Synthetically altering the genome and some its applications

In this paper we will be talking about how synthetically altering the genetic code can directly impact the world around us. The genetic code is the basis of all life, from the tiniest of bacteria all the way up to the largest of animals and plants. All living things have a genome. A genome is defined as the genetic code that holds all of the blueprints for that particular organism. The genetic code is written with proteins, in the form of codons. These codons are made up of amino acids and we have 20 different amino acids that make up the whole world of genomes (Microreviews). All of the amino acids are the same throughout all organisms. This means that we should, in theory, be able to successfully alter the genome of all living things, and this is due to the fact that we all share the same set of amino acids. Since all organisms have different lengths of their own genomes, being able to alter all of them is quite a feat. Since all living things, share common building blocks, being able to synthetically alter the genome would be advantageous when it comes to applying it to things in the immediate realm of medicine and science as far as disease and identifying how the genome plays a role in cells under these tests. We will talk about what can be done by genetically altering the code, how it is done, where this is being applied and lastly the advances we have seen using this application of synthetic genomes.

The genetic make-up is all around us. It is in every living organism. It has been the conquest of many geneticists to be able to understand what happens when it comes to the coding on the genetic level. The idea is that, if they can alter the genetic code, then they can fix many things that go wrong in it. For example, people born with birth defects due to errors in the codons; this could be fixed if we could synthetically alter the genome. Altering the genome is the end result of all of this though. First we have to be able to understand how the genome works, what the codons are coding for, and how to use the 20 available amino acids to code for the wide spectrum of life that we have. The way that they have been able to actually go in and figure out what happens when things are added, or deleted has been through observation. Let’s explain; we could see that there were problems in the world regarding defects. To figure out these problems scientists eventually went to the molecular level and found that the genome had made a mistake in its coding, hence these errors. When there is an error in the coding of our genome, it usually gets fixed, but when it doesn’t get fixed that is when problems, such as Down syndrome, occur. Now that scientists have been able to identify what the coding can do and when the coding has gone wrong, they now use coding of their own to produce some pretty amazing things that will hopefully lead to developments to helping us cure problems like Down syndrome.

The biggest thing right now is being able to make organs for humans from organisms that aren’t humans (Novel Applications). They can successfully grow skin and cartilaginous things for humans from other animals. The bigger picture is being able to grow functioning organs for our species from another species. They have done a lot of genetic altering in animals such as pigs, dogs, goats and monkeys (Genome Editing). However pigs are the one that they have done the best with. They can make micro pigs which are six times smaller than the normal pig; they’ve made super muscular pigs as well. This advancement in itself has implications for food production, being able to alter the genome of our farm products to enhance their characteristics would be revolutionary in today’s growing demand for feeding the population of the world. There is a company that is working with pig cells to develop human organs right now called “Synthetic Genomics”. Another use of being able to alter the genetic make-up would be that we could rid the world of diseases caused by this. There would be no need to fret if a newborn was going to be stricken with down-syndrome or autism, they would just go in and simply fix the genome and the baby would be, in theory, fine. Having these sorts of advances where we can synthetically build new parts of the genome means that, slowly but surely, society will be able to fix some of the worlds many problems when it comes to genome related troubles. These advances made above are just the surface of what’s to come in the future of genome related altering/fixing.

A big and effective way that scientists have come to be able to edit the genetic make-up is through the use of an enzyme called CRISPR-Cas9 (Genome Editing). This enzyme allows whoever is doing the genome editing to cut the DNA using this enzyme allowing for the insertion of the synthetic amino acid necessary for whatever work they are doing. CRISPR-Cas9 is one way to genetically alter a genome; it is also one of the more cost effective ways of doing so (Genome Editing). Being able to go in and alter the genetic make-up is a great feat in itself; it has so many uses in the world around us because any genome could be altered. However there are some implications in this.

Some people think that being able to go in and alter the genome is making on “God Like” and in a sense it is. One is physically going in and changing the genetics of a living thing. This has some moral implications. What if this application is used immorally and unethically? Sure there are tons of good uses for being able to do this and they are doing it now, but the cons are also very real. No one can ever fully understand what happens on the molecular level. As hard as we try it is hard for everything to go “accordingly”. The application of these advances however does out way the cons as of now; mainly because I believe that as a society we understand the dangers of toying with the genetic make-up. We understand the dangers enough for it to be scary so I think that we won’t need to worry about the uses of this get to a point of no return.

In closing, why this is big thing in the world right now? Being able to go in and genetically alter the genome of a living organism is a huge milestone that would propel the world in so many ways. Geneticists could literally make anything the way it needed to be and we could do it with relative ease. What they are looking at right now in this realm as far as organ development is a large task in itself. The genetic make-up is a delicate system that relies on the proteins to make the right amino acids for the sake of coding our bodies down to the cellular level. The advances that have been made have been astounding in the world of science. Without proteins the cell would not be able to perform most of its usual functions. Protein creates the energy in the cell, it codes genetic material, and it does loads for the cell. Without the CRISPR-Cas9 enzyme we wouldn’t be able to alter the genome as effectively and as costly as we do it. Without the use of animals to test our genetic altering on we would be even further behind in the developments in this field as well. Everything about genetic altering is kind of scary, but it is also a really beautiful thing. Being to be able to cure the world of most genetic problems just with a simple cut and fix of the genome. What a wonderful world to live in with such advances to be able to do some incredible things. Yes some things are not here yet, and there will be hiccups along the way whether it is through the means to do it or the morals of society, but things will always be advanced in the world of science and the tests done now show that they are making these leaps when it comes to the genetic code. It means that they are that much closer to understanding the language of life.

References

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