Countstar
Smart Cell Analysis

Castor S1

High-throughput Intelligent 3D Cell Analyzer

ALIT LifeTech Inc.


Countstar

Countstar
Smart Cell Analysis

Castor S1

High-throughput Intelligent 3D Cell Analyzer

INNOVATIVE HARDWARE

- Advanced image acquisition
- Z-stack imaging and projection
- Wide consumable compatibility
- Ready for integration in automated environments

INTELLIGENT SOFTWARE

- AI-based image analysis algorithms
- Intuitive user interface
- Customizable reports in MS-Excel, PDF or image JPG
- Compliant with FDA's 21 CFR Part 11 and cGMP regulations

TAILORED APPLICATIONS

- Organoid culture quality control
- Label-free organoid drug response test
- Organoid quantity and viability monitoring using fluorescence stains
- Cytotoxicity analysis for tumor organoid-based IO co-cluture assay

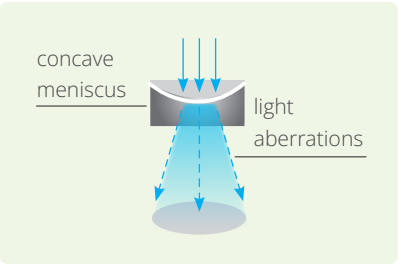
ADVANCED LIGHT PATH DESIGN

Innovative Imaging Technology

The concave meniscus formed in the wells of a microtiter plate causes significant light refraction near the edge of a well, resulting in an image with dark ring section when using common imaging technology. This makes it challenging to identify and quantify cells seeded near the edges. The Countstar Castor's innovative imaging technology solves this issue, captures bright and clear images of the entire well area, enabling confident identification of single cells near the well's edge.

Conventional image of a well with a broad and dark edge affecting cell recognition.

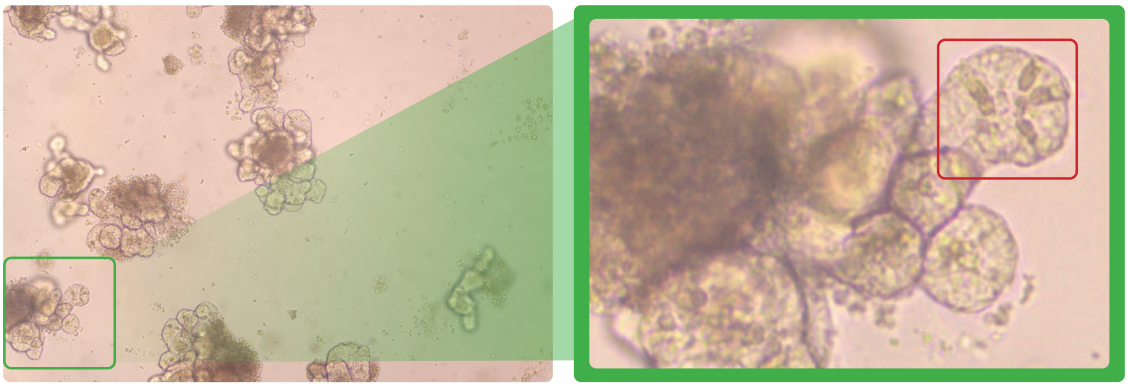
Well image acquired on a Castor S1 showing a bright image of the entire well, including its edge.



Concave meniscus results in light aberrations at the edges of a well.

HIGH-SENSITIVITY PELTIER-COOLED CAMERA

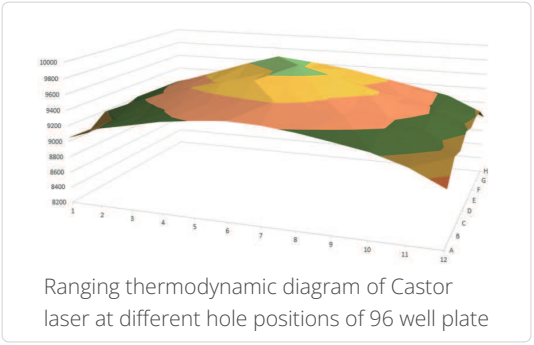
The advanced optics of the Countstar Castor S1, consisting of a cooled CMOS high-resolution camera at 10MP, and high NA objectives at 4x and 10x, captures images with rich details, enabling precise phenotyping of various types of organoids.



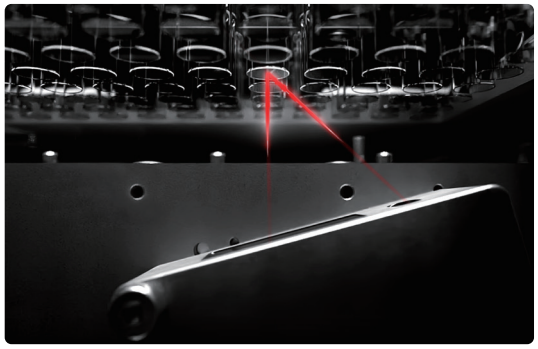
Exemplary image of mouse small intestinal organoids on day 5 was acquired with 10x magnification. The structure of intestinal crypts is clearly visible.

LASER RANGING AUTO FOCUSING

There can be significant differences in the focus layer of well bottoms among microtiter plates, depending on different suppliers or even different production batches from the same manufacturer. In rare cases, different wells on the same plate may have different focus layers, leading to inconsistent image definition if the focus isn't adjusted accordingly. The Countstar Castor S1 rapidly scans the bottom of each plate with a laser beam to automatically identify the correct focus distance for each well, ensuring sharp images of all samples on the plate. This advanced technology allows users to select from a broad range of multi-well plates.



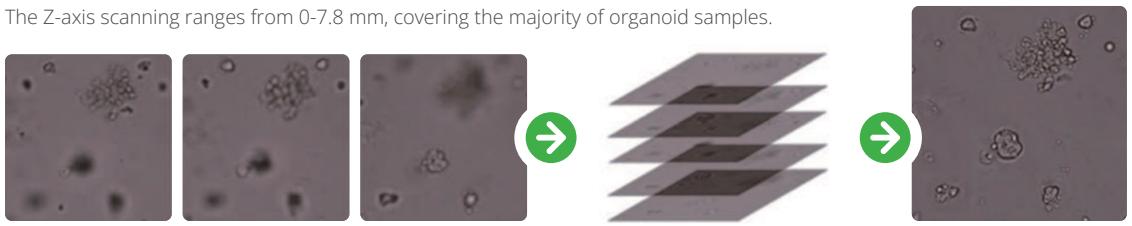
Ranging thermodynamic diagram of Castor laser at different hole positions of 96 well plate



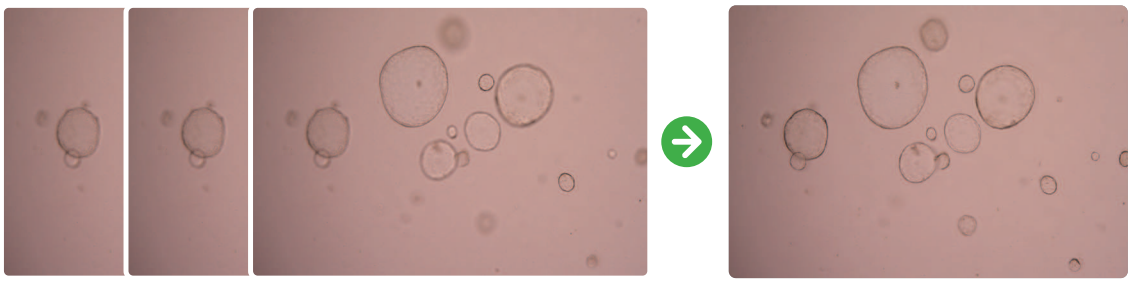
Z-STACK IMAGING AND PROJECTION

The Countstar Castor S1 has a built-in Z-axis scanning feature to capture organoids grown in matrigel. Our imaging processing algorithm generates a Z-stack projection and stitching image of the whole matrigel dome, enabling a comprehensive phenotype analysis of each organoid.

The Z-axis scanning ranges from 0-7.8 mm, covering the majority of organoid samples.



Z-axis multilayer scanning | Projection algorithm processing | Z-stack projection



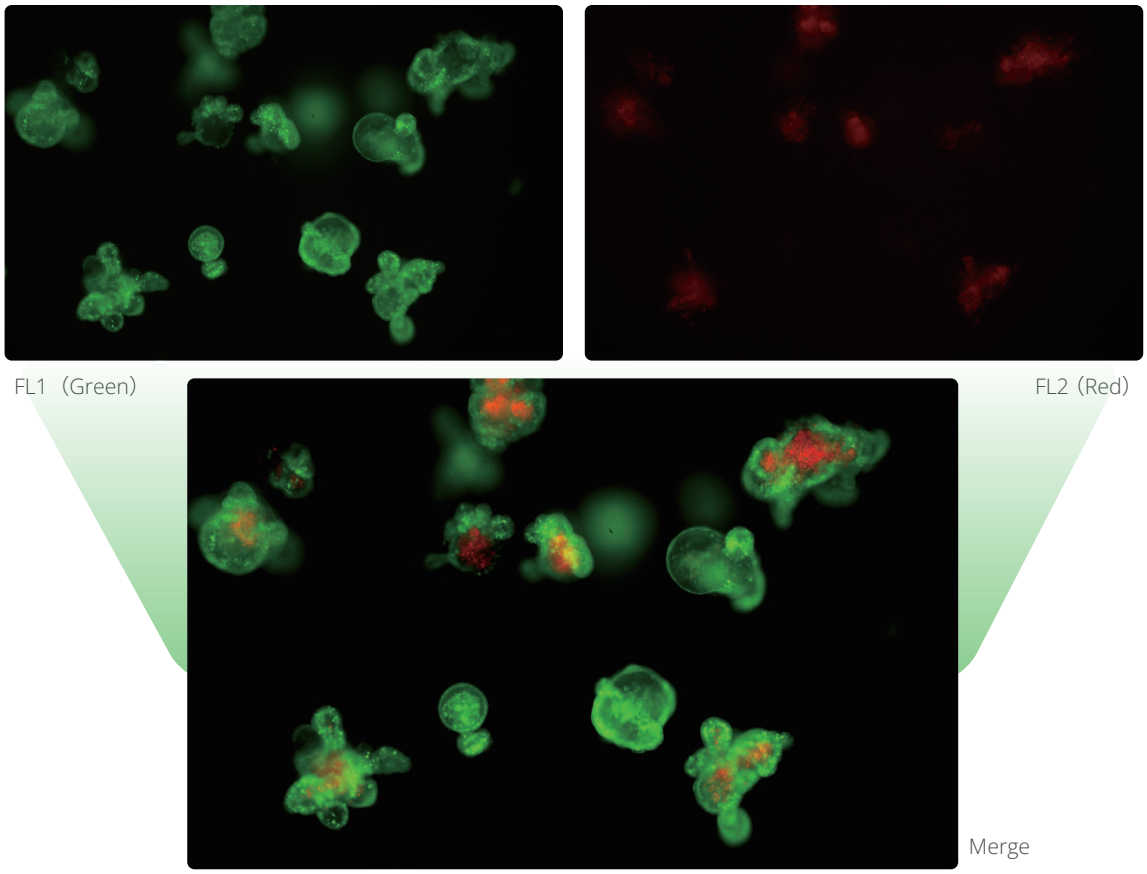
Z-stack imaging | Z-stack projection

TWO-CHANNEL, LED-BASED FLUORESCENT LIGHT SOURCE COMBINED WITH MULTI-PASS FILTERS

- High-performance, solid-state multi-range fluorescent LEDs make the excitation of fluorophores more efficient and sensitive.
- Variable multi-pass filters allow for customizable combinations, enabling the application of a wider range of fluorescent dyes.

Excitation	Emission	Adaptive fluorescent dye
465-495	515-555	FITC/GFP
528-552	590-650	RFP/DsRed/mCherry/PE/PI

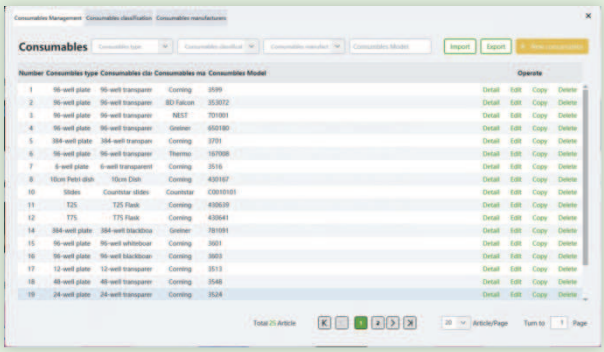
AO/PI viability assay of mouse small intestinal organoids



Living cells are shown in green. Dead cells are shown in red.

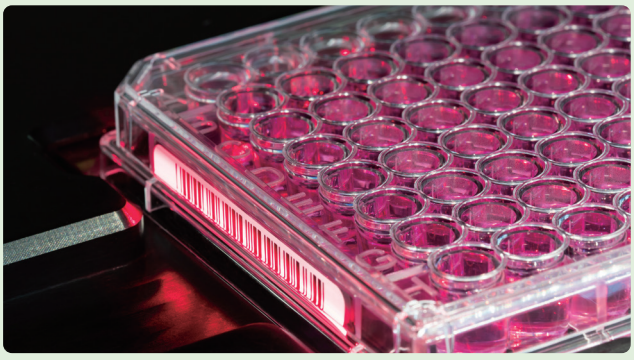
WIDE CONSUMABLE COMPATIBILITY

- The Countstar Castor S1 contains a comprehensive consumable library with detailed geometric dimensions.
- Custom-made plates or newly launched consumables can be easily added to the consumable library.



1. 12 well plate
2. 24 well plate
3. 35mm/60mm/100mm petri-dish
4. 96 well plate
5. 384 well plate
6. 48 well plate
7. T75 culture flask
8. Countstar chamber slide and adapter
9. 6 well plate
10. T25 culture flask adapter

BUILT-IN BARCODE SCANNER



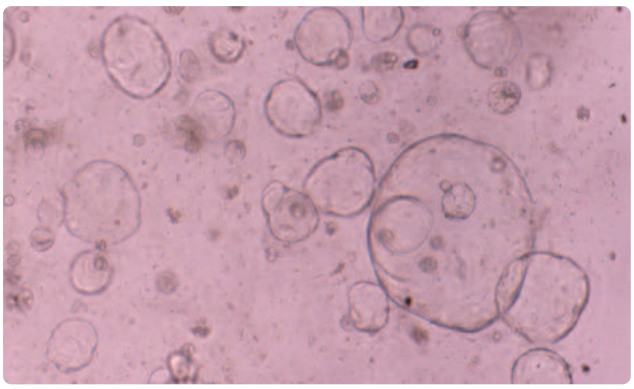
Sophisticated and distinct identification of consumables allows a convenient and traceable sample management of different consumables to avoid potential sampling errors.

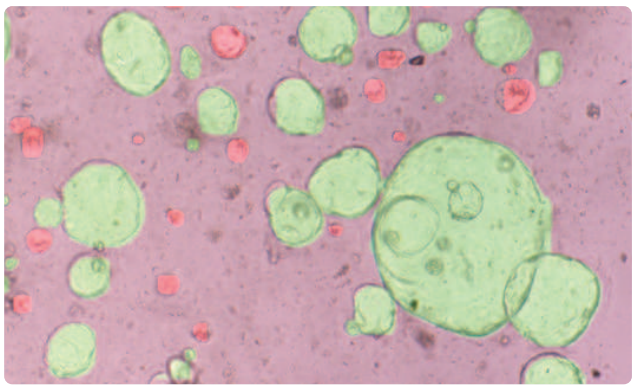
AUTOMATION COMPATIBLE

The Countstar Castor S1 can be combined with various types of robotic platforms to allow a full integration into automated high-throughput analysis platforms.

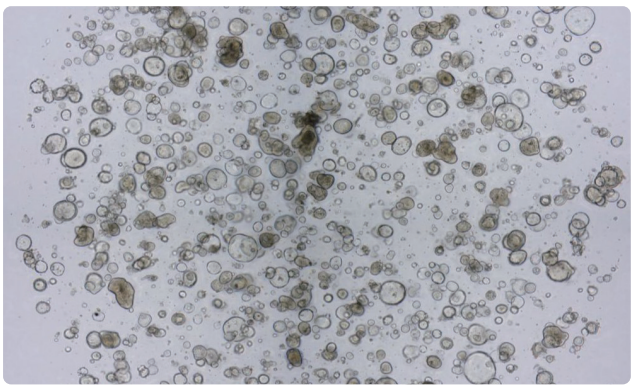
AI-BASED IMAGE ANALYSIS

Organoids with diverse morphologies in a complex sample can be accurately identified and characterized, using AI-based image analysis algorithms.

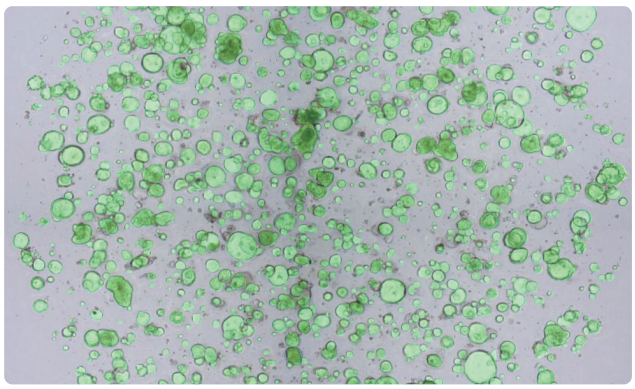




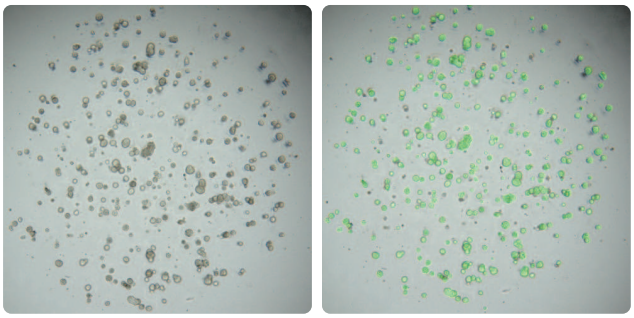
Normal hepatocellular duct derived organoids, labeled in green, display a “vacuolar” structure formed by a single layer of epithelial cells. Hepatocellular-cholangiocarcinoma organoids, labeled in red, display irregular “cystic” and parenchymal structures.



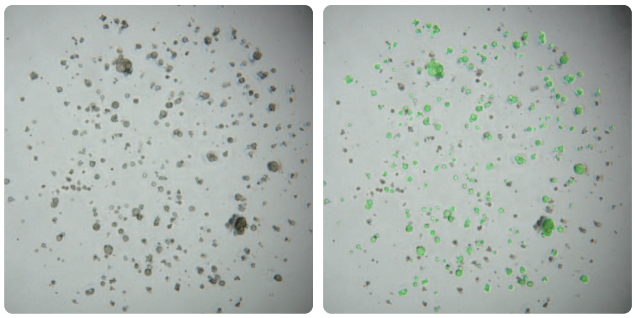
Acquired image of colorectal cancer organoids



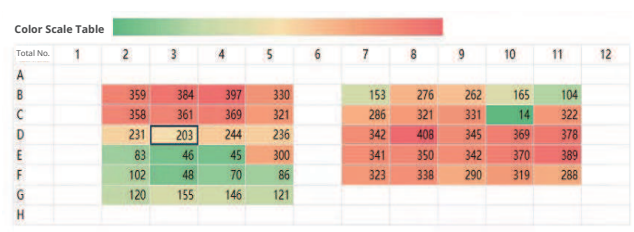
Recognition image of colorectal cancer organoids

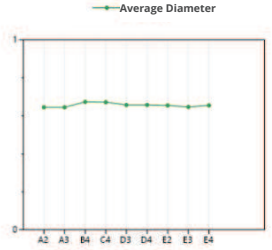


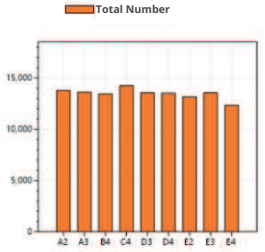
Pre-drug treatment of colorectal cancer organoids



Post-drug treatment of colorectal cancer organoids



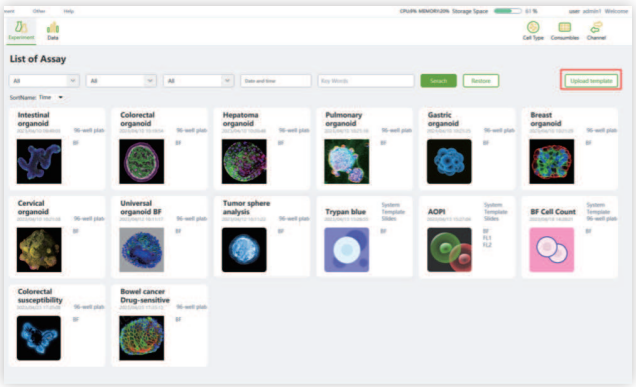




Multiple analysis results presentation by heat maps, line and bar graphs.

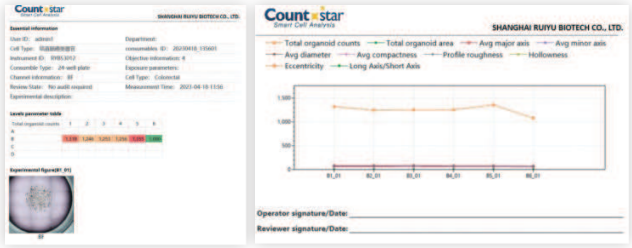
INTUITIVE GRAPHICAL USER INTERFACE (GUI)

Pre-defined “BioApps” for each type of organoid simplify image acquisition, review and analysis. New templates for varying types of organoids can be added easily to the BioApp library.



AUTOMATICALLY GENERATED COMPLIANCE REPORTS

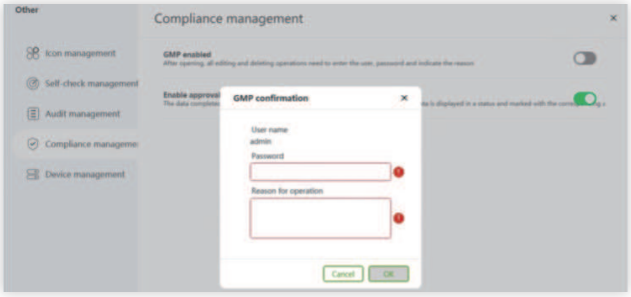
Comprehensive display of data charts, diagrams, images, and quantitative statistical analysis results.

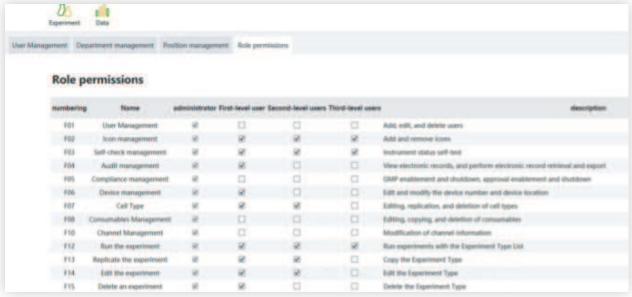


Software supports a one-click report generation.

OPERATION COMPLIES WITH FDA’s 21 CFR PART 11 AND ALL RELEVANT cGxP GUIDELINES

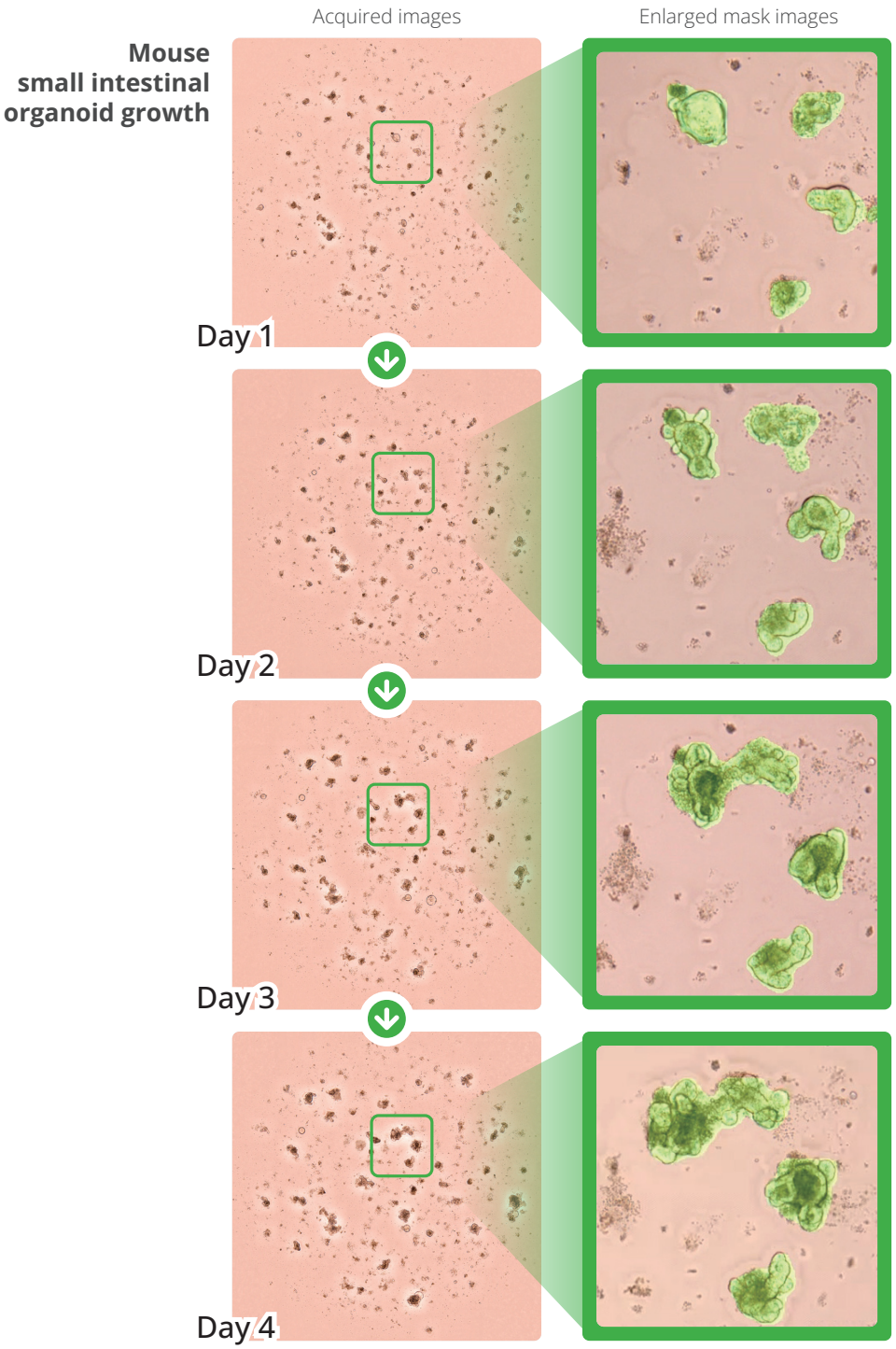
The Countstar Castor S1 provides a tamper-proof data management with a multi-level user access control, electronic signature, and all-encompassing audit tracking.



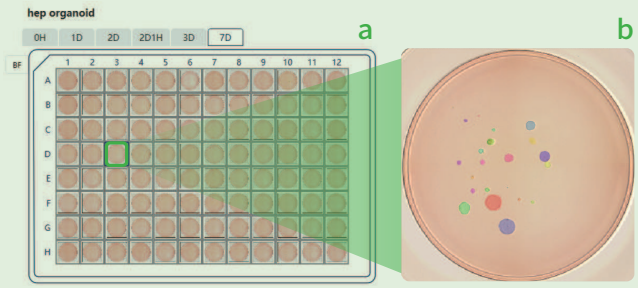


ORGANOID CULTURE QUALITY CONTROL

Unlike classical 2D cell cultures, 3D-cultured organoids contain various cell types, can form functional "micro-organs" that simulate the development process of whole organs and tissues, as well as their physiological and pathological states. Therefore, organoids are playing an increasingly important role in basic research and drug development. It is essential to monitor and analyze the growth status of organoids with high precision and high-throughput.



GROWTH MONITORING OF LIVER CANCER-DERIVED ORGANOIDS

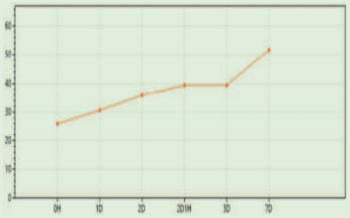


c

Output Parameter

ID	Total No.	Average Major Axis	Average Circularity	Average Minor Axis	Profile Roughness	Hollowness	Eccentricity
A01	13.00	39.81	1.00	37.59	31.22	1.00	0.43
A10	37.00	75.56	0.91	69.86	30.23	1.00	0.43
A11	14.00	62.34	0.94	57.29	25.40	1.00	0.50
A12	13.00	59.28	0.94	53.71	27.40	1.00	0.50
A02	8.00	56.00	0.96	53.05	43.52	1.00	0.40
A03	10.00	28.97	1.01	26.81	30.84	1.00	0.44
A04	11.00	71.17	0.96	67.49	35.44	1.00	0.40

d



e

Color Scale Table: 6 — 13.75 — 21.5 — 29.25 — 37

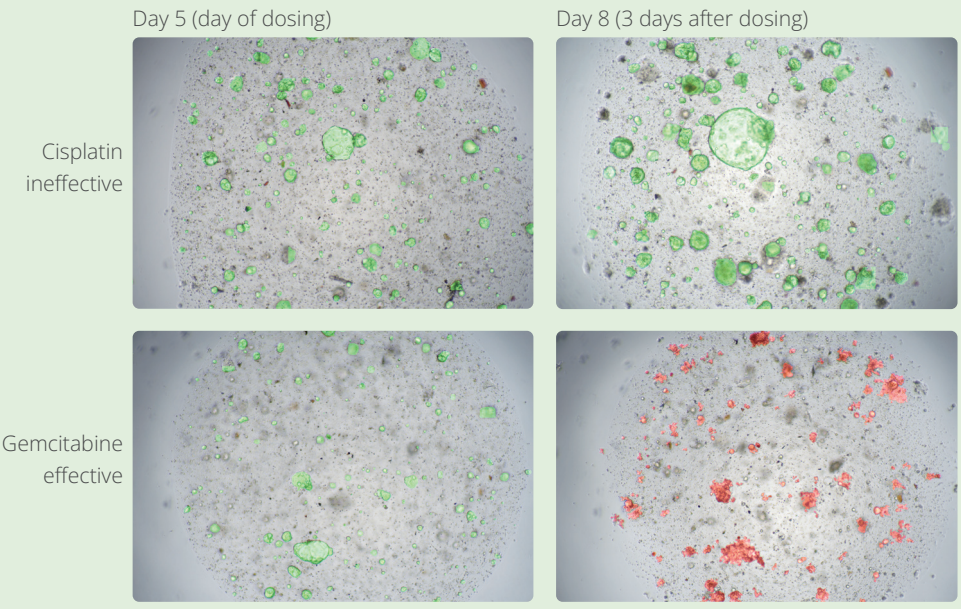
Total No.	1	2	3	4	5	6	7	8	9	10	11	12
A	13.00	8.00	10.00	11.00	14.00	11.00	18.00	13.00	17.00	37.00	14.00	13.00
B	14.00	16.00	22.00	13.00	7.00	14.00	18.00	8.00	13.00	21.00	16.00	14.00
C	19.00	19.00	18.00	15.00	12.00	12.00	17.00	23.00	8.00	10.00	12.00	13.00
D	17.00	10.00	21.00	7.00	9.00	6.00	16.00	15.00	10.00	18.00	9.00	16.00
E	12.00	14.00	18.00	12.00	16.00	15.00	17.00	10.00	20.00	10.00	19.00	18.00
F	19.00	11.00	14.00	13.00	12.00	8.00	23.00	19.00	15.00	15.00	18.00	17.00
G	31.00	8.00	15.00	12.00	15.00	12.00	23.00	11.00	17.00	9.00	20.00	18.00
H	23.00	23.00	19.00	8.00	20.00	13.00	18.00	24.00	17.00	17.00	15.00	11.00

a. Plate view with thumbnail images of hepatic cholangiocarcinoma organoids over 7 days. **b.** Enlarged, processed image of the selected well D3 with identified organoids colored differently, according to their phenotypes. **c.** Result table listing analyzed values of organoid features. **d.** Time course plot of average organoids diameter development of the selected well. **e.** Heatmap showing the number of organoids per well.

LABEL-FREE ORGANOID DRUG RESPONSE ANALYSIS

Organoids derived from cisplatin-resistant primary cholangiocarcinoma tissues were cultured for 5 days, then treated with either cisplatin or gemcitabine for 3 days in replicates.

Samples were then analyzed in a Countstar Castor S1. Gemcitabine showed strong toxicity to the organoids, while cisplatin didn't stop the growth of the organoids.

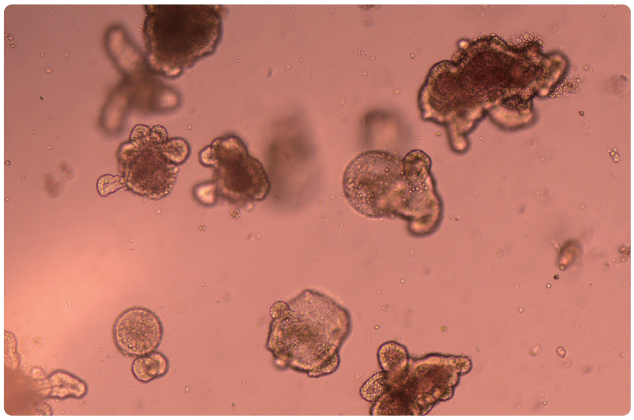


Live organoids are labeled in green. Dead, degrading organoids are labeled in red.

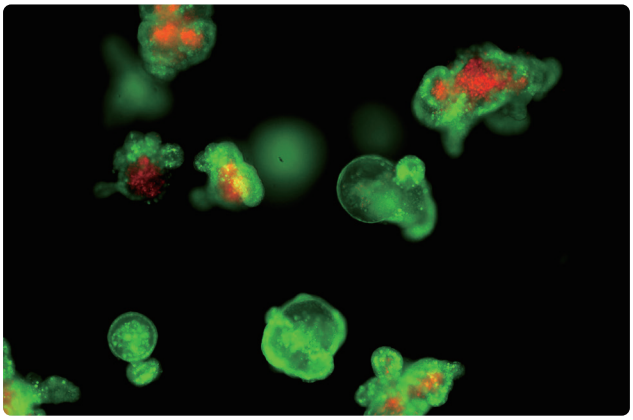
ORGANOID FLUORESCENCE VIABILITY ANALYSIS

Cell viability in organoids and tumor spheroids can be measured using viability staining reagents (e.g. Acridin Orange (AO) / Propidium Iodide (PI). Fluorescence imaging in a Z-axis scan is carried out to obtain the titer, distribution, and spatial localization of dead and live cells. This is essential in evaluating the tissue penetration effect of drugs.

Mouse small intestinal organoids in bright field view



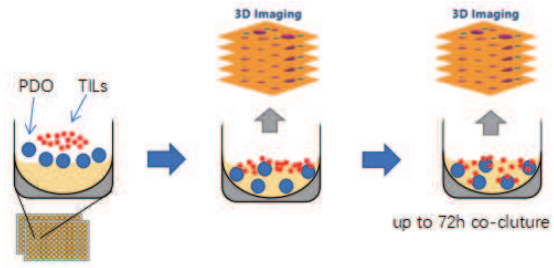
Same image section in fluorescent view

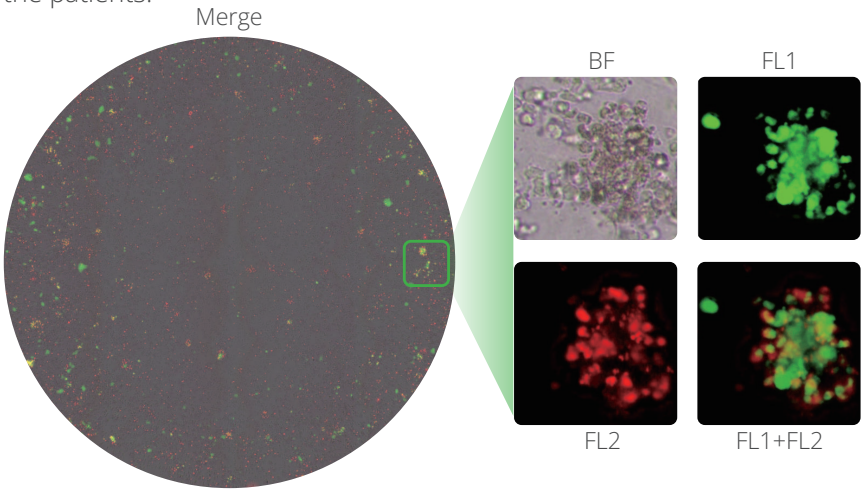


Live cells are labeled in green. Dead cells are labeled in red.

CYTOTOXICITY ANALYSIS FOR TUMOR ORGANOID-BASED IO CO-CLUTURE ASSAY

Patient-derived organoids (PDO) are a powerful and effective model for drug screening and patient response prediction to treatment regimens, especially with immune cells co-cluture. The Countstar Castor S1 enables high-throughput imaging and effective data processing, accelerating the identification of an optimal, individualized treatment for the patients.

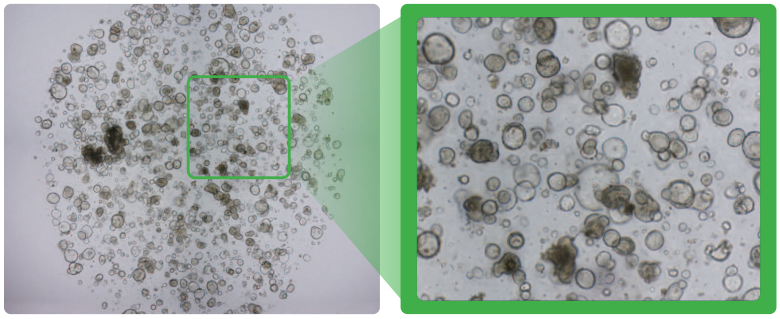




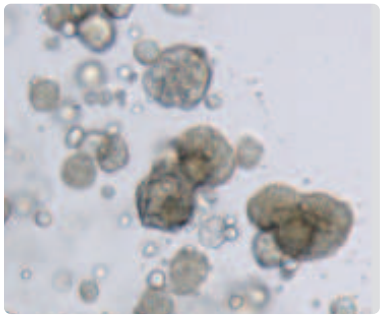
Proliferating hepatocellular carcinoma (HCC) organoids are labeled in green (CFSE); Dead and degrading HCC organoids and NK-92MI cells are labeled in red (EthD-1).

CONTINUOUSLY EXPANDING CATEGORIES OF ORGANOID ANALYSIS

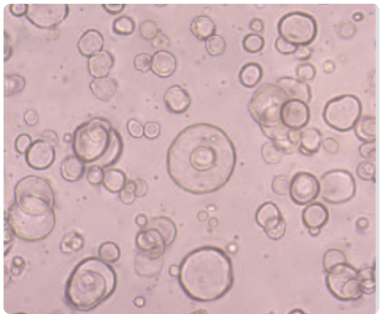
A comprehensive phenotype database of organoid morphologies has been established, will continue to expand due to extensive collaborations with many universities, research institutes, and well-known pharmaceutical companies. The data, shown below, were selected from this wide range of organoid experiments, including colorectal cancer organoids, breast cancer organoids, gastric cancer organoids, liver cancer organoids, and cervical cancer organoids.



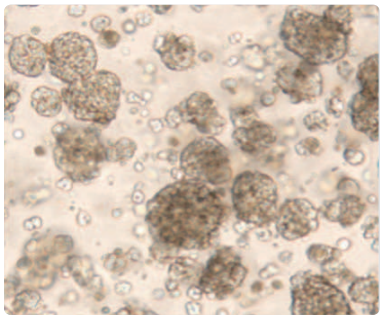
Colorectal cancer organoids



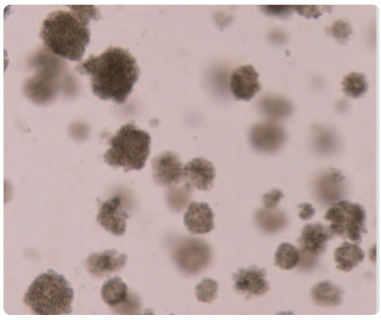
Breast cancer organoids



Gastric cancer organoids



Hepatocellular carcinoma organoids



Cervical cancer organoids

PRODUCT SPECIFICATIONS

Light source	High performance LEDs
Optical magnifications	4x objective lens (NA=0.2), 10x objective lens (NA=0.3)
Camera	16-bit, 10-megapixel, cooled color CMOS
Autofocus method	Laser and image-based autofocus
Compatible consumables	6-384 well plates, microscope slides, 35/60/100mm petri-dishes, T25/75 flasks
Consumable load	1 plate / tray per analysis
Maximum path length of X and Y axis of motor stage	X： 115mm　Y： 220mm
Scope of Z-axis scanning	0-7.8mm
Fluorescence channels	EX : 480/30nm　EM : 535/40nm EX : 540/25nm　EM : 620/60nm
Power input	AC110-240V、50/60Hz、1.5A
Monitor size	23.8 inches
Computer configuration	i7 processor, 64G RAM, 256G solid state hard drive + 4T hard drive, 1650S 4G graphics card
Computer size (W*D*H)	169mm × 300mm × 367mm
Product size (W*D*H)	555mm × 540mm × 482mm
Product weight	36.5kg

Product ordering information

Product Name: High-throughput Intelligent 3D Cell Analyzer
Model: Countstar Castor S1
Product No.: IN100102(USA) / IN100103(EUR)


Countstar
List of Assay

ALIT LifeTech Inc.

Countstar series product is for research purposes only and is not approved for diagnostic operation.

Countstar
Smart Cell Analysis

VOL.05220230809