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Research Article

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Molecular and Immunophenotypic Modulation Induced by Radiotherapy in Breast Carcinoma

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Abstract

Breast cancer remains one of the most significant causes of morbidity and mortality among women worldwide. Beyond its therapeutic role, radiotherapy (RT) may induce biological alterations that modify hormonal receptor expression and HER2 amplification. This study evaluated 152 breast carcinomas diagnosed at the University Hospital Center 'Mother Teresa' (2023–2025), comparing pre and postradiotherapy profiles using IHC and SISH. Findings reveal marked immunophenotypic plasticity, including ER/PR downregulation and HER2 amplification. Molecular insights suggest that radiation induced oxidative stress, genomic instability, and epigenetic remodeling drive these changes. Understanding RT induced reprogramming is essential for optimizing post treatment therapeutic decisions.

Keywords: breast carcinoma; radiotherapy; hormone receptors; HER2; immunophenotypic modulation; epigenetics; oxidative stress

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