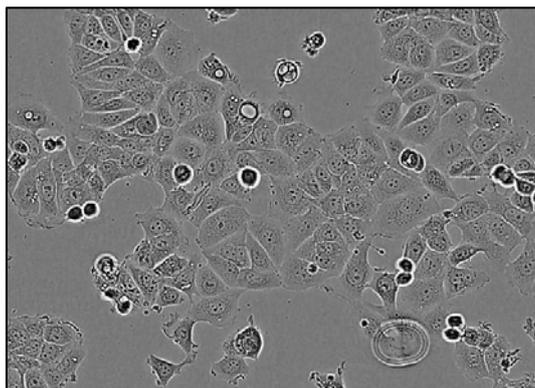


Cell line profile

MCF7 (ECACC catalogue no. 86012803)

Cell line history

MCF7 was derived from the pleural effusion from a 69 year old female suffering from a breast adenocarcinoma¹. It was named after the Michigan Cancer Foundation (MCF) and is the most studied human breast cancer cell line in the world².



MCF7 cells 48hr post seeding

Key characteristics

MCF7 cells are of interest because they maintain a number of characteristics similar to mammary epithelium. The cell line has an epithelial-like morphology and monolayers form dome structures due to fluid accumulation between the culture dish and cell monolayer. It is one of few breast cancers that express the oestrogen receptor alpha (ER- α)³⁻⁵. The cells also express androgen, progesterone and glucocorticoid receptors making them valuable tools in medical research. Treatment of MCF7 with oestrogens has been shown to have an anti-apoptotic effect^{6, 7} whereas treatment with anti-oestrogen chemotherapy drugs (e.g. tamoxifen) can reduce growth of cultures by inhibiting proliferation and inducing apoptosis^{8, 9}.

Soon after derivation the MCF7 cells were shown to be genetically unstable¹⁰⁻¹³ with cell lines from different labs shown to perform differently¹⁴. Different cellular subpopulations have also been shown to exist in growing cultures with the identification of a stem cell fraction capable of regenerating the remaining subtypes¹⁵. A number of MCF7 variants have been intentionally developed¹⁶ including lines hypersensitive to oestrogen which may be ER-positive or ER-negative^{17, 18}. There are also a number of chemotherapy resistant lines which have recently been added to the collection (see related cell lines below).

Note that the supposed Adriamycin resistant variant MCF-7/ADR has now been confirmed as a misidentified cell line and is not a derivative of MCF7. This cell line has now been identified as the ovarian cancer cell line Ovar8.

Applications

MCF7 are primarily used as an *in vitro* model to study breast cancer biology. Due to the number of variants available, it has applications in development of chemotherapeutic drugs and understanding drug resistance.

Culture tips

Cells may carry B or C type retrovirus and are considered to represent a category 2 pathogen. Cells should be grown in EMEM (EBSS) media supplemented with 2mM glutamine, 1% non-essential amino acids (NEAA) and 10% foetal bovine serum (FBS), seeded at a density between $2-4 \times 10^4$ cell/cm² and subcultured when 70-80% confluent.

It has been demonstrated that phenol-red, a common additive in cell culture media, is a weak oestrogen and can bind to the receptors found on MCF7^{19, 20}. For studies looking at oestrogen activity the use of phenol-red-free medium is advised. ECACC offers a related cell line, MCF7/S0.5 (ECACC no. **16022501**), which is adapted to grow on low serum and phenol-red-free media and may be more suitable for hormone-related studies.

Due to the instability of the MCF7 cell line and the existence of different subpopulations it is particularly important to complete work from a defined working cell bank of frozen stock. It is also important to consider the source of cells as those from different laboratories or depositories may behave differently.

Related cell line	ECACC catalogue number	Description
MCF7/S0.5	<u>16022501</u>	Human, Breast, Cancer, oestrogen receptor, MCF7 Adapted to grow in low-serum media.
MCF7/182R-6	<u>16022506</u>	Breast cancer, fulvestrant resistant
MCF7/AnaR-4	<u>16022519</u>	Breast cancer, MCF7, Anastrozole resistance
MCF7/ExeR-4	<u>16022523</u>	Breast cancer, Exemestane resistance
MCF7/LetR-1	<u>16022524</u>	Breast cancer, Letrozole resistant
MCF7/TAMR-7	<u>16022509</u>	Breast cancer, tamoxifen-resistant
MCF-7/ADR		Misidentified cell line: Actually derived from Ovar8 (ovarian cancer). Re-designated NCI/ADR-RES ^{21, 22}

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