Company Presentation

February 2021

Forward-Looking Statements

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Forward-Looking Statements (con't)

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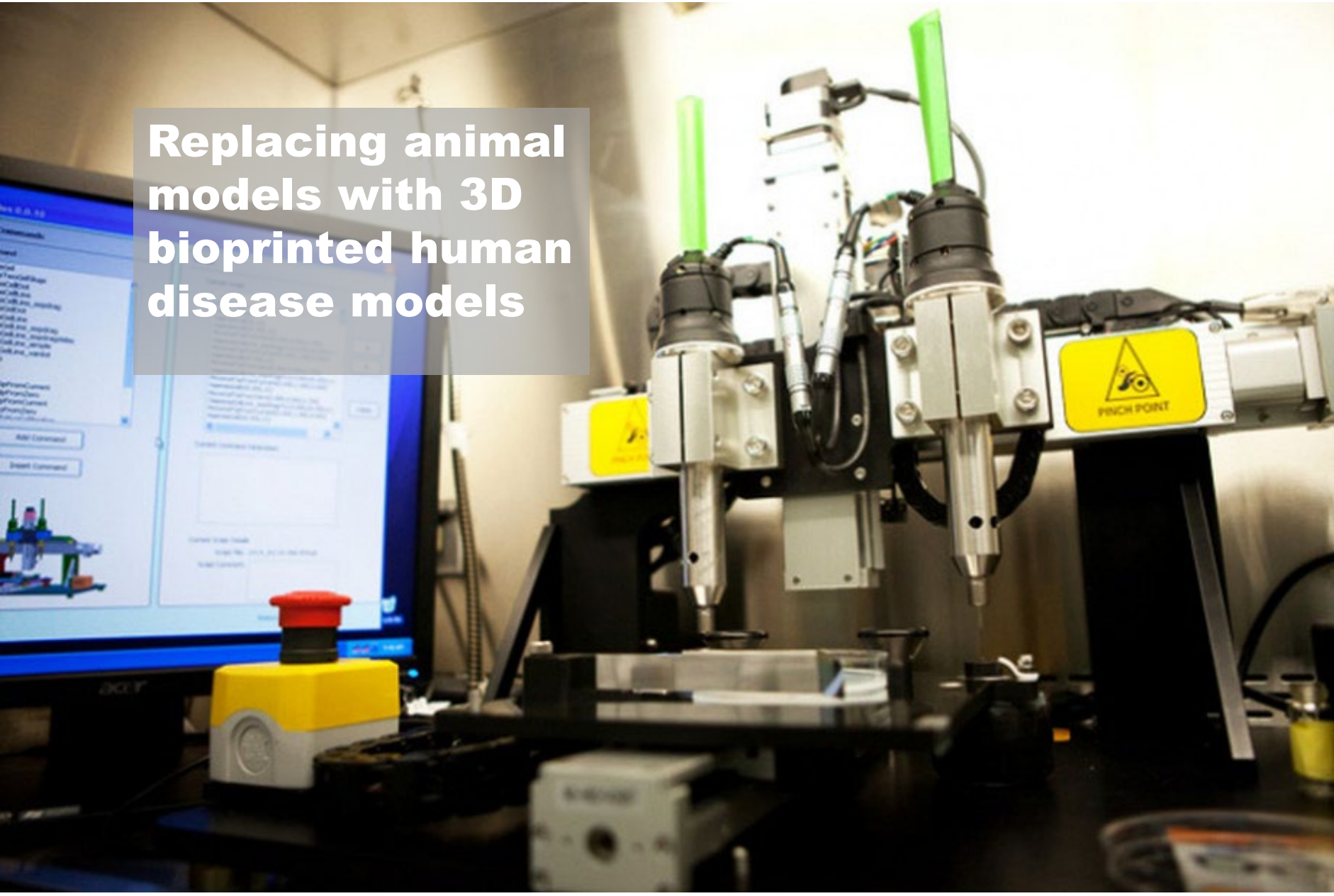
organovo™

Custom Disease Models Using 3D Bioprinting

First Opportunity: Inflammatory Bowel Disease

Goal of Multiple INDs by End of 2025

December 31, 2020 Cash Reserves of $18.8M (Q4 2020 net cash used in operating activities of $1.5M)


Replacing animal models with 3D bioprinted human disease models
PINCH POINT

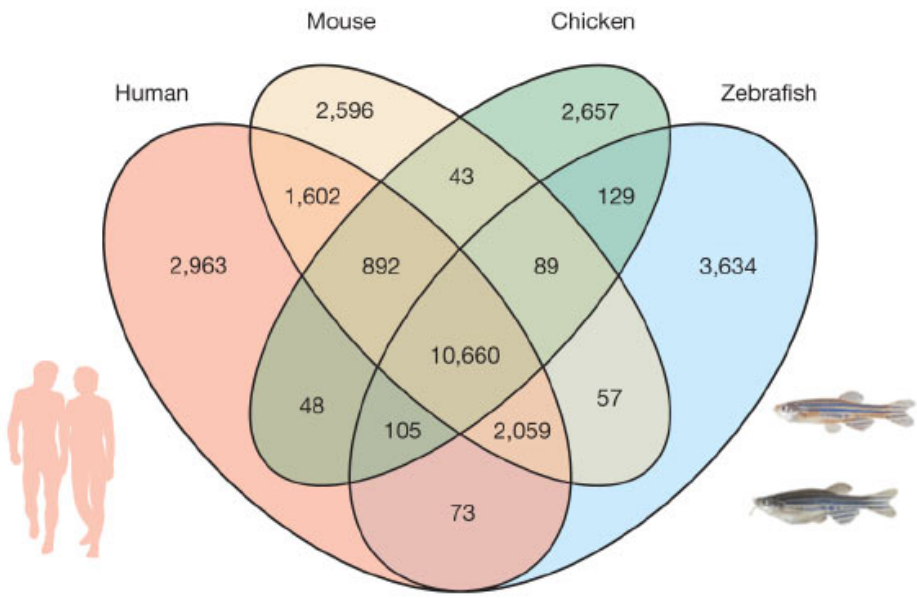
Drug Discovery in 3D

Moving Past the Animal Testing Paradigm

- 3D Bioprinted tissues and other complex in vitro models offer a way to work with a ***fully human*** system that shows better biology
- Strategy – Organovo is advancing novel drugs discovered with 3D tissues, moving towards clinical trials and pharma partnerships
- Biotech therapeutics company - In 2024 Organovo anticipates a portfolio of drugs approaching or just entering clinical trials

Animal models are outdated technology

Genetic overlap across species
(number of genes)



Species	% of human overlap
chicken	64%
zebrafish	70%
mouse	83%

Human–mouse overlap is not much more than zebrafish

The gaps with preclinical species result in **drug clinical failures**

Developing drugs in animals results in **bad choices**

Animal Testing – The Problem

- 88% of drugs fail during clinical trials
- 50% of those failures are due to human-animal gap
- Treatments cure mice of cancer but fail in human testing

- "We test them [drugs] on animals, and it's not reliable... Ultimately, the ability to develop and test medicines will be you on a chip" – Francis Collins, NIH Director, at TEDMED, discussing the challenges with animal models and the new developments in 3D tissue models

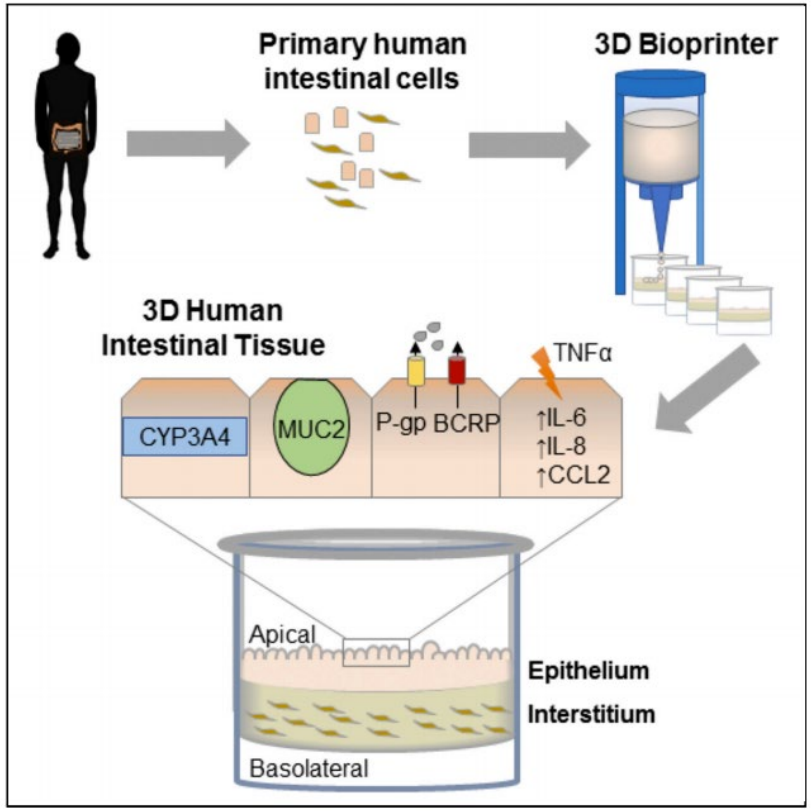
Arrowsmith, J., Miller, P. *Nat Rev Drug Discov* **12,** 569 (2013).

3D Tissues Allow for Better Biology

- **Minimizes plastic interaction**
- **More relevant cell-cell interaction**
- **Four or more cell types**

- **Cells in full contact with plastic**
- **One or two cell types**

Organovo makes custom disease models using 3D bioprinting



By careful selection of cells, handling during processing, conditions during culture, we believe the disease can be reproduced “in a dish”

Drug Discovery Process – in 3D

3D disease models impact the discovery and development process

Target Selection

- Cellular & Genetic Targets
- Genomics
- Proteomics
- Bioinformatics

Lead Discovery

- Synthesis & Isolation
- Assay Development
- High Throughput Screening

Medicinal Chemistry

- Library Development
- Structure Activity Studies
- In Silico Screening
- Chemical Synthesis
- Formulation

In Vitro Studies

- Drug Affinity & Selectivity
- Cellular disease models
- Mechanism of Action
- Toxicology

In Vivo Studies

- Animal Models of Disease States
- Pharmacokinetics
- Functional Imaging
- Ex Vivo Studies
- Toxicology

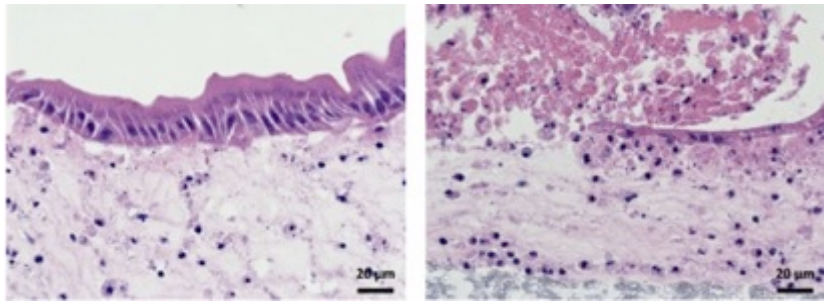
Clinical Trials

- Phase I
- Phase II
- Phase III

Areas of Opportunity in 3D

First Opportunity: Crohn's and Ulcerative Colitis Using 3D Models – Inflammatory Bowel Disease (IBD)

Organovo has previously established a 3D bioprinted intestinal model



Bioprinted control intestine Bioprinted diseased model

iScience 2, 156–167, 2018

IBD Market is Attractive Commercially

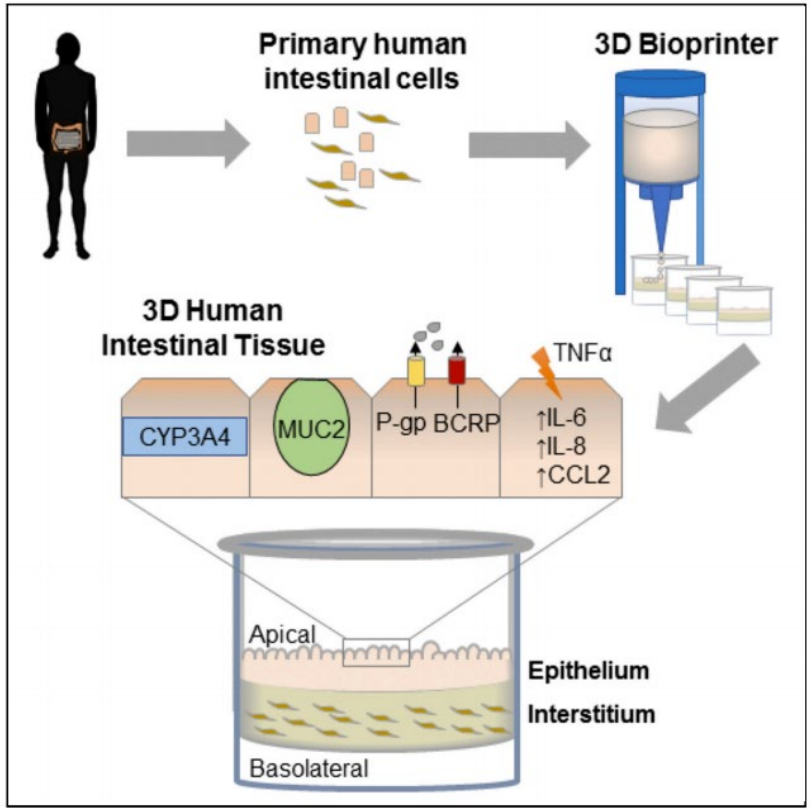
- 15.5B market globally by 2026[1]
- Projected 6% CAGR[2]
- Treatments offer value for patients but considered to be strong opportunity for improvement
- Main treatments today: TNF inhibitors, aminosalicyclates, integrin antagonists, and corticosteroids

[1]Grandviewrearch market analysis report on Inflammatory Bowel Disease Treatment By Type (Ulcerative Colitis, Crohn's Disease), By Route of Administration, By Distribution Channel, And Segment Forecasts, 2019 - 2026

[2]Transparency Market Research report on the IBD (ulcerative colitis and Crohn's disease) treatment market for the forecast period of 2019–2027.

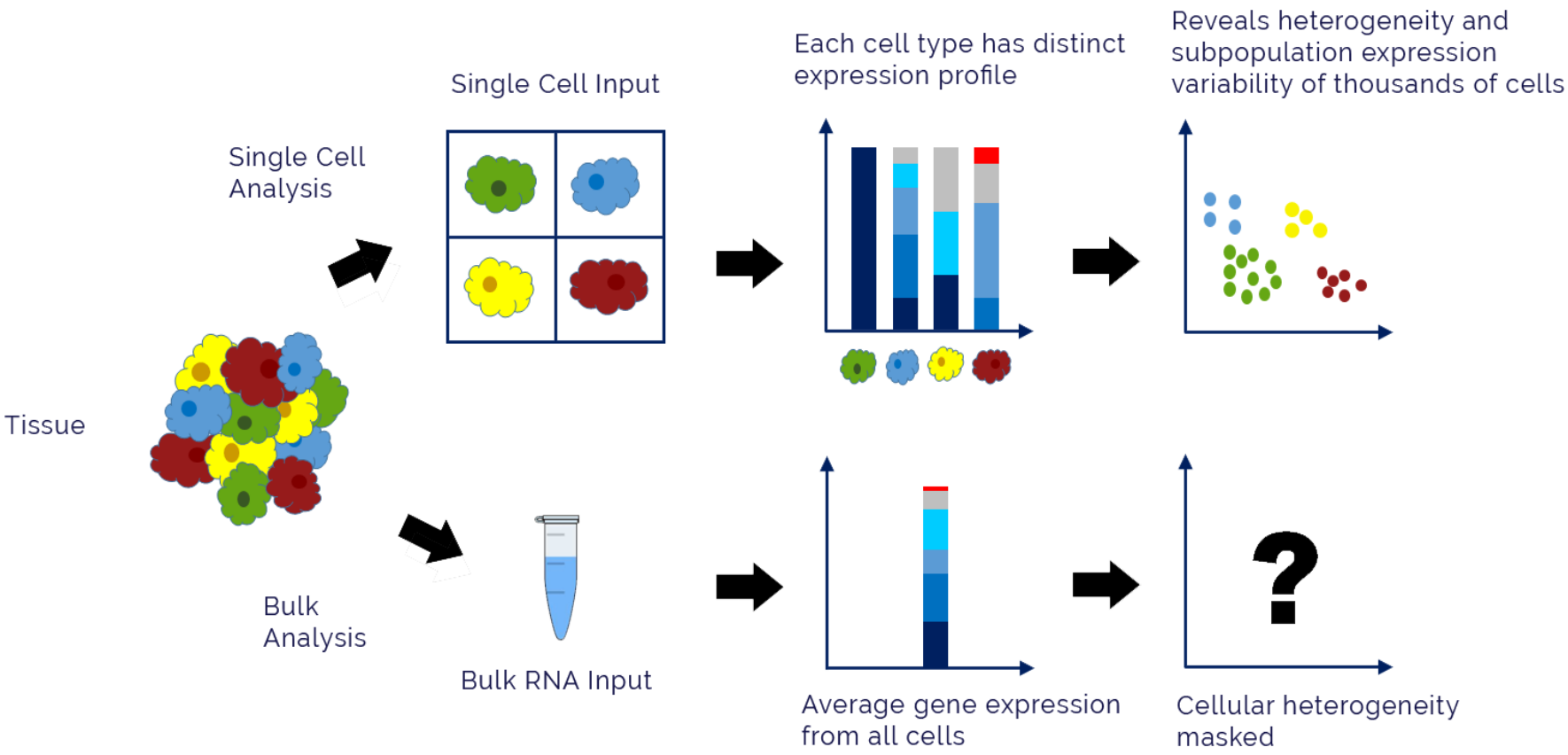
3D Toolkit

Organovo makes custom disease models using 3D bioprinting

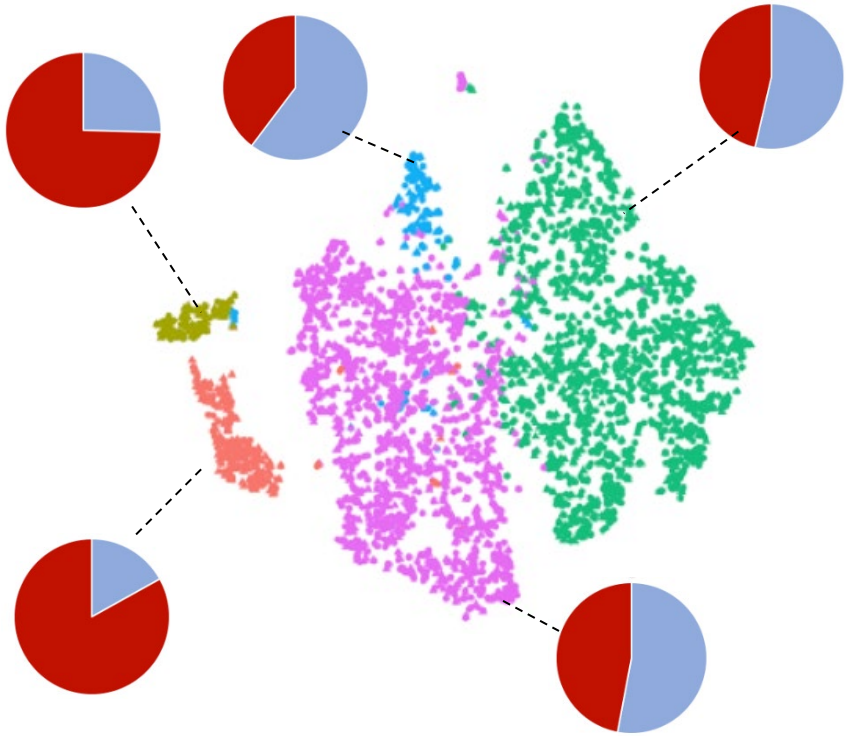


By careful selection of cells, handling during processing, conditions during culture, we believe the disease can be reproduced “in a dish”

Single cell RNA sequencing is a tool Organovo can use to see disease signal



Organovo's diseased model will show genes that express higher in certain clusters



- Can measure what genes are active in a sample
- 64 million data points per tissue
- Combine with additional public and private databases
- Create algorithms to drive understanding of biology

We can identify genes from 3D cultures that are clearly implicated in disease

Each TSNE plot shows expression levels of a specific gene, disease and control tissues overlaid (single cell RNA-Seq)

Disease clusters express specific marker genes that become target opportunities

Organovo uses various modern tools in searcing for disease signals in bioprinted model

- Conditions are permissive for the continuation of a clinically-relevant disease process occurring in patients
- Opportunity to fully understand expression and metabolomic profiles from these bioprinted tissues during progression
  - Bulk RNA
  - Single Cell RNA seq
  - Metabolomic analysis of media
- These disease-regulated genes and compounds represent a punch list of targets for validation

Target validation occurs after identification of genes of interest

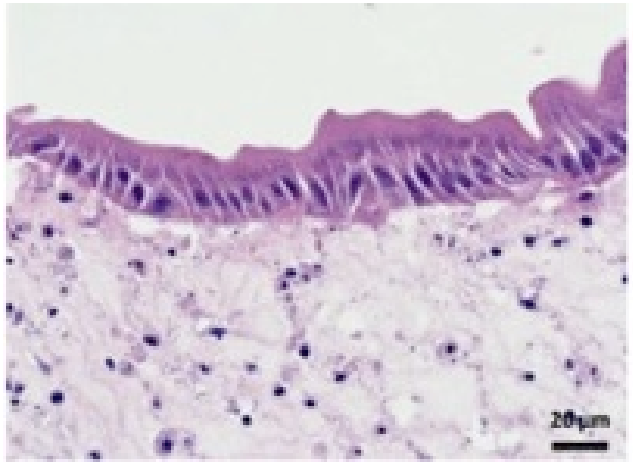
- Gene expression analysis identifies the genes of interest
  - Bulk RNA
  - Single cell
  - Metabolomics
- Then utilizing a higher throughput model – modulate targets for effects on disease phenotype
  - Test targets using tool compounds
  - siRNAs
  - Antibodies

Target identification and validation are followed by creation of drug chemistry

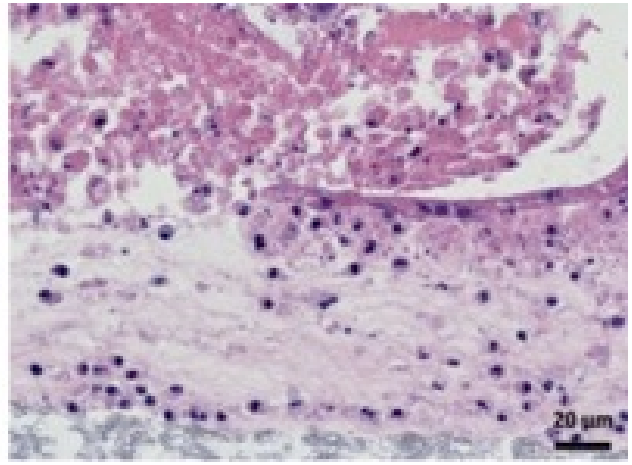
- After validation of gene target, begin drug discovery approaches
- Medicinal chemistry – outsource plan primarily initially
  - Patent busting
  - Screening in moderately HTP model for novel chemotypes and SAR support
  - Surveying for existing chemical matter for potential licensing deals
- Primary screen against selected target could be a simple enzymatic screen.
  - Hits would be tested in the 3D models
- Donor to donor variation can be tested along with biomarkers.

Organovo's Intestinal Model

Organovo's intestinal modeling efforts already have demonstrated solid results



Bioprinted control intestine



Bioprinted diseased model

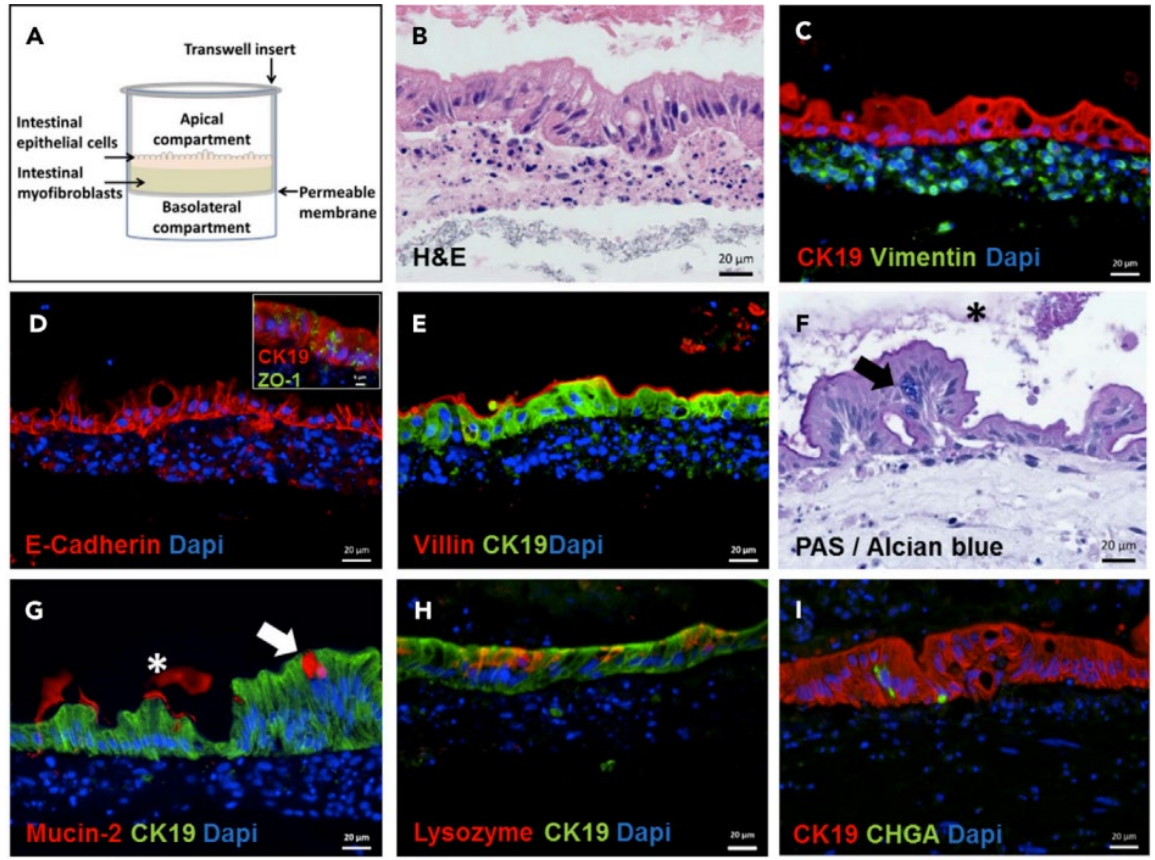
"Bioprinted 3D Primary Human Intestinal Tissues Model Aspects of Native Physiology and ADME/ Tox Functions"

Lauran R. Madden, Theresa V. Nguyen, Salvador Garcia-Mojica, ..., Sharon C. Presnell, Deborah G. Nguyen, Kelsey N. Retting

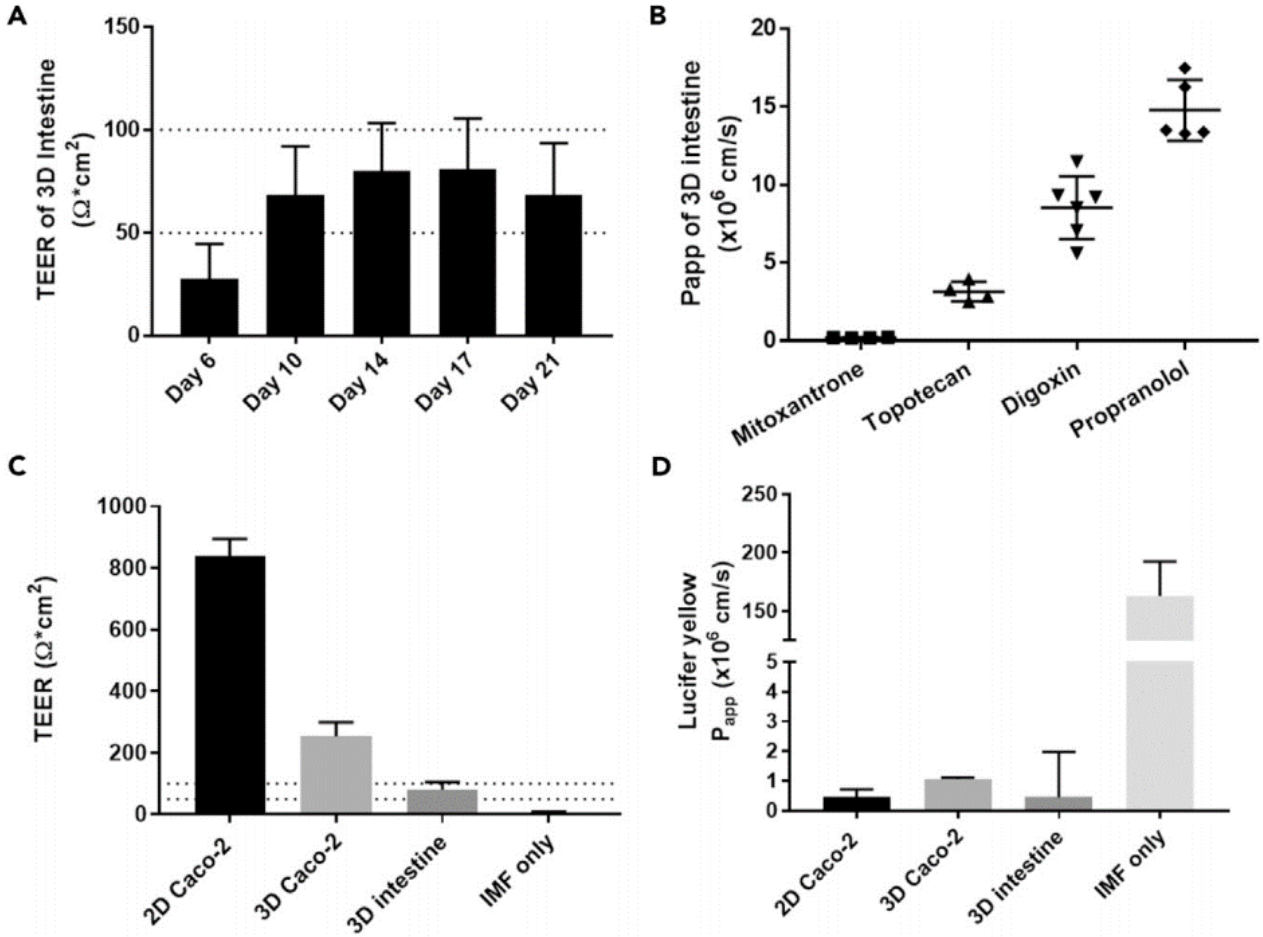
iScience 2, 156–167, April 27, 2018

Organovo's intestinal model demonstrates features of native tissue

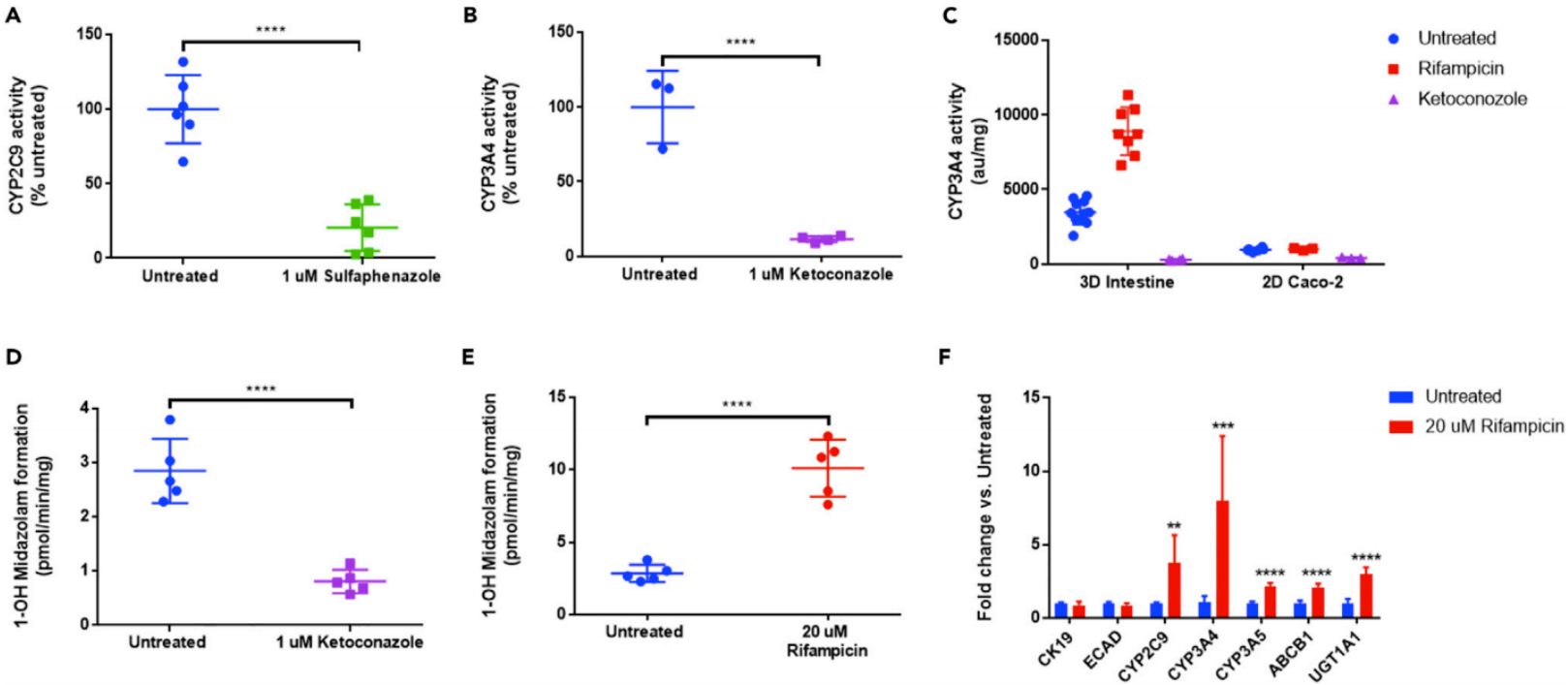
- Polarized epithelium
- Tight junctions
- Specialized epithelial cell types
- Expresses functional, inducible CYP450 enzymes
- Physiological barrier function
- Functional P-gp and BCRP transporters.



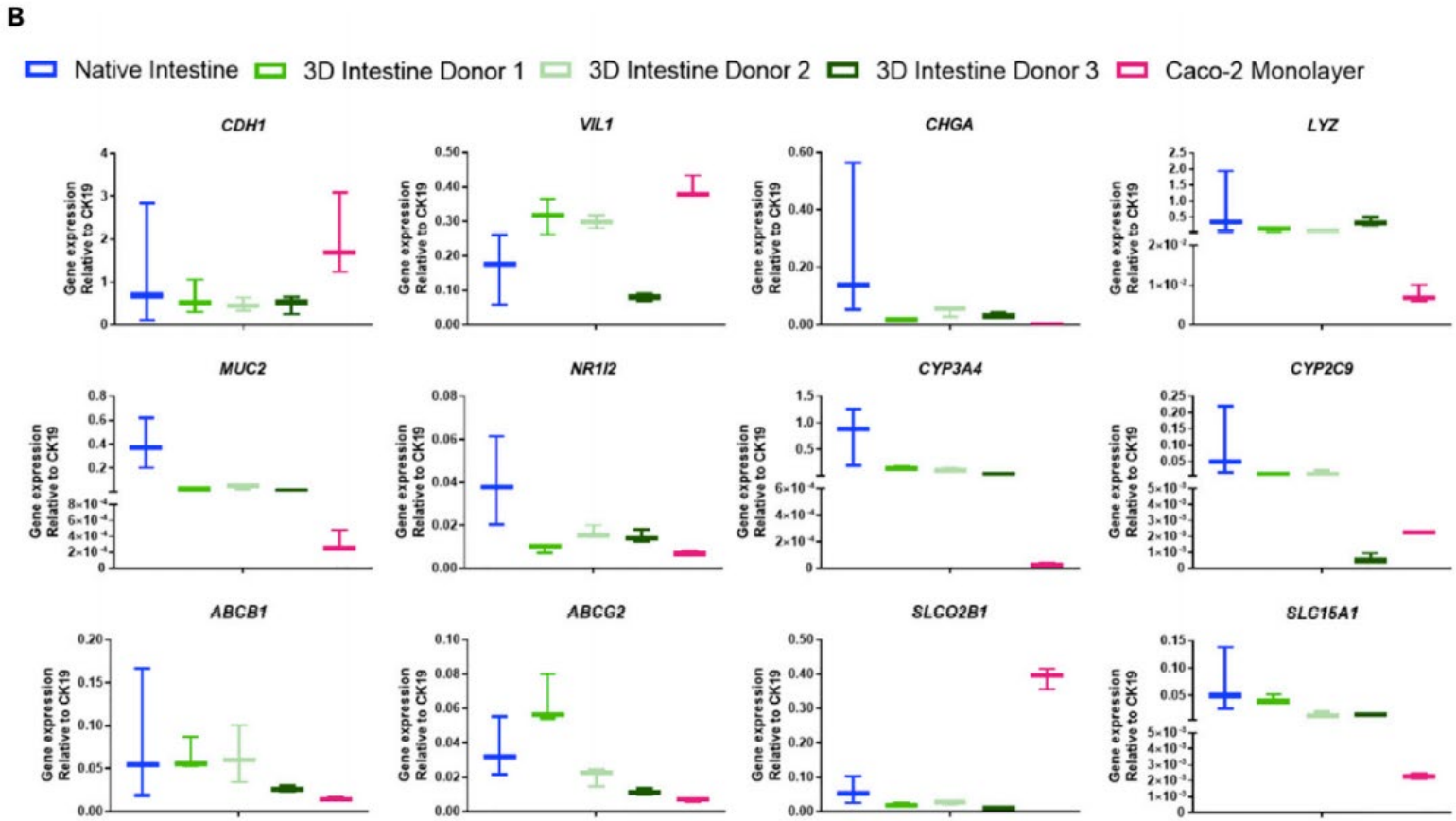
Bioprinted intestine shows permeability comparable to native tissue



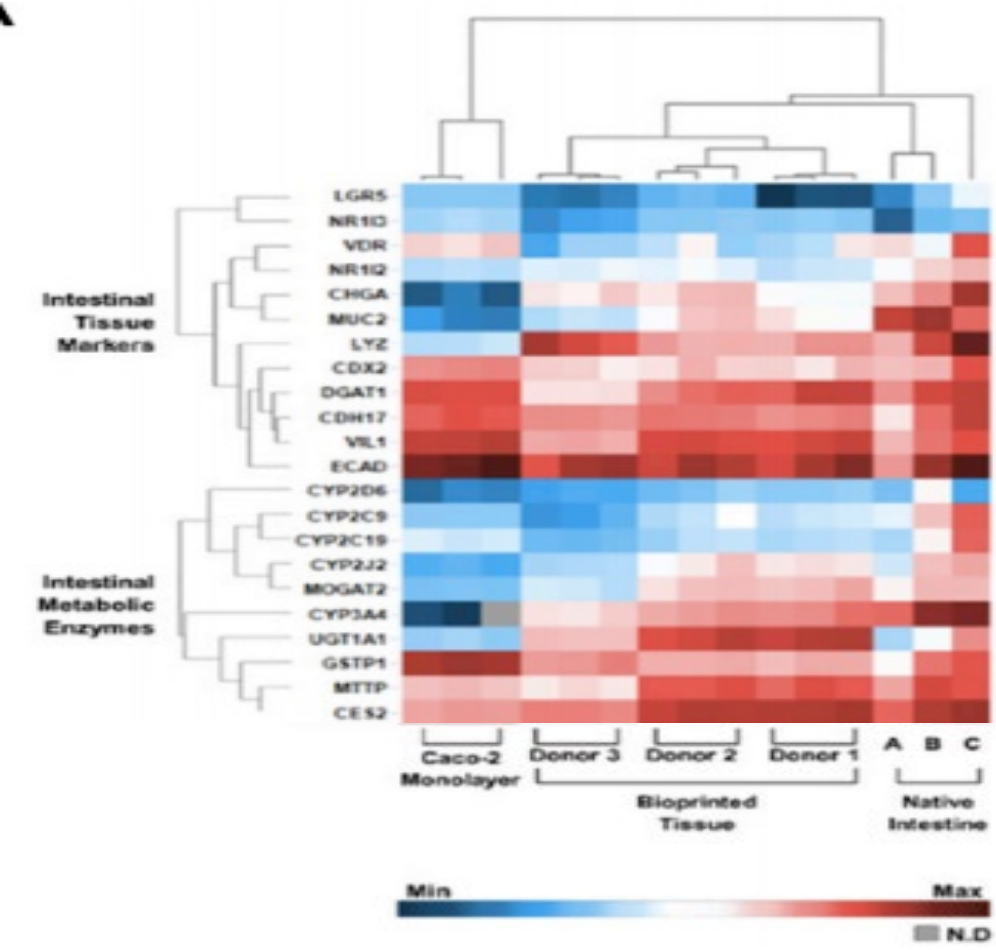
Bioprinted intestine has appropriate cytochrome P450 activity

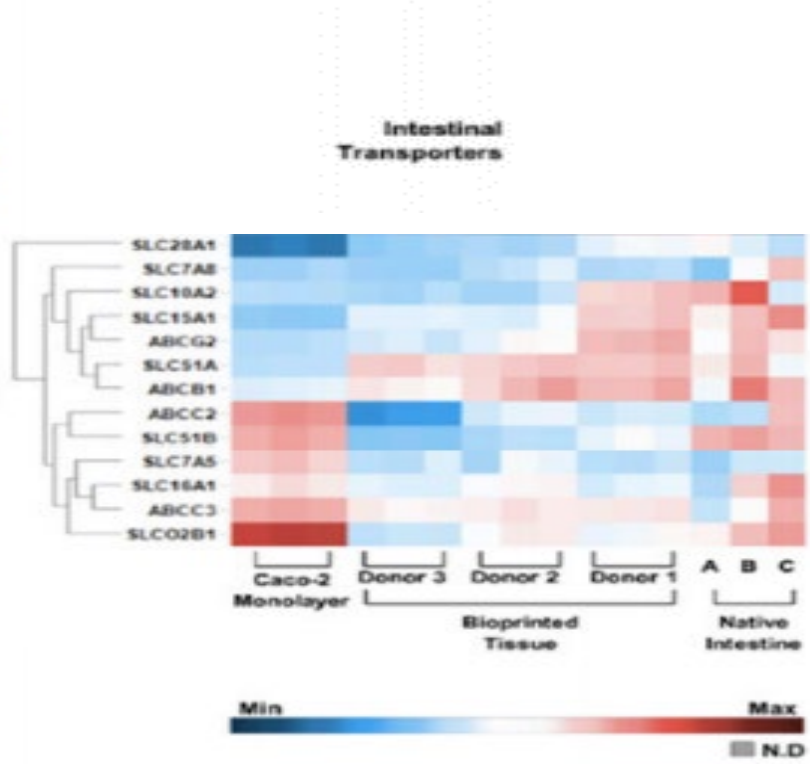


Bioprinted intestine gene expression compares very well to native intestine

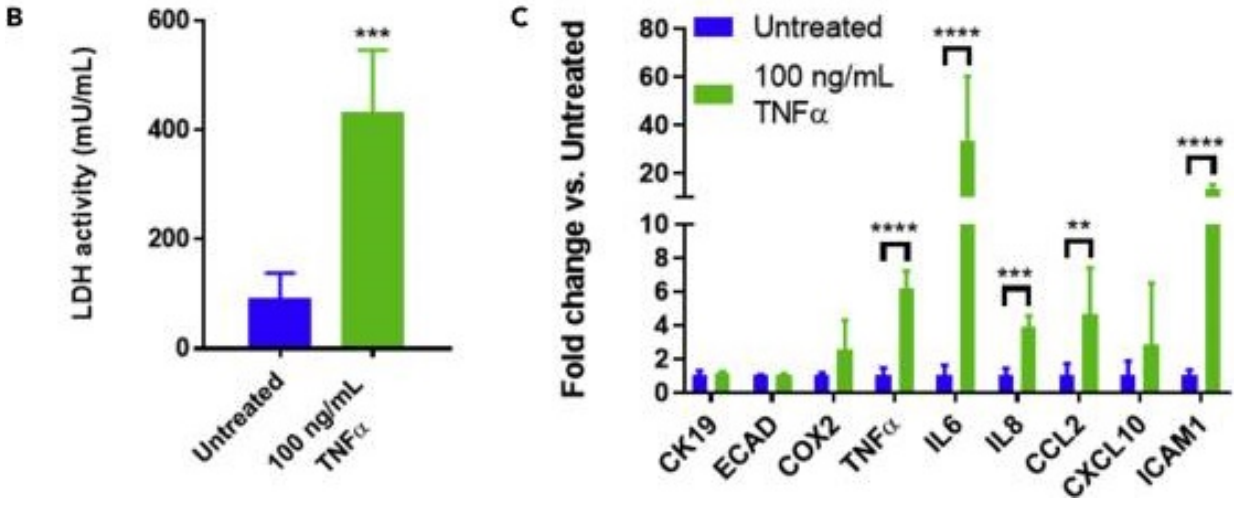


Bioprinted intestine and native tissue gene expression profiles are similar, unlike the typical CaCo-2 model





Treatment of bioprinted intestine with TNF-α induces inflammatory markers



Value Proposition

Many preclinical therapeutics companies receive high valuation from public markets

- Since 2018, significant valuations afforded preclinical companies in the public markets – valuations can be in the $500M-$1B range
- Follows the trend of earlier and earlier pharma M&A and deals
- We believe pharma is moving to earlier deals and creating higher value due to growth of the biotech space and pharma need to grow early pipeline
- **STAT News 2018 - "Preclinical biotech companies are having an IPO bonanza." A. Feuerstein, July 24, 2018.**
- **"Of the IPOs that went out in the first half of 2019, about half were preclinical or phase 1 at IPOs...," Norris told FierceBiotech… "In the top five, there were two to three preclinical or phase 1 companies," he said.[2]** (n.b.: there were also some preclinical companies in bottom)

[2] FierceBiotech **Top 10 biotech IPOs in 2019** Amirah Al Idrus Feb 24, 2020

Sample company comparable valuation

- Avidity Biosciences (NASDAQ: RNA)
  - IPO in 2020, raised $250M. Now trading with >$800M market capitalization*
  - Most advanced program still at “IND Enabling” stage currently
  - Partnered with Lilly in typical deal structure Organovo will expect from partner
  - Organovo believes it has the potential to be in similar position within 3 years

* As of February 8, 2021

Steps to Drug Candidates

Projected Multi Program Timeline

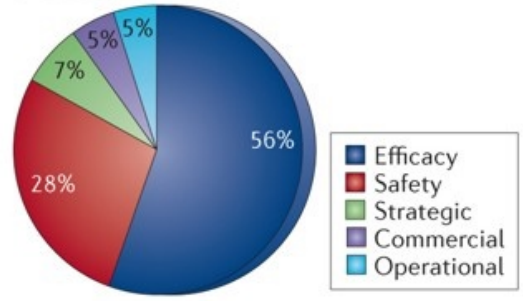
- Disease Model Building
  - 2021-2022
- Target Validation and Selection
  - 2021-2022
- Screening and Lead Compound Selection
  - 2022-2023
- Investigative New Drug (IND) Enabling Studies
  - 2023-2024
- IND Filings with FDA
  - 2024-2025

Organovo will seek to have multiple IND filings by end of 2025

Significant Potential Impact of 3D Human Disease Models Overall

- Clinical trial overall failure rate is 88%
- Largest cause of failure in Phase 2-3 is Efficacy issues
- If society can reduce those by 50%, and reduce safety issues by 25% using 3D,
- Clinical trial failure rate could then be 76%
- Such outcomes would double the number of drugs than can get approved per dollar of pharma clinical research spending
- Cost of development per approved drug could be reduced from $1.2B to $600M
  - Strong potential for reduced drug costs and ability to achieve ROI in more markets, saving more patients

Causes of Phase 2/3 failure



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