Cytokines for Organoid Culture

Organoids are 3D structures derived from tissue-specific adult stem cells or induced pluripotent stem cells (iPSCs). They self-organize through cell sorting, recapitulating the complex architecture and basic functional properties of native organs and tissues. The addition of appropriate cytokines to culture media is crucial for successful organoid formation and differentiation. ABclonal develops and produces a broad portfolio of cytokines characterized by high purity, low endotoxin levels, robust biological activity, and excellent Lot-to-Lot consistency. These cytokines are suitable for cell differentiation induction and organoid culture applications.

Recommended cytokines for organoid culture

1
Brain Organoids

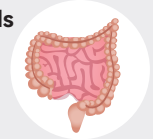
EGF
GDNF
Noggin
DKK-1
BDNF
FGF-2/bFGF

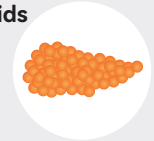
2
Liver Organoids

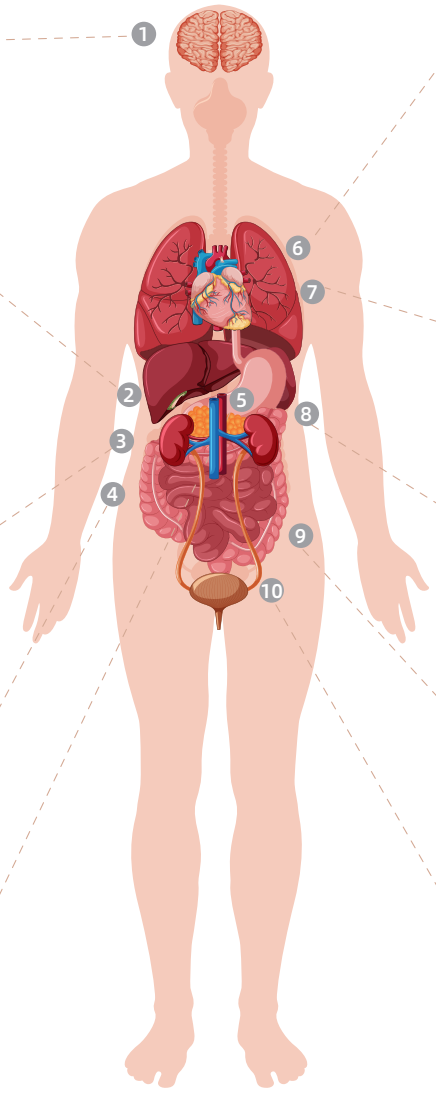
Noggin
EGF
R-Spondin-1
FGF-10
HGF
Wnt-3a

3
Stomach Organoids

Noggin
EGF
R-Spondin-1
FGF-10
Wnt-3a

4
Intestinal Organoids

Noggin
EGF
R-Spondin-1
Wnt-3a

5
Pancreatic Organoids

Noggin
EGF
R-Spondin-1
FGF-10
Wnt-3a



6
Mammary Organoids

Heregulinβ-1
Noggin
EGF
R-Spondin-1
R-Spondin-2
FGF-2/bFGF
FGF-10
Prolactin
Wnt-3a

7
Lung Organoids

Noggin
EGF
Wnt-3a
R-Spondin-1
FGF-10

8
Kidney Organoids

EGF
Noggin
R-Spondin-1
FGF-10

9
Ovary Organoids

Noggin
EGF
R-Spondin-1
FGF-10

10
Prostate Organoids

Noggin
EGF
R-Spondin-1
Activin A
FGF-2/bFGF
FGF-10

References

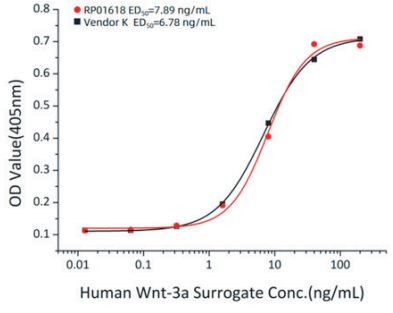
Stem Cells. 2018 Sep;36(9):1329-1340. doi: 10.1002/stem.2852.
Nat Rev Mol Cell Biol. 2020 Oct;21(10):571-584. doi: 10.1038/s41580-020-0259-3.
Biochim Biophys Acta Rev Cancer. 2021 Apr;1875(2):188527. doi: 10.1016/j.bbcan.2021.188527.

Key Cytokines and Their Functions

Catalog No.	Product	Function
RP01618	Human Wnt-3a Surrogate	Wnt-3a activates the Wnt/β-catenin signaling pathway, which directly regulates stem cell proliferation and self-renewal capacity. By promoting stem cell division while suppressing differentiation, this pathway is essential for long-term organoid culture and structural maintenance. Although Wnt-3a primarily functions to inhibit cell differentiation, it can also support specific lineage commitment and facilitate tissue structure formation under certain contextual conditions and in concert with other signaling factors.
RP00071	Human R-spondin-1/RSPO1	R-spondin-1 serves as a potent agonist of the Wnt signaling pathway, enhancing the activation of Wnt/β-catenin signaling. It plays a critical role in organ development, the maintenance of epithelial stem cells, and the induction or suppression of carcinogenesis. In organoid culture systems, R-spondin-1 is commonly co-administered with Wnt-3a to support robust long-term expansion and structural integrity.
RP01237	Human Noggin/NOG	Noggin functions as a specific antagonist of Bone Morphogenetic Proteins (BMPs). It directly binds to BMP ligands, preventing their interaction with cell surface receptors and thereby inhibiting BMP signal transduction. This inhibition helps maintain stem cells in an undifferentiated state, creates a microenvironment conducive to stem cell expansion and pluripotency, preserves stem cell properties, and supports the long-term culture and structural integrity of organoids.
RP03287	Human EGF	EGF binds to the epidermal growth factor receptor (EGFR) on the cell surface, which belongs to the receptor tyrosine kinase family. Its activation triggers a series of downstream signaling pathways, such as the MAPK and PI3K/AKT pathways, both of which are critical regulators of cell growth and survival. By activating EGFR, EGF promotes cell proliferation, differentiation, and survival. Its application in organoid culture is highly valuable, as it plays a key role in maintaining and regulating the growth and function of various cell types.
RP01042	Human FGF-2/bFGF	bFGF is an important mitogen as well as an inducer of morphogenesis and differentiation. It primarily exhibits four major biological functions: (1) promoting angiogenesis; (2) facilitating wound healing and repair; (3) enhancing tissue regeneration; and (4) participating in neural regeneration processes.

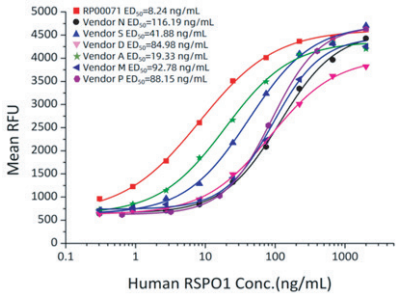
Comparative Data of Cytokines and Competing Products

RP01618 Human Wnt-3a Surrogate Protein



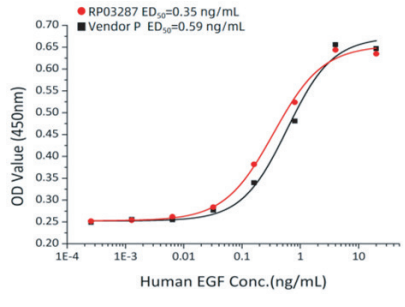
Measured by its ability to induce alkaline phosphatase production by C3H10T1/2 mouse embryonic fibroblast cells.

RP00071 Human R-spondin-1/RSPO1 Protein



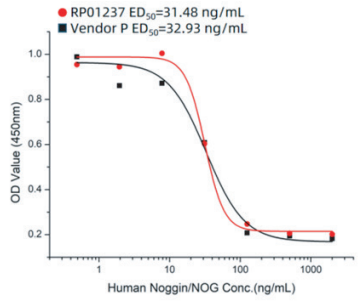
Measured by its ability to induce Topflash reporter activity in HEK293T human embryonic kidney cells.

RP03287 Human EGF Protein



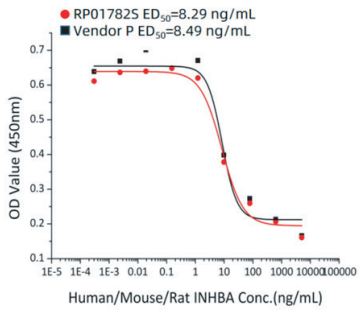
Measured in a cell proliferation assay using 4MBr-5 rhesus monkey epithelial cells.

RP01237 Human Noggin/NOG Protein



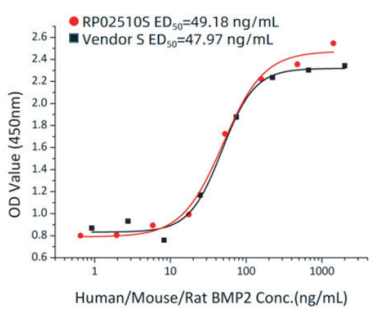
Measured by its ability to inhibit BMP-4-induced alkaline phosphatase production by ATDC5 mouse chondrogenic cells.

RP01782S Human/Mouse/Rat mature Activin A/INHBA Protein



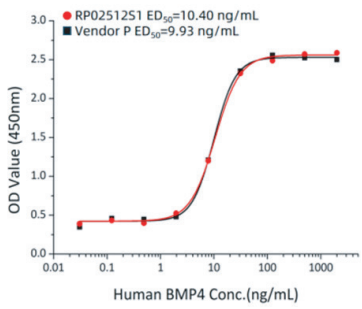
Measured by its ability to inhibit proliferation of MPC-11 cells.

RP02510S Human/Mouse/Rat mature BMP-2 Protein



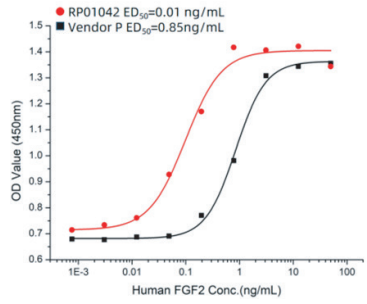
Measured by its ability to induce alkaline phosphatase production by ATDC5 mouse chondrogenic cells.

RP02512S1 Human/Mouse/Rat Mature BMP-4 Protein



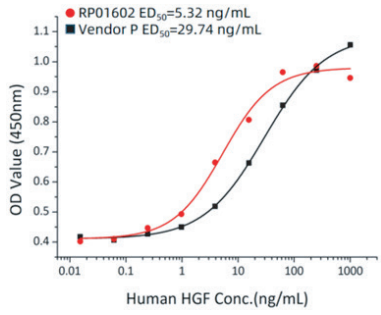
Measured by its ability to induce alkaline phosphatase production by ATDC5 mouse chondrogenic cells.

RP01042 Human FGF-2/bFGF Protein



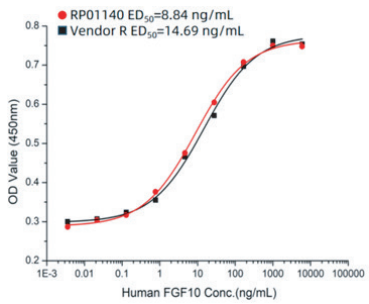
Measured by its ability to promotes the proliferation of Balb3T3 mouse embryonic fibroblasts cells.

RP01602 Human HGF Protein



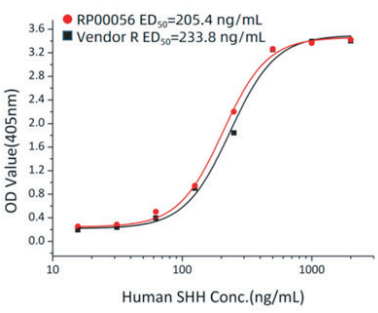
Measured by its ability to neutralize TGF-β1 mediated inhibition on Mv-1-Lu cell proliferation.

RP01140 Human FGF-10 Protein



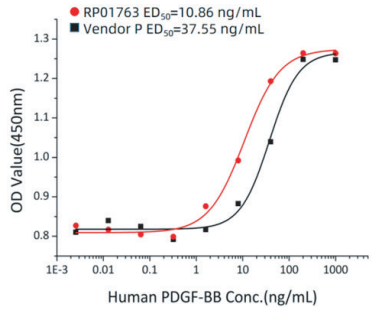
Measured by its ability to promote proliferation assay using 4MBr-5 rhesus monkey epithelial cells.

RP00056 Human Sonic hedgehog protein N-product/SHH(C24IVI) Protein



Measured by its ability to induce alkaline phosphatase production by C3H10T1/2 mouse embryonic fibroblast cells.

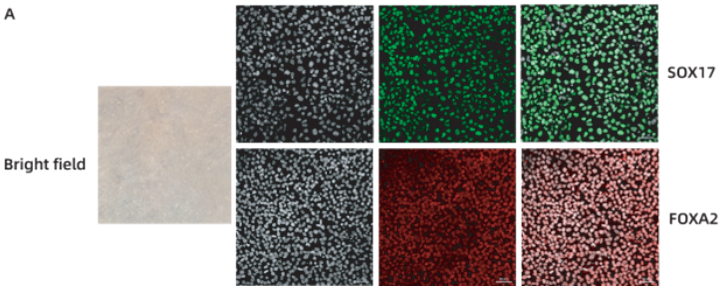
RP01763 Human PDGF-BB Protein



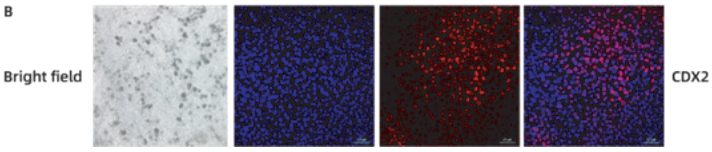
Measured by its ability to promote proliferation assay using BALB/3T3 mouse fibroblasts.

Bioactivity data for related products

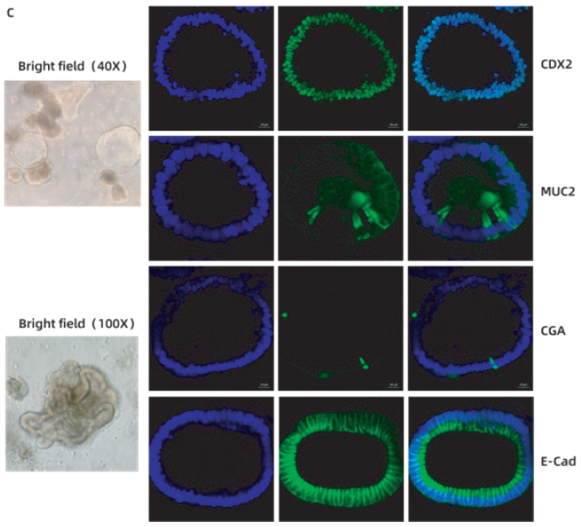
Small intestinal organoids induced by hPSC (Customer feedback)



Markers: SOX17(Green)/FOXA2(Red) (Cat. A19053) (white indicate the nuclei)



Makers: CDX2 (Red) (Cat. A19030) (Blue indicates the nucleus)



Makers: CDX2 (Cat. A19030), MUC2 (Cat. A14659), CGA (Cat. A9576), E-Cad (Cat. A20798) (Green indicates the markers, Blue indicates the nucleus)

A: Differentiate human pluripotent stem cells (hPSCs) into definitive endoderm(DE) cells.

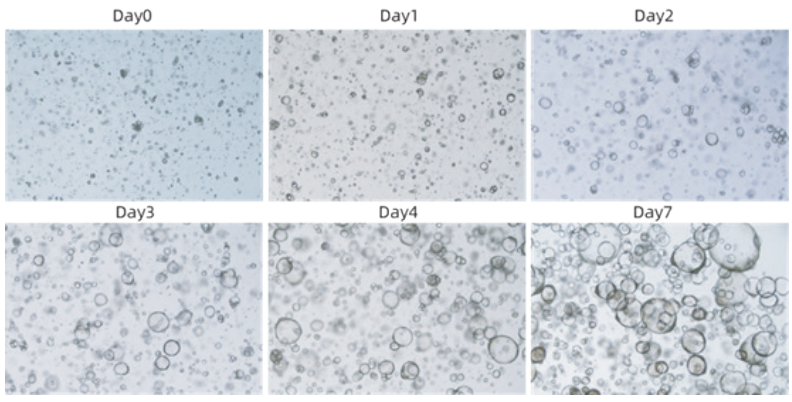
B: Differentiate definitive endoderm (DE) cells into mid-hindgut tissue.

C: Differentiate mid-hindgut tissue into small intestinal organoids.

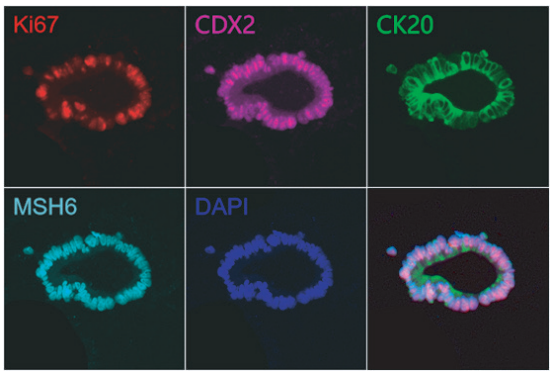
Recommended cytokines:

Activin A (Cat# RP01782S)	FGF-4 (Cat# RP01717)	NOG (Cat# RP01237)
Wnt-3a (Cat# RP01618)	RSPO1 (Cat# RP00071)	EGF (Cat# RP03287)

Human colorectal cancer organoids (Customer feedback)



Morphology map of human colorectal cancer organoids

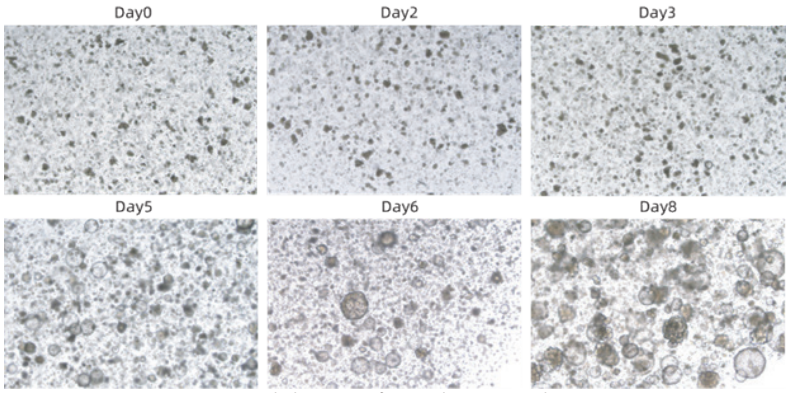


Makers: Ki-67 (Cat. A20018), CDX2 (Cat. A19030), CK20 (Cat. A19041), MSH6 (Cat. A25640)

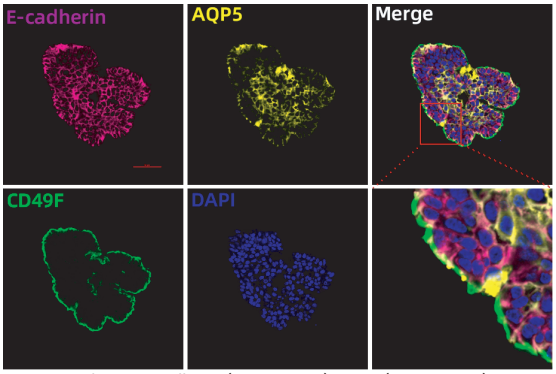
Recommended cytokines:

NOG (Cat# RP01237)	RSPO1 (Cat# RP00071)	HGF (Cat# RP01602)
EGF (Cat# RP03287)	FGF-10 (Cat# RP01140)	

Mouse lung organoids (Routinely tested)



Morphology map of mouse liver organoids

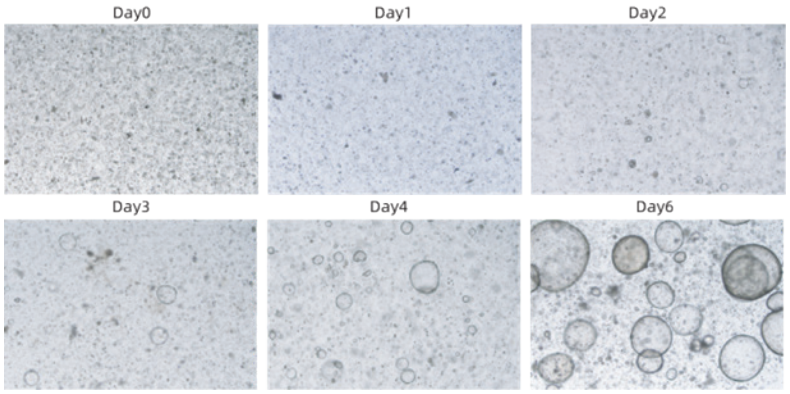


Makers: E-Cadherin (Cat. A20798), AQP5 (Cat. A23292), CD49F (Cat. A26707)

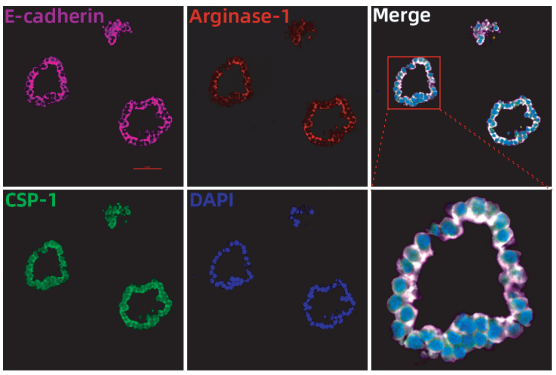
Recommended cytokines:

Wnt-3a (Cat# RP01618)
EGF (Cat# RP03287)
FGF10 (Cat# RP01140)
NOG (Cat# RP01237)
RSPO1 (Cat# RP00071)

Mouse liver organoids (Routinely tested)



Morphology map of mouse lung organoids

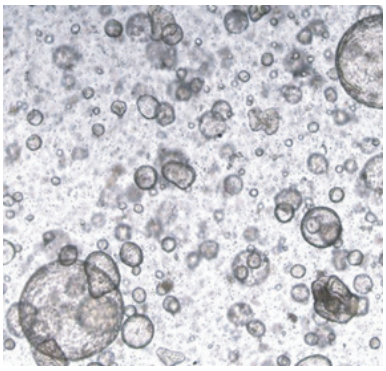


Makers: E-Cadherin (Cat. A20798), Arginase-1 (Cat. A25808), CPS1 (Cat. A24810)

Recommended cytokines:

Wnt-3a (Cat# RP01618)
EGF (Cat# RP03287)
FGF10 (Cat# RP01140)
NOG (Cat# RP01237)
RSPO1 (Cat# RP00071)
HGF (Cat# RP01602)

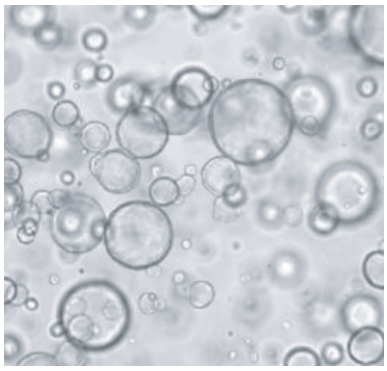
Human gastric cancer organoids (Customer feedback)



Recommended cytokines:

Wnt-3a (Cat# RP01618)
NOG (Cat# RP01237)
EGF (Cat# RP03287)
RSPO1 (Cat# RP00071)
bFGF (Cat# RP01042)

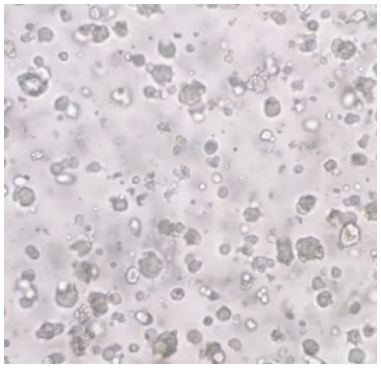
Human gastric epithelial organoids (Routinely tested)



Recommended cytokines:

Wnt-3a (Cat# RP01618)
NOG (Cat# RP01237)
EGF (Cat# RP03287)
RSPO1 (Cat# RP00071)
FGF-10 (Cat# RP01140)

Human renal tumor organoids (Customer feedback)



Recommended cytokines:

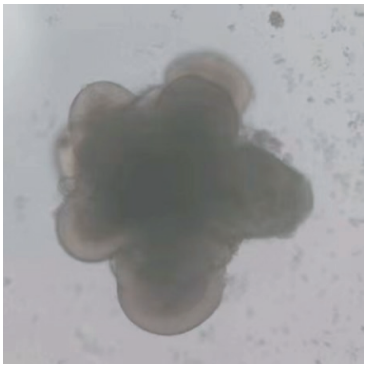
NOG (Cat# RP01237)

EGF (Cat# RP03287)

RSPO1 (Cat# RP00071)

FGF-10 (Cat# RP01140)

Liver organoids induced by iPSC (Customer feedback)



Recommended cytokines:

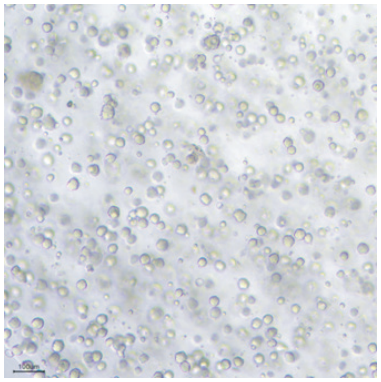
Activin A (Cat# RP01782S)

bFGF (Cat# RP01042)

HGF (Cat# RP01602)

Oncostatin M (Cat# RP00054)

Mouse Esophageal organoids (Customer feedback)



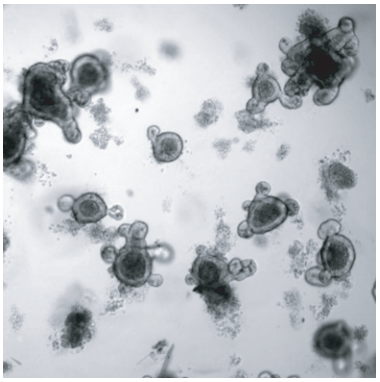
Recommended cytokines:

NOG (Cat# RP01237)

EGF (Cat# RP03287)

RSPO1 (Cat# RP00071)

Mouse small intestinal organoids (Customer feedback)



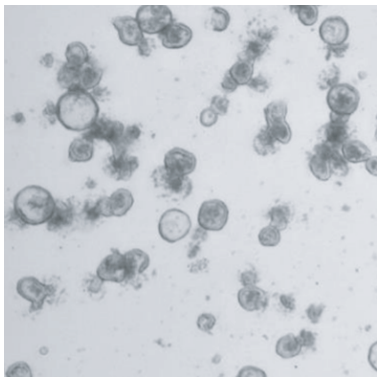
Recommended cytokines:

NOG (Cat# RP01237)

EGF (Cat# RP03287)

RSPO1 (Cat# RP00071)

Mouse large intestinal organoids (Routinely tested)



Recommended cytokines:

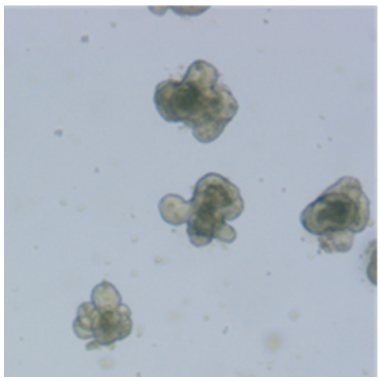
Wnt-3a (Cat# RP01618)

NOG (Cat# RP01237)

EGF (Cat# RP03287)

RSPO1 (Cat# RP00071)

Animal small intestinal organoids (Customer feedback)



Recommended cytokines:

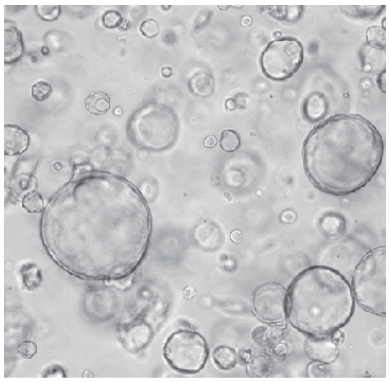
Wnt-3a (Cat# RP01618)

NOG (Cat# RP01237)

EGF (Cat# RP03287)

RSPO1 (Cat# RP00071)

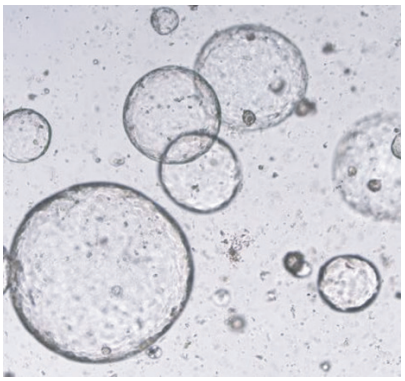
Human liver organoids (Routinely tested)



Recommended cytokines:

Wnt-3a (Cat# RP01618)
NOG (Cat# RP01237)
EGF (Cat# RP03287)
RSPO1 (Cat# RP00071)
FGF-10 (Cat# RP01140)
bFGF (Cat# RP01042)
HGF (Cat# RP01602)

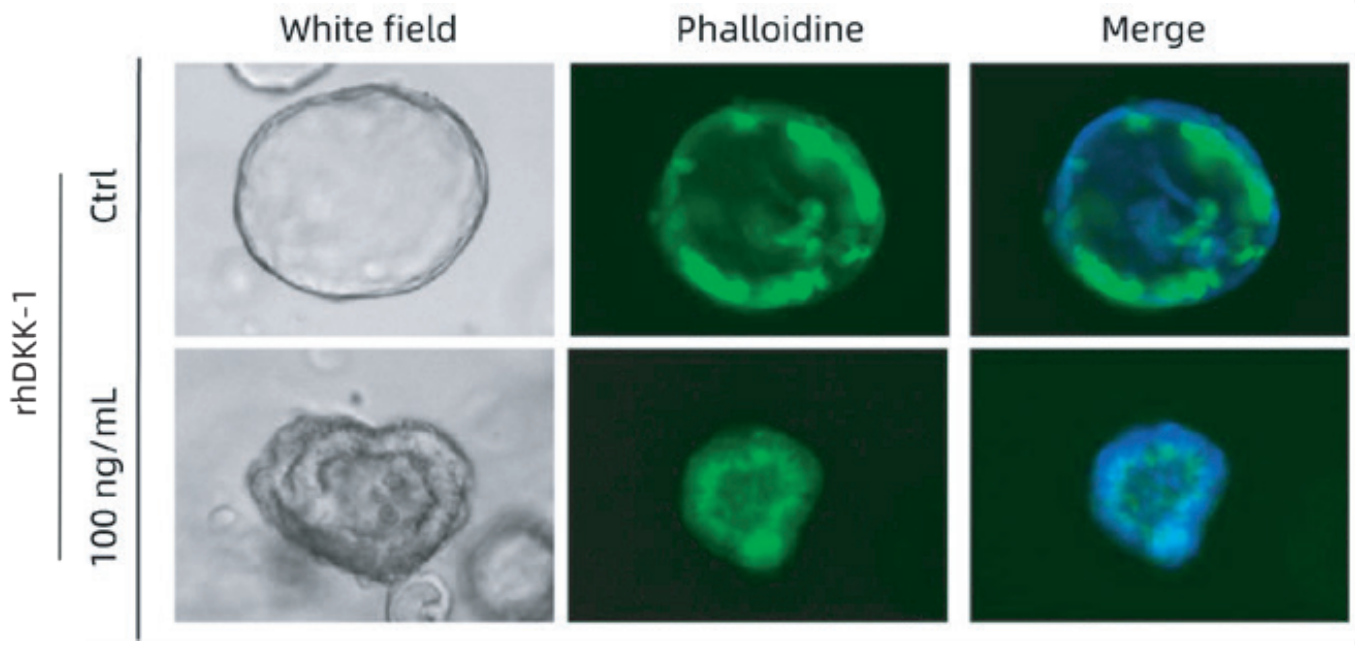
Mouse colon organoids (Routinely tested)



Recommended cytokines:

Wnt-3a (Cat# RP01618)
NOG (Cat# RP01237)
EGF (Cat# RP03287)
RSPO1 (Cat# RP00071)

Human kidney organoids (DKK1 promotes the establishment of cellular polarity) (Routinely tested)



Recommended cytokines:

Wnt-3a (Cat# RP01618)
NOG (Cat# RP01237)
EGF (Cat# RP03287)
RSPO1 (Cat# RP00071)
FGF-10 (Cat# RP01140)
bFGF (Cat# RP01042)
KGF (Cat# RP01717)
FGF-9 (Cat# RP01710)
IGF-I (Cat# RP00996)
Dkk-1 (Cat# RP01343)

Recommended Product List (Partial)

Product Name	Species	Cat.No.
Wnt-3a Surrogate	Human	RP01618
Noggin/NOG	Human	RP01237
EGF	Human	RP03287
R-Spondin-1/RSPO1	Human	RP00071
FGF-2/bFGF	Human	RP01042
FGF-4	Human	RP01712
FGF-9	Human	RP01710
FGF-7/HBGF-7/KGF	Human	RP01717
FGF-10	Human	RP01140
Hepatocyte growth factor/HGF	Human	RP01602
Sonic hedgehog protein N-product/SHH(C24IVI)	Human	RP00056
Activin A/INHBA	Human/Mouse/Rat	RP01782S
BMP-2	Human/Mouse/Rat	RP02510S
BMP-4	Human/Mouse/Rat	RP02512S1
BMP-7	Human	RP02513S
BDNF	Human	RP01243
GDNF	Human	RP00835
IGF-I	Human	RP00996
Dkk-1	Human	RP01343
PDGF-BB	Human	RP01763
Prolactin/PRL	Human	RP01723
Pro-neuregulin-1/NRG1 (Beta1)	Human	RP01825
Oncostatin-M/OSM	Human	RP00054
R-Spondin-2/RSPO2	Human	RP03266