

## human Chemokine CXCR3A Receptor Cell Line

Product No.: ES-142-C

Lot No.: M1W-C1

### Material Provided

Cells: 2 x 1 mL frozen aliquot (ES-142-CV)  
Format: ~2.5 x 10<sup>6</sup> cells /mL in freezing medium

### Product Information

Cellular Background: CHO-K1

Cell Line Development: Our proprietary bicistronic expression plasmid containing the sequence coding for the human Chemokine CXCR3 (isoform A) receptor was transfected in CHO-K1 cells. Geneticin-resistant clones were obtained by limit dilution and compared for receptor expression levels by radioligand binding assay. The clone with the highest receptor expression level was selected for characterization in binding and functional assays.

DNA Sequence: Identical to coding sequence of GenBank NM\_001504.1.

Corresponding Protein Sequence: Identical to GenBank NP\_001495.1.

Receptor expression level (B<sub>max</sub>): Estimated to be 7 pmol/mg protein, using [<sup>125</sup>I]-TAC

K<sub>d</sub> for the above radioligand: 0.2 nM

Shipping Conditions: Shipped on dry ice. Please ensure dry ice is still present in the package upon receipt or contact customer support.

Storage Conditions: Store in liquid nitrogen (vapor phase) immediately upon receipt.



## Quality Control

The EC<sub>50</sub> for a reference agonist was determined in LANCE® cAMP assay performed on an EnVision® instrument. A mycoplasma test was performed using MycoAlert® (Lonza) mycoplasma detection kit. We certify that these results meet our quality release criteria.

human CXCL11 (I-TAC) (EC<sub>50</sub>): 3.3 nM

Stability: Cells were kept in continuous culture for 90 days and showed a B<sub>max</sub> of 17, 14 and 12 pmoles/mg of protein for T30, T57, and T90 respectively, indicating a good stability of the receptor expression.

Mycoplasma: This cell line tested negative for mycoplasma.

## Assay Procedures

We have shown for many of our GPCR cell lines that freshly thawed cells respond with the same pharmacology as cultured cells. All of our products validated in this way are available as frozen ready-to-use cells in our catalogue. This demonstrates that cells can be prepared and frozen in advance of a screening campaign simplifying assay logistics.



## Recommended Cell Culture Conditions (CHO-K1)

- The recommended media catalogue number and supplier reference information are listed in this Product Technical Data Sheet (last page). Media composition is specifically defined for each cell type and receptor expression selection. The use of incorrect media or component substitutions can lead to reduced cell viability, growth issues and/or altered receptor expression.
- Cells undergo major stress upon thawing, and need to adapt to their new environment which may initially affect cell adherence and growth rates. The initial recovery of the cells, and initial doubling time, will vary from laboratory to laboratory, reflecting differences in the origin of culture media and serum, and differences in methodology used within each laboratory.
- For the initial period of cell growth (i.e. until cells have reached Log-phase, typically 4-10 days), we strongly recommend removal of the antibiotics (G418, Zeocin™, Puromycin, Blasticidin, Hygromycin, Penicillin and Streptomycin) from the culture media. Immediately after thawing, cells may be more permeable to antibiotics, and a higher intracellular antibiotic concentration may result as a consequence. Antibiotics should be re-introduced when cells have recovered from the thawing stress.

Growth Medium: Ham's F-12, 10% FBS, 0.4 mg/ml G418 (receptor expression selection).

Freezing Medium: Ham's F-12, 10% FBS with 10% DMSO, without selection agents.

Thawing Cells: Using appropriate personal protective equipment, rapidly place the frozen aliquot in a 37°C water bath (do not submerge) and agitate until its content is thawed completely. Immediately remove from water bath, spray aliquot with 70% ethanol and wipe excess. Under aseptic conditions using a sterile pipette, transfer content to a sterile centrifuge tube containing 10 mL growth medium without antibiotics, pre-warmed at 37°C, and centrifuge (150 x g, 5 min). Discard supernatant using a sterile pipette. Resuspend cell pellet in 10 mL of pre-warmed growth medium without antibiotics by pipetting up and down to break up any clumps, and transfer to an appropriate culture flask (e.g. T-25, T-75 or T-175, see recommended seeding density below). Cells are cultured as a monolayer at 37°C in a humidified atmosphere with 5% CO<sub>2</sub>.

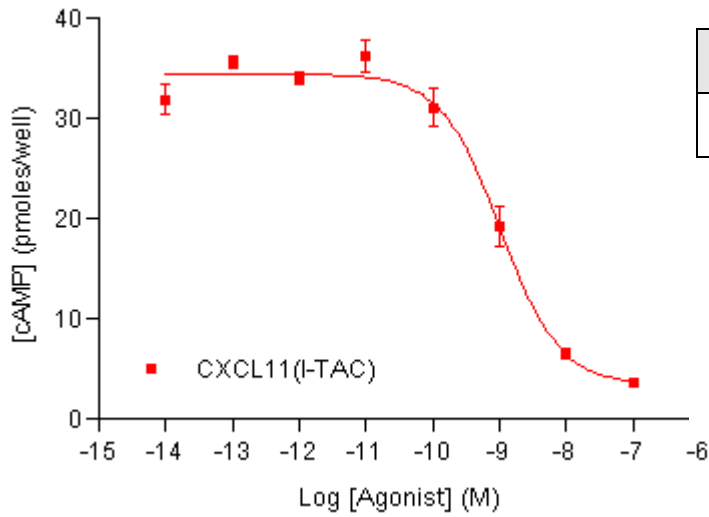
Recommended Seeding Density:	Thawing:	15,000 – 33,000 cells/cm <sup>2</sup>
	Log-phase:	11,000 – 15,000 cells/cm <sup>2</sup>

Troubleshooting: Initial doubling time can vary between 18 and 96 hours (Average = 25 hours). If cells are still not adhering after 48 hours or grow very slowly, we recommend maintaining the cells in culture and not replacing the media before 5-6 days (cells secrete factors that can help with adherence and growth). If confluence is still <50% after 5-6 days, it is recommended that you replace the media with fresh media (without antibiotics). Do not passage the cells until they reach 80-90% confluence (Log-phase). If cells have not recovered after 10-12 days, please contact our Technical Support.

Culture Protocol: Under aseptic conditions, cells are grown to 80% confluence (Log-phase) and trypsinized (0.05% trypsin/0.5 mM EDTA in calcium and magnesium-free PBS). See recommended seeding density for Log-phase above.

Banking Protocol: Cells are grown to 70-80% confluence (Log-phase). Under aseptic conditions, remove medium and rinse the flask with an appropriate volume of calcium and magnesium-free PBS (example 10 mL for T-175). Trypsinize (0.05% trypsin/0.5 mM EDTA in calcium and magnesium-free PBS) to detach cells (example 5 mL for T-175), let stand 5-10 min at 37°C. Add fresh, room temperature growth medium (without antibiotics) to stop trypsinization and dilute EDTA (example 10 mL for T-175). Transfer cells to a sterile centrifuge tube and centrifuge (150 x g, 5 min). Discard supernatant using a sterile pipette. Resuspend cell pellet in ice-cold freezing medium by pipetting up and down to break up any clumps. Count cells and rapidly aliquot at the selected cell density (e.g. 2.5 x 10<sup>6</sup> cells/mL) in sterile polypropylene cryovials. Use appropriate material to ensure slow cooling (about -1°C/min) until -70°C. Transfer vials into a liquid nitrogen tank (vapor phase) for storage.

Typical Product Data - cAMP Assay



Agonist	EC <sub>50</sub> (M)
human CXCL11 (I-TAC)	1.0 X 10 <sup>-9</sup>

Figure 1. Agonist Response in cAMP assay

An agonist dose-response experiment was performed in 96-well format using 25,000 cells/well. Forskolin at a final concentration of 5  $\mu$ M was used. cAMP concentrations were determined using a Tropix kit (Applied Biosystems, cat no CS200), according to manufacturer specifications. Data from a representative experiment are shown.

Typical Product Data -Radioligand Binding Assay (Filtration)

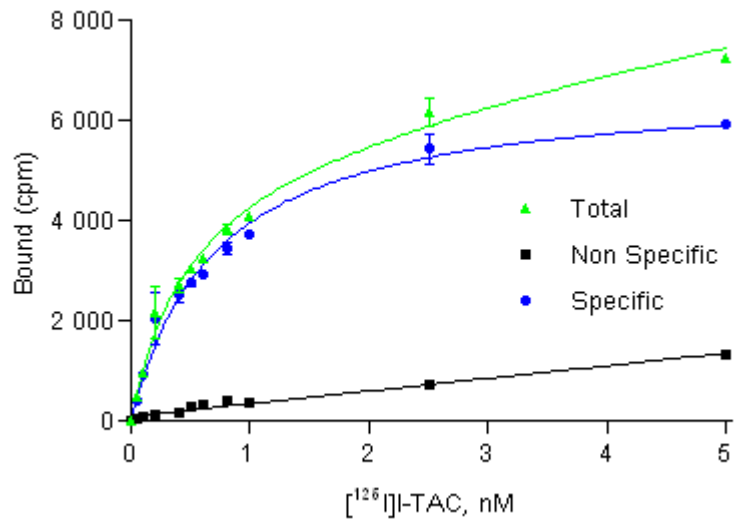
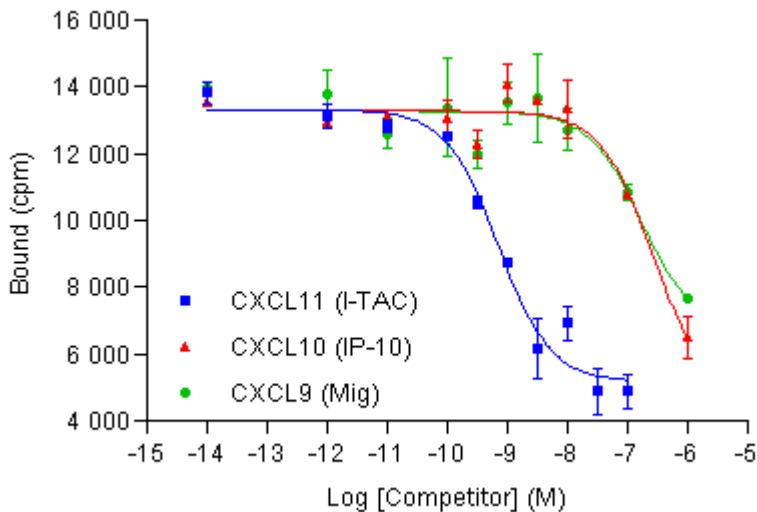


Figure 2: Saturation Binding Assay Curve (Filtration)

A saturation binding assay was performed in 96-well format using 2 µg membranes/well. Counts per minute (cpm) were measured on a TopCount® instrument. Data from a representative experiment are shown.

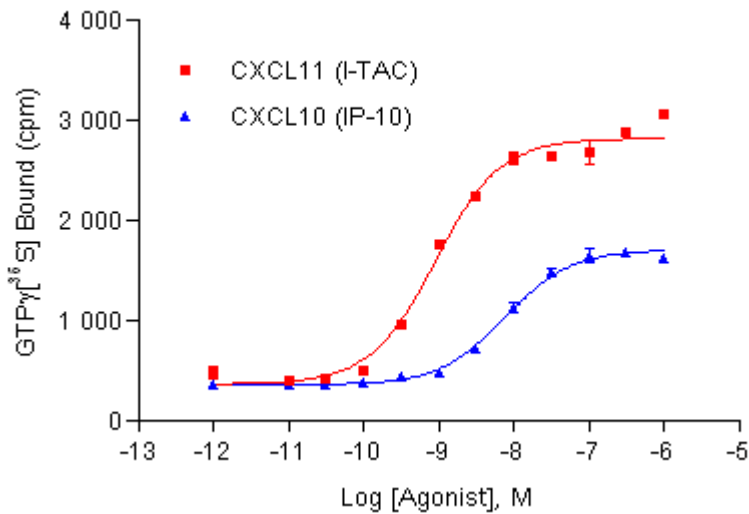


Agonist / Antagonist	IC <sub>50</sub> (M)
human CXCL11 (I-TAC)	7.1 x 10 <sup>-10</sup>
human CXCL10 (IP-10)	> 10 <sup>-7</sup>
human CXCL9 (Mig)	> 10 <sup>-7</sup>

Figure 3: Competition Binding Assay Curve (Filtration)

A competition binding assay was performed in 96-well format using 2 µg membranes/well. Displacement of 0.2 nM [<sup>125</sup>I]-TAC was used. Counts per minute (cpm) were measured on a TopCount® instrument. Data from a representative experiment are shown.

Typical Product Data - GTP $\gamma$ S - Flashplate Assay

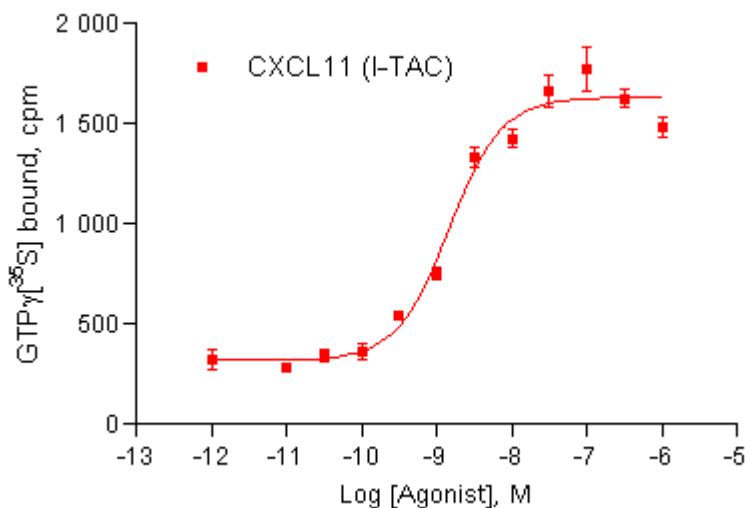


Agonist	EC <sub>50</sub> (M)
human CXCL11 (I-TAC)	9.1 X 10 <sup>-10</sup>
human CXCL10 (IP-10)	7.7 X 10 <sup>-9</sup>

Figure 4. Agonist Response in GTP $\gamma$ S - Flashplate assay

Briefly, 20  $\mu$ l of MgCl<sub>2</sub> (30 mM), 20  $\mu$ l of GDP (30  $\mu$ M), 20  $\mu$ l of saponine (100  $\mu$ g/ml), 100  $\mu$ l of hCXCR3 membrane (5  $\mu$ g) and 20  $\mu$ l of ligand at various concentration were preincubated in a 96 well Flash plate (Revvity, cat no SMP200) for 15 min at 30°C. 20  $\mu$ l of [<sup>35</sup>S]GTP $\gamma$ S (1 nM, Revvity # NEG030H) were then added and incubated at 30°C for 30 min and the reaction was stopped by centrifugation of the plate (2000 rpm, 10 min at 4°C) and aspiration of the supernatant. The plate was then counted on a TopCount<sup>®</sup> instrument. Data from a representative experiment are shown.

Typical Product Data - GTP $\gamma$ S - SPA<sup>®</sup> Assay



Agonist	EC <sub>50</sub> (M)
human CXCL11 (I-TAC)	1.4 X 10 <sup>-9</sup>

Figure 5. Agonist Response in GTP $\gamma$ S - SPA<sup>®</sup> assay

An agonist dose-response scintillation proximity assay (SPA) was performed in 96-well format using 5  $\mu$ g membranes/well. Counts per minute (cpm) were measured on a TopCount<sup>®</sup> instrument. Data from a representative experiment are shown.



## LANCE<sup>®</sup> cAMP Assay Procedure

- Stimulation Buffer: HBSS, 5 mM HEPES, 0.1 % Protease-free BSA, 0.5 mM IBMX, pH 7.4.
- Cells/well: 2500. For compounds not tested herein we recommend titrating the cells for optimal performance, i.e. 1000-10,000 cells per assay point.
- Antagonist Pre-incubation: Simultaneous addition of antagonists with reference agonist.
- Agonist Stimulation: 30 min at room temperature (22°C).

cAMP measurements were performed with the LANCE<sup>®</sup> cAMP 384 Kit (Revvity # AD0262), according to the manufacturer instructions. Briefly:

1. Compounds (6  $\mu$ L/well) were dispensed into a 384-well white Optiplate:

	G <sub>αs</sub> and G <sub>αi</sub> assay modes		G <sub>αs</sub> assay mode		G <sub>αi</sub> assay mode	
	Basal	Forskolin	Agonist Assay	Antagonist Assay	Agonist Assay	Antagonist Assay
Buffer	6 $\mu$ L	-	-	-	-	-
Antagonist	-	-	-	3 $\mu$ L of 4x final conc.	-	3 $\mu$ L of 4x final conc.
Agonist	-	-	6 $\mu$ L of 2x final conc.	3 $\mu$ L of 4x final conc.	6 $\mu$ L of 2x final conc. in 2x final FK conc.	3 $\mu$ L of 4x final conc. in 4x final FK conc.
Forskolin	-	6 $\mu$ L of 2x final conc.	-	-		

2. Cells in mid-log phase, grown in media without antibiotics for 18 hours prior to the experiment, were detached by gentle flushing with PBS-EDTA, recovered by centrifugation and resuspended in stimulation Assay buffer to the concentration of  $4.2 \times 10^5$  cells/mL.
3. The Alexa Fluor<sup>®</sup> 647-anti cAMP antibody was added 1/100 (vol/vol) to the cells suspension.
4. 6  $\mu$ L/well of cell and antibody suspension (2500 cells/well) were dispensed on top of the compounds prepared in the 384 well Optiplate.
5. After incubation for 30 min at room temperature the reaction was stopped by addition of 12  $\mu$ L of Detection Mix.
6. The plate was incubated for 60 min at room temperature, and read with an EnVision<sup>®</sup>.

Note: Assays can also be miniaturized into 1536-well format.



## Membrane Radioligand Binding Assay Procedure (Filtration)

*Note: The following are recommended assay conditions and may differ from the conditions used to generate the typical data shown in the above section.*

Assay Buffer:	25 mM Hepes pH 7.4, 10 mM MgCl <sub>2</sub> , 1 mM CaCl <sub>2</sub> , 0.5% BSA
Wash Buffer:	25 mM Hepes pH 7.4, 5 mM MgCl <sub>2</sub> , 1 mM CaCl <sub>2</sub> , 500 mM NaCl (ice cold)
Radioligand:	[ <sup>125</sup> I]-TAC (Revvity # NEX376)
Filters:	Unifilter 96 GF/C (Revvity # 6055690)

### Membrane Binding Protocol:

Binding assays were performed in 200 µL total volume according to the following conditions. All dilutions are performed in assay buffer:

1. Membrane dilution:	2 µg of membranes per well, diluted in order to dispense 150µL/well. Keep on ice.
2. Assembly on ice (in 96 Deep well plate)	<ul style="list-style-type: none"><li>• 25 µL of assay buffer or of unlabeled ligand (human CXCL11 (I-TAC), 5 µM final) for determination of non specific binding</li><li>• 25 µL of radioligand at increasing concentrations (see figure 2)</li><li>• 150 µL of diluted membranes</li></ul>
Saturation Binding:	
Competition Binding:	<ul style="list-style-type: none"><li>• 25 µL competitor ligand at increasing concentrations (see figure 3)</li><li>• 25 µL of radioligand (0.2 nM final)</li><li>• 150 µL of diluted membranes</li></ul>
3. Incubation:	60 min at 27°C.
4. Filters preparation:	GF/C filters were presoaked in 0.5 % PEI at room temperature for at least 30 min.
5. Filtration:	Aspirate and wash 9 x 500 µL with ice cold wash buffer using a FilterMate Harvester.
6. Counting:	Add 30 µL/well of MicroScint™-O (Revvity # 6013611), cover filter with a TopSeal-A PLUS (Revvity # 6050185) and read on a TopCount®.





## GTP $\gamma$ S - SPA<sup>®</sup> Assay Procedure

Assay Buffer: 20 mM HEPES pH 7.4; 100 mM NaCl, 10  $\mu$ g/ml saponin, 1 mM MgCl<sub>2</sub>, 0.1% protease-free BSA

GDP concentration: 3  $\mu$ M GDP (final)

SPA Beads: PVT-WGA (Revvity # RPNQ0001), 0.25 mg/well

Radioligand: GTP $\gamma$ S, [<sup>35</sup>S] - (Revvity # NEG030H)

Membranes: 5  $\mu$ g/well

Format: 96-well

Final volume: 100  $\mu$ L/well

GTP $\gamma$ S-SPA assays were performed in 100  $\mu$ L total volume according to the following conditions. All dilutions are performed in assay buffer:

1. Membrane Dilution:	5 $\mu$ g of membranes per well, diluted in order to dispense 20 $\mu$ L/well. Keep on ice.
2. GDP preparation:	Prepare a 5-fold concentrated GDP solution (i.e. 15 $\mu$ M).
3. GTP $\gamma$ S, [ <sup>35</sup> S] - dilution:	Dilute GTP $\gamma$ S, [ <sup>35</sup> S] - to give ~25,000 dpm/20 $\mu$ L
4. Beads:	Dilute beads to 12.5 mg/mL (0.25 mg/20 $\mu$ L)
5. Assembly (in Optiplate <sup>™</sup> ),  Agonist Assay:	<ul style="list-style-type: none"> <li>• 20 <math>\mu</math>L of 5x GDP dilution</li> <li>• 20 <math>\mu</math>L of 5x agonist dilutions at increasing concentrations</li> <li>• 20 <math>\mu</math>L of diluted membranes</li> </ul>
Antagonist Assay:	<ul style="list-style-type: none"> <li>• 20 <math>\mu</math>L of 5x GDP dilution</li> <li>• 20 <math>\mu</math>L of a 5x antagonist at increasing concentrations: 5x reference agonist dilution (to reach a final concentration corresponding to its EC<sub>80</sub>)</li> <li>• 20 <math>\mu</math>L of diluted membranes</li> </ul>
6. Pre-incubation:	Incubate for 15 min at room temperature (RT)
7. Assemble (continued)	<ul style="list-style-type: none"> <li>• 20 <math>\mu</math>L of the GTP<math>\gamma</math>S, [<sup>35</sup>S] - dilution</li> <li>• 20 <math>\mu</math>L of the SPA Beads dilution</li> </ul>
8. Incubation:	<ul style="list-style-type: none"> <li>• Cover plate with a TopSeal,</li> <li>• Shake on an orbital shaker for 2 min,</li> <li>• Incubate for 1h at RT</li> <li>• Centrifuge the plate for 10 min. at 2000 rpm</li> <li>• Incubate for 0h to 1h at RT</li> </ul>
9. Counting	Count for 1 min on a TopCount <sup>®</sup>

## References

1. Cox M.A., Jenh CH, Gonsiorek W, Fine J, Narula SK, Zavodny PJ, Hipkin RW. (2001) Human interferon-inducible 10-kDa protein and human interferon-inducible T cell alpha chemoattractant are allotropic ligands for human CXCR3: differential binding to receptor states. *Mol. Pharmacol.* 59:707-715.
2. Loetscher M., Loetscher P, Brass N, Meese E, Moser B. (1998) Lymphocyte-specific chemokine receptor CXCR3: regulation, chemokine binding and gene localization. *Eur.J. Immunol.* 28:3696-3705.
3. Loetscher M., Gerber B, Loetscher P, Jones SA, Piali L, Clark-Lewis I, Baggiolini M, Moser B. (1996) Chemokine receptor specific for IP10 and mig: structure, function, and expression in activated T-lymphocytes. *J. Exp. Med.* 184:963-969.

## Materials and Instrumentation

The following tables provide the references of compounds and reagents used or recommended for the characterization of the human Chemokine CXCR3A receptor ValiScreen® cell line, as well as some advice on how to use these compounds:

Table 1. References of compounds used for functional characterization and binding assays

Name	Provider	Cat no	Working Stock Solution
human CXCL11 (I-TAC)	R&D systems	266-IP	10 µM in PBS + 0.1% protease-free BSA
human CXCL10 (IP-10)	R&D systems	672-IT	10 µM in PBS + 0.1% protease-free BSA
human CXCL19 (Mig)	R&D systems	392-MG	10 µM in PBS + 0.1% protease-free BSA
[ <sup>125</sup> I]-TAC	Revvity	NEX376	N/A

Table 2. References of cell culture media and assay buffers.

Name	Provider	Cat no
HAM's F-12	Hyclone	SH30026.02
DMEM	Hyclone	SH30022.02
Advanced DMEM/F12 (serotonin receptors)	Invitrogen	12634-010
EMEM	BioWitthaker	06-174G
EX-CELL DHFR media (DHFR deficient cell lines)	Sigma	C8862
FBS	Wisent	80150
FBS dialyzed	Wisent	80950
G418 (geneticin)	Wisent	400-130-IG
Zeocin	Invitrogen	R25005
Blasticidin	invitrogen	R210-01
Puromycin	Wisent	400-160-EM
Standard HBSS (with CaCl <sub>2</sub> and MgCl <sub>2</sub> )	GIBCO	14025
HEPES	MP Biomedicals, LLC	101926
BSA, Protease-free	Sigma	A-3059
PEI	Sigma	P3143
Trypsin-EDTA	Hyclone	SH30236.02
Sodium Pyruvate	GIBCO	11360
L-Glutamine	GIBCO	25030
NEAA (non-essential amino acids)	GIBCO	11140
Forskolin	Sigma	F6886

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