

Biomedical Engineering Ethics

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Abstract—As biomedical engineers, our main goal is to improve the lives of others. This is evident when discussing the creation of artificial limbs, artificial organs, etc. When handled responsibly, this emerging technology has the ability to impact the lives of millions of people around the world. However, there has to be a clear distinction made between using this technology to aid in recovery versus using this technology for human enhancement.

I. INTRODUCTION

With so many rapid advancements in the field of biomedical engineering, it is easy for the ethical concerns and moral considerations related to them to be overlooked. The ethical responsibilities of biomedical engineers are unique in that they combine those of engineers and medical professionals, including a responsibility to adhere to general ethical standards in research and development of technology. There are many gray areas associated with the ethics in biomedical engineering. One such gray area exists when discussing the topic of human enhancement. This issue arises when the engineers are no longer developing devices and techniques for the sole purposes of aiding in diagnoses and treatments but are now designing them to enhance healthy human traits beyond a normal level. (1)

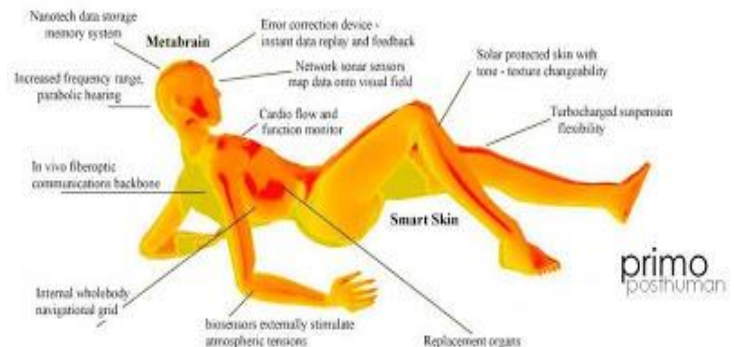
II. ISSUES

The idea of human enhancement envelopes a wide variety of different scenarios that may arise. One example of this falls under the category of genetic engineering. In a practice that is currently being studied called germline engineering, genes in eggs, sperm and very early embryos are modified. This is controversial because these modifications are passed down to future generations with unknown consequences. There are also concerns that such engineering would violate the rights of future generations and allow the decision maker in these cases to “Play God”. Another controversial issue stems from the subfield of tissue engineering. The use of human embryonic tissue raises ethical concerns because cells are harvested from human embryos, which are killed in the process. There is a worry that an increased demand for human embryonic tissue promotes the large-scale cultivation of human embryos specifically for this purpose. Prostheses and implants also raise ethical questions. This technology has been known to work wonders in the field of rehabilitation engineering, where patients are able to receive artificial limbs and organs where needed. However, this would mean that people are becoming part human and part machine, which forces us to reconsider the definition of being a human. There are various other applications in the field of biomedical engineering that will force us to take a step back and evaluate our impact on the

world around us. Some of these other emerging technologies include diagnostic imaging, neuroprosthetics and brain-computer interfaces. (1, 2)

III. DISCUSSION

The image below illustrates many of the future possibilities regarding human enhancement. Since biomedical engineering is a relatively new field, there hasn't been as much of an emphasis on ethical concerns as in other fields. When discussing the majority of these controversial practices, there is really no clear cut solution as to how to handle this technology in the future. As biomedical engineers, it will be our responsibility to educate ourselves and others about the potential consequences of ignoring ethical concerns in this field. One way that biomedical engineers can prevent future complications in their field is by living by a code of ethics including keeping patient's records confidential, publishing properly credited results of research accurately and clearly and by keeping training methods free from inappropriate influence from outside interests. (3,4,5)



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