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Gene Editing Trends in Lung Cancer - A Review Approach †

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Abstract: In 2020, according to the National Agency for Cancer Research, the estimated cumulative risk of lung cancer incidence was over 6.0 value (Source: Globocan 2020), thus lung cancer is considered one of the most commonly diagnosed diseases worldwide, with frequent metastasis and recurrences. In terms of human gene editing, CRISPR/Cas (Clustered regularly interspaced short palindromic repeat-associated) technology was applied either for molecular lung diagnostic (including the Cas proteins from type V and VI) or for molecular lung therapy (with type II Cas protein). In the scientific literature, the main aspects that are addressed to non-small cell lung cancer (NSCLC) therapy take into consideration both systems, CRISPR/Cas9 and the newest CRISPR/Cas13a, with a promising potential to knock down the oncogene expression *in vitro* or *ex-vivo* studies [1,2]. There were constructed different personalized CRISPR/Cas systems targeting specific lung cancer-related proto-oncogenes (such as MYC, ERBB1, RAS, ERBB2, RAF1, FOS, ROS1, JUN) leading to knockout inactivation or tumor-suppressor genes (such as TP53, MFN2, GOT1, CDKN2A, RB, MCC, APH, APC) to inhibit tumor growth and, in consequences to activate the lung repair. Single guide RNA (sgRNA) was designed to target the mutated genes and, together with Cas9 enzyme, formed a double-strand break, enabling to disruption of the oncogene and inhibiting cancer cell proliferation. Further, the CRISPR - based system was also used to identify antioxidant enzyme genes whose loss confers vulnerabilities to β-Lapachone in NSCLC cell mutants [3,4,5]. Evendown, the CRISPR/Cas-based gene lung therapy was extremely improved over the last years, with promising results regarding the specific oncogene off-target effect; the process is still challenging when multiple gene mutations are produced.

Keywords: non-small cell lung cancer (NSCLC); CRISPR/Cas9; cancer-related proto-oncogenes.

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Conflicts of Interest

The authors declare no conflict of interest.