Validated Calu-3 Xenograft Model:
Subcutaneous Xenograft Tumor Model

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The Role of NSCLC Cancer Xenograft Models

Non-small cell lung cancer (NSCLC) is the most common type of lung cancer, comprising about 85% of cases and including major subtypes such as adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. Due to its genetic complexity and high mortality rate, NSCLC remains a critical focus for cancer research and therapeutic development. Xenograft models, created by implanting human NSCLC cells into immunodeficient mice, provide a valuable platform for studying tumor progression and the tumor microenvironment *in vivo*. These models are often utilized in preclinical research to evaluate the efficacy of chemotherapies, targeted therapies, and immunotherapies, offering insights into mechanisms of drug resistance and cancer metastasis.

Calu-3 Cell Line

The Calu-3 cell line is a human lung adenocarcinoma epithelial cell line derived in 1975 from the pleural effusion of a 25-year-old Caucasian male. As a well-characterized, tumorigenic cell line, Calu-3 is often used in cancer research for studying lung cancer biology, drug efficacy, and therapeutic resistance. Its epithelial morphology and ability to form polarized monolayers make it particularly valuable for modeling respiratory epithelium and investigating tumor progression and metastasis. This makes Calu-3 cells instrumental in preclinical drug development, serving as a model for evaluating targeted therapies and exploring molecular mechanisms underlying lung adenocarcinoma.

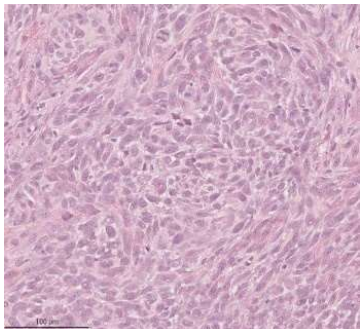

Figure 1. H&E stained slide of subcutaneously-implanted Calu-3 tumor (Altogen Labs).

Altogen Labs Validated Calu-3 Xenograft Model

At Altogen Labs, in the preclinical xenograft study, exponentially growing Calu-3 lung cancer cells are trypsinized, assessed for viability (>99%) using the MTT assay, and suspended in Matrigel at a concentration of one million cells per 200 µL for subcutaneous injection into the hind flank of 10–11-week-old athymic nu/nu or BALB/c mice. Tumor development is monitored by palpation and measured with digital calipers until reaching 90–140 mm³, after which mice are randomized into treatment groups to receive the test compound according to a specified dosing regimen. Tumor growth and mouse body weight are tracked regularly, and animals are euthanized when tumors reach 2,000 mm³ or meet ethical endpoints. Following euthanasia, tumors are excised, weighed, and processed for digital imaging, with tissues preserved for histological, molecular, or genetic analyses. This protocol allows for comprehensive evaluation of tumor response to therapeutic interventions in a controlled *in vivo* setting.

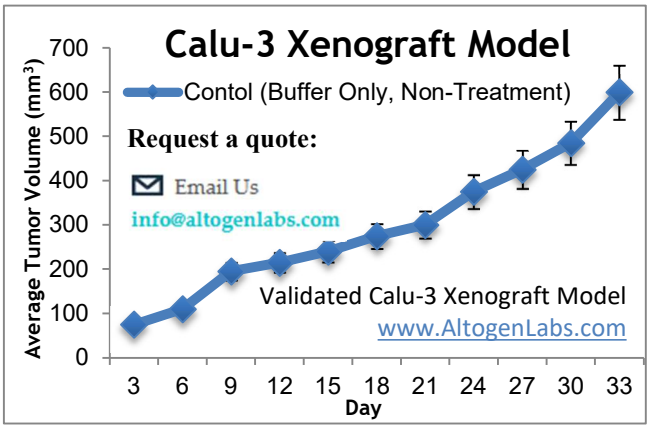

Figure 2. Tumor growth of Calu-3 cells as subcutaneous xenograft *in vivo*, tumor volume, mean values +/- SEM (Altogen Labs).

Subcutaneous Calu-3 Lung Cancer Xenograft Model

The subcutaneous Calu-3 xenograft model serves as a widely adopted *in vivo* system for investigating lung adenocarcinoma progression and assessing therapeutic efficacy. In this approach, Calu-3 cells, are injected into the subcutaneous tissue of immunocompromised mice, enabling reliable tumor formation and straightforward monitoring of tumor growth. This subcutaneous model allows for researchers to evaluate tumor responses to chemotherapeutic agents, targeted therapies,

and combination treatments within a controlled setting. The Calu-3 model is an essential preclinical platform for advancing lung cancer research and therapeutic development.

Case Study: Calu-3 Tumor Sensitivity to Cediranib in NSCLC Treatment

In this study by Jiang Y. *et al*, published by *Lung Cancer* journal, Calu-3 xenografts, representing the stromal vessel phenotype, showed a significant reduction in perfusion and increased hypoxia within 24 hours of cediranib treatment. This vascular disruption led to notable tumor regression in Calu-3 models, demonstrating their heightened sensitivity to VEGFR TKI therapy. These results suggest that stromal vessel architecture in Calu-3 tumors enhances responsiveness to cediranib. Dynamic contrast-enhanced MRI was proposed as a non-invasive tool to predict treatment outcomes by identifying vascular phenotypes. The findings indicate that Calu-3 tumors could serve as a model for predicting therapeutic responses to anti-angiogenic treatments in NSCLC.

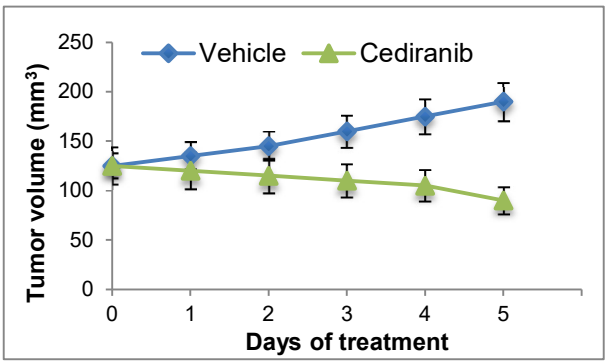

Figure 3. Cediranib (6 mg/kg) effectively inhibited Calu-3 xenograft tumor growth.

Oncogenic Drivers in Calu-3 Non-Small Cell Lung Cancer Cells

Calu-3 non-small cell lung cancer (NSCLC) cells demonstrate distinct oncogenic behavior primarily through ERBB2 (HER2) gene amplification, resulting in uncontrolled cellular proliferation and survival, contributing to tumor progression and therapeutic resistance. Notably, Calu-3 cells exhibit pronounced sensitivity to epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors (TKIs), such as erlotinib, due to their specific oncogenic landscape. These molecular alterations position Calu-3 as a critical model for investigating targeted therapeutic strategies against ERBB2-driven lung carcinogenesis.

The Calu-3 xenograft model offers a range of experimental options to comprehensively evaluate tumor behavior and therapeutic responses. Researchers at Altogen Labs can assess tumor progression through Tumor Growth Delay (TGD) and Tumor Growth Inhibition (TGI) studies, with flexible dosing regimens in terms of frequency, duration, and administration routes, including intravenous, intratracheal, oral gavage, and advanced micro-injection techniques. Additional analyses, such as immunohistochemistry, cell count, blood chemistry, and toxicity assessments, provide deeper insights into treatment effects and systemic health. Alternative engraftment sites, including orthotopic transplantation and metastatic models via tail vein or left ventricular injections, introduce the study of tumor growth and dissemination in more physiologically relevant contexts. Additionally, a positive control group using cyclophosphamide at 20 mg/kg can be used to further support the evaluation of therapeutic efficacy in comparison to standard chemotherapeutics.

References:

Blanco R, Iwakawa R, Tang M, Kohno T, Angulo B, Pio R, Montuenga LM, Minna JD, Yokota J, Sanchez-Cespedes M. A gene-alteration profile of human lung cancer cell lines. Hum Mutat. 2009 Aug;30(8):1199-206. doi: 10.1002/humu.21028. PMID: 19472407; PMCID: PMC2900846.

Calu-3 Xenograft Model. https://altogenlabs.com/xenograft-models/lung-cancer-xenograft/calu-3-xenograft-model/

Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin. 2021 May;71(3):209-249. doi: 10.3322/caac.21660. Epub 2021 Feb 4. PMID: 33538338.

Jiang Y, Allen D, Kersemans V, Devery AM, Bokobza SM, Smart S, Ryan AJ. Acute vascular response to cediranib treatment in human non-small-cell lung cancer xenografts with different tumour stromal architecture. Lung Cancer. 2015 Nov;90(2):191-8. doi: 10.1016/j.lungcan.2015.08.009. Epub 2015 Aug 20. PMID: 26323213; PMCID: PMC4641245.

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