Applied StemCell, Inc.
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Datasheet

Neuron Induction Media

Product Information

Catalog Number

ASE-9321NI

Description

Neuron Induction Media is serum-free media produced using Applied StemCell's proprietary formulations to allow researchers to differentiate neural stem cells (NSC) into functional neurons. Applied StemCell's induction and maturation media have been extensively tested and optimized using NSC and neurons derived from a variety of human pluripotent cells (hESC and hiPSC). The neuronal differentiation process is divided into two stages. In the first stage, the Neuron Induction Medium is used to differentiate NSC into neuronal precursors. In the second stage, the Neuron Maturation Medium is used to further differentiate neuronal precursors into mature, functional neurons and to maintain mature neurons in long-term culture (up to 40 days) (See Fig 1). Neuron Maturation Medium can be purchased separately (ASE-9321NM) or as part of the Neuron Starter Kit (ASE-9321K/ ASE-9321KF).

Figure 1. The process of neuronal differentiation using Neuronal Induction and Maturation Media.

Quantity

Neuron Induction Basal Medium: 100 mL; Induction Supplement A: 8 mL; Induction Supplement B: 2 mL; Induction Supplement C: 200 µL

Shipping

The components of the Neuron Induction Media are shipped as two packages: the -20°C components are shipped on dry ice and the 2-8°C components are shipped in cooler containing cold inserts.

Storage and Stability

Store the Induction Basal Medium and Induction Supplement A: Store at 2-8°C; Store Induction Supplement B and Induction Supplement C: Store at -20°C. This product is stable for at least 6 months from the date of receiving when stored as directed.

Safety Precaution

PLEASE READ BEFORE HANDLING ANY FROZEN VIALS. Please wear the appropriate Personal Protection Equipment (lab coat, thermal gloves, safety goggles and a face shield) when handling the cells. Handle the frozen vials with due caution. Please be aware that the following scenario can occur: Liquid nitrogen can leak into the vials when the vials are submerged in liquid nitrogen. Upon thawing, the liquid nitrogen returns to the gas phase, resulting in a dangerous build-up of pressure within the vial. This can result in the vial exploding and expelling not only the vial contents but also the vial cap and plastic fragments of the vial.

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Restricted Use

This product is for research use only and not intended for human or animal diagnostic or therapeutic uses.

Warranty

Performance of Applied StemCell's Neuron Induction Media has been extensively tested with other components. Applied StemCell will not hold responsibility if components other than the recommended components is used.

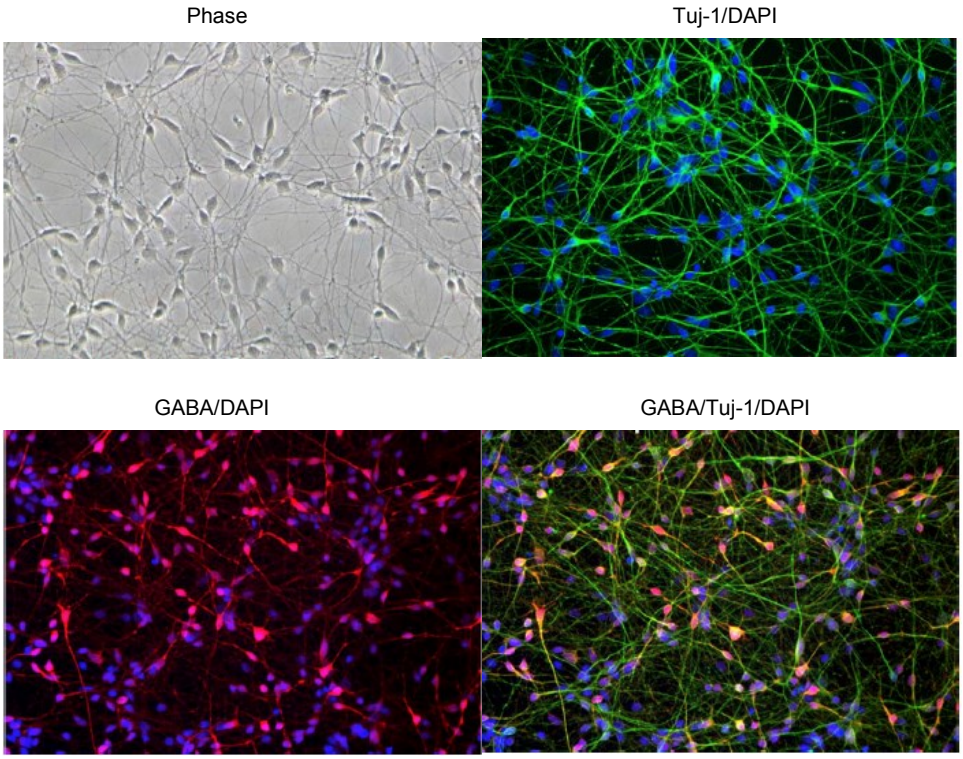

Figure 3. Neuron morphology and immunostaining data at 10 days post-thaw. Tuj-1 (Neuronal Class III β-Tubulin) – green, GABA (GAMMA – AMINOBUYRIC ACID) - red

Media and Material

Components included with Neuron Induction Media (ASE-9321NI):

Cat. Number	Component	Amount	Storage
ASE-9321NI-A	Neuron Induction Basal Medium	100 mL	2-8°C
ASE-9321NI-B	Neuron Induction Supplement A	8 mL	2-8°C
ASE-9321NI-C	Neuron Induction Supplement B	2 mL	-20°C
ASE-9321NI-D	Neuron Induction Supplement C	200 µL	-20°C

Additional Reagents Required but not Provided

- Poly-L-ornithine hydrobromide, Sigma-Aldrich, Cat# P3655
- Laminin, Life Technologies, Cat# 23017-015
- Cell culture grade water, Corning Cellgro, Cat# 25-055-CVC
- Accutase (cell dissociation reagent), Life Technologies, Cat# A11105-01
- DMEM, Life Technologies, Cat# 12491-015

Protocol

1. Handling Upon Receiving

Components of Applied StemCell's Induction Media are shipped as two separate packages: The -20°C components are shipped on dry ice; whereas the 2-8°C components are shipped in cooler containing cold inserts (8-15°C). Upon receiving the product, check the integrity of the packages and the presence of dry ice (contact Applied StemCell if the integrity of a package has been compromised, e.g. no dry ice in the package). Store components as specified.

2. Preparation of Culture Vessels and Media

The handling procedures described below have been extensively tested for all of Applied StemCell's NSC line (ASE-9234 and ASE-9234F) using specified substrate coating and Applied StemCell's optimized maintenance media. The user should follow these procedures closely. The user assumes all responsibility for the failure of the experiment should there be any deviation from these procedures.

2.1 Coating Cell Culture Vessels with Poly-L-ornithine and Laminin

Cell culture vessels should be coated one day before or on the day of plating the cells.
Please read producer's manual for handling of Poly-L-ornithine and Laminin.

2.1.1 Prepare stock solution of poly-L-ornithine (10 mg/mL) by dissolving the powder in sterile cell culture grade water. The stock solution should be stored at -20°C.
2.1.2 Thaw a stock solution of poly-L-ornithine on ice.
2.1.3 Prepare working solution of poly-L-ornithine in sterile cell culture grade water (f.c. 20 µg/mL). To make sufficient volume for this experiment, please refer to Table 1.
2.1.4 Add poly-L-ornithine solution into desired cell culture vessel to cover growth surface entirely (see Table 1).
2.1.5 Distribute the solution evenly and incubate vessels in the cell culture incubator for 2 hr (37°C/ 5% CO_2/ humidity control).
2.1.6 In the meantime, thaw a stock solution of Laminin (1 mg/mL) on ice.
2.1.7 Prepare working solution of Laminin in sterile cell culture grade water (f.c. 20 µg/mL). To make sufficient volume for the experiment, please refer to Table 1.
2.1.8 Rinse vessels twice with cell culture grade water. Pipette water gently toward the corner of the vessel to avoid mechanical removal of poly-L-ornithine coating.
2.1.9 Aspirate water from the vessels and add Laminin solution to cover growth surface entirely. Incubate in the cell culture incubator (37°C/ 5%CO_2/ humidity control) for 2 hours.
2.1.10 We recommend that freshly coated vessels be used. However, if not used immediately, store coated vessels at 4°C in Laminin solution (up to 4 days).
2.1.11 Pre-warm vessels at 37°C before use.
2.1.12 Aspirate Laminin just before seeding cells. Do not let the surface dry. There is no need to wash vessels after removal of Laminin.

Table 1. Recommended volumes of coating reagents in various vessels.

Vessel Type	P-L-ornithine	Laminin
96 well plate	50 µL/well	50 µL/well
4 or 24 well plate	250 µL/well	250 µL/well
35 mm dish	1.5 mL	1.5 mL
60 mm dish	2.5 mL	2.5 mL

3. Differentiation of NSC into Functional Neurons

The neuronal differentiation process is comprised of two phases. I) During the induction phase, differentiation of NSC into neuronal precursors will be initiated, which will be hallmarked by morphological changes in NSC (cell polarization and elongation), however the cells will still proliferate. II) During the maturation phase, cell divisions will gradually decrease and neural precursors will elongate significantly, generate neuronal processes and mature.

All steps described below were optimized using NSC produced by Applied StemCell. If NSC from other sources are used, the protocols might need further optimization according to performance of these cells. All operations should be performed in accordance with aseptic cell culture standards. All media and vessels used for cell culture must be pre-warmed to 37°C prior to use.

3.1 Preparation of complete Neuronal Induction Media:

Use sterile techniques when preparing reagents and materials. Thaw frozen supplement at room temperature (15-25°C) or overnight at 2°-8°C. It is advised to use thawed components within 2 days to formulate complete medium, however if desired, thawed components can be re-frozen once. Complete medium shall be stored at 2°-8°C and used within 7-10 days. Pre-warm complete medium at 37°C before use.

Table 2. Formulation of Complete Neuronal Induction Medium (e.g. 100 mL size)

Component	Storage	Volume Provided	Formulation per 50 mL	Optional One-time Re-freezing
Neuronal Induction Basal Medium	2°-8°C	1 x 100 mL	50 mL	
Neuronal Induction Supplement A	2°-8°C	1 x 8 mL	4 mL	
Neuronal Induction Supplement B	-20°C	2 x 1 mL	1 mL	yes
Neuronal Induction Supplement C	-20°C	2 x 100 µL	100 µL	yes

3.2 Neuronal Induction

3.1.1 At **day 0**, seed NSC onto poly-L-ornithine/Laminin coated vessels at density ranging from $4x10^4$ to $6x10^4$ live cells /cm^2 in culture medium used for NSC (Figure 2).

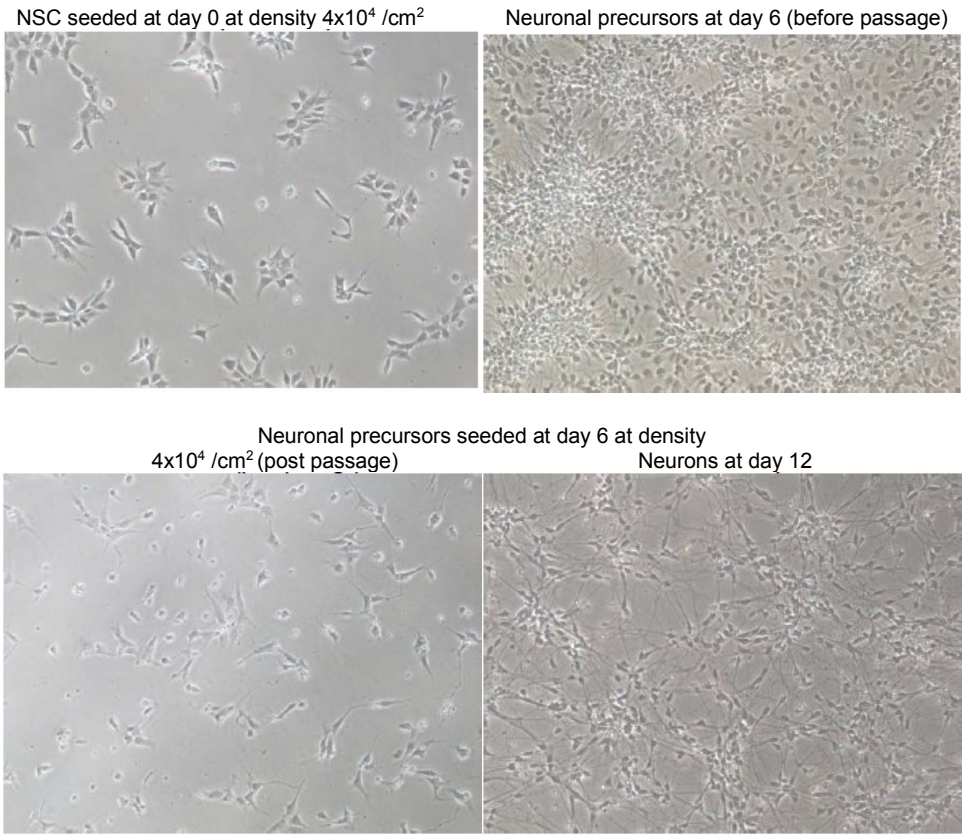

Figure 2. An example of NSC, neuronal precursors and neuron densities at different stages of differentiation using Neuronal Induction and Neuronal Maturation Media.

3.1.2 The following day, switch to Neuronal Induction Medium.
3.1.3 Change medium every alternate day.
3.1.4 At approximately **day 6**, the cells will reach confluence*. Passage neuronal precursors using Accutase and seed them onto new vessels in Neuronal Maturation (ASE-9321NM).

a. Aspirate induction medium and add Accutase to the vessel with cells (100µL/cm^2)
b. Incubate 5 minutes in the cell culture incubator
c. Add equal volume of DMEM to dilute Accutase and wash/mix the cells off of the vessel
d. Centrifuge cells at 400xg for 5 minutes
e. Re-suspend cells in desired volume of Neuronal Maturation Medium (e.g. 5 mL) and perform cell count.

Note: *NSC lines from alternate sources may show variable differentiation dynamics. If cells are not confluent at day 6, adjust protocol according to cell performance (e.g. increase induction time or change seeding densities).*