DOI.10.7860/JCDR/2026/90859.24104 Abstract No.: MP 02

# Xenograft Mouse Models in Cancer Research: Characterisation, Applications, and Future Perspectives: A Narrative Review

AMOLI SHEE[1], ALOK CHANDRA BHARTI[2], AASTHA MITTAL[3]

## ABSTRACT

**Introduction:** Cancer remains a major global health challenge, emphasising the need for reliable experimental models that accurately mimic human tumor biology and therapeutic responses. Xenograft mouse models, including patient-derived xenograft (PDX), cell-derived xenograft (CDX)- subcutaneous and orthotopic models, have emerged as indispensable tools in translational oncology research due to their ability to reproduce tumor heterogeneity, metastatic potential, and treatment responses observed in human cancers.

**Aim:** This review aims to summarise the methodologies, characterisation approaches, and preclinical applications of xenograft mouse models in cancer research, with emphasis on their translational significance and future prospects.

**Materials and Methods:** A comprehensive literature-based review was conducted using published studies focused on xenograft mouse models in cervical, ovarian, and lung cancers. Relevant studies describing tumor engraftment, histopathological characterisation, tumor progression, metastatic behavior, circulating tumor cells, and therapeutic evaluation in immunocompromised mice were critically analysed and compiled.

**Results:** Published evidence demonstrates that xenograft models serve as valuable platforms for investigating tumor growth, angiogenesis, metastasis, tumor heterogeneity, and drug responsiveness. Orthotopic xenograft models closely mimic the native tumor microenvironment and metastatic progression, whereas subcutaneous models provide reproducible and easily measurable tumor development. Patient-derived xenograft models preserve tumor heterogeneity and enhance translational relevance for therapy evaluation. Additionally, xenograft systems have been widely utilised to study circulating tumor cells and treatment responses in multiple cancer types.

**Conclusion:** Xenograft mouse models remain essential tools in preclinical oncology research. Their reproducibility, translational relevance, and adaptability continue to advance cancer biology research and facilitate the development of novel therapeutic strategies.

**Keywords:** Cervical Neoplasms, Drug Evaluation, Nude Mice, Preclinical, Tumor Microenvironment, Xenograft Model.

**PARTICULARS OF CONTRIBUTORS:**
1. M.Sc. Medical Physiology Student, Department of Physiology and Allied Sciences, Amity Institute of Health Allied Sciences, Amity University, Noida, Uttar Pradesh, India.
2. Professor, Department of Zoology, Molecular Oncology Laboratory, University of Delhi, Delhi, India
3. Research Associate, Department of Zoology, Molecular Oncology Laboratory, University of Delhi, Delhi, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**
Dr. Alok Chandra Bharti,
Professor, Department of Zoology, Molecular Oncology Laboratory, University of Delhi, Delhi, India.
Email: bhartiac2011@gmail.com; alokchandrab@yahoo.com