



Normal Human Induced Pluripotent Stem Cell-derived Neural Stem Cells (XCL-1 NSC) Instruction Sheet

Safety and Use Statement

This product is for Research Use Only. This product is not approved for human or veterinary use or for use in *in vitro* diagnostics or clinical procedures.

Lifeline recommends storing cryopreserved vials in liquid nitrogen vapor phase. Handle cryopreserved vials with caution. Always wear eye protection and gloves when working with cell cultures. Aseptically vent any nitrogen from cryopreserved vials by carefully loosening the vial cap in a biosafety cabinet prior to thawing the vials in a water bath. If vials must be stored in liquid phase, the vials should be transferred to vapor phase storage or -80°C for up to 24 hours prior to being thawed.

Basic Aseptic Technique

Cells, medium and LifeFactors® should only be used in an aseptic environment, a Class II biological safety cabinet with front access and filtered laminar airflow, or an equivalent device. Always wear gloves and eye protection when working with these materials. Wipe or spray all bottles and vials with 70% ethanol or isopropanol, especially around the area of the cap, before placing them in the biological safety cabinet. Allow these surfaces to dry completely before opening the bottle or vials. Transfer cells, medium or LifeFactors with disposable sterile pipettes. Do not mouth pipette! Take up the volume needed into the pipette, being careful not to touch the sterile tip to the rim of the container or any other surface. Close the container and open the container into which the transfer is being made, again being careful not to touch any surfaces with the sterile tip. Transfer the material and close the container. Wash your hands before and after working with cell cultures. Do not block airflow in a laminar flow hood as this may compromise sterility. Ensure that biological safety cabinets are certified routinely and that the HEPA filters are replaced regularly.

Cryopreserved Vials

Normal Human Induced Pluripotent Stem Cell-derived Neural Stem Cells (XCL-1 NSC) are sold as cryopreserved vials and are shipped in biodegradable insulated packages containing dry ice to ensure the cells remain in a cryopreserved state. To maintain the cells' integrity, unpack the products immediately upon receipt and store at a temperature lower than -150°C or in the vapor phase of a liquid nitrogen dewar. If the cells are to be thawed and plated within 24 hours, they may be stored at -80°C. Do not store the vial for more than 24 hours at -80°C, as the cells will slowly degrade at this temperature.

Medium Preparation

StemLife™ Basal Medium (LM-0011) contains no growth factors, antimicrobials, or phenol red. To support cell proliferation, you must add StemLife NSC LifeFactors (LS-1105) to the basal medium (see StemLife NSC Medium instructions).

A vial of Gentamicin and Amphotericin B (GA; LS-1104) is provided with the purchase of StemLife NSC Medium Complete Kit (LL-0070) and StemLife NSC Medium + Fibronectin Kit (LL-0073) for your convenience. The use of GA is recommended to inhibit potential fungal or bacterial contamination of eukaryotic cell cultures. Phenol Red (LS-1009) may be purchased, but is not required.

To place an order, please visit lifelinecelltech.com or call technical and customer service at 877.845.7787.

Pre-warming Medium

If using less than 100 mL of medium, Lifeline® recommends warming only the volume needed in a sterile conical tube. Repeated warming of the entire bottle over extended periods will cause degradation and reduced shelf life of the medium. When warming the entire bottle of medium, Lifeline recommends using a Lifeline water bath sleeve (included with medium) to help protect the medium from contaminants in the 37°C water bath. Medium will warm to 37°C in 10 to 30 minutes, depending on the volume. Do not leave medium in water bath for extended periods.

Pre-coating Culture Vessels with Fibronectin Solution

Tissue culture vessel(s) must always be pre-coated with the Fibronectin Solution (CM-0098) prior to inoculating with XCL-1 NSC. To pre-coat, add 2 mL of the fibronectin solution to each 25 cm² of surface area. Gently rock the culture vessel(s) to ensure an evenly coated surface. Incubate the vessel(s) in a cell culture incubator (at 37°C, 5% CO₂, humidified) for a minimum of 3 hours, or overnight (recommended for convenience). Be sure that the culture vessel(s) maintain sterility and do not dry out prior to being used. At the completion of the incubation period, aspirate the fibronectin solution from the vessel(s) and add the appropriate volume of fully supplemented StemLife™ NSC Medium. Do not rinse the culture vessel(s) prior to adding the medium.

Thawing and Plating Cryopreserved Cells

Remove vial from dewar and check the cap to be sure that the vial is securely sealed. Spray the vial with 70% ethanol or isopropanol and transfer it to a biosafety cabinet. Allow it to dry thoroughly and carefully loosen the cap to vent any liquid nitrogen that may have entered the vial. Recap the vial and hold only the bottom half of the vial in a 37°C water bath for approximately one minute or until vial is almost completely thawed—a small amount of ice should still be visible. To avoid potential contamination, do not allow the vial cap to make contact with the water. Do not over thaw as this may damage the cells. Dry the vial, spray the exterior of the vial with 70% ethanol or isopropanol and place the vial in a biological safety cabinet and allow it to dry. Carefully remove the cap to avoid contamination or splatter. Gently resuspend the cells in the vial using a 1 or 2 mL sterile pipette. Do not centrifuge; the cells may be directly plated from the vial. Plate cells into pre-warmed fully supplemented StemLife NSC Medium in desired culture vessel at a density of 40,000 cells per cm². Flasks with vented caps, commonly referred to as filter caps, are strongly recommended. Gently rock the culture vessel from side to side and front to back to evenly distribute cells within the vessel. Place seeded culture vessel in a 37°C, 5% CO₂ incubator. Refeed the cells after they have attached (approximately 4 to 36 hours after inoculation) to remove cryopreservation reagents.

Standard Calculation for Plating of Cells

Gently re-suspend the cells evenly in the medium. Using a clean hemacytometer, and aseptic technique, remove 20 µL of the cell suspension to a separate tube, such as a microcentrifuge tube. Add an equal volume of 0.4% Trypan Blue solution to the cell suspension in the microcentrifuge tube. Perform cell counts between 1 to 5 minutes after the addition of Trypan Blue to the cell suspension. Place 10 µL of the cell suspension into at least one chamber of the hemacytometer. Count a minimum of 4 quadrants on the hemacytometer (see diagram below). Dead and dying cells are permeable to Trypan Blue and will look completely blue. For accurate cell counts, optimal number of cells per quadrant should be 25 to 75 cells. After counting the cells, calculate the average of the 4 quadrants. Take the cell count average and multiply by the dilution factor and by 10⁴ to get the number of cells per mL. Multiply the desired seeding density (40,000 viable cells per cm²) by the surface area of the vessel(s) to be inoculated. This will give you the total number of cells to inoculate one vessel. Divide the number of cells needed to inoculate one vessel by the total number of cells in the cell suspension. This will give you the volume of cell suspension with which to inoculate each vessel. Inoculate the cells into the culture vessels prepared with pre-warmed culture medium. Mix gently to evenly distribute the cells and place culture vessels into the incubator at 37°C, 5% CO₂.

Sample calculation:

Average viable cells per quadrant = 50

50 cells/quadrant x 10,000 quadrants/mL x 2 (dilution factor*) = 1,000,000 cells/mL

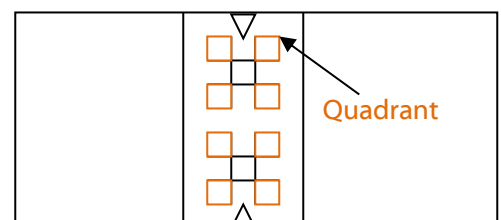
*if using equal volumes of Trypan Blue and cell suspension.

Inoculating a T-25 flask at 40,000 cells/cm²:

40,000 cells/cm² x 25 cm² = 1,000,000 cells/flask

Calculate volume of cell suspension to inoculate each flask with:

1,000,000 cells/flask divided by 1,000,000 cells/mL = 1.0 mL/flask



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Passaging Cells

Normal Human Induced Pluripotent Stem Cell-derived Neural Stem Cells (XCL-1 NSC) may be passaged once the culture is 100% confluent and still actively proliferating. XCL-1 NSC are not contact inhibited. It is recommended that cells be passaged after reaching confluence, which should take between 3 and 4 days.

Lifeline® recommends using the Accutase® Cell Detachment Solution (<http://www.accutase.com/>) per the manufacturer's instructions. Briefly, aspirate the medium from the culture vessel(s). There is no need to rinse the vessel(s) with Phosphate Buffered Saline (PBS; CM-0001) prior to adding the enzyme, but it may be performed as an optional step. Add 2 mL of Accutase per each 25 cm² surface area of the vessel(s). Swirl the vessel(s) gently to ensure all cells are coated with the Accutase. Observe the cells carefully under the microscope. When the cells round up, they are ready to be released. This normally takes 1 to 3 minutes depending on the confluence of the cells. Detach the cells by gently striking the culture vessel against your hand several times. Observe the cells under the microscope to be sure they have become detached. Using aseptic laboratory techniques, pipette the cells into a sterile centrifuge tube. Collect the remaining cells by rinsing the culture vessel(s) with at least 1 mL of PBS per each 5 cm² and pipetting the cells into the sterile centrifuge tube. Check culture vessel(s) under the microscope for cells still attached and repeat steps if necessary to retrieve all the cells from the vessel(s). All steps must be completed under aseptic conditions in a biological safety cabinet.

Centrifuge the cells at 150 x g* for 3 to 5 minutes. For best results, calculate speed for individual centrifuge type. Time may also be centrifuge dependent. Do not over centrifuge cells as this will cause cell damage. After centrifugation, the cells should form a clean loose pellet. Please consult Lifeline's technical service department if issues arise from trypsinization or centrifugation.

Aspirate the solution from the centrifuge tube and resuspend the cell pellet in pre-warmed StemLife™ NSC Medium by gently pipetting up and down with a 2 or 5 mL pipette. Count cells using a hemacytometer, and re-plate at 40,000 cells per cm² (or use a split ratio of 1:3 to 1:6) in vessel(s) that have been pre-coated with Fibronectin (per instructions on page 2), and containing the respective pre-warmed culture medium.

*To calculate RCF (x g)

$$RCF = 0.0001118 \times (rpm)^2 \times r$$

r = rotational radius in centimeters

rpm = rotations or revolutions per minute

Recommended Feeding Guidelines

Guidelines for a T-25 Flask. Adjust volumes according to culture surface area.

Every other day, remove medium and feed with 5 mL of fresh supplemented medium.

Most cultures that are 50% confluent will be ready for passage the following 1 to 2 days and should be fed with 8 to 10 mL of supplemented medium.

Do not use more than 10 mL of medium per 25 cm² of culture surface to ensure that the media depth is at a level where gas diffusion will be sufficient to support the cells' requirements for oxygen.

The depth of the medium affects gas diffusion gradients through the culture medium to the cells. The volumes of medium recommended in this table result in a range of depths between 2 mm and 5 mm, which is compatible with general recommendations, 10 mL being at the maximum depth allowable (5 mm).

Lifeline Technical Note: There are different and often contradictory terminologies used by cell culture companies to define the passage number of cells. Lifeline's designation of 'primary cells' are cells that have been isolated from tissue, plated onto culture vessels, expanded, harvested and cryopreserved. The term 'secondary' indicates that the cells have been isolated, plated and expanded in culture vessels twice before being harvested for cryopreservation.

Accutase® is a registered trademark of Innovative Cell Technologies, Inc. (<http://www.accutase.com/>)

To place an order, please visit lifelinecelltech.com or call technical and customer service at 877.845.7787.

Quick Steps for Cell Culture:

1. Always wash hands before and after working with cell cultures.
2. Always wear eye protection and gloves when working with cell cultures.
3. Store cryopreserved cells in liquid nitrogen vapor phase.
4. When working with cells or medium, always use a certified biological safety cabinet.
5. Handle cryopreserved vials with caution. Aseptically vent any nitrogen from cryopreserved vials in a biosafety cabinet prior to thawing in a water bath.
- 6. Always pre-coat tissue culture vessel(s) with Fibronectin Solution prior to inoculation with XCL-1 NSC according to the coating instructions described on page 2.**
7. Feed cells using pre-warmed Lifeline® culture medium according to feeding chart on page 3.
8. When cells are 100% confluent and still actively proliferating, passage cells using Accutase Cell Detachment Solution. (*This typically occurs within 3 to 4 days.*)
9. Incubate the cells with Accutase until rounded, do not over incubate.
10. Add PBS to rinse all the cells from the culture surface.
11. Centrifuge at 150 x g for 3 to 5 minutes. Adjust speed and time as appropriate for your centrifuge.
12. Aspirate solution from centrifuge tube, add pre-warmed Lifeline culture medium and gently re-suspend cells.
13. Count cells using a hemacytometer, re-plate at 40,000 cells per cm² (or use a split ratio of 1:3 to 1:6) in vessel(s) pre-coated with Fibronectin, and containing pre-warmed Lifeline culture medium.
14. Incubate cells using 1 to 2 mL of culture medium per 5 cm² surface area at 37°C, 5% CO₂.
15. For any question on cell handling, please contact technical service. We are here to help.

Product	Catalog Number(s)
XCL-1 NSC, Normal Human iPSC-derived Neural Stem Cells, Male – 1,000,000 cells/vial	IC-0001
StemLife™ NSC Medium Complete Kit (StemLife Basal Medium, StemLife NSC LifeFactors® Kit)	LL-0070
StemLife NSC Medium + Fibronectin Kit (StemLife Basal Medium, StemLife NSC LifeFactors® Kit, Fibronectin Solution)	LL-0073
GA Antimicrobial Supplement, 0.5 mL (Gentamicin 30 mg/mL, Amphotericin B 15 µg/mL); provided with purchase of LL-0070 and LL-0073	LS-1104
Fibronectin Coating Solution [100 µg/mL], 10 mL	CM-0098
Phenol Red Supplement [33 mM], 1 mL	LS-1009
FrostaLife™ Cryopreservation Solution, 100 mL	LM-0015
Accutase® Cell Detachment Solution (http://www.accutase.com/ ; Innovative Cell Technologies, Inc.)	AT104

Notes:

Call Lifeline Technical Service and Sales at 877.845.7787
or visit lifelinecelltech.com for more information

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