Applications of Genetic Engineering

Student's Name

Institutional Affiliation

Applications of Genetic Engineering

When tuberculosis was a disease that could not be cured, no one would have thought that a few pills could help lift quarantine. Similarly, children born with diabetes or deformed body parts like ears or hands were considered to be in a condition that is incurable and entirely irreversible. The concept of heredity and congenital disorders was unknown to humanity until Gregor Mendel started creating systematic data from his study of *Arabidopsis sp*. Genetics was born soon after Mendel propounded that the most important elements of heredity lie in the nucleus of our cells and are called ‘gene’. The world of genetics started flowing smoothly in different directions to unveil the capacities of these units or heredity.

As well known, genes occur in close segregates and are held together by histamines to form chromosomes. The chromosomes are highly compressed and occur within each cell’s nucleus and they are an exact copy of genetic information on each other in the nuclei of every cell. When genetic engineers found that changing the chromosomal constitution would affect genetic codes hidden in them, they realized that avoiding many of the hereditary disorders would be possible. Soon, genetic engineering became a field of intense experimentation and analysis, results of which can be seen today in the 21st century.

While the very first questions were related to understanding how genetic engineering can lead to correction of disorders and congenital defects, gradual understanding of the field led to initial applications being directed towards plant genetic engineering. Studies in animal genetic engineering have been path breaking, with animal clones and genetically engineered body parts for medical grafting. There have been other positive results as well with different commercial and industrial advantages. Now on, all the different applications of genetic engineering that have benefitted mankind in various ways are checked out.

Applications of genetic engineering to agriculture come in many forms. Better developed fruits and vegetables grown in nurseries and through rearing genetically modified plants are important for the healthy food habits of people in general. These fruits and vegetables are grown in carefully maintained nurseries which have the necessary hardening conditions to allow the germination, growth and flowering of germplasm grown in tissue culture (Imanaka & Aiba, 1981). In short, the different tissue cultures developed after genetically engineering crop explants are transferred for growth in these nurseries, which give rise to healthy and genetically modified organic fruits and vegetables that are naturally rich in nutrients and therefore healthy to partake.

Bio-fertilizers and pesticides are also created through genetic engineering which are used to ensure that crops each year are under the influence of bio-degradable fertilizers and organic pesticides. The soil especially, runs for a longer number of crop cycles when there are no harmful chemical residues after the crop is harvested. Present experiments concentrate on deriving better and self-dependant crop plants which are longstanding and better resistant to climatic conditions. Also, self dependant plants require seeds to be sown only once, which cuts down time and effort on part of the farmer.

When one takes a look at the medical field today, it can be found that a whole new set of medicines have been released in the market, thanks to the marvels of genetic engineering. Through recombinant DNA technology and hybrid cultures, mice, rats, rabbits and even monkeys have been used to create stronger antigens and antibodies which help fight diseases through vaccines and capsules (Shuler & Kargi, 2002). The concepts of chemotherapy and radiotherapy have directly risen out of the concepts of genetic engineering and are crucial in delaying the processes of terminal illness. Treatment of hereditary diseases is often undertaken through the use of genetic engineering methods, to ensure that the present generation is able to generate suitable proteins, hormones, and antibodies to negate the effects of the hereditary genetic constitution, which changes over time. Thus, deformed ears and limbs can be cured when the right genetic processes are triggered through suitable medicines.

Industries based on organic and biological raw materials receive better conditioned raw materials after being subjected to genetic engineering processes (Schoemaker et al., 2003). The main focus is on the use of superior quality raw materials like Jute plant saplings to create better products, namely bags and rubber respectively.

Amongst the commercial applications of genetic engineering known to people, the most important are those in bakery and confectionary industries. The quality and taste of the mixes are improved thoroughly through the use of better genetically engineered raw materials which need less time for fermentation and so on (Imanaka & Aiba, 1981). Ultimately, every product in this industry becomes a combination of different genetically engineered components of the bakery industry, which ultimately give us very tasteful outcomes.

The creation of clones through genetic engineering is a process that causes news and public anticipation to grow. The creation of Dolly, a sheep clone, has opened up chances of how to use the same processes in creating human clones. Studies are on and undoubtedly, this is the part of genetic engineering that everybody is looking forward to.

Organisms that are known to cause bio-degradation of waste products cannot breakdown artificial particles like plastics and hard rubber (Frewer & Shepherd, 1995). Through genetic engineering micro-organisms are being created which have better biodegradation capabilities like digesting oil. These are very useful in treating large oil spells that occur in oceans and seas and threaten the balance of aquatic flora and fauna.

Thus, in all applications of genetic engineering, man has been striving to create a better world for himself by modifying the existing limitations of nature and having more control on diseases and other limitations. The future of genetic engineering lies in molecular biology and RNA technology. It has been long identified that genes express themselves through proteins and macromolecules involved in metabolism and several biochemical processes. People have to understand that these proteins and macromolecules regulate key processes inside the cell and also influence the duplication of DNA and RNA, which are key genetic code readers. Therefore, in order to bring in different desired changes in the genetic construction of an individual, manipulations at the molecular level will be able to help genetic engineers achieve their goals.

References

Frewer, L. J., & Shepherd, R. (1995). Ethical concerns and risk perceptions associated with different applications of genetic engineering: Interrelationships with the perceived need for regulation of the technology. *Agriculture and Human Values*, *12*(1), 48-57.

Imanaka, T., & Aiba, S. (1981). A perspective on the application of genetic engineering: stability of recombinant plasmid. *Annals of the New York Academy of Sciences*, *369*(1), 1-14.

Schoemaker, H. E., Mink, D., & Wubbolts, M. G. (2003). Dispelling the myths-biocatalysis in industrial synthesis. *Science*, *299*(5613), 1694-1697.

Shuler, M. L., & Kargi, F. (2002). *Bioprocess engineering*. Upper Saddle River: Prentice Hall, 249-254