DNA manipulation by artificial mechanism of rupturing the H_2 bonds of the base proteins for humans with higher Immunity

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Abstract— DNA is the prime genetic molecule, carrying all the hereditary information within chromosomes. The concept presented here deals with the manipulation of the DNA strands artificially during initial stages of cell division and incorporating a protein in a DNA which will have a chemical composition to sustain the attacks by the viruses, bacteria, germs, or any foreign body. This technique of editing the DNA will enhance the immune system of humans to a higher level making them lesser susceptible to any sort of disease. The method of DNA edition will modulate the genetic information sent during DNA replication without disturbing the sequencing of the base proteins which are the building blocks of a DNA.

Index Terms— Deoxyribonucleic acid (DNA), Adenine (A), Thymine (T), Cytosine (C) and Guanine (G), Hydrogen bond (H_2 bond).

1 Introduction

Today we know that the blueprint for life lies in the nucleus of every cell in the human body. It is often referred to simply as DNA or Deoxyribonucleic acid. It looks like a twisted ladder, called a double helix. The steps are made of four nitrogen bases- Adenine (A), Thymine (T), Cytosine (C) and Guanine (G). Each of the bases has a complementary partner: A pairs with T, C pairs with G. Every step in the DNA ladder is made of these pairs, stacked in different orders to build the genes that are the genetic code for every organism.

Deoxyribonucleic acid (DNA), is a self-replicating material which is present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information. The DNA actually encodes the fundamental and distinctive characteristics or qualities of someone or something, especially which are regarded as unchangeable.The function of DNA is to be a keeper of the code to any living organism's characteristics and genes. DNA is considered the building block of life. Your DNA will determine whether you are right handed or left handed, blond or brown hair, and how tall you might be, etc. This is the principal role of a DNA.

2 Background

2.1 DNA and base proteins

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA. The information in DNA is stored as a code made up of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T). Human DNA consists of about 3 billion bases, and more than 99 percent of those bases are the same in all people. The order, or sequence, of these bases determines the information available for building and maintaining an organism, similar to the way in which letters of the alphabet appear in a certain order to form words and sentences. DNA bases pair up with each other, A with T and C with G, to form units called base pairs as seen in Fig 1.

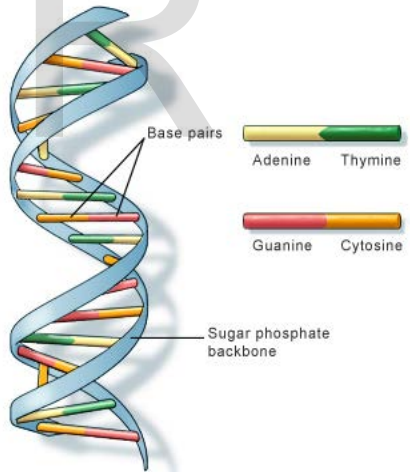

Fig 1: Double helical structure formed by base pairs attached to a sugar-phosphate backbone in a DNA.

2.2 Structure of DNA helix: H_2 bonds

The double helical structure of DNA is largely due to hydrogen bonding between its base pairs (as well as pi stacking interactions), which link one complementary strand to the other and enable replication.

A hydrogen bond is a type of attractive (dipole-dipole) interaction between an electronegative atom and a hydrogen atom bonded to another electronegative atom. In the case of DNA hydrogen bonding is the chemical interaction that underlies and connects the base-pairing. The DNA hydrogen

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bonds are responsible for holding together the double helix structure

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The two strands of DNA stay together by H bonds that occur between complementary nucleotide base pairs. Two hydrogen bonds occur between the adenosine and the thymine base pairs, and between the cytosine and the guanine there are three.

A key aspect to look out for is that a smaller base is always paired with a bigger one. The effect of this is to keep the two chains at a fixed distance from each other all the way along. Also the pairing has to be as follows:

1. Adenine (A) pairs with Thymine (T);
2. Guanine (G) pairs with Cytosine (C). (Fig 2)

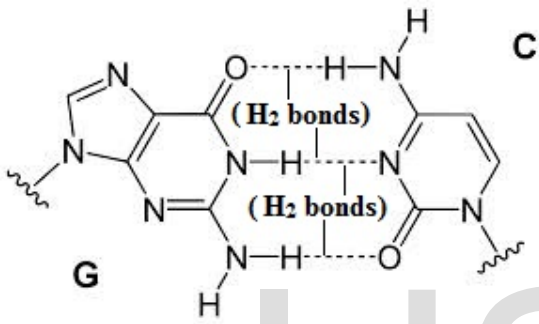

Fig 2: Double helical DNA with H_2 bonds between guanine (G) and cytosine (C)

The above Fig 2 shows the skeletal framework of DNA base proteins linked together through the H_2 bonds.

3 DNA MANIPULATION: METHOD

The fundamental methods used for DNA manipulation include the isolation of a single DNA, breaking of H_2 bonds by keeping a track of the electronegativity of the adjacent atoms and then adding a protein to the DNA structure without disrupting the overall composition and functioning of a DNA.

The double helical strands of a DNA are held together predominantly because of the H_2 bonds. When these bonds break up at the time of cell division, a protein 'x' must be integrated with the newly formed DNA. This 'x' protein is a chemical substance which sustains attacks from any kind of virus, bacteria, or any foreign body.

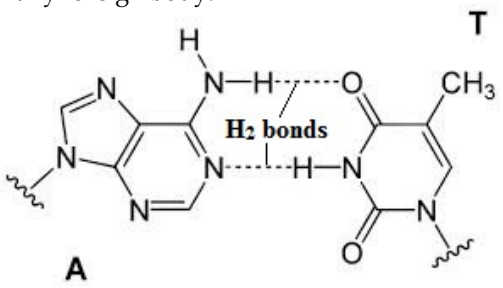

Fig 3(a): Internal H_2 bonds before editing a DNA (A with T)

The above fig 3(a) shows the internal chemical structure of a DNA wherein the two base proteins i.e. Adenine and Thymine (A and T) are attached with H_2 bonds. Fig 3(a) show the DNA's chemical skeleton before it is edited. Now let us see the scenario after the DNA is edited.

3.1 Process:

The process of DNA manipulation involves three steps:

1. To **isolate DNA** from the organism.
2. To put the DNA into the DNA **vector**.
3. To **transfer** the vector by transfection or transformation into the host.

Isolation of the DNA:

We get the part of the DNA and isolate it, thanks to *restriction endonucleases - type II*. A restriction enzyme (or restriction endonuclease) is an enzyme that cuts DNA at or near specific recognition nucleotide sequences known as restriction sites Thus the DNA strand is broken up in the specific places which are bordered by short nucleotide sequences. Both strands are cut out. Then we can recognize them and categorize by their size by agarose gel **electrophoresis**.

Joining the DNA:

DNA ligase is a specific type of enzyme that facilitates the joining of DNAstrands together. Thus *DNA ligase* governs the properties of the segment. The cohesive ends are created and the insertion can take place.

Transfer into the Host:

It is absolutely necessary to choose the right vector for the DNA. It must accept the foreign DNA and continues its cell cycle. The most common are bacteria – especially *E.coli*. The transformation of DNA from a virus is called **transfection**. We have ensured that the integration into the host genome will be successful. The most important is to maintain the ability to replicate DNA. After insertion of a vector (protein 'x' in this case), the newly formed DNA model is represented in Fig 3(b).

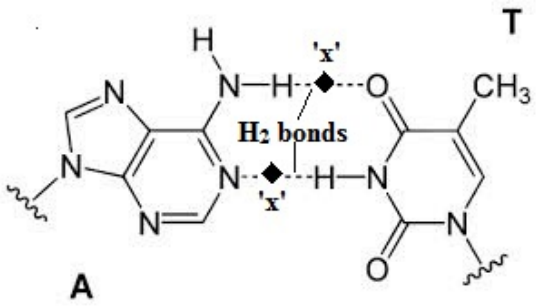

Fig 3(b): DNA with 'x' protein between H_2 bonds (A with T) after editing.

The above Fig 3(b) depicts the edited DNA with a protein 'x'

that can withstand the attack by the foreign bodies and thus enhance the immunity of an individual.

The Protein 'x':

The protein 'x' to be induced in a DNA has a chemical composition that endures the feature of combating the entry of any foreign body that affect the human immune system in a negative way. This chemical protein enhances and strengthens the immunity of an individual by behaving like any other antibody but having the ability to withstand all kinds of bacteria, viruses, etc. It is clinical component which serves in an effectual way without distorting the composition and functioning of the respective base proteins. Thus it allows the DNA to continue with the routine cell cycle and replication activity irrespective of its positioning into the DNA body.

4 Recent developments

Recently, researchers at Massachusetts Institute of Technology (MIT), USAhave revealed an interesting result that could probably change the face of medical science. The research was conducted on the mechanism of "Erasing a Genetic Mutation". This technique devised a gene editing system based on the bacterial proteins. The procedure cured mice of rare liver disorder caused by single genetic mutation. This mechanism snips out the defective mutated DNA and relpaces it with with the correct sequence. As a result the mutated DNA that caused liver disorder in mice was edited to develop itself into a new sequence of DNA that is potentially immune to the liver disorders. This approach actually corrects a defective gene in a living adult animal. As per the research team this method holds the potential to treat many genetic disorders. These are the latest findingsof the research and experiments conducted at MIT, USA dated 31st march, 2014.

5. Theoretical analysis and discussion

The concept put forth here relates to the idea of attaching a DNA with the chemical substance or a protein that is immune to various diseases like malaria, cough, cold, etc. A simple DNA consists of four base protiens as seen earlier i.e. A, T, G, and C. These proteins are attached with hydrogen bonds which cannot be broken artificially. These bonds are broken naturally at the time of cell division. Thus at the time of cell division, a chemical substance or a protien must be inserted into the DNA keeping the chemical structure of the DNA base proteins intact.The chemical protein to be stacked in the DNA should have strong resilience to the human specific diseases . The protein to be attached to the DNA strands must be designed with a substance that performs self replication depending on the duplication of the respective DNAs; which simply means that upon DNA replication the newly placed chemical protein must analogously replicate.As a result, with the natural growth of a humans, the newly edited DNA will multiply itself and the new DNA's that are generated will naturally possess the chemical protein within themselves.As the chemical protein has strong immunity towards diseases, it will ensure that the humans are resistant to any foreign body that cause diseases.

Designing such a chemical protein 'x' requires a thorough study, analysis and an efficient developmental platform. This experiment certainly assures that the humans will be unsusceptible to the wide spectrum of diseases. And thus as a result, humans will probably be disease free in the near future.

6. Conclusion:

As per the above discussion the changes in the DNA structure through the induced protein can be evaluated. The study and theoretical analysis of DNA manipulation process lightens up the path for achieving the grail of humans with higher immunity. In the coming years we will see a new generation of 'disease free' humans with the inherent ability to nurture healthy life.

7. Acknowledgment:

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