

Ethical debates in biomedical engineering essay samples

[Science](#), [Genetics](#)



Biomedical engineering can be described as the application of engineering techniques and principles to medicine. It is a combination of expertise in medicine, human biology and engineering in the development of techniques and technologies for patient care and healthcare. According to Monzon (277), biomedical engineering is yet to be formally recognized as a profession due to its multi and interdisciplinary nature. As a result, currently there is no distinct field that addresses biomedical engineering ethics. The ethical obligations of biomedical engineers are a combination of both those of medical professionals and engineers. By studying three fields of biomedical engineering, one is able to identify the ethical issues in them.

Cellular, Genetic and Tissue Engineering

These are fields that involve attempts of attacking biomedical issues at the microscopic level. For example, cellular engineering is concerned with controlling cell function through mechanical, chemical, genetic or electrical engineering of cells. Genetic engineering is concerned with controlling genetic material in cells. There is also somatic cell therapy which involves the genetic modification of body cells with the aim of replacing defective genes with functional ones. According to Monzon (279), the treatment of serious diseases using somatic cell therapy has been widely accepted as being ethical. Germline engineering, which involves the modification of genes in sperm, eggs or very early embryos, is seen as controversial since it causes inheritable modifications of the genome and this can be passed to coming generations. Ethical issues surrounding tissue engineering include the use of embryonic tissue where cells are harvested from human embryos,

the patenting of certain tissue types, compensation of human donors and the protection of donors' privacy.

Biomaterials, Prostheses and Implants

A number of fields in biomedical engineering focus on developing prosthetic implants and devices. One such field is biomaterials. It is complementary to tissue engineering and involves the development of nonbiological or synthetic materials used for interfacing with biological parts in replacing, treating or replacing organs or tissues. The creation and application of implants and prostheses has become a major ethical concern in rehabilitation engineering. Their use raises ethical issues related to human identity and dignity since they are concerned with the addition of artificial systems and structures to human biology (Saha 16). The use of implants and prostheses has been viewed as making humans cyborgs. A major person of interest regarding prosthetic limbs is South African runner Oscar Pistorius who was allowed to compete in able-bodied races. For example, can a person using such biomaterials be considered to be fully human or is the person enhanced? Another concern is the requirements that must be met for responsible testing of new such biomaterials.

Biomedical Imaging and Optics

Another ethical debate in biomedical engineering arises in the field of biomedical imaging. This is the use of engineering techniques and technologies in detecting and visualizing biological processes. Such techniques are clinically used in detecting and diagnosing diseases. While it presents obvious benefits for healthcare, there are concerns arising from the

use of diagnostic imaging. According to Saha (12), there has been worry that imaging for the purposes of diagnoses can lead to an excess of diseases in that diseases that were not being investigated might be revealed while there is no therapy available for them. Such revelations can confront patients and medical professionals with moral choices or information that they did not expect. Brain imaging is also a source of moral controversy especially when it reaches a point of revealing information regarding an individual's plans for action or mental states. Such developments bring about concerns for privacy and the possibility of mind reading, a factor that can be used in manipulating and controlling people. Of most importance in the field of biomedical engineering is the ethical issue of human identity and dignity whereby humans beings might be replaced by genetically engineered people.

Works Cited

- Monzon, Jorge E. " Teaching Ethical Issues in Biomedical Engineering." International Journal of Engineering, 1999; 15(4): 276-281.
- Saha, Subrata. " Sixth International Conference on Ethical Issues in Biomedical Engineering". International Journal of Medical Implants and Devices, 2011; 5(1): 1-32.