Public Health England

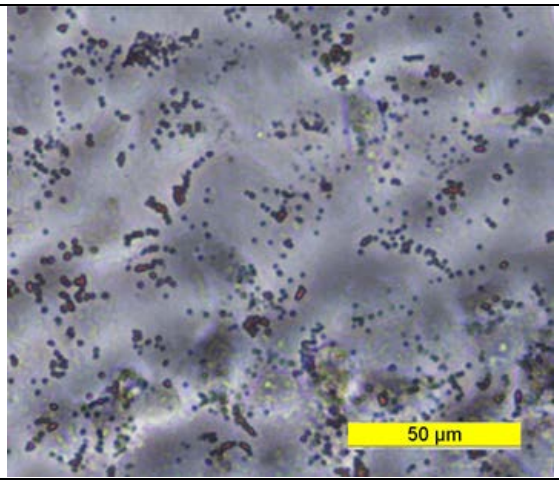
ECACC European Collection of Authenticated Cell Cultures
Operated by Public Health England

Cell line profile
A549 (ECACC catalogue no. 86012804)

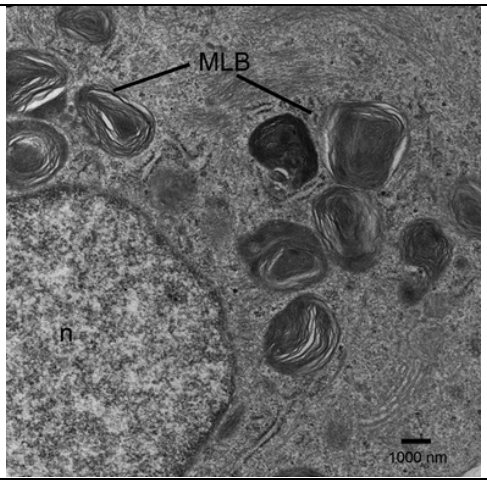
Cell line history

The A549 cell line was isolated in 1973 from a pulmonary adenocarcinoma[1] in a study to attempt to establish continuous cell lines from 200 different tumours. Despite being developed as a tool for cancer research the cell line was consequently characterized as being representative of the Alveolar Type II pneumocytes of the human lung [2] [3] [4] [5] and because of this the cell line has been a mainstay of respiratory research for nearly forty years. Work with early passage A549 soon after the isolation of the cell line provided evidence of its ability to exhibit features of an ATII epithelial cell phenotype[3] [4] [5], together with reports that extended culture of early passage material resulted in cellular 'differentiation' evident by the expression of high numbers of Multilamellar bodies (MLB) [2] [6] indicating the cell might be capable of surfactant production, a key feature of ATII cells. More contemporary studies[7] [8], however, have led to a more conservative view on the cell line's suitability to recapitulate the ATII phenotype. Recent work[9] shown that extended culture in physiologically relevant cell culture medium may increase the ATII like properties of the cell line.

Images



A459 monolayer stained for lipid droplets using Oil-Red O



Transmission Electron Micrograph (TEM) of Multilamellar bodies (MLB) in an A549 cell after long term culture (n=nucleus).

Key characteristics

Using the cytidine diphosphocholine pathway the cells can synthesise phospholipids (lecithins) which manifest as lipid droplets in the cytoplasm. With long term culture in a physiological medium the lipid may be expressed as Multilamellar Bodies (MLB) similar to those seen in ATII pneumocytes. Extensive RNA microarray analysis of the gene expression of the cell line is openly available[9]

Written by Jim Cooper
December 2012

Applications

Cancer research, the generation of epithelial models of the distal lung for studies into airway function and disease and virology; the A549 cell line is a suitable host for many human respiratory viruses including adenoviruses.

Culture tips

Cultures of the cell line can be expanded effectively using conventional subculture techniques, however, for lung disease research it is recommended that the cells are maintained in long term culture (around 20 days) with regular medium changing with a physiologically relevant medium such as Hams F12/10% FBS to allow differentiation to an ATII like phenotype. Culture in simple medium such as DMEM/10% FBS may result in the adoption of a mucus secreting phenotype not typical of distal lung.

Key references

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8. Corbière, V. *et al.* Phenotypic characteristics of human type II alveolar epithelial cells suitable for antigen presentation to T lymphocytes. *Respir. Res.* **12,** 15 (2011)
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Related cell lines	ECACC catalogue number	Description
BEAS-2B	95102433	Human Bronchial Epithelium
CALU 1	93120818	Human lung epidermoid carcinoma