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## Impact of radiotherapy on hormone receptor and HER2 status in breast cancer

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### Abstract

Breast cancer is a complex disease characterized by diverse biological behaviours, where variations in hormone receptor (HR) and HER2 status play a critical role in shaping treatment approaches and influencing patient outcomes. Understanding the effects of therapies such as radiotherapy on these biomarkers is essential for enhancing treatment efficacy. This retrospective study examines how radiotherapy impacts HR status and HER2 expression in breast cancer patients at the University Hospital “Mother Theresa” in Tirana. Among 350 patients analysed for HR status, 4.8% showed changes, with this figure rising to 43.8% in a subset of 39 patients who were retested following radiotherapy. Importantly, 12.8% of those with residual tumours needed alterations in their treatment plans due to shifts in HR status.

In a subgroup of 180 patients with confirmed HER2-positive breast cancer, tissue samples were collected both pre- and post-radiotherapy. HER2 expression was evaluated using immunohistochemistry (IHC) for protein detection and silver in situ hybridization (SISH) for gene amplification, following rigorously validated protocols. Before radiotherapy, all patients exhibited HER2 overexpression or gene amplification. Post-treatment analysis indicated that 75.6% (n=136) maintained stable HER2 expression, while 24.4% (n=44) displayed changes, with 16% (n=7) experiencing reduced HER2 positivity, including 6.8% (n=3) who converted to HER2-negative.

These results highlight the necessity for regular reevaluation of both HR and HER2 status after radiotherapy, reflecting the evolving nature of breast cancer biology. By tailoring treatment strategies to account for these changes, healthcare providers can enhance patient outcomes.

**Keywords:** Breast cancer, immunohistochemistry, hormonal receptor, HER2, therapy.

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