INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Breast cancer remains a leading cause of cancer-related mortality among women, with aggressive subtypes like triple-negative breast cancer posing significant treatment challenges. This thesis explores drug repurposing as a strategic approach to overcome therapeutic resistance by targeting metabolic alterations and epithelial-to-mesenchymal transition (EMT) pathways. A network-based screening identified Pimozide and Ponatinib as potential inhibitors of IR, ITGB1, and CD36, whose combination significantly impaired cancer cell migration, invasion, and viability. Further, a synergistic drug cocktail comprising Epirubicin, SAHA, and Pimozide (ESP) enhanced anticancer efficacy while reducing drug dosage. To improve targeted delivery, Pimozide was encapsulated in ZIF-8 metal-organic frameworks, demonstrating pH-responsive release and enhanced intracellular uptake. Together, these findings highlight the therapeutic promise of rational drug repurposing and advanced nanocarrier systems in breast cancer treatment. This work lays the foundation for further translational studies aimed at optimizing combinatorial therapies and nanoparticle-mediated drug delivery for clinical application.