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### MPS Models

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Search:  Show  entries

View	Edit	Model Name	Center	Base Model	Organ	Device	Disease
<a href="#">View</a>	<a href="#">Edit</a>	2D Mono-layer Hepatocytes	University of Pittsburgh Drug Discovery Institute		Liver	96 Well Flat Clear Bottom Black Polystyrene TC-Treated	None
<a href="#">View</a>	<a href="#">Edit</a>	Hepatocyte Suspension	University of Pittsburgh Drug Discovery Institute		Liver	Eppendorf Tube 1.5 mL	None
<a href="#">View</a>	<a href="#">Edit</a>	Mimetas liver	University of Pittsburgh Drug Discovery Institute	Liver (Mimetas)	Liver	Mimetas Organoplate	None
<a href="#">View</a>	<a href="#">Edit</a>	Mimetas Liver 2.0	University of Pittsburgh Drug Discovery Institute	Liver (Mimetas)	Liver	Mimetas Organoplate 400	None
<a href="#">View</a>	<a href="#">Edit</a>	LAMPS	University of Pittsburgh Drug Discovery Institute	Liver (UPDDI)	Liver	Nortis Single Chamber	None
<a href="#">View</a>	<a href="#">Edit</a>	SQL-SAL 1.0	University of Pittsburgh Drug Discovery Institute	Liver (UPDDI)	Liver	Nortis Single chamber (v0.9)	None
<a href="#">View</a>	<a href="#">Edit</a>	SQL-SAL 1.0 CS Rhomb 24uL	University of Pittsburgh Drug Discovery Institute	Liver (UPDDI)	Liver	Rhombic Chamber Chip 24uL	None
<a href="#">View</a>	<a href="#">Edit</a>	SQL-SAL 1.5	University of Pittsburgh Drug Discovery Institute	Liver (UPDDI)	Liver	Nortis Single Chamber	None
<a href="#">View</a>	<a href="#">Edit</a>	vLAMPS	University of Pittsburgh Drug Discovery Institute	vLiver (UPDDI)	Liver	Micronit OOC	NAFLD

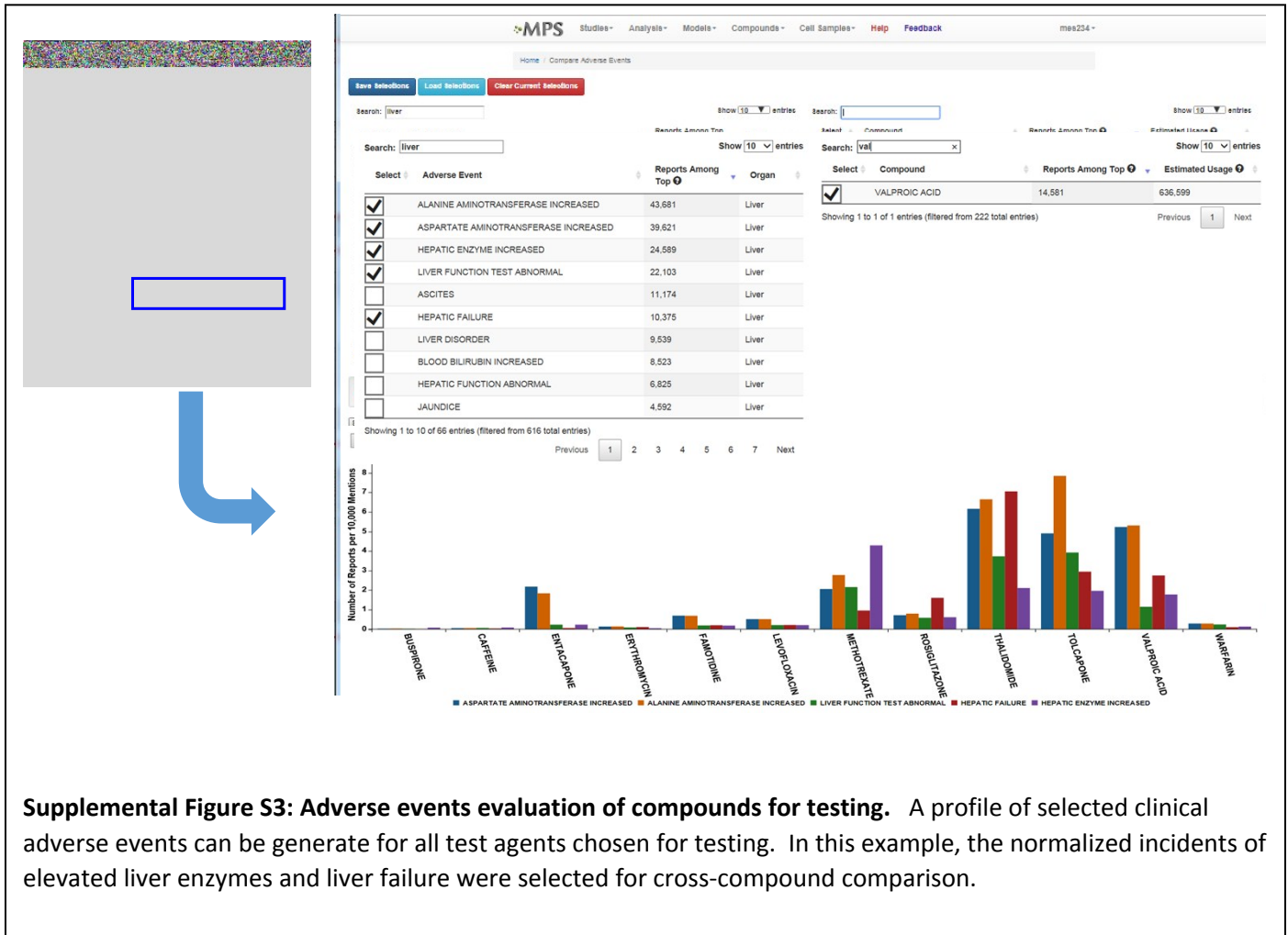
Showing 1 to 9 of 9 entries (filtered from 46 total entries) Previous  Next

**Supplemental Figure S1: Selecting the appropriate MPS experimental model.** The MPS database contains detailed bench ready protocols the user can print to assemble and test compounds in various liver models. In this example, the traditional 2D monolayer culture for toxicity and metabolism testing, the gold standard hepatocyte suspension culture for metabolism, a 4 cell organoid type 3D microfluidic liver system in a 96 well Mimetas® plate suitable for high throughput screening, the a 4 cell supervised/self assembly 3D microfluidic Liver Acinus MicroPhysiology (LAMPS) and the earlier version of the LAMPS called the Sequentially Layered, Self Assembly Liver (SQL-SAL) models, and the Vascularized Liver Acinus MicroPhysiology (vLAMPS) model are choices available to meet user needs. The models vary by cell number, types, organization and complexity for the user to select one appropriate to answer the experimental hypothesis.

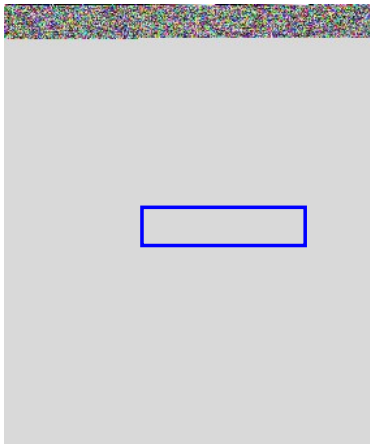
The screenshot shows the MPS Adverse Events interface. On the left, a 'Compounds' dropdown menu is open, with 'View Adverse Events' highlighted. A blue arrow points from this menu item to a table of adverse events. The table lists events for Tolcapone and Entacapone, including details like event type, number of reports, normalized reports, estimated usage, organ, and a black box warning icon.

View	Compound	Event	Number of Reports	Normalized # of Reports	Estimated Usage	Organ	Black Box Warning
<a href="#">View</a>	TOLCAPONE	ALANINE AMINOTRANSFERASE INCREASED	8	7.85	10,195	Liver	!
<a href="#">View</a>	TOLCAPONE	ASPARTATE AMINOTRANSFERASE INCREASED	5	4.90	10,195	Liver	!
<a href="#">View</a>	TOLCAPONE	BLOOD BILIRUBIN INCREASED	4	3.92	10,195	Liver	!
<a href="#">View</a>	TOLCAPONE	LIVER FUNCTION TEST ABNORMAL	4	3.92	10,195	Liver	!
<a href="#">View</a>	ENTACAPONE	ASPARTATE AMINOTRANSFERASE INCREASED	40	2.29	174,449	Liver	
<a href="#">View</a>	ENTACAPONE	ALANINE AMINOTRANSFERASE INCREASED	34	1.95	174,449	Liver	
<a href="#">View</a>	ENTACAPONE	HEPATIC FUNCTION ABNORMAL	25	1.43	174,449	Liver	
<a href="#">View</a>	ENTACAPONE	GAMMA-GLUTAMYLTRANSFERASE INCREASED	20	1.15	174,449	Liver	
<a href="#">View</a>	ENTACAPONE	LIVER DISORDER	17	0.97	174,449	Liver	

**Supplemental Figure S2: Selecting the appropriate compounds for testing.** Clinical adverse events reporting records are contained within the database. In this example, filters are used to identify compounds with black box warning (!) for liver toxicity, increased incidents of liver enzyme elevations and suitable compounds without liver effects from all reported adverse events found in the FDA Adverse Events Reporting System (**FAERS**) to test in the LAMPS model. The incidents of adverse events found in the FAERS database are 'normalized' to estimated drug use from the CDC database.



**Supplemental Figure S3: Adverse events evaluation of compounds for testing.** A profile of selected clinical adverse events can be generate for all test agents chosen for testing. In this example, the normalized incidents of elevated liver enzymes and liver failure were selected for cross-compound comparison.



MPS Studies Analysis Models Compounds Cell Samples Help Feedback mes234

Home / Drug Trials

### Drug Trials

Show MPS  Show EPA  Show TCTC  Show Unassigned

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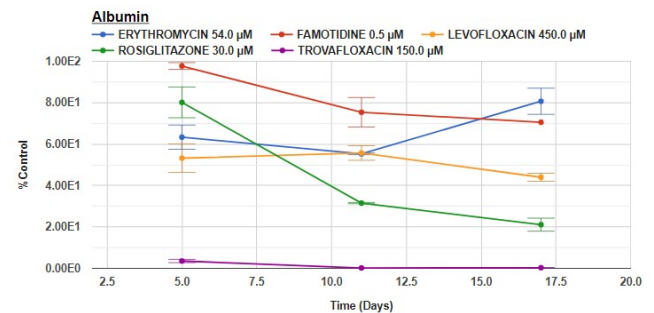
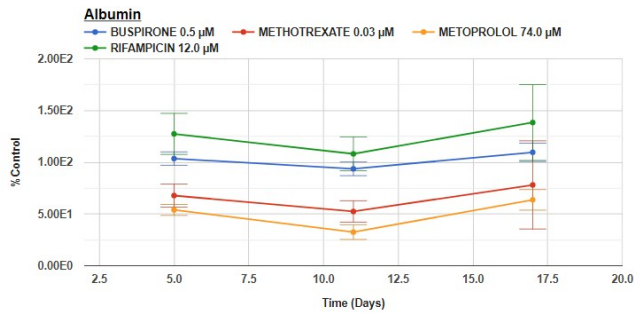
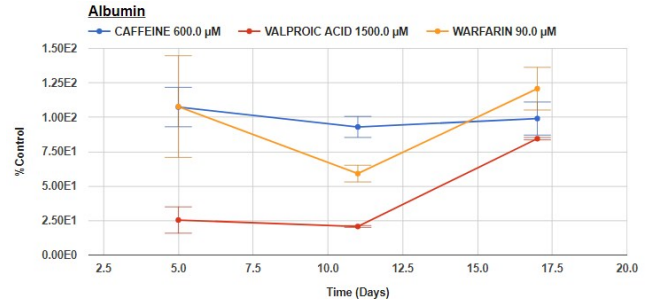
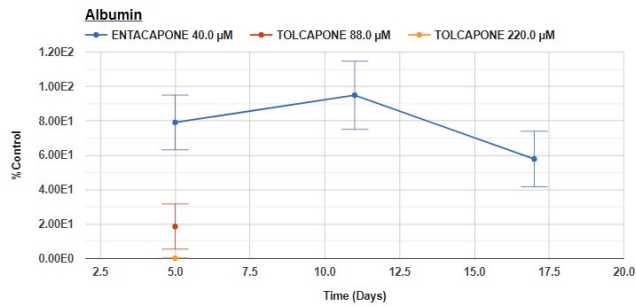
Search:  Show 50 entries

View	Drug Trial ID	Treatment	Species	Trial Type	Finding	Descriptor	+/-	Frequency	Value	Value Units
<a href="#">View</a>	187	ACETAMINOPHEN	Human	Clinical	Blood :: PK :: Cmax		Pos		21.0	µg/mL
<a href="#">View</a>	174	ENTACAPONE	Human	Clinical	Blood :: PK :: Cmax		Pos		1.22	µg/mL
<a href="#">View</a>	184	NIMESULIDE	Human	Clinical	Blood :: PK :: Cmax		Pos		6.5	µg/mL
<a href="#">View</a>	178	TOLCAPONE	Human	Clinical	Blood :: PK :: Cmax		Pos		7.2	µg/mL
<a href="#">View</a>	172	TROGLITAZONE	Human	Clinical	Blood :: PK :: Cmax		Pos		2.82	µg/mL
<a href="#">View</a>	178	TOLCAPONE	Human	Clinical	Blood :: PK :: Cmax		Pos		7.2	µg/mL
<a href="#">View</a>	172	TROGLITAZONE	Human	Clinical	Blood :: PK :: Cmax		Pos		2.82	µg/mL

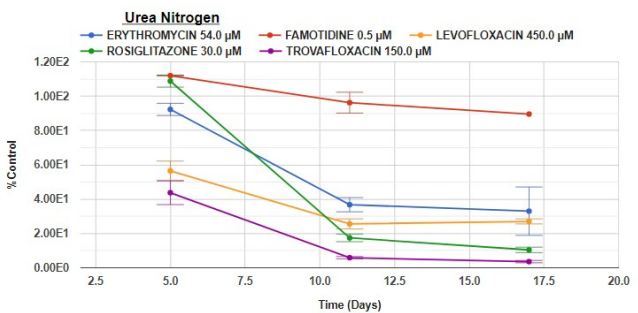
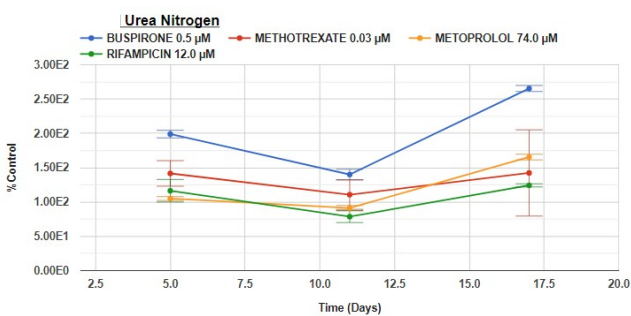
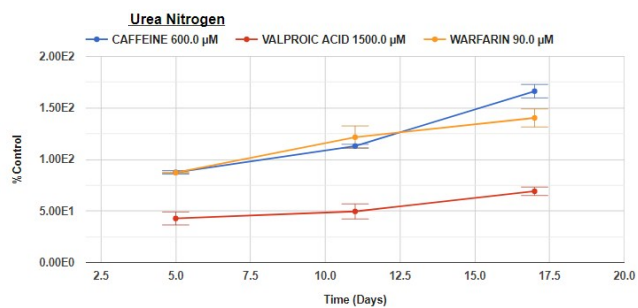
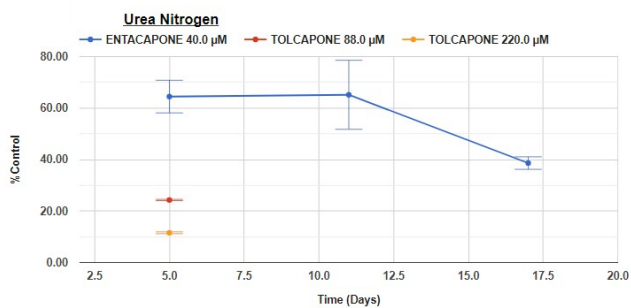
Funded by the National Center for Advancing Translational Sciences Tissue Chips Program, the National Center for Advancing Translational Sciences Tissue Chip Testing Centers Program, and in part by the Vanderbilt-Pittsburgh Resource for Organotypic Models for Predictive Toxicology

Contribute on Github

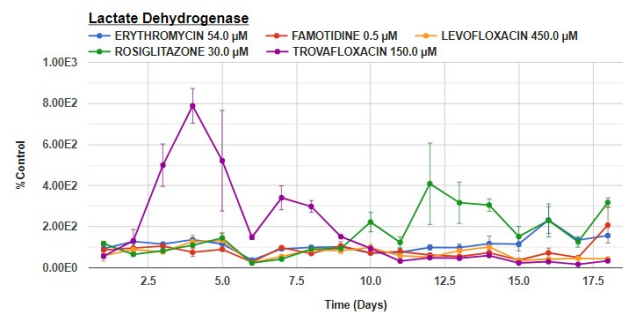
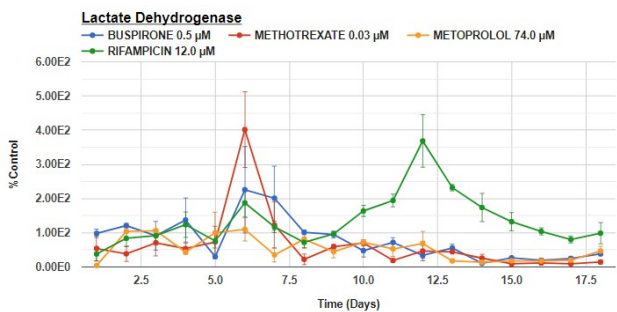
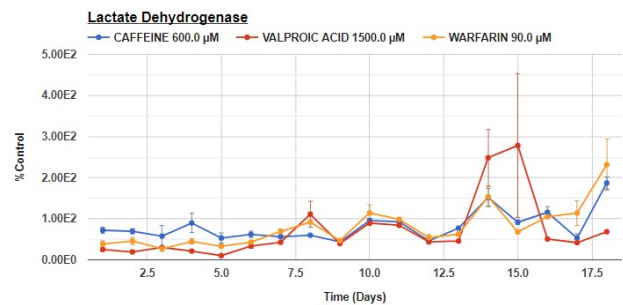
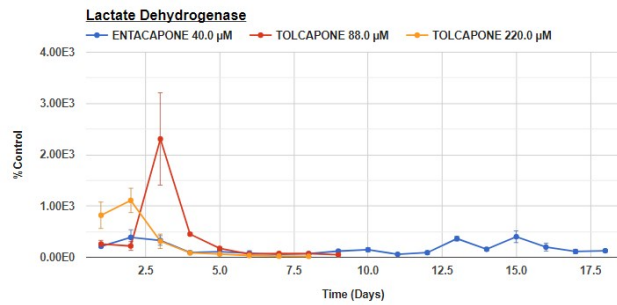
**Supplemental Figure S4: Selecting the appropriate testing concentration.** A list of compound Cmax values can be generated in the database to guide test agent concentration for testing.



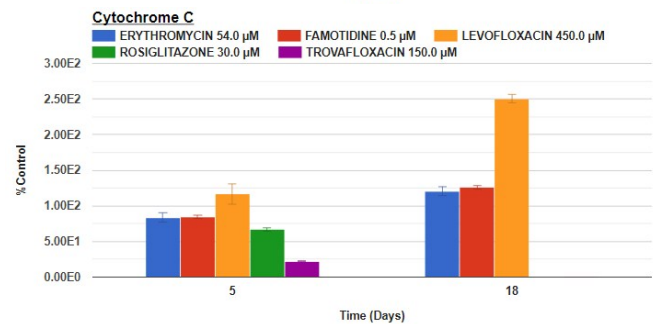
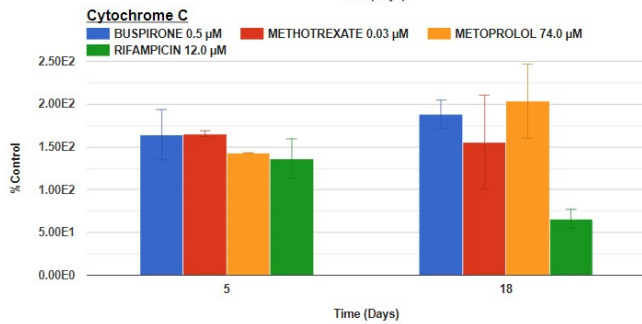
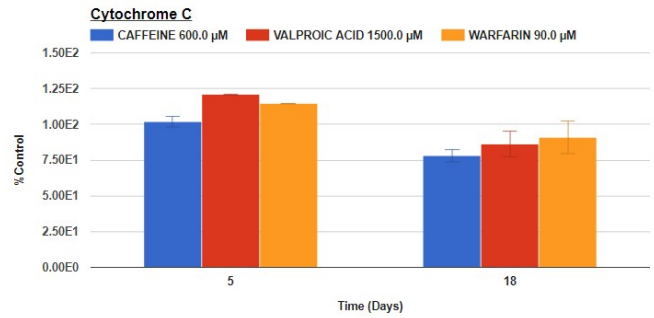
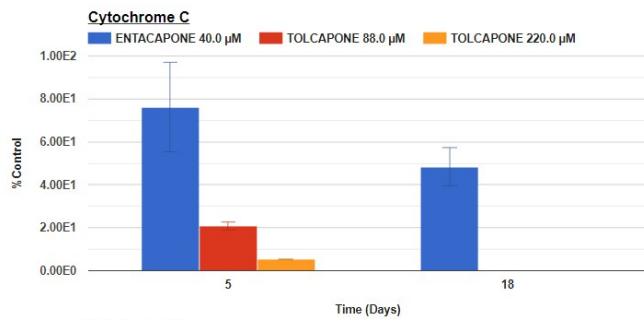
**Supplemental Figure S5. Albumin data from 14 compounds.** Data are measured as ng/ml and normalized to percent of the control response in efflux media collected on Days 5, 11 and 17. The MPS experimental models in duplicate or triplicate devices were treated 18 consecutive days by continuous perfusion flow to entacapone (40 μM); tolcapone (88 μM), tolcapone (220 μM); caffeine (600 μM); Valproic Acid (1500 μM); Warfarin (90 μM); Buspirone (0.5 μM); Methotrexate (0.03 μM); Rifampicin (12 μM); Erythromycin (54 μM); Famotidine (0.5 μM); Levofloxacin (600 μM); Rosiglitazone (30 μM) or Trovafloxacin (200 μM).



**Supplemental Figure S6. BUN data from 14 compounds.** Data are measured as ng/ml and normalized to percent of the control response in efflux media collected on Days 5, 11 and 17. The MPS experimental models in duplicate or triplicate devices were treated 18 consecutive days by continuous perfusion flow to entacapone (40 μM); tolcapone (88 μM), tolcapone (220 μM); caffeine (600 μM); Valproic Acid (1500 μM); Warfarin (90 μM); Buspirone (0.5 μM); Methotrexate (0.03 μM); Rifampicin (12 μM); Erythromycin (54 μM); Famotidine (0.5 μM); Levofloxacin (600 μM); Rosiglitazone (30 μM) or Trovafloxacin (200 μM).



**Supplemental Figure S7. LDH data from 14 compounds.** Data are measured as ng/ml and normalized to percent of the control response in efflux media collected on Days 1 - 18. The MPS experimental models in duplicate or triplicate devices were treated 18 consecutive days by continuous perfusion flow to entacapone (40  $\mu\text{M}$ ); tolcapone (88  $\mu\text{M}$ ), tolcapone (220  $\mu\text{M}$ ); caffeine (600  $\mu\text{M}$ ); Valproic Acid (1500  $\mu\text{M}$ ); Warfarin (90  $\mu\text{M}$ ); Buspirone (0.5  $\mu\text{M}$ ); Methotrexate (0.03  $\mu\text{M}$ ); Rifampicin (12  $\mu\text{M}$ ); Erythromycin (54  $\mu\text{M}$ ); Famotidine (0.5  $\mu\text{M}$ ); Levofloxacin (600  $\mu\text{M}$ ); Rosiglitazone (30  $\mu\text{M}$ ) or Trovafloxacin (200  $\mu\text{M}$ ).

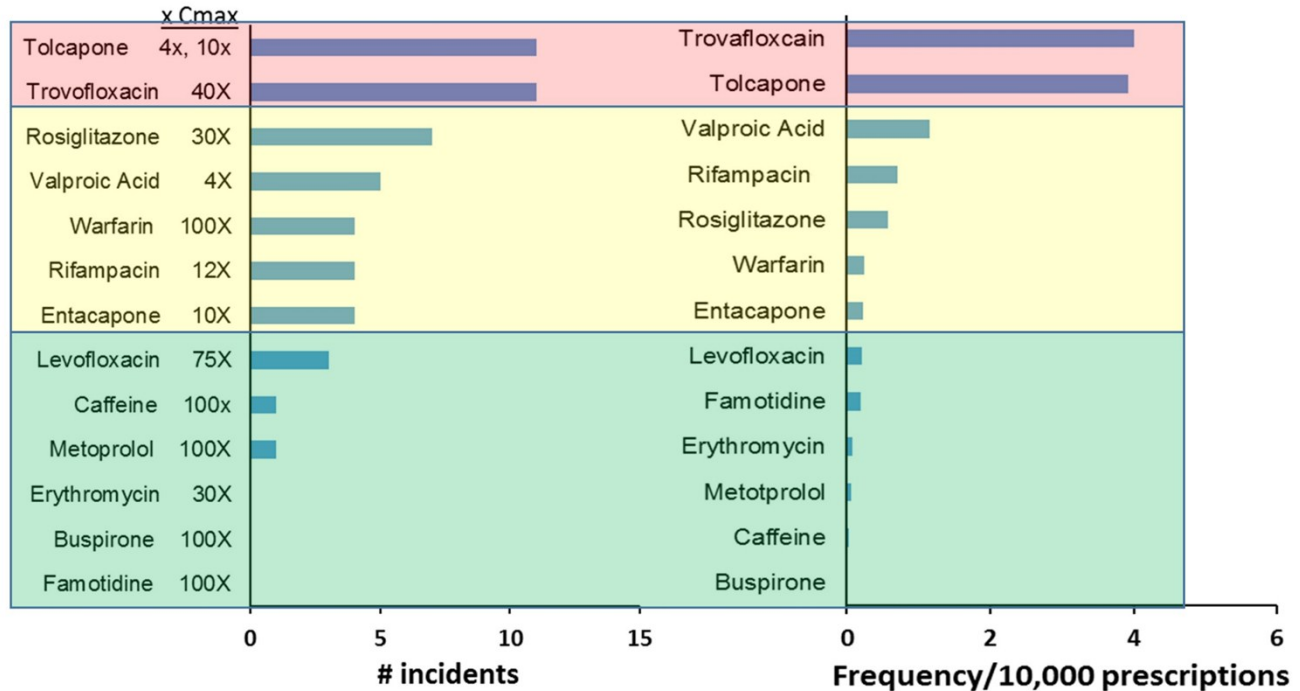


**Supplemental Figure S8. Cytochrome C data from 14 compounds.** A High Content Analysis instrument was used to measure fluorescent intensity on Days 5 and 18 of the mitochondria located Cytochrome C GFP biosensor. The data was normalized to control levels. The MPS experimental models in duplicate or triplicate devices were treated 18 consecutive days by continuous perfusion flow to entacapone (40  $\mu\text{M}$ ); tolcapone (88  $\mu\text{M}$ ), tolcapone (220  $\mu\text{M}$ ); caffeine (600  $\mu\text{M}$ ); Valproic Acid (1500  $\mu\text{M}$ ); Warfarin (90  $\mu\text{M}$ ); Buspirone (0.5  $\mu\text{M}$ ); Methotrexate (0.03  $\mu\text{M}$ ); Rifampicin (12  $\mu\text{M}$ ); Erythromycin (54  $\mu\text{M}$ ); Famotidine (0.5  $\mu\text{M}$ ); Levofloxacin (600  $\mu\text{M}$ ); Rosiglitazone (30  $\mu\text{M}$ ) or Trovafloxacin (200  $\mu\text{M}$ ).



**Test Compounds ranked by cumulative incidents of adverse responses in LAMPS**

**Test Compounds ranked by frequency of clinical abnormal liver function tests\***



• Data from the FDA FAERS database

**Supplemental Figure S9.** Increasing Incidents of Adverse Responses in LAMPS and Tracked FAERS Data by Clinical Hepatotoxicity in the MPS-Db. Pink designates hepatotoxic compounds, yellow designates DILI compounds and green designate non liver toxic compounds. Although the absolute order varies slightly between the in vitro and clinical assessments of liver toxicity, the overall concordance can be accurately categorized.

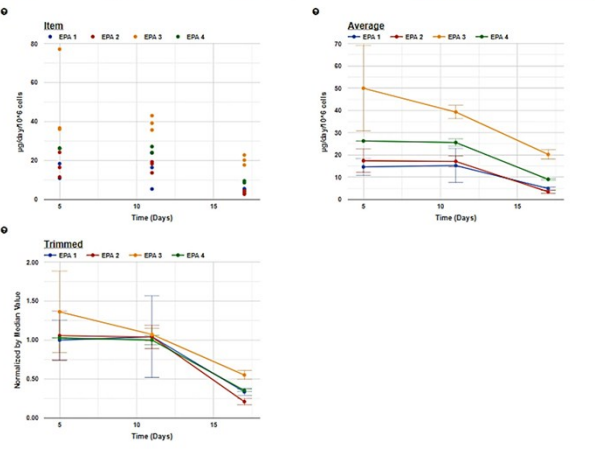
**A.**

Reproducibility Status: **Excellent (ICC)**

Selection Parameters

Target/Analyte	Albumin
Value Unit	µg/day/10 <sup>6</sup> cells
Sample Location	Effluent
Compounds	No Compounds-
Cells	endothelial (Human Vasculature) Chamber; hepatocyte (Human Liver) Chamber; monocyte (Human Immune) Chamber; stroma (Human Liver) Chamber;
Items with Same Treatment	N0168, N0200, N0235, N0268, N0269, N0280, N0271, N0272, N0273, N0285, N0286
Studies	EPA 1 (Taylor_EPA) Reproducibility Status: <b>Acceptable (ICC)</b> EPA 2 (Taylor_EPA) Reproducibility Status: <b>Acceptable (ICC)</b> EPA 3 (Taylor_EPA) Reproducibility Status: <b>Acceptable (ICC)</b> EPA 4 (Taylor_EPA) Reproducibility Status: <b>Excellent (ICC)</b>

Interpolation	Max CV or CV	ICC	ANOVA P-Value	Reproducibility Status
Trimmed	10.81	0.8245		<b>Excellent (ICC)</b>



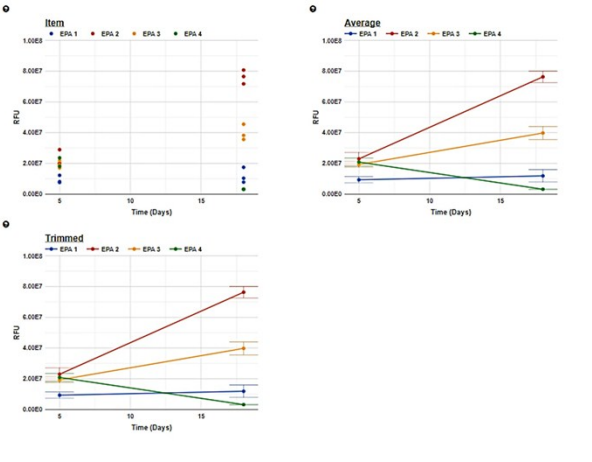
**B.**

Reproducibility Status: **Poor (ICC)**

Selection Parameters

Target/Analyte	Cytochrome C
Value Unit	RFU
Sample Location	Chamber
Compounds	No Compounds-
Cells	endothelial (Human Vasculature) Chamber; hepatocyte (Human Liver) Chamber; monocyte (Human Immune) Chamber; stroma (Human Liver) Chamber;
Items with Same Treatment	N0168, N0200, N0235, N0268, N0269, N0280, N0271, N0272, N0273, N0285, N0286
Studies	EPA 1 (Taylor_EPA) Reproducibility Status: <b>Poor (ICC)</b> EPA 2 (Taylor_EPA) Reproducibility Status: <b>Excellent (ICC)</b> EPA 3 (Taylor_EPA) Reproducibility Status: <b>Excellent (ICC)</b> EPA 4 (Taylor_EPA) Reproducibility Status: <b>Excellent (ICC)</b>

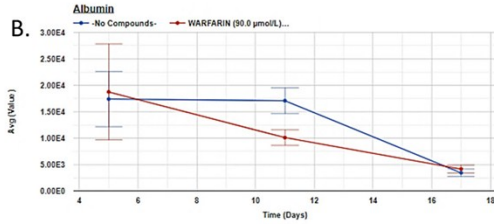
Interpolation	Max CV or CV	ICC	ANOVA P-Value	Reproducibility Status
Trimmed	100.7	-0.01023		<b>Poor (ICC)</b>



**Supplemental Figure S10: Detailed analysis of inter-study reproducibility assessment.** The detailed analysis shows the data used to calculate the inter-study reproducibility with links to the individual items (with same treatment) and the studies being compared. The intra-study reproducibility status is given for the samples in each of the studies being compared. The graphs show the individual data points for each of the samples (Items), the average value of the samples and a trimmed version of the average graph showing only the time points that overlapped between the studies. A) Albumin study to study reproducibility; and B) Cytochrome C study to study reproducibility.

Show Details	Compounds	# of Chips	# of Time Points
<input checked="" type="checkbox"/>	-No Compounds-	3	3
<input checked="" type="checkbox"/>	WARFARIN (90.0 µmol/L) Added on: D00 H00 M00; Duration of: D29 H00 M00; Added to: Influent	2	3

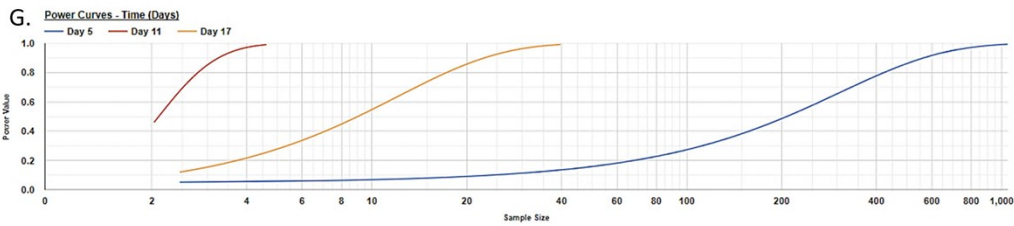
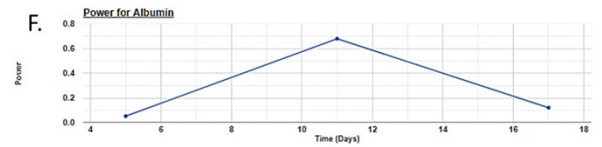
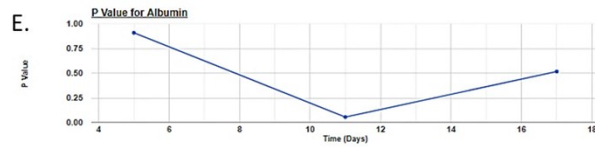
Showing 1 to 5 of 5 entries



**C. Effect Size Methods**

- Cohen's d
- Glass's Δ
- Hedges' g
- Hedges' g'

**D. Significance Level (α)**



Include	Time Points
<input checked="" type="checkbox"/>	5
<input checked="" type="checkbox"/>	11
<input checked="" type="checkbox"/>	17

**Supplemental Figure S11. Additional information generated to assess the human MPS experimental model by Power Analysis.** In this example, the effect of warfarin on albumin secretion is being compared with the no compound control. The user selects the treatments to be analyzed (A) and a graph of the experimental data is generated (B). The user then selects the desired method of calculating the effect size (C, see Methods and Materials), the desired significance level (D), and runs the analysis. The p-values and the power values for the difference between the samples is plotted for each point on the data curve (E and F, respectively). Finally, a power curve is generated showing the required sample size to achieve different statistical power values for the given dataset (G). See Figure 6 for selecting the Target/Analyte to analyze, power estimates for different sample sizes and estimates for different sample sizes.

Disease Overview

Disease Biology

Clinical Data

Disease Models &amp; Studies

## Metastatic Breast Cancer Disease Biology

"Breast cancer is the leading cause of cancer death among women worldwide. The vast majority of breast cancers are carcinomas that originate from cells lining the milk-forming ducts of the mammary gland. The molecular subtypes of breast cancer, which are based on the presence or absence of hormone receptors (estrogen and progesterone subtypes) and human epidermal growth factor receptor-2 (HER2), include: hormone receptor positive and HER2 negative (luminal A subtype), hormone receptor positive and HER2 positive (luminal B subtype), hormone receptor negative and HER2 positive (HER2 positive), and hormone receptor negative and HER2 negative (basal-like or triple-negative breast cancers (TNBCs)). Hormone receptor positive breast cancers are largely driven by the estrogen/ER pathway. In HER2 positive breast tumours, HER2 activates the PI3K/AKT and the RAS/RAF/MAPK pathways, and stimulate cell growth, survival and differentiation. In patients suffering from TNBC, the deregulation of various signalling pathways (Notch and Wnt/beta-catenin), EGFR protein have been confirmed. In the case of breast cancer only 8% of all cancers are hereditary, a phenomenon linked to genetic changes in BRCA1 or BRCA2. Somatic mutations in only three genes (TP53, PIK3CA and GATA3) occurred at >10% incidence across all breast cancers."

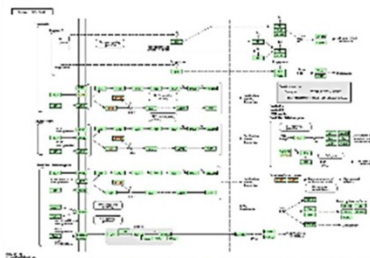
Reference: KEGG Breast Cancer

## Metastatic Breast Cancer Genomic Resources

### Genomic Databases

Name	Description
<a href="#">Gene Expression Omnibus</a>	The Gene Expression Omnibus (GEO) is a public repository that archives and freely distributes comprehensive sets of microarray, next-generation sequencing, and other forms of high-throughput functional genomic data submitted by the scientific community. The disease biology portal delivers a prequeried link to the most relevant archives.
<a href="#">OMIM Gene-Phenotype Relationship</a>	OMIM is a comprehensive, authoritative compendium of human genes and genetic phenotypes with full-text, referenced overviews of all known Mendelian disorders. The disease biology portal delivers a curated query of the most relevant genes.
<a href="#">DISEASES.org</a>	DISEASES is a weekly updated web resource that integrates evidence on disease-gene associations from automatic text mining, manually curated literature, cancer mutation data, and genome-wide association studies. The disease biology portal provides a query that displays disease relevant search results.

### KEGG: Metastatic Breast Cancer Disease Entry



Click to view an interactive pathway map for Metastatic Breast Cancer.

## Proteomics, Metabolomics, and Pharmacogenomic Resources

### ProteomicsDB by SAP

ProteomicsDB by SAP is a proteomic database that allows you to browse proteins and chromosomes of interest.

### Metabolomicsworkbench

Metabolomicsworkbench serves as a national and international repository for metabolomics data.

### PharmaGKB

PharmaGKB is a website that investigates genetic variations and how the body

### DrugBank

DrugBank is a unique bioinformatics and cheminformatics database that combines

**Supplemental Figure S12. Disease Biology portal.** The [Disease Biology](#) portal allows the user to link to various genomic, proteomics, metabolomics, and pharmacogenomic databases. The links on this page are automatically pre-queried for the disease of interest.

## Metastatic Breast Cancer Clinical Data

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[Copy](#) [CSV](#) [Print](#) [Column visibility](#)

Search:

Show **50** entries

View	Drug Trial ID	Compound	Species	Trial Type	Finding	Descriptor	+/-	Frequency	Value	Value Units
<a href="#">View</a>	225	EVEROLIMUS 10.0 mg   Exemestane 25.0 mg	Human	Clinical	All :: Other :: No Toxicity	Progression Free Survival	Pos			
<a href="#">View</a>	225	Exemestane 25.0 mg	Human	Clinical	All :: Other :: No Toxicity	Progression Free Survival	Pos			
<a href="#">View</a>	227	Fulvestrant 500.0 mg	Human	Clinical	All :: Other :: No Toxicity	Progression Free Survival	Pos			
<a href="#">View</a>	226	LETROZOLE 2.5 mg	Human	Clinical	All :: Other :: No Toxicity	Progression Free Survival	Pos			
<a href="#">View</a>	226	LETROZOLE 2.5 mg	Human	Clinical	All :: Other :: No Toxicity	Progression Free Survival	Pos			
<a href="#">View</a>	227	Palbociclib 125.0   Fulvestrant 500.0 mg	Human	Clinical	All :: Other :: No Toxicity	Progression Free Survival	Pos			

Showing 1 to 6 of 6 entries

Previous **1** Next

[Review Completed Drug Trials](#)

**Supplemental Figure S13. Clinical Data portal.** The [Clinical Data](#) portal provides curated information on key drugs for the disease. Each of the drug entries here has a link to the original clinical study allowing for users to access more details of the study. The [Review Completed Drug Trials](#) button on the bottom queries ClinicalTrials.gov for the disease of interest and allows the user to view all the current and closed clinical trials of compounds for treating the disease where results have been reported.

## Metastatic Breast Cancer Disease Models & Studies

[Disease Overview](#) [Disease Biology](#) [Clinical Data](#) [Disease Models & Studies](#)

### Metastatic Breast Cancer Disease Models

Show MPS  Show EPA  Show TCTC  Show Unassigned

[Copy](#) [CSV](#) [Print](#) [Column visibility](#)

Search:  Show 100 entries

View	Edit	Model Name	Organ	Device	Center	Description
<a href="#">View</a>	<a href="#">Edit</a>	LAMPS MCF7 Metastatic Breast Cancer Model	Liver	Nortis Single Chamber	University of Pittsburgh Drug Discovery Institute	This model is the Nortis Device equivalent to the 96 MCF7 Metastatic Breast Cancer Co-Culture Model. It contains the 4-cell types from the LAMPS model with the addition of the various MCF7 mutant cells
<a href="#">View</a>	<a href="#">Edit</a>	LAMPS MCF7 Metastatic Breast Cancer Plate Model	Liver	96 Well Plate	University of Pittsburgh Drug Discovery Institute	In order to verify growth patterns in the LAMPS microfluidic model with the addition of MCF7 breast cancer mutant cells a static plate co-culture model consisting of the 4 cell types of the liver and the addition of the MCF7 mutant cells was created.
<a href="#">View</a>	<a href="#">Edit</a>	MCF7 Metastatic Breast Cancer Monoculture Model	Liver	96 Well Plate	University of Pittsburgh Drug Discovery Institute	Single MCF7 Mutant in a plate

Showing 1 to 3 of 3 entries [Previous](#) [1](#) [Next](#)

### Studies Using Metastatic Breast Cancer Disease Models

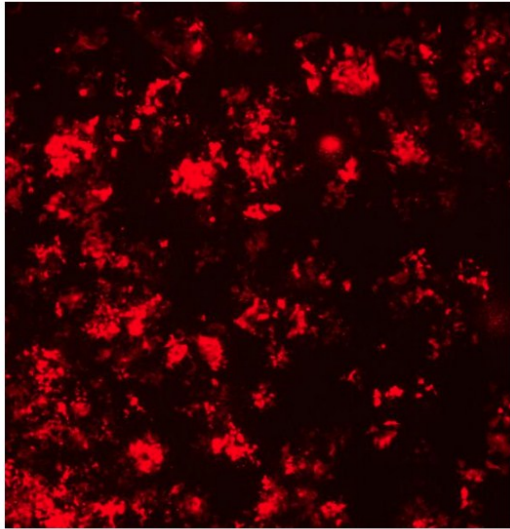
[Copy](#) [CSV](#) [Print](#) [Column visibility](#)

Search:  Show 50 entries

View/Edit	Study Name	Start Date	Study Types	MPS Models	Data Points	Images	Creator	Group	Review
<a href="#">View/Edit</a>	UPDDI-CC-2019-02-25-MBC 3D Relationship Between Hepatocytes and MCF7 Cells	Feb 25, 2019	CC	LAMPS MCF7 Metastatic Breast Cancer Model	0	0	Dillon Gavlock	Taylor_MPS	
<a href="#">View/Edit</a>	UPDDI-DM-2018-07-10-Effect of AZD9498 on growth of MCF7 Y537S Mutant Cells	Jul 10, 2018	DM	LAMPS MCF7 Metastatic Breast Cancer Model	56	0	Dillon Gavlock	Taylor_MPS	
<a href="#">View/Edit</a>	UPDDI-DM-2018-03-23-MCF7 Monoculture Plate Study 2	Mar 23, 2018	DM	MCF7 Metastatic Breast Cancer Monoculture Model	114	72	Dillon Gavlock	Taylor_MPS	

**Supplemental Figure S14. Disease Models & Studies portal.** The [Disease Models & Studies](#) portal provides a list of all in vitro experimental models and studies in the MPS-Db for the disease of interest. All of the information for the experimental models and studies is easily accessible through the View and View/Edit links.

### Tumor Cells (mCherry | RED)



Note: This image may have been altered to assist with viewing.  
To perform analysis, please download the unaltered image.

Chip ID	N0341
Assay Plate ID	none
Assay Well ID	none
Time	D9 H0 M0
Method/Kit	Protein Fluorescence (mCherry)
Target-Stain Pairings	Tumor Cells (mCherry, red)
Target/Analyte	Tumor Cells
Sample Location	Chamber
Notes	This is one in a time series of images showing cell proliferation.
Image File Name	Y537S +E2 D9 B.tif
Image Field	2
Image Magnification	1.0x
Image Resolution	2.2 $\mu$ m
Image Sample Label	mCherry
Image Wavelength (ex/em nm)	587/610
Image Color Mapping	red
Image Setting Note	

**Supplemental Figure 15: Images and video data are also supported in the MPS-Db.** Day 9 growth of mCherry containing MCF7 Y537S cells in the MPS device. The metadata contains the information on device number, day of exposure, magnification and fluorescent wavelengths. Images can also be downloaded as tif files for additional analysis.

**Supplemental Table S1.** List of methods used to generate data for a variety of targets in different MPS organ models, which have been uploaded into the MPS-Db.

Assay Category	Target	Method/Kit	Organ Models in MPS-Db													
			Adipose	Bone	Brain	Heart	Intestine	Kidney	Liver	Skeletal Muscle	Skin	Vasculature	Liver Metastasis			
Cell morphology/function	Beat Interval	Microscopy Video Quantification (MotionGUI)				x										
	Beat Rate	EarlyTox Cardiotoxicity Kit, Microscopy Video Quantification (Manual, MotionGUI)				x										
	Bile Efflux	Bile Efflux, Image Algorithm (UPDDI)									x					
	Collagen	Picosirius Red Stain Kit (Polysciences: 24901-250)	x													
	Contractile Force	Force Transducer (Thorlabs)										x				
	Contraction Velocity	Microscopy Video Quantification (MotionGUI)				x										
	CYP3A4	P450-Glo CYP3A4 Assays (Promega: V9001)									x					
	Decay/Rise Ratio	EarlyTox Cardiotoxicity Kit (Molecular Devices: R8211)				x										
	Dextran-FITC (10kDa)	Fluorescence (490/525) (Sigma-Aldrich: FD10S)			x		x									
	E-Cadherin	anti-E-Cadherin									x					
	Fatty Acid	BODIPY 500/510 C1, C12 (ThermoFisher: D3823)	x									x				
	Glucose Uptake	Flow-through Biosensor B.LV5										x				
	Image	ICC/IFC (DAPI, FITC, Cy5), Live imaging, Phase Contrast										x				
	Lipid Droplets, Lipid to Nuclei Ratio	Lonza AdipoRed Assay Reagent (Lonza: PT-7009), Hoechst 33342	x													
	Maximum Elongation	Stimulation and Microscopy Video Quantification (1, 5, 10, or 20 Hz)											x			
	Neutral lipids	BODIPY 493/503 (ThermoFisher: D3922)	x													
	Relaxation Velocity	Microscopy Video Quantification (MotionGUI)				x										
	Steatosis (macro and micro)	HCS LipidTOX Red Neutral Lipid Stain (Thermo: H34476)										x				
	Transepithelial Electrical Resistance	EVOM2 Volt/Ohm Meter (WPI: 300523)					x									
	Tumor Area, Intensity	Protein Fluorescence (DAPI, Texas Red) with Quantification (ImageJ, AngioTool)													x	
Tumor Integrated Intensity	mCherry 587/610														x	
Vessel Area, Length, Junctions	Protein Fluorescence (DAPI, Texas Red) with Quantification (ImageJ, AngioTool)													x		
Cell viability/proliferaton/toxicity	Cell Viability (Quantitative)	CellTiter-Glo Luminescent Cell Viability Assay (Promega: G7573)					x			x				x		
	Cellular Metabolism	MTT Assay Kits									x			x		
	Lactate Dehydrogenase	Multiple commercial kits	x	x	x				x	x				x		
	Live Cells / Dead Cells	LIVE/DEAD Cell Imaging Kits	x						x	x						
	Mitochondria	Fluorescence (490/525)									x					
	PrestoBlue	PrestoBlue Cell Viability (ThermoFisher: A13261, A13262)	x	x	x				x	x				x		
	Tumor Growth	Cell Proliferation Kit II (XTT) (Sigma: 11465015001)													x	
	WST-1	WST-1 Assay Reagent - Cell Proliferation (ready to use) (ab155902)														x
Compound Level	User define compound(s) of interest	RapidFire-MS, HPLC-MS, LC-MS/MS, ICP-MS, IM/MS		x	x	x	x	x	x	x			x			
Device Characterization	Flowrate	Flowrate (by setting, volume, or weight)								x	x					
Gene Expression	User defined gene(s) of interest	RT-PCR (Applied Biosystems: StepOnePlus and SYBR Green Reaction Mix)		x												
Intracellular Biosensor	Cytochrome C	CytC Biosensor, Image Algorithm									x					
	GCaMP6	Live Imaging Algorithm (FITC)										x				
Protein Binding	Luciferase Expression	ONE-Glo Luciferase Assay System (Promega: E6110, E6120, E6130)		x												
	User defined compound of interest	Single-Use RED Plate with Inserts (Thermo Scientific: 2034.6) and ICP-MS		x						x	x					
Secreted Protein/Compound	Alpha-fetoprotein	Human alpha-Fetoprotein DuoSet (R&D Systems: DY1369)									x					
	Ammonium	Ammonia Assay Kit (abcam: ab83360)								x						
	Blood Urea Nitrogen	BUN Liquid Reagent (Stanbio Laboratory: SB-0580-250)										x				
	Glucose	Amplex Red Glucose/Glucose Oxidase Assay Kit, Flow-through Biosensor B.LV5										x				
	Insulin Secretion	Insulin ELISA											x			
	L-lactate	Flow-through Biosensor B.LV5											x			
	User define protein(s) of interest	Human ELISA Kits from various vendors	x	x	x		x	x	x							
	User define protein(s) of interest	Meso Scale Discovery Assay kits and V-PLEX panels		x	x	x		x								



