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Treatment and control the development of cervical cancer with disruption of E6 and E7 genes of Human papillomavirus (HPV) by CRISPR- cas9 method

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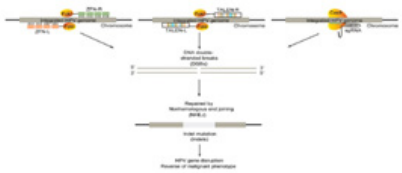
Cancer of the cervix uteri, more commonly known as cervical cancer, is an important public health concern. HPV persistent infection is the major causal factor of cervical intraepithelial neoplasia (CIN) and cervical cancer. Two HPV types (16 and 18) cause 70% of cervical cancers and pre-cancerous cervical lesions.) Although surgery and chemo radiotherapy can cure 80%–95% of women with early stage cancer, the recurrent and metastatic disease remains a major cause of cancer death. . Cervical cancer is the second most common cause of cancer death in women worldwide approximately, 500,000 new cases of cervical cancer have diagnosed each year, with 280,000 deaths worldwide. The important roles of HPV E6 and E7 oncogenes in HPV-driven carcinogenesis make them attractive targets for therapeutic interventions. Many efforts have made to design new drugs and develop gene therapies to treat cervical cancer also; the field of gene editing is undergoing unprecedented growth. HPV E6 oncoprotein promotes the degradation of host tumor suppressor gene p53, leading to the development of tumors therapeutic strategies that specifically target E6, which is constitutively expressed in tumors and is not present in normal tissues, may be highly effective and safe. CRISPR-CRISPR associated protein 9 (Cas9) is one of the genome editing technologies that has recently garnered attention, and is used to knockout target gene expression. This technique offers precise editing of a genome, enabling genetic research of defective genes and their behavior.
This article gives an overview on current knowledge and applying new and innovative methods of treatment and development control of cervical cancer caused by HPV.



Genome editing as a therapeutic strategy for HPV infections. Diagram of HPV genome editing using ZFNs, TALENs, and CRISPR/Cas9.

Recent Publications

1. Hu Z, Ma D. The precision prevention and therapy of HPV-related cervical cancer: new concepts and clinical implications. Cancer medicine. 2018 Oct;7(10):5217-36.
2. Lee C. CRISPR/Cas9-based antiviral strategy: status and the potential challenge. Molecules. 2019 Jan; 24(7):1349.
3. Zhen S, Li X. Oncogenic human papillomavirus: application of CRISPR/Cas9 therapeutic strategies for cervical cancer. Cellular Physiology and Biochemistry. 2017;44(6):2455-66.
4. Zhen S, Li X. Oncogenic human papillomavirus: application of CRISPR/Cas9 therapeutic strategies for cervical cancer. Cellular Physiology and Biochemistry. 2017; 44(6):2455-66.
5. Hu Z, Yu L, Zhu D, Ding W, Wang X, Zhang C, Wang L, Jiang X, Shen H, He D, Li K. Disruption of HPV16-E7 by CRISPR/Cas system induces apoptosis and growth inhibition in HPV16 positive human cervical cancer cells. BioMed research international. 2014 Oct;2014.
6. Zhang Y, Li M. Genome Editing Technologies as Cellular Defense against Viral Pathogens. Frontiers in cell and developmental biology. 2021:1868.

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