

## Mini Review

# Role of CRISPR Cas-9 in Thyroid Cancer

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The regularly clustered and interspersed short palindromic repeats CRISPR are used for the treatment against many diseases. It is also widely used in the field of medicine. It can speedily screen the entire genome also facilitates the regulation of gene therapy for the certain diseases due to its strong specificity and high efficiency. CRISPR-CAS 9 can be used in the different field of tumor research for changing the genome to explore the mechanism of tumor development and. It is used for the treatment of tumors and knocks out specific genes.

**Keywords:** Anaplastic Carcinoma; Alpha9-nAChR DNA; Cancer; CRISPR-CAS 9

## Introduction

One important gene-editing tool is CRISPR Cas-9. It has more accuracy than all other techniques used in DNA editing. There are many applications of the CRISPR Cas-9 system. It is the best technology that makes the geneticists and the medical researchers to change the part of the genome. CRISPR has simplicity and versatility in its use. There are two main components of the CRISPR Cas-9 system which are helpful in the introduction and editing of DNA. Cas-9 is an enzyme. CAS-9 acts as scissor for a molecule, which helps cut the both strands of DNA at a certain location. So, the bits of DNA may feasibly add or removed. A guide RNA is also present which is known as gRNA. The gRNA comprises of a short piece of RNA scaffold. This gRNA is used to search and bind a specific sequence in DNA. Guide RNA and target DNA has complementary bases. The guide RNA is used as a shirt sequence by the CAS - 9 for cutting the strands of DNA. At that time, DNA is damaged and the cell tries to repair it. There are many diseases for which CRISPR -CAS 9 is being used as a treatment. Thyroid cancer develops when changes or mutation in the cells. In this case, abnormal cells begin to multiply in our thyroid, and once if they become enough in number they develop into tumors. There are 23 pairs of chromosomes in the human genome. There are 6 nucleotides in each chromosome. In thyroid, anaplastic carcinoma is also known as undifferentiated cancer of thyroid. The patients are oftenly in their 60s to 70s at presentations. There are many technologies for the editing of genes, such as Zinc-finger Nucleases and TALENs have been used for therapeutic application in animals. The cellular DNA (subsequent) repair method enables the required insertion, deletion, or may substitution at the targeted site. CRISPR-CAS 9 is widely used in the clinical treatment of diseases. By using the modified sgRNAs for CRISPR /CAS 9 editing of a gene on alpha9-nAChR DNA loci of MDA- MB -231 cells through the infection of lentivirus, there can be found a significant alph9-nAChR gene sequence a mixture of anticipated Cas-9 cleavage point by using the method of Sanger DNA sequencing.

## Working of CRISPR CAS 9 CRISPR

It is very interesting in the treatment of many diseases. Some microbes such as bacteria have a defense mechanism against invaders like viruses. These microbes are used to store as CRISPR which are the

short palindromic repeat by capturing the snippets of intruders DNA. So this idea was taken from microbes. When this microbe attacks for the second time then these segments turned into short segments of DNA. This same germ tries to attack again and help an enzyme called CAS find and slice up the invader's DNA. This is the main role of CRISPR CAS 9. After this multiple groups had successfully adapted and made systems for editing any part of DNA first in the cells of other microbes and then in the human cells. CRISPR role in thyroid cancer: Tumor promotes cell proliferation, which inhibits the apoptosis of cell, and change the expression of certain antigens on the face of the cell. Surgery, chemotherapy, radiotherapy, molecular targeted therapy combined therapies is useful treatments for thyroid cancer. Radiotherapy and chemotherapy have some disadvantages.

The most valuable gene-editing technique is Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) and with the associated protein 9 (CAS 9) has revealed the most applicable and certain editing of a gene capability as comparing to the previous gene manipulative devices. In the study of cancer mostly oncogenic mutations are involved via the application of CRISPR Cas-9 and in vivo and in vitro methods are used. 1st of all we would explain the CRISPR CAS-9 as a many functional genome editing and it may explain the numerous application of CRISPR CAS-9 in the functional screening. There are many other applications of CRISPR Cas-9.

## CRISPR Case-9 and advanced editing of gene tool

Alot of techniques have been such as RNAi which stands for RNA interference, ZFNs (Zinc finger nucleases), and TALENS. Double-stranded RNA is used as initiators for the RNAi technique. When an exogenous dsRNA is inserted into the cells than 21-30 base pairs are recognized of short RNAs by the family of RNase 3. After it, the siRNAs which are mature and direct RNA Induced Silencing Complex known as (RISC) to target RNA, which takes to the final destruction of the RNA which was targeted and causes gene silencing. It is a valuable immune system which defends against the foreign invasive nucleic acid. There are 6 classes in the CRISPR Cas-9 system. Class 1 (type 1, 3 and 4) Class 2 (type 2, 5 and 6) systems.

## Importance of CRISPR CAS-9

CRISPR Case-9 is an important gene-editing technique. It is most useful against mutations due to genetic changes. Different genomes

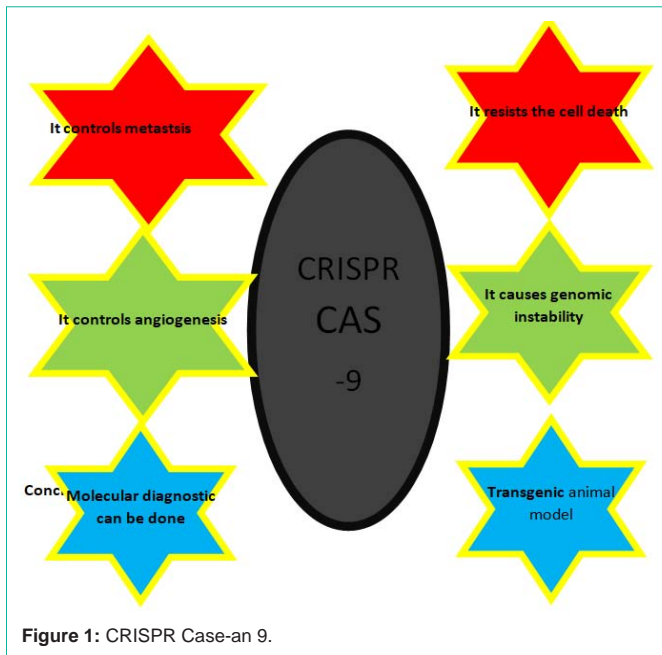


Figure 1: CRISPR Case-an 9.

can be edited by the use of CRISPR Cas-9. Thyroid cancer which is very dangerous and can lead to even death also can be treated by CRISPR Case-9. The genetic code of all organisms can be generated by CRISPR Case-9. Because it can cut the bad DNA and add the functional DNA.