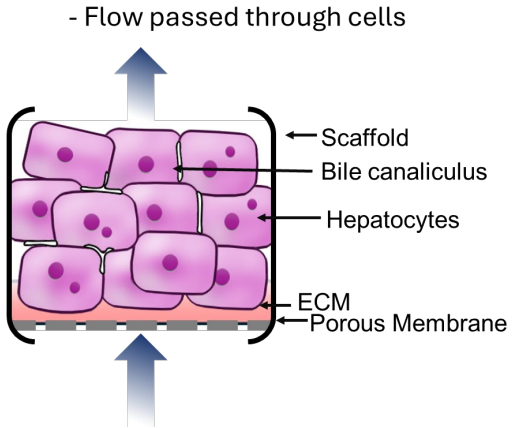


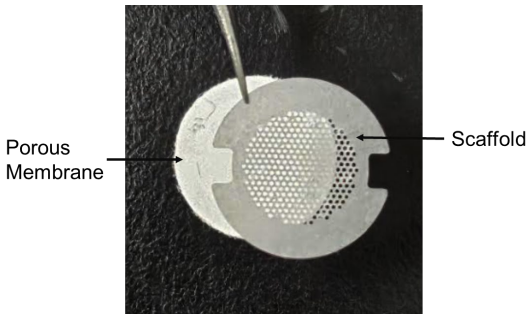


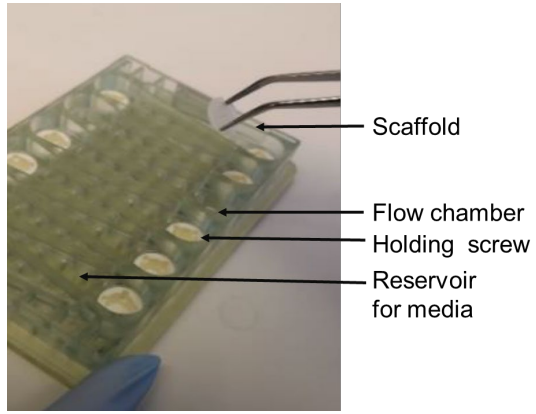


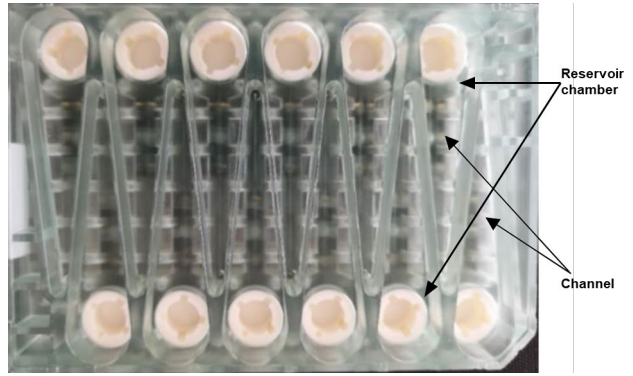


3D Meshed-bed design









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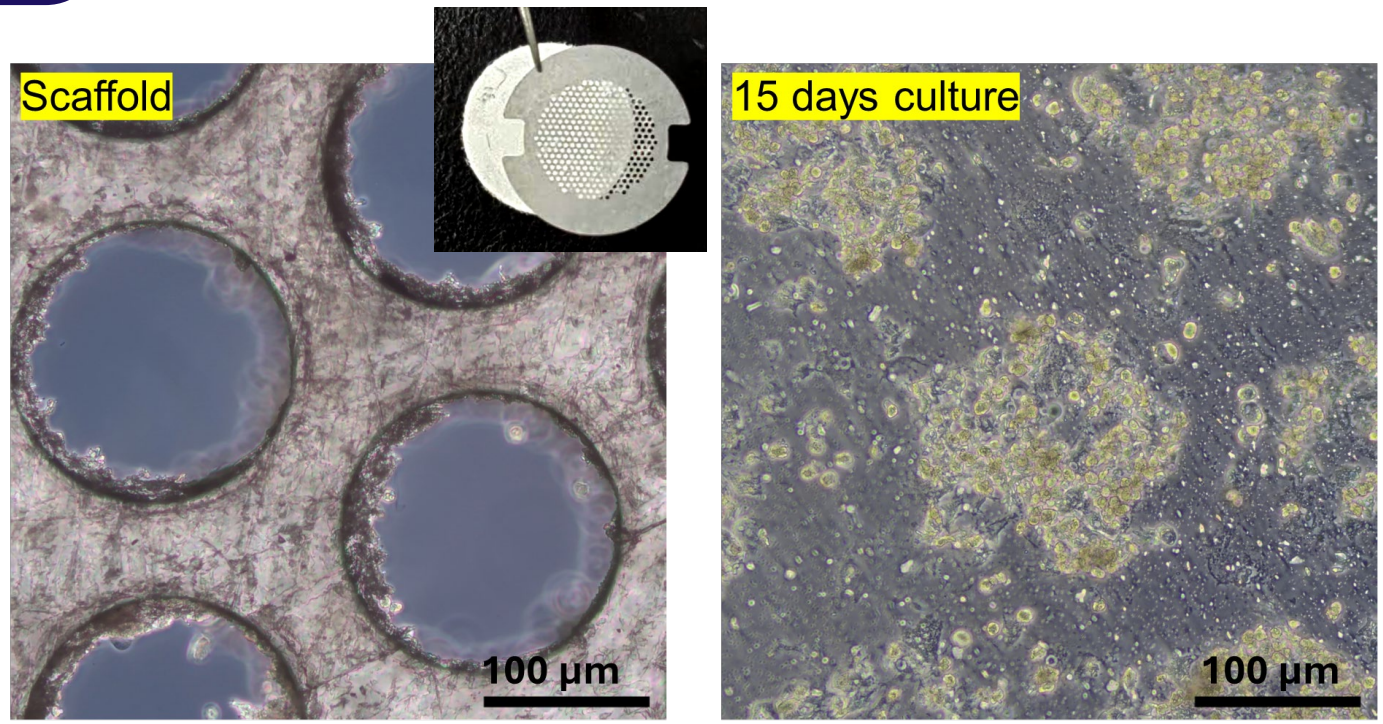
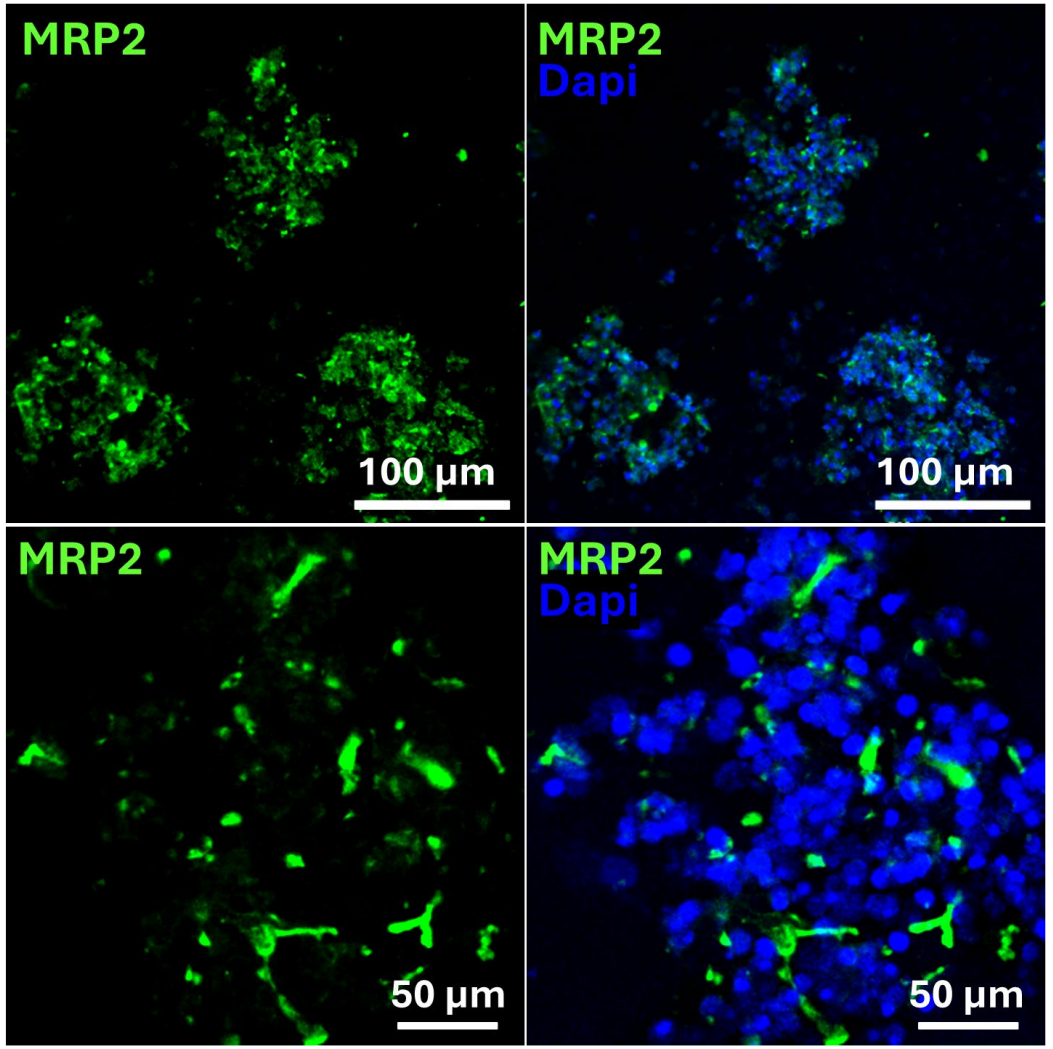
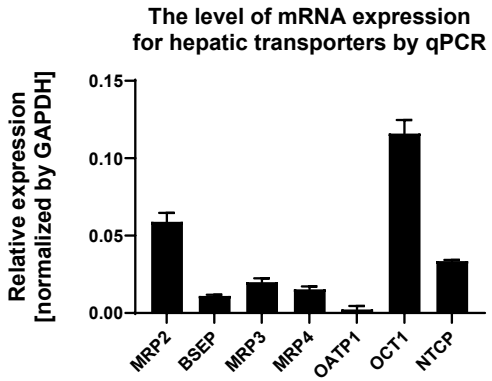
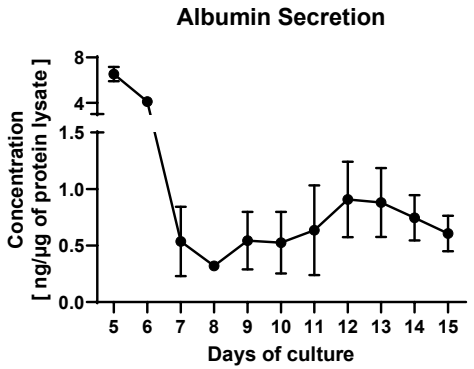
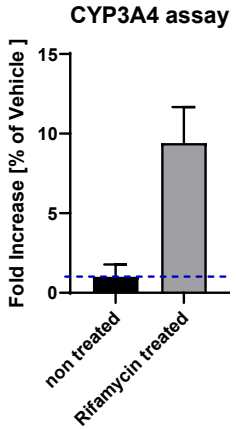
3-D meshed-bed designed fluidic system with HepatoXcell™ Pro





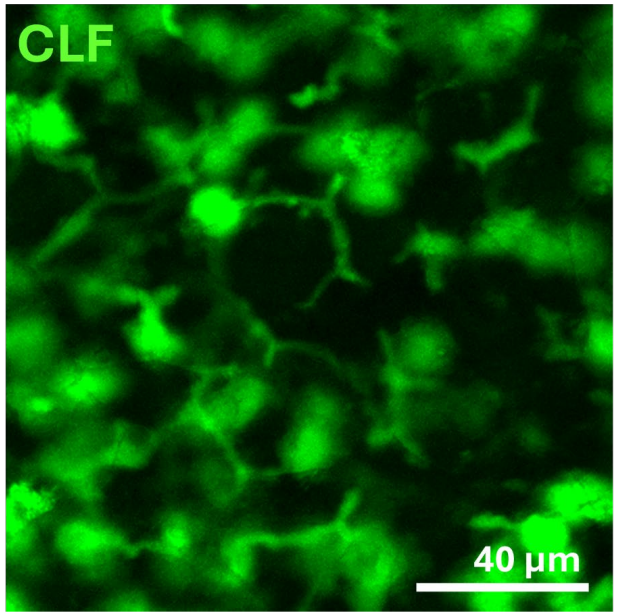


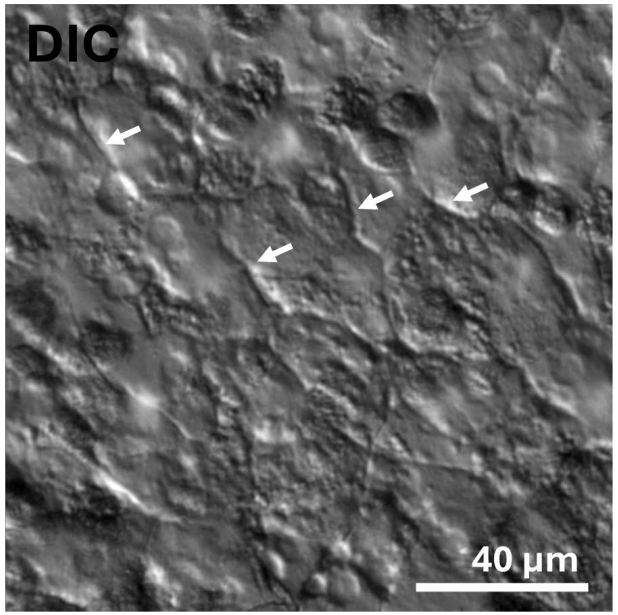


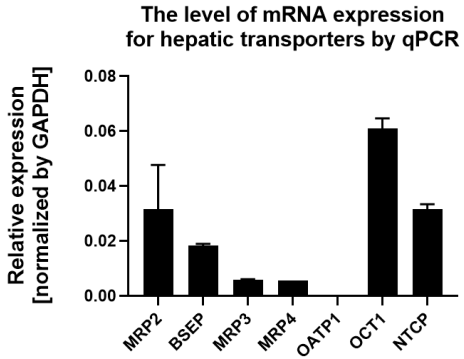


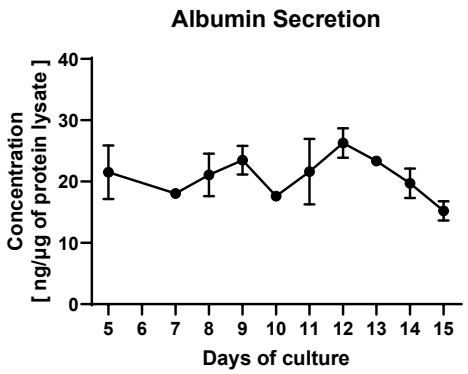
Flat-bed designed fluidic system with HepatoXcell™ Pro

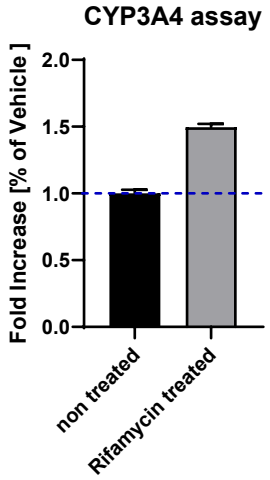
CLF assay to measure bile acid efflux

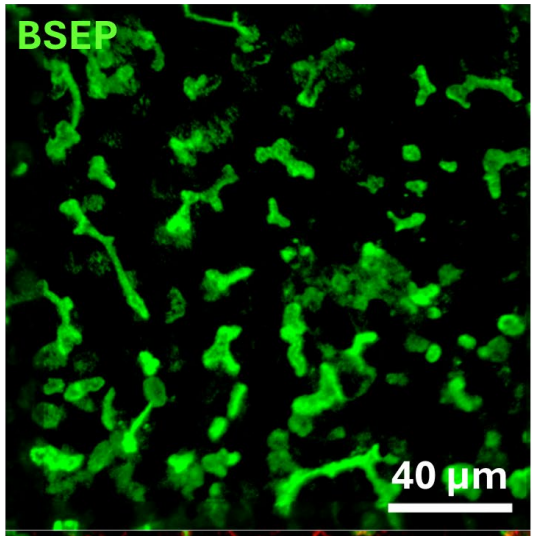


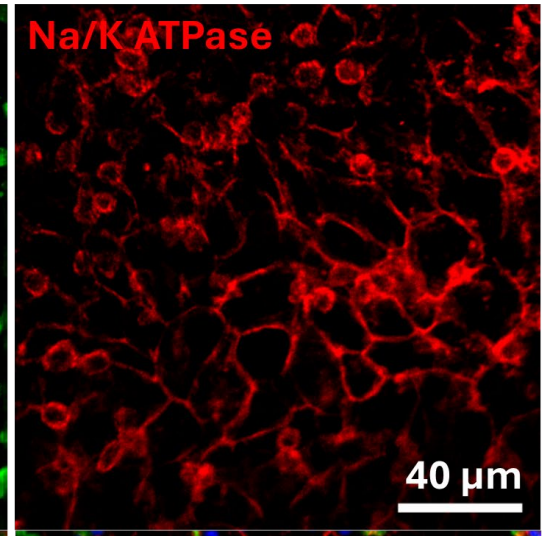


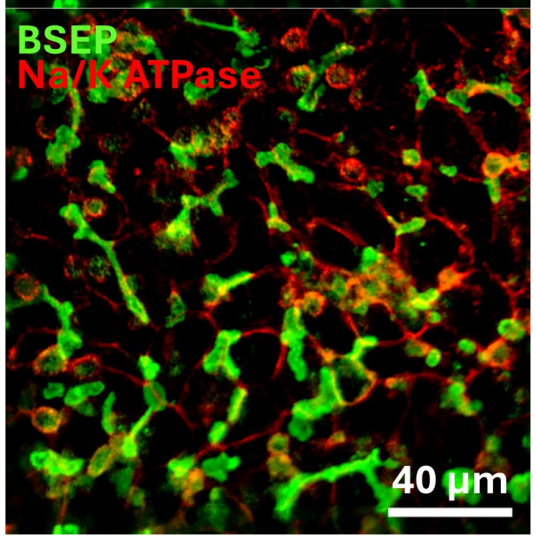


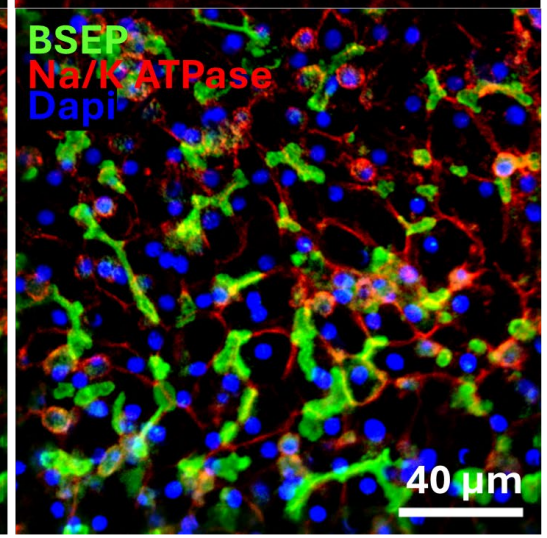




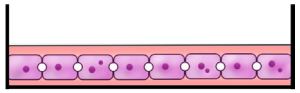
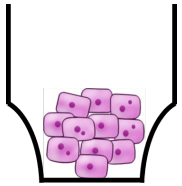
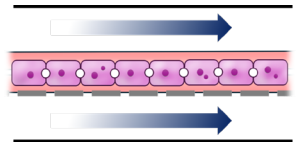
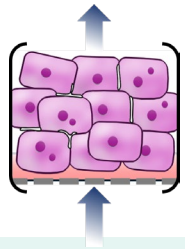








Guide of potential uses for HepatoXcell™ Pro

Culture System	2-D Sandwich culture	3-D Spheroid culture	Flat-bed designed fluidic culture	3-D Meshed-bed designed fluidic culture
Diagram of System				
Types of System	Transitional culture System	Microphysiological System		
Physiological relevance	Medium	Medium	High (+++++)	High (+++)
Media flow	No	No	Yes	Yes
Culture period	7 days	~ 1 month	Over a month	
Co-culture	N/A	N/A	Yes, with Non-Parenchymal Cells	
Polarization/ Canaliculi formation	Yes	Yes	Yes	Yes
Expression of transporters	Yes	Yes	Yes	Yes
Metabolic Activity	Yes (++)	Yes (++)	Yes (+++++)	Yes (+++)
Initial seeding	$4x10^5$ cells/well (24 well)	$0.15x10^4$ cells/well (96 well)	~$1.2x10^5$ cells/chip	$6x10^5$ cells/chip
Assay friendly	++	+	+++++	+++

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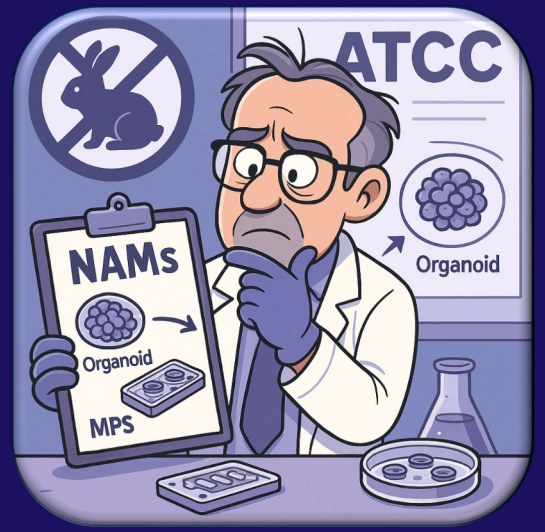
Key takeaways

- Demand for 3-D formats is undeniable and growing rapidly
- Multiple platform technologies are commercially available
- Reproducible and reliable biological resources needed
- Lack of harmonized and robust protocols across platforms
- Acceptance criteria specification



FDA and NIH initiatives highlight a shift towards ethical research practices and adoption of innovative, human-relevant methodologies in biomedical research

Thank you!

Questions?

Visit **booth 207** to ask us about:

- ATCC® toxicological solutions
- Microphysiological systems and other advanced models
- HepatoXcell™ by ATCC
- HepatoXcell promotions (or scan this qr code)
  - 20% off primary hepatocytes- up to 3 vials; Promo code ATCC-000045
  - 15% off hepatocyte media- Promo code ATCC-000046

www.atcc.org/HepatoXcell

ATCC®

CREDIBLE LEADS TO INCREDIBLE

Thank You

Carolina Lucchesi
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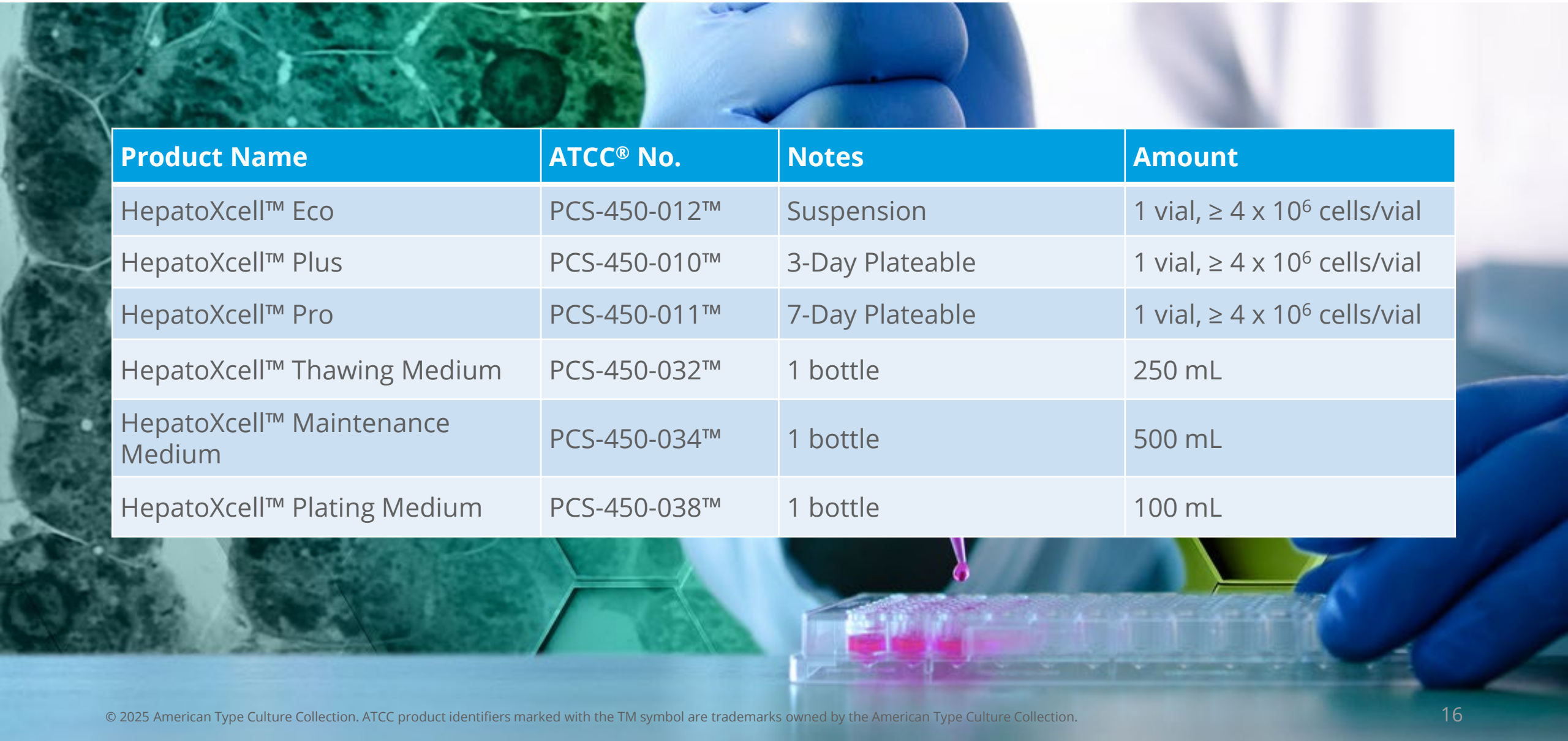
HepatoXcell™ hepatocytes and media



Product Name	ATCC® No.	Notes	Amount
HepatoXcell™ Eco	PCS-450-012™	Suspension	1 vial, ≥ 4 x 10^6 cells/vial
HepatoXcell™ Plus	PCS-450-010™	3-Day Plateable	1 vial, ≥ 4 x 10^6 cells/vial
HepatoXcell™ Pro	PCS-450-011™	7-Day Plateable	1 vial, ≥ 4 x 10^6 cells/vial
HepatoXcell™ Thawing Medium	PCS-450-032™	1 bottle	250 mL
HepatoXcell™ Maintenance Medium	PCS-450-034™	1 bottle	500 mL
HepatoXcell™ Plating Medium	PCS-450-038™	1 bottle	100 mL