

What is recombinant dna and its advantages and disadvantages



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In recent years science has been using recombinant DNA to genetically modify animals, plants and now technology has advanced to the point where there is constant speculation on manipulating human DNA.

Recombinant DNA, or more commonly known as 'genetic engineering' involves "the combination of DNA from one organism with DNA from another organism". There are substances needed in bacterial cells. Firstly you will need the small spherical pieces of DNA named 'plasmids'. These are used as vectors, which simply means of transporting DNA into a cell. 1) "In molecular biology and genetic engineering a vector is a vehicle for transferring genetic material into a cell". Lastly you then need the required gene.

There are numerous ways of extracting the gene, using DNA probes, or using mRNA. Restriction enzymes are then need to cut the DNA from its chain at specific areas. Finally the desired gene is joined into the vector; the vector which is used to carry the gene is used to get inside the desired organism. In order to ensure the plasmids and gene have the same 'sticky ends' they're both cut with the same restriction enzyme. Then the two ends are joined using an enzyme named 'DNA ligase'. The vectors are then able to multiply and produce new daughter cells which also are able to make the required protein.

(2) Genetic engineering could be beneficial in the following areas, curing disease and illness, reduce the amount of patients needing transplants, increasing food production (poverty) and overall increasing the quality of life. Although attractive there are many potential disadvantages. Predominately

it is seen unethical to manipulate the human race. It is believed by many that this concept is “ playing God” and you shouldn’t modify nature and your fate (3). In an article in the ‘ Guardian’ is explains the vast benefits of this technology in relation to plants. Genetically modifying plants can increase their growth, and consequently you will have increased yield and more time for production.

This means that there is a greater supply of food which can be given by the greater demand in third world countries for example. Out of the 6 billion people in the world 1 billion suffer from hunger. It is here that genetic engineering can be used to save vast amounts of lives. Another idea is it could allow us to control our atmosphere better by ending climate change and modifying the respiration of plants. (4) Personally I believe it is a very sensitive as there is a complex dilemma attached with genetic engineering.

On the one hand it sounds ideal that we can prevent diseases and end poverty but ultimately nature will find a way of creating equilibrium in terms of the population. When one disease is cured, another will come about. However we can’t stop looking for a cure because of this. The fact it that it is such a ‘ grey’ area that people will abuse the power of the technology. This could cause chaos as people could transform their babies with their desired characteristics, hence the term ‘ designer babies’. Our society works because of variation.

Different people are good at different things. If we are all manipulated to be proficient in a specific area mankind simply wouldn’t be able to function. I hold a personal view that if this technology were able to be stringently

protected and used for the right reasons it could be the most beneficial thing that has ever hit civilisation. The difficult thing is that people abuse power.

If the technology was in the hands of someone dangerous it could kill off the human race. Darwinian's theory of ' survival of the fittest suggest that if such humans were to be created that could withstand greater threats than humans now eventually there would be a new race born. ' Chung Lee' a researcher in Illinois has currently had success in curing cancer in animals and plans to produce (5) " We postulate that, if we can remove TGF-b from the cancer cells, our body's immune system may be able to reject these cancer cells. This is the basis of our research project aimed to cure cancer and we aim to develop state-of-the-art technology using gene therapy for the cure of cancer in humans". This shows that we have already been able to cure animals from cancer. This could eventually be used for our pets.

Instead of injections and implanting embryos we can inject the new DNA into the animal's bloodstream. It is a widespread worry that the fact we don't know everything about this technology that it could be dangerous. If the DNA is injected and doesn't go in the correct areas, there is chance for mutation and these vital genes can become cancerous. Recombinant DNA technology can be used to make insulin for diabetics. It can be made by transferring human insulin gene into E-coli bacteria. It is then developed in the fermenter.

As the bacteria multiply they manufacture molecules of human insulin. Once you have the product you need to extract and then purify. " The products are recombinant proteins which can be injected in to the diabetic". Here

recombinant DNA has its advantages because it keeps the production of insulin up and saves diabetics lives.

A concern held by some is that adults will be able to be screened for genes that predispose them to genetic disorders and discrimination can happen from this for example health insurance can be jeopardised even when someone is perfectly healthy. There has been testing with children who have bad vision and nearly blind can get some vision restored. Scientists initially tested dogs that have this inherited disorder. This gene controls the photo receptors in the eye which convert light into nerve signals. Scientists injected the dog with a virus that carries a correct functioning gene into the dog's eye and after a while it was reported the dog restored some vision as he avoided obstacles in dim light.

(?) Another ethical reason why some oppose the idea of genetic engineering is that a lot of the testing is used with animals. Therefore they are put under unnecessary pain and in some cases death. They can be kept in abnormal conditions and a lot of people find this unfair and cruel. Scientists are in a predicament as they need to test things out but they can't do it on humans and many find it inhumane to test on animals. However I believe it is for the right reasons and it is benefitting the human race so it has to be done. From a religious point of view it would be seen immoral to manipulate life to how we want it because they believe God made us in his image and modifying it would be the equivalent of modifying his creation.

Some would argue that he gave us free will and we should be allowed to do as we wish. However selective breeding has been in practise for some time it

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could be argued. Humans practice genetic engineering in form of selective breeding of animals and plants for thousands and thousands of years. No religion says that selective breeding is bad or even unnatural. In the same way genetic engineering based on tweaking of genetic code should not be seen as bad thing, as a sin". (6) To conclude I believe that this technology is too powerful to ignore, it could save millions of lives and do a lot more benefit to humans so the advantages outweigh the disadvantages.

We have to do the best we possibly can to keep people alive with the resources we have. However the Human Genome project predicts that it could be another 12 years until the project is complete and therefore we don't know all the possible dangers of the concept yet. If we have been given free will it seems stupid to pass up such possibilities. The advancement genetic engineering has shown from the first commercial use in 1982 - human insulin from bacteria , shows us the remarkable results achievable from this technology. It will take a lot of convincing, but primarily as long as we can keep it under control and safe I believe people should definitely allow it to be put into practise.