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Gene Editing in ErbB/HER Family-Mediated Cancer Immunology

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Abstract : ErbB/HER family has an essential role in tumor progression, proliferation, invasion, metastasis, and migration. ErbB/HER-targeted therapeutic agents have emerged as effective therapeutic options to achieve excellent clinical outcomes and boost cancer drug discovery by enhancing treatment efficacy, lowering drug resistance, and minimizing systemic toxicity. Furthermore, combination therapy targeting ErbB/HER family members, as well as hormonal therapy, chemotherapy, immunotherapy, and radiotherapy, also enhance therapeutic effects for cancer immunology. Zinc-finger nucleases (ZFNs), transcription activator-like effector nucleases (TALENs), and Clustered Regularly Interspaced Short Palindromic Repeats-CRISPR-Associated 9 (CRISPR-Cas9) comprise powerful tools for redefining the boundaries of cancer research. In this chapter, we provide a comprehensive evaluation of anti-cancer single and combined therapeutics to target ErbB/HER family members, which could represent promising approaches for cancer treatment. We also discuss the recent and worldwide advancements in the structures, mechanism, selectivity, and efficacy of single and combined ErbB/HER-targeted drug design and development efforts, which sheds light on their potential to improve cancer treatment. In addition, we highlight recent achievements and therapeutic potentials of ZFNs, TALENs, and CRISPR/Cas9 for cancer immunology, such as genetic analysis and manipulation. The customized application of CRISPR/Cas9-mediated targeting of ErbB2/HER2 inhibited cell proliferation, and tumorigenicity opens up the novel possibility for cancer treatment.

Keywords : ErbB/HER family, ErbB/HER-targeted therapeutic agents, combined therapy, gene editing, CRISPR/Cas9
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