



3D Cell Culture and Beyond

RocketCell™ Apical-Out Intestinal Organoid Growth Kit, AOF

All-in-one, animal origin-free kit for growth, expansion, and passaging of apical-out intestinal organoids.

Protocol
Catalog #: RC03-GK

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RocketCell™ Apical-Out Intestinal Organoid Growth Kit, AOF - RC03-GK

Components	Catalog No.	Size	Storage Temp	Shipping
VitroGel® ORGANOID-5	VHM04-5	10 mL	4°C	Ambient
RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF	RC03-M1	5 mL	-20°C to -80°C	Dry Ice
RocketCell™ Intestinal Organoid Growth Medium, AOF	RC03-M2	100 mL	- Working volume: 4°C. - Remaining vol: -20°C to -80°C	Ice Pack
RocketCell™ Cell Viability Enhancer (1000X)	RC02-CV	50 µL	-20°C	Dry Ice
RocketCell™ Phenol Red (1000X)	RC04-PRS	100 µL	15-22°C	Ice Pack

Storage/Stability:

Product	Temperature	Shelf Life
VitroGel® ORGANOID-5, 10 mL	2°C - 8°C	24 months
RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF, 5 mL	-20°C to -80°C	12 months
RocketCell™ Intestinal Organoid Growth Medium, AOF, 100 mL	-20°C to -80°C	12 months
RocketCell™ Cell Viability Enhancer (1000X), 50 µL	-20°C	12 months
RocketCell™ Phenol Red (1000X), 100 µL	Room Temperature	12 months

Apical-Out Intestinal Organoid Development Using RocketCell™ Apical-Out Intestinal Organoid Growth Kit , AOF



A. Introduction

RocketCell™ Apical-Out Intestinal Organoid Growth Kit, AOF (TheWell Bioscience, Catalog #: RC03-GK) is a complete solution for mature apical-out intestinal organoid development in a 100% animal origin-free environment. Kit includes ready-to-use media (2 different types) for organoid culture initiation and maintenance, and synthetic hydrogel VitroGel® ORGANOID-5.

Organoid polarity is essential for their development and function, as it mimics *in vivo* tissue organization and enables studies of epithelial barrier function, nutrient uptake, and host–microbiome interactions. Most organoids are cultured in animal-derived matrices like Matrigel®, resulting in apical-in polarity, where the apical surface faces inward and limits access for studying nutrient uptake, drug response, and microbial interactions. This orientation does not reflect physiological conditions, where interactions occur at the apical surface.

While techniques like microinjection can access the apical side, they are labor-intensive and low throughput. Alternative approaches to generate apical-out organoids using suspension culture or diluted matrices often disrupt cell–matrix interactions, leading to reduced stability and function.

This kit is specifically designed to generate apical-out organoids, enabling direct access to the apical surface while maintaining stability. The culture medium is optimized to provide the nutritional support necessary for long-term intestinal organoid growth. VitroGel® ORGANOID-5 is a synthetic, chemically defined hydrogel that supports the growth of a variety of organoids, including patient-derived organoids or organoids developed from pluripotent stem cells (PSCs), co-culture, and PDX model.

Items in the kit:

- VitroGel® ORGANOID-5 (Catalog #: VHM04-5)
- RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF (Catalog #: RC03-M1)
- RocketCell™ Intestinal Organoid Growth Medium, AOF (Catalog #: RC03-M2)
- RocketCell™ Cell Viability Enhancer (1000X), 50 µL (Catalog #: RC02-CV)
- RocketCell™ Phenol Red (1000X), 100 µL (Catalog #: RC04-PRS)

VitroGel® ORGANOID-5 hydrogel is ready to use at room temperature and has a neutral pH, is transparent, permeable, and compatible with various imaging systems. The solution transforms into a hydrogel matrix by simply mixing with the cell/organoid culture medium. Together with media and hydrogel, the RocketCell™ Apical-Out Intestinal Organoid Growth Kit, AOF provides a complete solution for apical-out intestinal organoid development.

Please note that the medium is phenol red–free. However, if desired, users may add phenol red (included in the kit) as a pH indicator to visually monitor culture acidification and help determine optimal growth and feeding intervals. Also, note that Phenol Red has reported estrogenic activity and may interfere with fluorescent imaging applications.

B. 3D Organoid Culture Protocol

Here we use an intestinal organoid culture protocol as an example to elaborate basic organoid culture process, organoid passaging, and expansion process using the RocketCell™ Apical-Out Intestinal Organoid Growth Kit, AOF.

C. Materials

1. The **RocketCell™ Apical-Out Intestinal Organoid Growth Kit, AOF** (includes)

Components	Catalog No.	Size	Storage Temp
VitroGel® ORGANOID-5	VHM04-5	10 mL	4°C
RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF	RC03-M1	5 mL	-20°C to -80°C
RocketCell™ Intestinal Organoid Growth Medium, AOF	RC03-M2	100 mL	• Working volume: 4°C. • Remaining vol: -20°C to -80°C
RocketCell™ Cell Viability Enhancer (1000X)	RC02-CV	50 µL	-20°C
RocketCell™ Phenol Red (1000X)	RC04-PRS	100 µL	15-22°C

Note: Keep the unopened/unused media at -20°C to -80°C. Keep the working volume of the cell suspension medium and growth medium at 4°C, the medium is good for 1-2 weeks.

2. Intestinal organoid fragments
3. Culture plates
 - a. VitroPrime™ 3D Culture and Imaging Plate (Recommended)
 - i. 96-well (Catalog #: VP-3D96W5)
 - ii. 24-well (Catalog #: VP-3D24W5)
 - b. VitroPrime™ Spread-Attach Plate
 - i. 96-well (Catalog #: VP-SA96W)
 - ii. 48-well (Catalog #: VP-SA48W)
 - iii. 24-well (Catalog #: VP-SA24W)
4. Conical tubes (15 mL or 50 mL)
5. Serological pipettes
6. VitroGel® Organoid Recovery Solution (for fast recovery, Catalog #: MS04-100)
7. VitroGel® Cell Recovery Solution (for gentle recovery, Catalog #: MS03-100)
8. RocketCell™ Organoid Essential-Core Medium, AOF (optional, Catalog #: RC04-OCM)

D. Medium Preparation

1. Slowly thaw RocketCell™ Apical-Out Intestinal Organoid Media at 4°C or on ice and avoid excessive heat. Aliquoting the media as needed, the recommended aliquoting volumes are listed below:
 - a. Aliquot 5 mL RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF into 1 mL aliquots (or as preferred) and store at -20°C to -80°C.
 - b. Aliquot 100 mL RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF into 5 to 10 mL as preferred and store at -20°C to -80°C. The working volume can be stored at 4°C for 2 weeks.

Note: Thaw, aliquot, and refreeze the media only once; avoid repeated freeze–thaw cycles

- c. **Optional:** If a pH indicator and colored medium are preferred, add Phenol Red (1000X) in 1X concentration. E.g., Add 100 µL of Phenol Red (1000X) in 100 mL of RocketCell™ Intestinal Organoid Growth Medium, AOF.
2. **Optional:** If using RocketCell™ Organoid Essential-Core Medium, AOF kit for buffering steps (Protocol E step 3 & 7), aliquot the RocketCell™ Organoid Essential-Core Supplement (50X), AOF like below
 - a. Aliquot 10 mL RocketCell™ Organoid Essential-Core Supplement (50X), AOF into 0.2 to 1 mL aliquots and store at -20°C to -80°C.

Note: Thaw, aliquot, and refreeze the media only once; avoid repeated freeze–thaw cycles.

E. Initiating 3D Culture from Cryopreserved Intestinal Organoids

1. Bring VitroGel® ORGANOID-5 hydrogel to room temperature.
2. Allow RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF, RocketCell™ Intestinal Organoid Growth Medium, AOF and RocketCell™ Cell Viability Enhancer (1000X) to reach room temperature (25°C).

Note: Do not use a water bath to heat up the medium. Choose one option to process.

- a. Prepare 10 mL RocketCell™ Intestinal Organoid Growth Medium, AOF with 1X RocketCell™ Cell Viability Enhancer (10 µL enhancer solution in 9,990 µL RocketCell™ Intestinal Organoid Growth Medium, AOF)
 - b. Prepare 10 mL RocketCell™ Organoid Essential-Core Complete Medium with 1X RocketCell™ Cell Viability Enhancer by adding 200 µL of RocketCell™ Organoid Essential-Core Supplement (50X), AOF in 9790 µL of RocketCell™ Organoid Essential-Core Basal Medium, AOF and then add 10 µL RocketCell™ Cell Viability Enhancer.
3. Retrieve an organoid cryovial from liquid nitrogen following required safety measures and place vial in a floater rack in a 37°C water bath or a vial thawing device. If using a device, first spray vial with ethanol, and place into the device till thawed. If using water bath, proceed with next step, otherwise proceed to Step 7.
 4. Inspect the vial and remove it from the 37°C water bath when a small piece of ice is still visible. Do not shake or mix.

Note: A 1 mL vial should thaw in about 1-2 minutes. Immediately after thawing, dilute and transfer the organoid suspension into fresh, room-temperature medium to minimize osmotic shock and limit exposure to DMSO or other cryoprotectants.
 5. Carefully and quickly sanitize the exterior by generously spraying it with 70% ethanol, and transfer to a biosafety cabinet.
 6. Gently and slowly transfer the 1 mL organoid suspension into the 9 mL of medium from step 2 above in the 15 mL conical tube.
 7. Centrifuge tube at 200-300 x g for 5 minutes at 4°C. Aspirate the supernatant without disturbing the cell pellet (A rough organoid fragment count is recommended).
 8. Prepare the cell/organoid suspension in RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF.
 9. Add 2 mL VitroGel® ORGANOID-5 hydrogel to 1 mL cell/organoid suspension (hydrogel-organoid mixture) and very gently pipette up and down 5-10 times to mix thoroughly. (Keep VitroGel® and cell medium at 2:1 v/v mixing ratio)
 10. **Note:** It is recommended to include ~250–300 organoid fragments per 50 µL of final gel-suspension volume. Adjust gel and cell suspension volumes accordingly.

11. Transfer the hydrogel-organoid mixture to a well plate.

The recommended volume of hydrogel for different types of well plates is listed below:

a. **VitroPrime™ 3D Culture and Imaging Plate** (Recommended)

	96-well Plate	24-well Plate
Sample holder (hydrogel-organoid mixture)	20 µL	150 µL
Cover medium volume	100 µL	500 µL
Higher medium volume for the weekend	200 µL	1 mL

b. **VitroPrime™ Spread-Attach Plate**

	96-well Plate	48-well Plate	24-well Plate
Sample holder (hydrogel-organoid mixture)	50 µL	150 µL	300 µL
Cover medium volume	50-100 µL	150-300 µL	300-500 µL
Higher medium volume for the weekend	200 µL	600 µL	1 mL

12. Wait 15 min at room temperature for soft gel formation.

Note: During the hydrogel forming process, avoid disrupting the hydrogel by tilting or shaking the well plate.

13. Carefully cover the hydrogel with RocketCell™ Intestinal Organoid Growth Medium, AOF with RocketCell™ Cell Viability Enhancer for 24 to 48 hrs (refer to prep steps below) with the recommended volume of cover medium above.

Remove the tube of RocketCell™ Cell Viability Enhancer from -20°C, let come to RT for 2-3 min, centrifuge, and disinfect, and transfer to a biosafety cabinet. Remove 5 µL of RocketCell™ Cell Viability Enhancer and add to the 5 mL of RocketCell™ Intestinal Organoid Growth Medium, AOF.

14. Place the well plate in an incubator at 37°C with 5% CO₂.
15. After 24 to 48 hrs, replace Growth Medium with RocketCell™ Cell Viability Enhancer with RocketCell™ Intestinal Organoid Growth Medium, AOF (without RocketCell™ Cell Viability Enhancer).
16. Change the top medium according to the experiment's design (recommended every 2-to-3-day interval).

Notes:

- Change 50-80% of the top medium with the same type of culture medium used. Change 100% of the top medium if switching to a different medium during organoid culture. Avoid disturbing hydrogel during medium changes.
- Organoids start maturing after 5 days on RocketCell™ Intestinal Organoid Growth Medium, AOF. Mature organoids (day 6-12) can be used for expansion/passaging. Alternative, Organoid can be maintained in VitroGel® hydrogel system on RocketCell™ Intestinal Organoid Growth Medium, AOF over 60 days.

F. Organoid Harvesting

We recommend using VitroGel® Organoid Recovery Solution (Catalog #: MS04-100) for fast organoid harvesting or VitroGel® Cell Recovery Solution (Catalog #: MS03-100) for gentle organoid harvesting. The volumes were described here for 1 well in a 96-well plate containing VitroGel®-cultured organoids using a 3D encapsulation method. For the detailed protocol, including organoid harvesting from animal-based hydrogels, please refer to the detailed product handbook. The general recovery protocol is below:

1. Warm the Recovery Solution to 37°C.
2. Take the organoids out of the incubator and remove the medium covering the top of the hydrogel. Wash the hydrogel two times with DPBS.
3. Add warm Recovery Solution to each well and use a pipette (1 mL or 200 µL pipette) to gently break the hydrogel into small pieces by gently pipetting up and down. This step can accelerate the hydrogel dissolving process. The recommended volume of Recovery Solution for different types of well plates is listed below:

	96-well Plate	48-well Plate	24-well Plate
Volume of Recovery Solution per well	200 µL	500 µL	1 mL

4. Transfer the mixture of step 3 to a 15 mL conical tube and add 5X volume of the warm Recovery Solution to the same tube.

Optional: Rinse the well with additional recommended volume of warm Recovery Solution and combine the solution with the centrifuge tube.

Recommendation: Adding RocketCell™ Cell Viability Enhancer into Recovery solution during gel de-polymerization process will improve cell viability and recovery. Thus, add RocketCell™ Cell Viability Enhancer in 1X concentration. E.g., Add 2 µL of RocketCell™ Cell Viability Enhancer in 2 mL of final Recovery Solution before incubation at 37°C. Adjust the volume of RocketCell™ Cell Viability Enhancer, according to final volume of recovery solution.

5. Use a 1 mL pipette or 10 mL serological pipette to very gently pipette the mixture up and down 2-5 times and put the tube in the water bath/dry bath for 2- 3 min at 37°C. Repeat this cycle 2-3 times until hydrogel is fully depolymerized. (In most situations, 1 incubation works; however, optimize the pipetting times and repeats according to the gel strength and cell type).
6. Centrifuge at 200-300 x g for 3-5 minutes at room temperature to collect the cell pellet. (Optimize the speed and time of the centrifuge according to different cell types).

Optional: If there is still some hydrogel on top of the cell pellet, carefully use a pipette to remove the hydrogel without disrupting the cell pellet, or resuspend the cell with 1 mL warm VitroGel® Organoid Recovery Solution and repeat steps 4 to 6 one more time.

G. Organoid expansion/passaging (VitroGel® to VitroGel®)

1. Follow the protocol F (Organoid Harvesting) above to obtain a pellet of organoid fragments/cells (A rough organoid fragment count is recommended).
2. Prepare the cell/organoid suspension in RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF.
3. Add 2 mL VitroGel® ORGANOID-5 hydrogel to 1 mL cell/organoid suspension (hydrogel-organoid mixture) and very gently pipette up and down 5-10 times to mix thoroughly. (Keep VitroGel® and cell medium at 2:1 v/v mixing ratio)

4. **Note:** It is recommended to include ~250–300 organoid fragments per 50 μ L of final gel-suspension volume. Adjust gel and cell suspension volumes accordingly. Transfer the hydrogel-organoid mixture to a well plate.

The recommended volume of hydrogel for different types of well plates is listed below:

a. **VitroPrime™ 3D Culture and Imaging Plate** (Recommended)

	96-well Plate	24-well Plate
Sample holder (hydrogel-organoid mixture)	20 μ L	150 μ L
Cover medium volume	50-100 μ L	300-500 μ L
Higher medium volume for the weekend	200 μ L	1 mL

b. **VitroPrime™ Spread-Attach Plate**

	96-well Plate	48-well Plate	24-well Plate
Sample holder (hydrogel-organoid mixture)	50 μ L	150 μ L	300 μ L
Cover medium volume	50-100 μ L	150-300 μ L	300-500 μ L
Higher medium volume for the weekend	200 μ L	600 μ L	1 mL

5. Wait 15 min at room temperature for soft gel formation.
Note: During the hydrogel forming process, avoid disrupting the hydrogel by tilting or shaking the well plate.
6. Carefully cover the hydrogel with RocketCell™ Intestinal Organoid Growth Medium, AOF with RocketCell™ Cell Viability Enhancer for 24 to 48 hrs (refer to prep steps below) with the recommended volume of cover medium above.
Remove the tube of RocketCell™ Cell Viability Enhancer from -20°C, let come to RT for 2-3 min, centrifuge, and disinfect, and transfer to a biosafety cabinet. Remove 5 μ L of RocketCell™ Cell Viability Enhancer and add to 5 mL of RocketCell™ Intestinal Organoid Growth Medium, AOF.
7. Place the well plate in an incubator at 37°C with 5% CO₂.
8. After 24 to 48 hrs, replace the Growth Medium with RocketCell™ Cell Viability Enhancer with RocketCell™ Intestinal Organoid Growth Medium, AOF **without** RocketCell™ Cell Viability Enhancer.
9. Change the top medium according to the experiment's design (recommended every 2-to-3-day interval).

Notes:

- Change 50-80% of the top medium with the same type of culture medium used. Change 100% of the top medium if switching to a different medium during organoid culture. Avoid disturbing the hydrogel during medium changes.
- Organoids start maturing after 5 days on RocketCell™ Intestinal Organoid Growth Medium, AOF. Mature organoids (day 6-12) can be used for expansion/passaging.

H. Organoid expansion/passaging (Matrigel® to VitroGel®)

Here we discuss how to harvest organoids cultured in Matrigel® and expand them into VitroGel® using VitroGel® Organoid Recovery Solution (Catalog #: MS04-100). Using a 24-well plate with 25 µL Matrigel® dome as an example below:

1. Remove the medium from the animal-based ECM culture plate.
2. Add 1 mL cold VitroGel® Organoid Recovery Solution (pre-chilled at 4°C or ice bucket) to each well of a 24-well plate with 25 µL domes.

Note: Adjust the volume based on the well-plate use and the dome volume (Keep the VitroGel® Organoid Recovery Solution volume at least 10X of Matrigel® dome volume).

Adding RocketCell™ Cell Viability Enhancer into Recovery Solution during gel de-polymerization process will improve cell viability and recovery. Thus, add RocketCell™ Cell Viability Enhancer in 1X concentration.

3. Transfer the gel and solution together to a 15 mL centrifuge tube.

Optional: Add another 1 mL VitroGel® Organoid Recovery Solution to wash the plate and combine the solution to the tube.

4. Gently pipette up and down 5-10 times and chill the tube on ice or place in the refrigerator for 2-5 minutes for ECM dissociation.

Optional: Rock the tube for 2-5 minutes instead of pipetting.

5. Centrifuge at 200-300 x g for 3-5 minutes at 4°C.
6. Remove the supernatant. The cells should be ready for subculture.

Optional: If there is still some ECM on top of the cell pellet, carefully use a pipette to remove the hydrogel without disrupting the cell pellet, or resuspend the cell with 1 mL cold VitroGel® Organoid Recovery Solution and repeat steps 4 to 6 one more time.

7. Prepare the cell/organoid suspension in RocketCell™ Intestinal Organoid Cell Suspension Medium, AOF.
8. Add 2 mL VitroGel® ORGANOID-5 hydrogel to 1 mL cell/organoid suspension (hydrogel-organoid mixture) and very gently pipette up and down 5-10 times to mix thoroughly. (Keep VitroGel® and cell medium at 2:1 v/v mixing ratio)
9. **Note:** It is recommended to include ~250–300 organoid fragments per 50 µL of final gel-suspension volume. Adjust gel and cell suspension volumes accordingly.
10. Transfer the hydrogel-organoid mixture to a well plate.

The recommended volume of hydrogel for different types of well plates is listed below:

a. **VitroPrime™ 3D Culture and Imaging Plate** (Recommended)

	96-well Plate	24-well Plate
Sample holder (hydrogel-organoid mixture)	20 µL	150 µL
Cover medium volume	50-100 µL	300-500 µL
Higher medium volume for the weekend	200 µL	1 mL

b. VitroPrime™ Spread-Attach Plate

	96-well Plate	48-well Plate	24-well Plate
Sample holder (hydrogel-organoid mixture)	50 µL	150 µL	300 µL
Cover medium volume	50-100 µL	150-300 µL	300-500 µL
Higher medium volume for the weekend	200 µL	600 µL	1 mL

11. Wait 15 min at room temperature for soft gel formation.

Note: During the hydrogel forming process, avoid disrupting the hydrogel by tilting or shaking the well plate.

12. Carefully cover the hydrogel with RocketCell™ Intestinal Organoid Growth Medium, AOF with RocketCell™ Cell Viability Enhancer for 24 to 48 hrs (refer to prep steps below) with the recommended volume of cover medium above.

Remove the tube of RocketCell™ Cell Viability Enhancer from -20°C, let come to RT for 2-3 min, centrifuge, and disinfect, and transfer to a biosafety cabinet. Remove 5 µL of RocketCell™ Cell Viability Enhancer and add to the 5 mL of RocketCell™ Intestinal Organoid Growth Medium, AOF.

13. Place the well plate in an incubator at 37°C with 5% CO₂.
14. After 48 hrs, replace Growth Medium with RocketCell™ Cell Viability Enhancer with RocketCell™ Intestinal Organoid Growth Medium, AOF **without** RocketCell™ Cell Viability Enhancer.
15. Change the top medium according to the experiment's design (recommended every 2-to-3-day interval).

Notes:

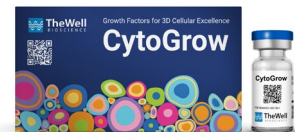
- Change 50-80% of the top medium with the same type of culture medium used. Change 100% of the top medium if switching to a different medium during organoid culture. Avoid disturbing the hydrogel during medium changes.
- Organoids start maturing after 5 days on RocketCell™ Intestinal Organoid Growth Medium, AOF. Mature organoids (day 6-12) can be used for expansion/passaging.

Appendix A: Other products for Culture of Organoids

- **VitroGel® ORGANOID** (Catalog #: VHM04)
- **RocketCell™ Intestinal Organoid Growth Medium, AOF** (Catalog #: RC03-M2) - Growth Medium Only
- **RocketCell™ Organoid Essential-Core Medium, AOF** (Catalog #: RC04-OCM)
- **RocketCell™ Supplements**
 - » RocketCell™ S1 Supplements (50X), AOF, (B27-like supplement)
 - » RocketCell™ S2 Supplements (50X), AOF, (N2-like supplement)
 - » RocketCell™ S3 Supplements (50X), AOF, (N2B27 like premixed supplement)
- **CytoGrow™ Growth Factors** - over 100+ types across multiple species available
See Appendix B
- **VitroPrime™ Spread-Attach Plate**
 - » 6-Well (Catalog #: VP-SA6W)
 - » 12-Well (Catalog #: VP-SA12W)
 - » 24-Well (Catalog #: VP-SA24W)
 - » 48-Well (Catalog #: VP-SA48W)
 - » 96-Well (Catalog #: VP-SA96W)
- **VitroPrime™ 3D Culture and Imaging Plate**
 - » 6-Well (Catalog #: VP-3D6W5)
 - » 24-Well (Catalog #: VP-3D24W5)
 - » 96-Well (Catalog #: VP-3D96W5)
- **VitroPrime™ Ultra-Low Attachment Plate, U-Bottom, 96-Well** (Catalog #: VP-ULA96U-8)
- **VitroPrime™ Cell Culture Inserts**
 - » 3 µm (Catalog #: VPE3-24-4)
 - » 8 µm (Catalog #: VPE8-24-4)
- **VitroGel® Organoid Recovery Solution**
 - » 100 mL (Catalog # MS04-100)
 - » 500 mL (Catalog # MS04-500)
- **VitroGel® Cell Recovery Solution** (Catalog #: MS03-100)
- **Cyto3D® Live-Dead Assay Kit** (Catalog #: BM01)

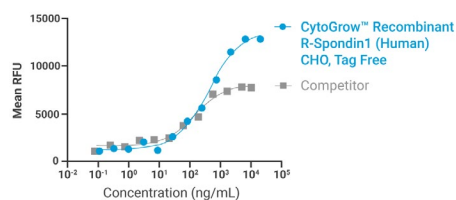
Appendix B: Growth Factors by Organoid Type

CytoGrow™ is TheWell Bioscience's portfolio of premium-grade recombinant proteins built for researchers who demand top-tier bioactivity, strong lot-to-lot consistency, and reliable real-world performance—with a budget-friendly price.

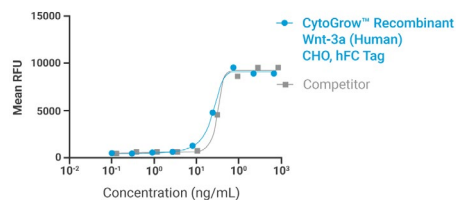


Organoid Types	Key Growth Factors and Cytokines			
Brain	BDNF (CG002) EGF (CG014)	FGF-2 (CG003) FGF-8b (CG020)	GDNF (CG092) NT-3 (CG105)	SHH TGF-β1 (CG069)
Breast	EGF (CG014) FGF-2 (CG003) FGF-7 (CG019)	FGF-10 (CG022) NRG1-β1 (CG106)	Noggin (CG059) R-Spondin1 (CG067)	R-Spondin 3 Wnt-3a (CG084)
Gastric	Activin-A (CG001) BMP-4 EGF (CG014)	FGF-4 (CG018) FGF-10 (CG022)	Gastrin Noggin (CG059)	R-Spondin1 (CG067) Wnt-3a (CG084)
Inner Ear	BMP-4 FGF-2 (CG003)	FGF3 FGF-10 (CG022)		
Intestinal	Activin-A (CG001) BMP-4	EGF (CG014) FGF-4 (CG018)	Noggin (CG059) R-Spondin1 (CG067)	Wnt-3a (CG084)
Kidney	Activin-A (CG001) BMP-2 (CG006) BMP-4	BMP-7 (CG007) FGF-2 (CG003)	FGF-7 (CG019) FGF-9 (CG021)	GDNF (CG092) R-Spondin1 (CG067)
Liver	Activin-A (CG001) BMP-4 BMP-7 (CG007) EGF (CG014)	FGF-2 (CG003) FGF-7 (CG019) FGF-10 (CG022) FGF-19 (CG119)	Gastrin HGF (CG032) IGF-1 (CG053) Noggin (CG059)	OSM (CG061) R-Spondin1 (CG067) VEGF165 (CG080) Wnt-3a (CG084)
Lung	Activin-A (CG001) FGF-4 (CG018)	FGF-7 (CG019) FGF-10 (CG022)	Noggin (CG059) R-Spondin1 (CG067)	SHH Wnt-3a (CG084)
Prostate	EGF (CG014) FGF-10 (CG022)	Noggin (CG059) R-Spondin1 (CG067)	Wnt-3a (CG084)	
Retinal	FGF-2 (CG003) IGF-1 (CG053)	Noggin (CG059) SHH	Wnt-3a (CG084)	

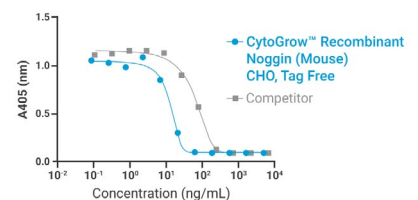
**R-Spondin1 (Human),
Recombinant Protein, CHO, Tag Free**



**Wnt-3a (Human),
Recombinant Protein, CHO, hFC Tag**



**Noggin (Mouse),
Recombinant Protein, CHO, Tag Free**





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