Product sheet

MCF-7 Cells | 300273

General information

Description	MCF7 cells, a widely used research model in human breast cancer research, are utilized extensively as an in vitro model for hormone-dependent breast cancer. Originating from the breast tissue of a 69-year-old white female with metastatic adenocarcinoma, MCF7 cells are a widely used in vitro model for hormone-dependent breast cancer, reflecting the Luminal A subtype. This subtype is characterized by a lower grade and better prognosis compared to more aggressive forms of breast cancer. In the realm of breast cancer research, MCF 7 cells are instrumental in evaluating the efficacy of breast cancer drugs and understanding the dynamics of breast cancer stem cells. They are central to cancer research, serving as a comparative model against more aggressive cell lines like MDA-MB-231. The investigation of therapeutic agents, such as tamoxifen and doxorubicin, is critical in drug discovery efforts targeting hormone-dependent breast cancers and gaining insights into the mechanisms of action and resistance. Similarly, the role of estradiol in modulating the growth and characteristics of these cells is a subject of significant interest, given its relevance to hormone-responsive breast cancers. Research employing the MCF7 breast cancer cell line often delves into the cellular processes of cytotoxicity and apoptosis, especially in response to cancer agents like curcumin, known for its potential in cancer prevention. The study of immune responses, including the action of tumor necrosis factor alpha (TNF alpha) and the impact of bacterial antigens, further enriches our understanding of the tumor microenvironment and potential therapeutic targets. MCF7 cells are meticulously studied in both 2D cell culture and 3D cell culture systems, including spheroid culture, to mimic tumor microenvironments more closely. These methodologies enable a more profound exploration of cell spheroid growth and the behavior of cancer stem cells within microtissues in scaffold-based systems. The MCF7 cell line, with its epithelial cell characteristics and resemblance to human adenocarcinoma cells, is a cornerstone of cancer research. It facilitates not only the exploration of breast cancer drugs and their mechanisms but also the broader implications for cancer treatment, including the potential role of mesenchymal stem cells and the efficacy of targeted therapies in vivo studies.
Organism	Human
Tissue	Breast
Disease	Adenocarcinoma
Metastatic site	Pleural effusion
Synonyms	MCF 7, MCF.7, MCF7, Michigan Cancer Foundation-7, ssMCF-7, ssMCF7, MCF7/WT, MCF7-CTRL, IBMF-7

Characteristics

Age	69 years

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Gender	Female
Ethnicity	Caucasian
Morphology	Epithelial-like
Growth properties	Monolayer, adherent

Regulatory Data

Citation	MCF-7 (Cytion catalog number 300273)
Biosafety level	1
NCBI_TaxID	9606
CellosaurusAccession	CVCL_0031

Biomolecular Data

Receptors expressed	The cells express the wildtype and variant estrogen receptors as well as progesterone receptor.
Protein expression	P53 negative, pGP9.5 negative, CEA positive
Isoenzymes	PGM3, 1, PGM1, 1-2, ES-D, 1-2, AK-1, 1, GLO-1, 1-2, G6PD, B,
Oncogenes	Wnt7h +, Tx-4
Tumorigenic	Yes, in nude mice
Products	Insulin-like growth factor binding proteins (IGFBP) BP-2, BP-4, BP-5
Mutational profile	TP53 wt

Karyotype	The stemline chromosome numbers ranged from hypertriploidy to hypotetraploidy, with the 2S component occurring at 1%. There were 29 to 34 marker chromosomes per S metaphase, 24 to 28 markers occurred in at least 30% of cells, and generally one large submetacentric (M1) and 3 large subtelocentric (M2, M3, and M4) markers were recognizable in over 80% of metaphases. No DM were detected. Chromosome 20 was nullisomic and x was disomic. Phenotype Frequency Product: 0.0154

Handling

Culture Medium	EMEM (MEM Eagle), w: 2 mM L-Glutamine, w: 2.2 g/L NaHCO3, w: EBSS (Cytion article number 820100a)
Supplements	Supplement the medium with 10% FBS and 1% NEAA
Dissociation Reagent	Accutase
Doubling time	24 hours
Subculturing	Remove the old medium from the adherent cells and wash them with PBS that lacks calcium and magnesium. For T25 flasks, use 3-5 ml of PBS, and for T75 flasks, use 5-10 ml. Then, cover the cells completely with Accutase, using 1-2 ml for T25 flasks and 2.5 ml for T75 flasks. Let the cells incubate at room temperature for 8-10 minutes to detach them. After incubation, gently mix the cells with 10 ml of medium to resuspend them, then centrifuge at 300xg for 3 minutes. Discard the supernatant, resuspend the cells in fresh medium, and transfer them into new flasks that already contain fresh medium.
Seeding density	3×10^4 cells/cm^2
Fluid renewal	2 to 3 times per week
Post-Thaw Recovery	Allow the cells to rest for 48 hours past thawing
Freeze medium	As a cryopreservation medium, we use complete growth medium (including FBS) + 10% DMSO for adequate post-thaw viability, 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.