PC-12

500311

GENERAL INFORMATION

Description

PC-12 cells are a cell line derived from a pheochromocytoma of the rat adrenal medulla. These cells are of embryonic origin, grow adherently and resemble a mixture of neuroblastic and eosinophilic cells. PC-12 cells are catecholamine cells that synthesize, store and release norepinephrine and dopamine. They have a diameter of approximately 10-12 microns and are small, irregularly shaped cells. The PC12 cell line is a classical neuronal cell model due to its ability to acquire sympathetic neuron features when dealing with nerve growth factor (NGF). Studies on dopamine regulation have shown that PC12 cells synthesize, release, and reuptake dopamine and have been extensively characterized for neurosecretion and the presence of ion channels and neurotransmitter receptors. Moreover, the relative proportion of various subtypes of Ca channels changes during differentiation. The PC12 cell line is an established neuronal cell model that is particularly useful in studying cellular responses to nerve growth factors (NGF) and how these lead to the expression of differentiation-specific proteins and differentiation. When cultured in NGF, PC12 cells differentiate into sympathetic ganglion neurons morphologically and functionally. The differentiation results from the reversible induction of a neuronal phenotype by NGF. Collagen coating has been shown to be favourable to achieving neuronal characteristics in terms of length and density of neurites by NGF treatment.
PC12 cells are tumorigenic and were derived from male New England Deaconess Hospital strain rats. The PC-12 cell line has 40 chromosomes, 38 autosomes, plus xY. Nerve growth factor (NGF) is expressed in PC12 cells, and exposure to NGF is one crucial regulator of cell differentiation.
In conclusion, PC12 cells are a versatile and widely used model system in neurobiology due to their ability to acquire sympathetic neuron features when dealing with nerve growth factor (NGF). These cells have been extensively characterized for neurosecretion, ion channels, and neurotransmitter receptors. Their extreme versatility for pharmacological testing and use as an established model for studying the proliferation and differentiation of neuronal cells make them a valuable tool in neurobiology research.

Tissue	Adrenal gland
Disease	Pheochromocytoma
Metastatic site	Not applicable (adrenal medulla pheochromocytoma; primary tumor site is adrenal gland)

Applications

Neurobiology research; NGF-induced neuronal differentiation; dopamine and catecholamine physiology; neurosecretion; ion channels (calcium, sodium); neurotransmitter receptor pharmacology; neuroprotection screening; Parkinson disease models

Synonyms

- PC 12
- PC12

CLASSIFICATION

Organism	Rat
Sex	Male
Growth properties	Adherent and suspension
GMO status	Non-GMO

GMO status details

No genetic modification; wildtype rat pheochromocytoma cell line

Biosafety level	1

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CHARACTERISTICS

Morphology	Polygonal
Cell type	Pheochromocytoma cells (neuroendocrine/chromaffin)
Tumourigenic	Yes, in New England Deaconess Hospital strain rats

Karyotype

40 chromosomes, 38 autosomes plus xY

IDENTIFIERS

Citation

PC-12 (Cytion catalog number 500311)

NCBI TaxID	10116
Cellosaurus	CVCL_S979

EXPRESSION AND SUSCEPTIBILITY

Receptors expressed

Nerve growth factor (NGF)

Products

Catecholamines, dopamine

HANDLING AND CULTURE

Culture medium

RPMI 1640, w: 2.0 mM stable Glutamine, w: 2.0 g/L NaHCO3 (Cytion article number 820700a)

Incubation atmosphere	37°C, 5% CO_2, humidified atmosphere.

Supplements

Supplement the medium with 10% FBS

Dissociation reagent	TrypLE Express (adherent on collagen); pipetting resuspension for suspension culture
Flask coating	Collagen

Subculturing

Suspension cells: Remove cells from substrate by pipetting with fresh medium. To obtain single cells, pass the suspension several times through a 22 gauge needle and dispense into new flasks. Growing on collagen: To remove adherent cells, use the following standard protocol. Remove medium and rinse the adherent cells using PBS without calcium and magnesium (3-5 ml PBS for T25, 5-10ml for T75 cell culture flasks). Add TrypleExpress (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. Carefully resuspend the cells, the addition of medium is optional but not necessary, and dispense into new flasks which contain fresh medium.

Seeding density	1 x 10^4 cells/cm^2
Fluid renewal	2 to 3 times per week
Post-thaw recovery	After thawing, plate the cells at 5 x 10^4 cells/cm^2 and allow the cells to recover from the freezing process and to adhere for at least 48 hours.

Thawing and culturing

Confirm that the vial remains deeply frozen upon delivery, as cells are shipped on dry ice to maintain optimal temperatures during transit.
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.
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.
Perform all subsequent steps under sterile conditions in a flow hood, disinfecting the cryovial with 70% ethanol before opening.
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.
Centrifuge the mixture at 300 x g for 3 minutes to separate the cells and carefully discard the supernatant containing residual freezing medium.
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.
Adhere to established subculture protocols for continued growth and maintenance of the cell line, ensuring reliable experimental outcomes.

QUALITY CONTROL AND CRYOPRESERVATION

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.

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.

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.

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.

DONOR

Donor age	Unspecified
Ethnicity	Japanese

LEGAL AND SAFETY

Safety precautions

When planning to store a cryovial in liquid nitrogen for future thawing, it is mandatory to adhere to stringent safety measures. Appropriate protective gloves and clothing are essential, and the use of a face mask or safety goggles is required during the transfer of frozen samples to or from the liquid nitrogen tank. This is to mitigate the risk of injury from potential cryovial explosions upon removal, which can result in the projection of sharp fragments.

Disclaimer

Our cells are provided for in vitro laboratory research purposes exclusively and are not intended for clinical or diagnostic use, nor are they to be administered to humans or used for veterinary purposes. Users must adhere to all applicable guidelines and regulations for the handling and use of these cells in a research setting.

Warranty

At Cytion, we stand behind the quality and viability of our products.
We guarantee that our cells will be viable at the start of culture for
60 days after shipment from our facilities.
We assure that all materials conform to the specifications described in the
Certificate of Analysis and/or Product Sheet.
For full details, please refer to our
Warranty Statement.

Material Transfer Agreement required	Yes

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