Product sheet

SH-SY5Y Cells | 300154

General information

Description	SH-SY5Y cells, a subclone derived from the neuroblastoma cancer cell line SK-N-SH, are a valuable cell model for neurodegenerative disorders such as Parkinson's and Alzheimer's disease. The SK-N-SH cell line was established in 1970 from a biopsy of a metastatic bone tumor from a 4-year-old cancer patient. The human SH-SY5Y cell line offers a unique cell source for functional studies in neurobiology and neurodegenerative disease research. SH-SY5Y cells grow both adherently and in suspension, forming clusters during division that differ significantly from the morphology of differentiated cells. These undifferentiated cells, before undergoing neuronal differentiation, serve as an essential foundation for neuroscientific studies. The neuronal differentiation of SH-SY5Y cells, which transforms them into neuronal cell models resembling various functional neurons, is achieved through biochemical interconversion processes involving gradual serum deprivation, retinoic acid, neurotrophic factors like brain-derived neurotrophic factor, and extracellular matrix proteins. This differentiation is crucial for studying neuronal markers and conducting neurotoxicology research, especially concerning the impact of organic pollutants on human neuron-like cells. The neurobiology of SH-SY5Y neuroblastoma cells, primarily known for their dopaminergic characteristics, can be explored for cholinergic properties under specific differentiation conditions. While these cells may express acetylcholinesterase, indicative of some cholinergic activity, their utility in studying cholinergic neurotransmission is less pronounced compared to their role in dopaminergic system studies. As a neurotoxicological model, the SH-SY5Y neuroblastoma cell line is instrumental in examining the effects of compounds on acetylcholinesterase and butyryl cholinesterase activities, essential for neurotoxicology studies. The sy5y line's contribution to understanding the biochemical pathways involved in neurodegenerative diseases, coupled with its role in the functional studies of dopaminergic and cholinergic systems, underscores its value in neuroscience research.
Organism	Human
Tissue	Bone Marrow
Disease	Neuroblastoma
Metastatic site	Bone marrow
Synonyms	SH-Sy5y, SHSY5Y, SHSY-5Y, SK-SH-SY5Y, SY5Y, SH-SY5Y Parental

Characteristics

Age	4 years
Gender	Female

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Morphology	The cells grow as clusters of neuroblastic cells with multiple, short, fine cell processes (neurites). Cells will aggregate, form clumps and float. A confluent monolayer is not formed.
Cell type	Neuroblast
Growth properties	Loosely adherent and form clumps at high cell density

Regulatory Data

Citation	SH-SY5Y (Cytion catalog number 300154)
Biosafety level	1
NCBI_TaxID	9606
CellosaurusAccession	CVCL_0019

Biomolecular Data

Tumorigenic	Forms tumors in nude mice within approx. 3-4 weeks.
Karyotype	The cytogenetic landscape of SH-SY5Y cells is marked by complex chromosomal aberrations, notably featuring a modal chromosome number of 47, including trisomy of 1q due to a distinctive insertion in chromosome 1. This genetic backdrop is crucial for understanding the cellular biology and oncogenic potential of SH-SY5Y cells, making them a versatile model in neuroscientific research, particularly in the realms of neurodevelopment, neurotoxicity, and neurodegenerative disease studies.

Handling

Culture Medium	Please mix EMEM and Ham's F12 in a 50:50 ratio (Cytion article numbers 820100a and 820600a)
Supplements	Supplement the medium with 15% FBS and 1% NEAA
Dissociation Reagent	Accutase

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Subculturing	These cells grow as a mixture of floating and adherent cells. Remove the medium with the floating cells, and recover the cells by centrifugation. Rinse the adherent cells using PBS without calcium and magnesium (3-5 ml PBS for T25, 5-10ml for T75 cell culture flasks). Add Accutase (1-2ml per T25, 2.5ml per T75 cell culture flask), the cell sheet must be covered completely. Incubate at 37 degree Celsius for 10 minutes. Combine with the floating cells recovered above. Carefully resuspend the cells, the addition of medium is optional but not necessary, and dispense into new flasks which contain fresh medium.
Seeding density	Seeding density after thawing $6x10^4$ cells/cm^2, seed into 1x T25 cell culture flask. The cells will become 80-90% confluent within 1-2 weeks. Once the cells proliferate vigorously, seed out the cells at a density of 1 - 2 $x10^4$ cells/cm^2.
Fluid renewal	1 to 2 times per week
Freeze medium	As a cryopreservation medium, we use 50% basal medium + 40% FBS + 10% DMSO, or CM-1 (Cytion catalog number 800100), which includes optimized osmoprotectants and metabolic stabilizers to enhance recovery and reduce cryo-induced stress.

Thawing and Culturing Cells

1. Confirm that the vial remains deeply frozen upon delivery, as cells are shipped on dry ice to maintain optimal temperatures during transit.
2. Upon receipt, either store the cryovial immediately at temperatures below -150°C to ensure the preservation of cellular integrity, or proceed to step 3 if immediate culturing is required.
3. For immediate culturing, swiftly thaw the vial by immersing it in a 37°C water bath with clean water and an antimicrobial agent, agitating gently for 40-60 seconds until a small ice clump remains.
4. Perform all subsequent steps under sterile conditions in a flow hood, disinfecting the cryovial with 70% ethanol before opening.
5. Carefully open the disinfected vial and transfer the cell suspension into a 15 ml centrifuge tube containing 8 ml of room-temperature culture medium, mixing gently.
6. Centrifuge the mixture at 300 x g for 3 minutes to separate the cells and carefully discard the supernatant containing residual freezing medium.
7. Gently resuspend the cell pellet in 10 ml of fresh culture medium. For adherent cells, divide the suspension between two T25 culture flasks; for suspension cultures, transfer all the medium into one T25 flask to promote effective cell interaction and growth.
8. Adhere to established subculture protocols for continued growth and maintenance of the cell line, ensuring reliable experimental outcomes.

Incubation Atmosphere	37°C, 5% CO_2, humidified atmosphere.
Shipping Conditions	Cryopreserved cell lines are shipped on dry ice in validated, insulated packaging with sufficient refrigerant to maintain approximately −78 °C throughout transit. On receipt, inspect the container immediately and transfer vials without delay to appropriate storage.
Storage Conditions	For long-term preservation, place vials in vapor-phase liquid nitrogen at about −150 to −196 °C. Storage at −80 °C is acceptable only as a short interim step before transfer to liquid nitrogen.

Quality Control & Molecular Analysis

Sterility	Mycoplasma contamination is excluded using both PCR-based assays and luminescence-based mycoplasma detection methods. To ensure there is no bacterial, fungal, or yeast contamination, cell cultures are subjected to daily visual inspections.