Screen Quest™ Live Cell Chemokine (C-X-C motif) receptor CXCR4 cAMP Assay Service Pack

Catalog number: 38206
Unit size: 100 Tests

Component	Storage	Amount (Cat No. 38206)
Component A: Ga16 DNA	Freeze (< -15 °C), Minimize light exposure	1 vial (15 µg)
Component B: Transfectamine™ 5000	Freeze (< -15 °C), Minimize light exposure	1 vial (75 µL)
Component C: Calbryte™ 520 NW	Freeze (< -15 °C), Minimize light exposure	1 vial
Component D: 10X Pluronic® F127 Plus	Freeze (< -15 °C), Minimize light exposure	1 bottle (1 mL)
Component E: HHBS	Freeze (< -15 °C), Minimize light exposure	1 bottle (9 mL)
Component F: DMSO	Refrigerated (2-8 °C)	1 vial (100 µL)
Component G: CXCR4 DNA	Freeze (< -15 °C), Minimize light exposure	1 vial (15 µg)

OVERVIEW

CXCR4, or C-X-C motif chemokine receptor 4, is a key member of the GPCR family that plays a critical role in immune system regulation, cell migration, and tissue homeostasis and is implicated in various pathological processes, including HIV entry, cancer metastasis, and inflammatory diseases, making it a significant therapeutic target. Traditional methods for studying GPCRs often fail to adequately capture the full spectrum of signaling mechanisms of specific receptors like CXCR4, which primarily couples to adenylyl cyclase activity and intracellular cAMP production.

The Screen Quest™ Live Cell Chemokine (C-X-C motif) receptor CXCR4 cAMP Assay Service Pack is specifically designed for real-time, high-throughput monitoring of intracellular cAMP changes associated with CXCR4 activation using transfected cell lines and Calbryte™ 520 wash-free calcium fluorescence detection methods. Unlike conventional assays that require cell lysis, this assay preserves cellular integrity, enabling both temporal and spatial resolution of specific signaling events associated with CXCR4. This assay employs cell lines transfected to express CXCR4 along with a promiscuous G-protein Gα16. The Gα16 protein allows CXCR4, which primarily signals through the cAMP pathway, to also couple to Gq signal transduction and mobilize intracellular calcium. Activation of CXCR4 by specific ligands, such as SDF-1 (stromal cell-derived factor-1), can be detected using calcium-sensitive dyes like Calbryte™ 520 AM, Cal-520™ AM, Fluo-8™ AM, Fluo-4™ AM, or corresponding no-wash calcium kits. The inclusion of CXCR4 and Gα16 co-expression ensures robust calcium signaling for reliable assay performance.

This service pack provides all necessary components for precise measurement of CXCR4-mediated cAMP changes using FLIPR, FDSS, or equivalent fluorescence microplate readers. It is an ideal tool for studying non-Gq protein-coupled CXCR4 activity, enabling researchers to explore CXCR4 signaling pathways and evaluate potential therapeutic compounds targeting this receptor.

AT A GLANCE

Protocol summary

1. Prepare cells for transfection
2. Prepare Transfectamine™ 5000-DNA mixture
3. Add Transfectamine™ 5000-DNA mixture to the cell culture, incubate overnight
4. Transfer the transfected cells to a 96-well plate 24-30 hours after transfection, and incubate the culture overnight
5. Add Calbryte™ 520 NW dye-loading solution
6. Incubate at room temperature or 37 °C for 30-60 minutes
7. Monitor the fluorescence intensity at Ex/Em = 490/525 nm

Important Note

Thaw the kit components at room temperature before starting the experiment.

KEY PARAMETERS

Fluorescence microplate reader

Cutoff	515 nm
Emission	525 nm
Excitation	490 nm
Recommended plate	Black wall/Clear bottom
Instrument specification(s)	Bottom read mode/Programmable liquid handling

Note: This kit is compatible with the following instruments: FDSS, FLIPR, ViewLux, NOVOStar, Array Scan, FlexStation, and IN Cell Analyzer.

CELL PREPARATION

1. Seed the cells such that they will be ~60-70% confluent at the time of transfection.
2. Replace with fresh growth medium before transfection. For example, replace with 2 mL of medium per well for 6-well plates and 6 mL of medium for 10 cm plates.

PREPARATION OF STOCK SOLUTIONS

Calbryte™ 520NW stock solution

1. Add 20 µL of DMSO (Component F) into the vial of Calbryte™ 520NW (Component C), and mix them well.

   Note: 20 µL of Calbryte™ 520NW stock solution is enough for one plate. Unused Calbryte™ 520NW stock solution can be aliquoted and stored at ≤ -20 °C for more than one month, provided the tubes are tightly sealed. Protect from light and avoid repeated freeze-thaw cycles.

PREPARATION OF WORKING SOLUTION

1X Assay Buffer

1. Combine 9 mL of HHBS (Component E) with 1 mL of 10X Pluronic® F127 Plus (Component D), and mix thoroughly.

Calbryte™ 520NW Working Solution

1. Add 20 µL of Calbryte™ 520 NW stock solution to 10 mL of 1X Assay Buffer, and mix well.

   Note: The working solution is stable for at least 2 hours at room temperature.

Transfectamine™ 5000-DNA Mixture

1. Add 15 µL of ddH_2O to the vial of Ga16 DNA (Component A) and CXCR4 DNA (Component G), to get the final concentration of 1 µg/µL for both DNAs.
2. Mix 3 µg of DNA [for example, 1.5 µg of Ga16 DNA (Component A) and 1.5 µg of CXCR4 DNA (Component G)] with 200 µL of serum-free medium.
3. Add 9 µL of Transfectamine™ 5000 (Component B) to the mixture from Step 2.
4. Mix well and incubate at room temperature for 20 minutes.

   Note: The ratio of Transfectamine™ 5000 and DNA need to be optimized for different cell lines. In general, the ratio for Transfectamine™ 5000 Transfection Reagent (µL) to DNA (µg) should be 3-5 µL : 1 µg.

Table 1. Sample protocols for a 6-well plate and a 10 cm plate

Component	6 well plate (per well)	10 cm plate
Fresh culture medium	2 mL	6 mL
Plasmid	~3 µg	10~15 µg
Serum-free medium	200 µL	600 µL
Transfectamine™ 5000 Transfection Reagent	~9 µL	~30-45 µL

SAMPLE EXPERIMENTAL PROTOCOL

Transfection protocol

1. Add Transfectamine™ 5000 -DNA mixture to the culture plate and incubate overnight.

   Note: The recombinant protein can start to be detected as early as 16 hours after transfection. The maximal expression level may be observed 72~96 hours after transfection.

2. Transfer the transfected cells to a 96-well plate 24-30 hours post transfection and incubate overnight.
   - **For adherent cells:** Plate cells overnight in the growth medium at 40,000 to 80,000 cells/well/100 µL for a 96-well plate.
   - **For non-adherent cells:** Centrifuge the cells from the culture medium and then suspend the cell pellet in cell growth medium or HHBS at 125,000 to 250,000 cells/well/100 µL for a 96-well poly-D lysine plate. Centrifuge the plate at 800 rpm for 2 minutes with brake off prior to the experiments.

   Note: Each cell line should be evaluated on the individual basis to determine the optimal cell density for the intracellular calcium mobilization.

Calcium assay

1. Add 100 µL/well (96-well plate) of Calbryte™ 520NW working solution into the cell plate.
2. Incubate the dye-loaded plate in a cell incubator for 30 minutes, and then incubate the plate at room temperature for another 15-30 minutes.

   Note: If the assay requires 37 °C, perform the experiment immediately without further room temperature incubation.

   Note: If the cells can function well at room temperature for longer time, incubate the cell plate at room temperature for 1 hour (It is recommended that the incubation time be no longer than 2 hours.)

3. Prepare the compound plate with HHBS or your desired buffer.
4. Run the calcium flux assay by monitoring the fluorescence intensity at Ex/Em = 490/525 nm.

EXAMPLE DATA ANALYSIS AND FIGURES

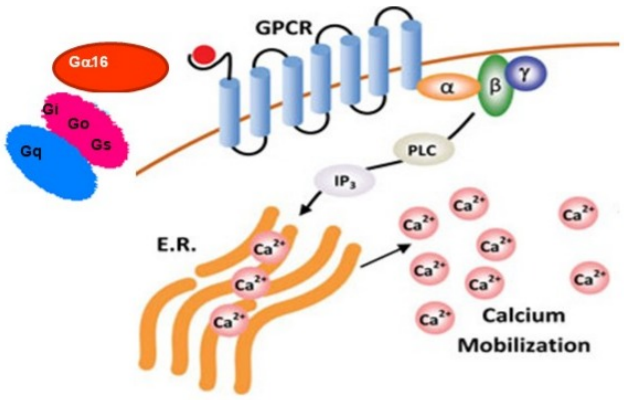

Figure 1. Screen Quest™ Live Cell Chemokine (C-X-C motif) receptor CXCR4 cAMP assay principle

DISCLAIMER

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