Validated MDA-MB-157 Xenograft Model:
Subcutaneous Xenograft Tumor Model

By Altogen Labs, 11200 Menchaca Road, Suite 203, Austin, TX 78748
Phone: (512) 433-6177 | Email: info@altogenlabs.com

Advancing Breast Cancer Research with Xenograft Models

Breast cancer is a heterogeneous disease characterized by distinct molecular subtypes, including hormone receptor-positive, HER2-enriched, and triple-negative breast cancer (TNBC), each exhibiting unique biological behaviors and therapeutic responses. Xenograft models, in which human breast cancer cells or patient-derived tumor tissues are implanted into immunodeficient mice, serve as invaluable preclinical tools for studying tumor biology and evaluating novel therapeutic strategies. Cell line-derived xenografts (CDX) utilize established breast cancer cell lines, while patient-derived xenografts (PDX) more closely recapitulate the histopathological and genetic complexity of human tumors, preserving key features such as tumor heterogeneity and drug resistance mechanisms. These models facilitate the investigation of tumor-stroma interactions, metastatic potential, and therapeutic efficacy in a physiologically relevant microenvironment. Xenografts are instrumental in assessing the impact of targeted therapies, chemotherapeutic agents, and immunotherapies in a controlled *in vivo* setting. Additionally, advancements in humanized mouse models have enhanced the ability to study immune-oncology approaches, particularly in TNBC, which lacks targeted treatment options.

MDA-MB-157 Cell Line

The MDA-MB-157 cell line is a highly characterized epithelial-like cell line derived from the pleural effusion of a 44-year-old female patient with medullary carcinoma of the breast. As a triple-negative breast cancer (TNBC) model, MDA-MB-157 cells lack expression of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2), making them a valuable *in vitro* system for studying aggressive breast cancer subtypes. These cells exhibit mesenchymal-like properties and display high migratory and invasive potential, characteristics commonly associated with TNBC progression and metastasis. MDA-MB-157 is known for its elevated expression of epidermal growth factor receptor (EGFR) and its dependence on glycolytic metabolism, both of which have implications for targeted therapy development. This cell line has been widely utilized in studies investigating tumor cell plasticity, chemoresistance mechanisms, and novel therapeutic interventions for TNBC. Furthermore, it serves as a model for evaluating the tumor microenvironment's role in disease progression due to its ability to interact with stromal components. MDA-MB-157 is also employed in xenograft studies to assess tumorigenicity and therapeutic response *in vivo*.

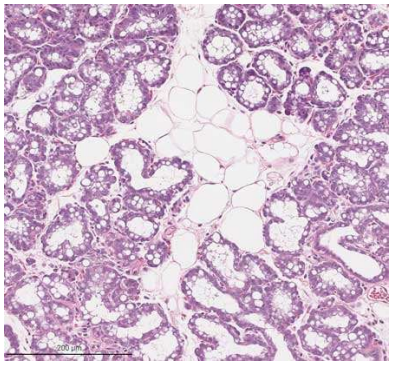

Figure 1. Tumor Histology. H&E stained slide of a subcutaneously-implanted MDA-MB-157 tumor (Altogen Labs).

Altogen Labs Validated MDA-MB-157 Xenograft Model

The study begins with the preparation of MDA-MB-157 cells, which are trypsinized and assessed for viability using a trypan blue assay, ensuring a minimum of 98% viable cells. The cell suspension is then adjusted to a concentration of one million cells per 100 µL in a Matrigel mixture. Immunodeficient mice, either athymic BALB/C or NOD/SCID, aged 10 to 12 weeks, receive a single subcutaneous injection of the cell suspension into the rear hind leg flank. Injection sites are monitored through palpation three times per week until tumors are established. Once tumors reach an average size of 100-150 mm³, digital caliper measurements continue regularly to track tumor progression.

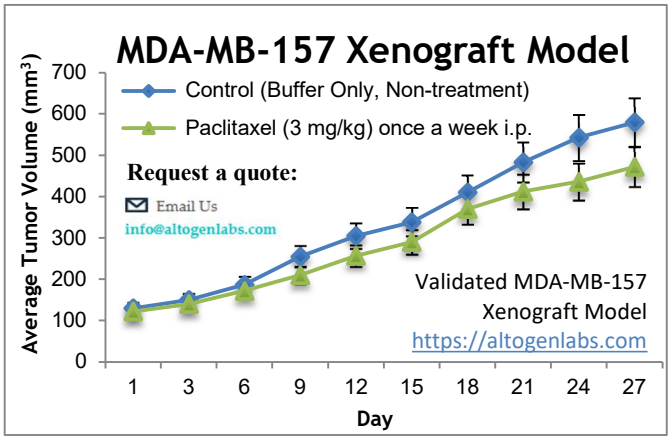

Figure 2. MDA-MB-157 breast cancer xenografted in immunocompromised mice, mean values +/- SEM (Altogen Labs).

Following tumor establishment, animals are randomized into client-determined treatment cohorts, and the compound of interest is administered accordingly. Tumor measurements are taken daily, and mouse body weights are recorded three times per week. Once tumors reach the predetermined size limit, animals are euthanized, and tissues are collected for further analysis. Tumor samples may be snap-frozen in liquid nitrogen for molecular studies or processed for histological evaluation. Additionally, tumors are weighed and documented with digital imaging to provide a comprehensive assessment of tumor growth and treatment response. Collected tissues can be further utilized for immunohistochemical staining or genomic profiling to investigate treatment-induced molecular alterations.

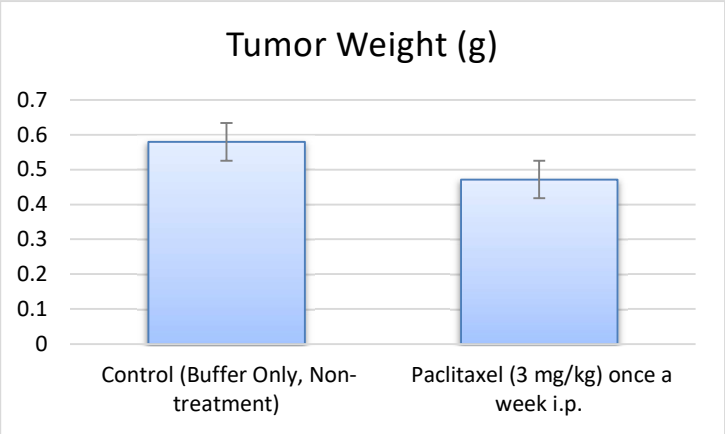

Figure 3. Tumor weight of MDA-MB-157 cells in control, non-treatment mice and paclitaxel treated mice at end of the study (Altogen Labs).

Subcutaneous MDA-MB-157 Breast Cancer Xenograft Model

The MDA-MB-157 subcutaneous xenograft model, in which human breast cancer cells are implanted into immunocompromised mice, is widely used to study tumor growth and therapeutic responses in triple-negative breast cancer (TNBC). These cells, derived from a metastatic pleural effusion, retain aggressive metastatic properties, making the model valuable for investigating both primary tumor progression and metastatic potential. Subcutaneous implantation allows for longitudinal monitoring of tumor growth using non-invasive imaging techniques, such as caliper measurements or bioluminescence. This model is particularly useful for evaluating the efficacy of targeted therapies, chemotherapies, and immunotherapies. While it lacks the complexity of orthotopic models, the subcutaneous model provides a reproducible and simple platform for preclinical screening. It also enables the study of molecular pathways involved in tumor progression and response to treatment, making it an essential tool in advancing TNBC research.

Case Study: DAXX-Mediated Tumor Suppression in Triple-Negative Breast Cancer

A study by Shi Y, *et al*., published by *Neoplasia* jornal investigates the role of MDA-MB-157 cells in triple-negative breast cancer (TNBC) research, particularly in the context of tumor suppression and therapeutic sensitivity. MDA-MB-157 cells were subcutaneously implanted into xenograft models to evaluate tumor growth and response to treatment. The study emphasizes the involvement of the DAXX protein in modulating tumor progression by repressing RAD51, a key player in homologous recombination-mediated DNA repair. Findings suggest that the overexpression of DAXX leads to a significant reduction in tumor growth, as evidenced by in vivo imaging and histological analysis. Furthermore, suppression of RAD51 sensitized MDA-MB-157 cells to PARP inhibitors, demonstrating a potential therapeutic strategy for BRCA-proficient TNBC cases. The research further explores the combined effect of RAD51 and PARP inhibition in MDA-MB-157-derived tumors. Experimental results indicate that dual inhibition enhances tumor suppression, supporting the concept of synthetic lethality in TNBC treatment. Immunohistochemical staining confirmed increased apoptosis in DAXX-overexpressing tumor tissues. The study underscores the potential for targeting RAD51 in conjunction with PARP inhibitors as an effective approach for treating TNBC, particularly in cases that retain BRCA functionality. Collectively, these findings establish MDA-MB-157 as a critical model for exploring novel therapeutic interventions in TNBC.

Additional Case Study: Panobinostat as a Targeted Therapy for Triple-Negative Breast Cancer

A study conducted by Tate CR, *et al.*, published by *Breast Cancer Research* journal, investigates the therapeutic potential of panobinostat, a histone deacetylase inhibitor, in targeting triple-negative breast cancer (TNBC) cells, including the MDA-MB-157 cell line. TNBC represents an aggressive breast cancer subtype with limited treatment options due to the absence of hormone receptors and HER2 expression. The study evaluates the effects of panobinostat on TNBC cell proliferation, viability, apoptosis, and tumorigenicity using both *in vitro* and *in vivo* models. MDA-MB-157 and other TNBC cell lines were treated with nanomolar concentrations of panobinostat, leading to increased histone acetylation, decreased cell survival, and G2/M phase cell cycle arrest. Notably, panobinostat-induced apoptosis was observed in all tested TNBC cell lines except MDA-MB-468, underscoring cell line-specific responses to treatment.

In vivo xenograft studies further demonstrated panobinostat's efficacy in reducing tumor growth, highlighting panobinostat's role in modulating key cancer biomarkers, including the upregulation of E-cadherin (CDH1), suggesting a potential reversal of the epithelial-to-mesenchymal transition (EMT). This finding implies that panobinostat not only inhibits tumor progression but may also reduce metastatic potential. The observed cytotoxic effects, combined with the modulation of tumor suppressor and epithelial marker genes, support the potential of panobinostat as a targeted therapy for aggressive TNBC cases.

Genomic Instability and Dysregulated Mitosis in MDA-MB-157 Cells

MDA-MB-157 breast cancer cells exhibit significant karyotypic instability, with chromosome numbers ranging from 52 to 69, reflecting their high degree of genomic aberration. These cells possess a mutated TP53 gene, which impairs DNA damage response and contributes to uncontrolled cell division. Unlike many TNBC subtypes, they retain wild-type BRCA1/2, suggesting alternative mechanisms drive their instability. A key feature of MDA-MB-157 cells is the overexpression of MAD2L2, a regulator of mitotic progression that disrupts proper spindle assembly checkpoint (SAC) function. This leads to frequent mitotic slippage, where cells prematurely exit mitosis without proper chromosome segregation, fueling aneuploidy. Furthermore, defective APC/C (Anaphase Promoting Complex/Cyclosome) regulation results in the accumulation of mitotic substrates, exacerbating chromosomal imbalances. These abnormalities contribute to the aggressive phenotype of MDA-MB-157 cells, making them an important model for studying genomic instability in triple-negative breast cancer (TNBC). Understanding their karyotypic landscape could reveal new therapeutic targets to improve treatment outcomes for TNBC patients.

Oncogene Characteristics

MDA-MB-157 cells, a mesenchymal-like subtype of triple-negative breast cancer (TNBC), exhibit aggressive migration and invasion properties, largely driven by oncogenic kinase signaling. These cells demonstrate hyperactivation of the PI3K/AKT/mTOR pathway, which promotes survival, proliferation, and metastatic potential. Additionally, mutations in key regulators such as GSK3, WNK1, and p53 contribute to their enhanced motility and resistance to therapy. The dysregulation of MAPK and STAT signaling further amplifies their metastatic behavior by enabling epithelial-to-mesenchymal transition (EMT). Targeting these pathways with phytochemicals like fisetin and quercetin has been shown to suppress migration and metastasis by inhibiting critical kinases and reversing mesenchymal traits. Notably, these oncogenic alterations render MDA-MB-157 cells highly aggressive, making them a valuable model for studying novel anti-metastatic strategies. Understanding their molecular profile is crucial for developing targeted therapies against TNBC.

Immuno-oncology Xenograft Models

Altogen Labs is a preclinical research organization specializing in the testing and evaluation of novel pharmacological and biological treatments, such as anticancer therapies, medical compounds, vaccines, cosmetics, and natural products. With a dedicated team of scientists, the specializes in immuno-oncology services, using advanced humanized and immunodeficient rodent models, including those engrafted with peripheral blood mononuclear cells (PBMC), CD34+ hematopoietic stem cells, and induced pluripotent stem cells (iPSC), to assess immune responses, drug efficacy, and toxicity. The organization also offers over 100 in-house validated xenograft models, including CDX, patient-derived xenografts (PDX), *in vitro* patient-derived cell cultures (PDC), and patient-derived organoids (PDOrg), providing robust platforms for evaluating drug efficacy in genetically characterized, clinically relevant cancer models. Altogen's platform predicts drug efficacy while in vivo testing in humanized models delivers critical preclinical data. Additionally, the team conducts extensive toxicity studies to evaluate compound safety over time, ensuring the clinical efficacy and safety of new therapies.

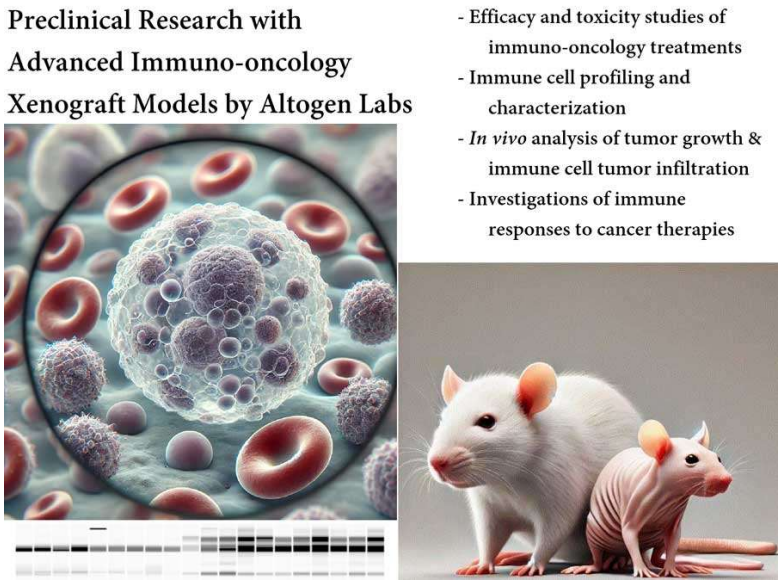

Figure 4. Advanced immune-oncology services available at Altogen Labs (Altogen Labs).

Xenograft animal models are essential for evaluating the efficacy of anti-cancer therapies by testing novel compounds against established tumor growths. At Altogen Labs, tumors are engrafted into immunocompromised mice or rats via subcutaneous inoculation, enabling preclinical assessment of therapeutic response. All clinically approved anti-cancer agents have undergone rigorous *in vivo* evaluation using these models. Xenograft studies involve multiple complex factors, including selecting an appropriate animal model, tumorigenic cell line, administration route, dosing regimen, and tumor growth analysis using histology, mRNA, and protein expression profiling. These models provide invaluable insights into tumor biology and drug response, supporting the development of targeted cancer therapies.

Figure 5. *In vivo* xenograft services offered at Altogen Labs for MDA-MB-157 (Altogen Labs).

At Altogen Labs, xenograft studies are conducted in compliance with IACUC and GLP regulations, ensuring ethical animal handling and high-quality research standards. Mice are acclimated to the vivarium, sorted by body mass, and monitored daily for tumor development and clinical health. Comprehensive study reports, including methods, results, statistical analyses, and raw data, are provided to clients. Additional services include tissue collection, histology, protein and RNA isolation, gene expression analysis, and specialized feeding or water systems for inducible gene expression models. The MDA-MB-157 xenograft model offers various research options, including tumor growth inhibition studies, immunohistochemistry, alternative engraftment sites for metastasis research, blood chemistry analysis, toxicity assessments, metabolic assays, and fluorescence-based whole-body imaging. Positive control groups using cyclophosphamide further enhance the study's rigor, ensuring robust preclinical evaluation of therapeutic agents.

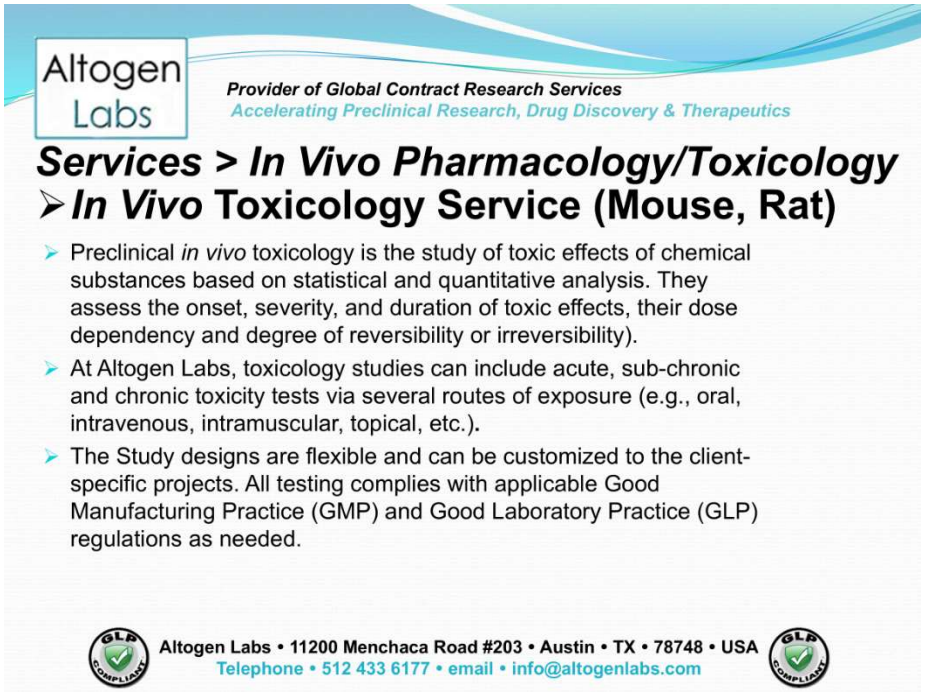

Figure 6. *In vivo* toxicology services offered at Altogen Labs (Altogen Labs).

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Keywords: MDA-MB-157, breast cancer, xenograft, breast, *in vivo*, cancer, preclinical, research, *in vivo* pharmacology, CDX, PDX

Other Available Altogen Labs Validated Xenograft Models:

BT474 Xenograft Model: https://altogenlabs.com/xenograft-models/breast-cancer-xenograft/bt474-xenograft-model/

Hs578T Xenograft Model: https://altogenlabs.com/xenograft-models/breast-cancer-xenograft/hs578t-xenograft-model/

MCF7 Xenograft Model: https://altogenlabs.com/xenograft-models/breast-cancer-xenograft/mcf7-xenograft-model/

HCC1954 Xenograft Model: https://altogenlabs.com/xenograft-models/breast-cancer-xenograft/hcc1954-xenograft-model/

NCI-H460 Xenograft Model: https://altogenlabs.com/xenograft-models/lung-cancer-xenograft/h460-xenograft-model/

NCI-H1975 Xenograft Model: https://altogenlabs.com/xenograft-models/lung-cancer-xenograft/nci-h1975-xenograft-model/

NCI-H226 Xenograft Model: https://altogenlabs.com/xenograft-models/lung-cancer-xenograft/nci-h226-xenograft-model/

NCI-H1155 Xenograft Model: https://altogenlabs.com/xenograft-models/lung-cancer-xenograft/h1155-xenograft-model/