Are Superhuman Abilities Achievable?

The human species are physically weak when compared with other animals. This revelation has been linked to evolutionary traits which suggest the weaker muscles are due to the demands of having more developed cognitive abilities [1]. However, that is not to say that humans are unable to gain the strength or other incredible traits that other living organisms have evolved over millennia. Due to the technological advancements made by humanity, the biological and chemical makeup of the earth and its inhabitants can be understood and even adapted.

To first determine the current genetic structure of creatures, different methods of DNA (deoxyribonucleic acid) sequencing are employed. Understanding the genetics of each living organism requires the order of the DNA bases to be read [2], but the current methods cost thousands per genome. When the genetic composition of an organism is known, the genome structure can be altered. Two approaches for doing this are synthetic biology and genome editing. Whilst synthetic biology employs the stitching of long strands of DNA together to be reinserted into the genome, the genome editing methods involve precisely modifying specific sections of DNA sequences at a cellular level [3]. It is currently against the law to practice genome editing on human embryos that will be allowed to develop beyond 14 days [4], but that may not be the case in the future as new technologies are being developed that will yield more consistent results, as well as reducing the cost and improving the efficiency [5].

Synthetic biology is in use globally for a range of industries, to modify everyday products [6]. In automotive it is used to naturally replicate rubber for tyres, since natural rubber is a limited resource. In the pharmaceutical industry, synthetic biology is used to streamline the chemical processes, resulting in significant cost savings. Agriculture is a large industrial user of synthetic biology, which gives the ability to add or remove traits from plants, or to select a specific strain to develop. The benefits gained vary from improved quality and nutritional value of food products to disease resistance and environmental tolerance [7].

Genome editing has more restrictions than synthetic biology due to part of the process being based on how the organism responds to stimuli. Current methods involve inserting nucleases into the genome, and it is how the genome repairs itself that determines the mutation in the organism [8]. However, with the advent of efficient and cost-effective gene-editing technologies, many industries are experiencing the wealth of opportunity that is on offer. Again, agriculture benefits widely from genome manipulation, whilst the medical research industry is experiencing breakthroughs in the modification of cell lines for mammalian species. These breakthroughs further aid in the war against disease by allowing their progressions in humans to be modelled in other creatures [9].

With all of this considered, it is entirely possible that the human genome could be altered to include specific trait mutations and physical changes. In fact, some mutations have already taken place naturally. Timothy Dreyer, a resident of Johannesburg, has bones that are far denser and thicker than the average population, which allows him to withstand punishment and trauma that most humans could not [10]. Another example is Steven Pete of Washington, who has an insensitivity to pain. This is due to a mutation in the SCN9A gene, which provides sodium channels that are used to generate and transmit electrical signals [11]. Although this doesn't make Steven immune to the damage sustained, it does allow him to continue without any natural reactions interfering. The drawback of this is that he is often unaware that he is injured [12].

Aside from the evolutions that humans have already undergone, there are plenty of trait examples in nature that could greatly benefit humanity. A species of jellyfish called Turritopsis is thought to be the only immortal creature on earth. Once they have reached adulthood and reproduced, this species of jellyfish reverses its life cycle to the juvenile polyp stage [13]. The Mexican axolotl is a species of salamander that can live both in water and on dry land. They can also regrow each of their limbs up to 5 times [14]. This is the result of many mutations over a 350-million-year evolution period. As a survival instinct, octopuses are able to camouflage into their surroundings to avoid threats. Mantis shrimp are amongst the strongest creatures in the world and are able to strike with the force of a .22 calibre bullet.

Any of these traits if found within humans would classify as superhuman abilities, yet natural evolutions may not be the only option. Future technologies may allow the design of genomes, which in turn could unlock new mutations. Disease immunity is a widely discussed topic in genomics [15], especially recently where international outbreaks and pandemics have occurred. And while these mutations would inevitably better human life, there are many moral implications attached to the topic. The main point of contention is that humans would have to be experimented on, and babies would be born with birth defects until the process is perfected. Therefore, international treaties make the practice illegal [4]. Once the system is perfected, new-borns could be designed, with parents and doctors selecting characteristics at will. This would not only remove unique individuality but could shutter the infant into following one career path. In popular culture, Kryptonians from the Superman comics designed their offspring to fulfil a predetermined role in society, removing their free will in the process. The ability to manipulate humanity could also ignite a race for power, with humans being known for selfish ideologies as explained by the thesis of psychological egoism [16].

Superhuman abilities are therefore theoretically achievable, but the technology currently doesn’t exist. It is however in development, and researchers are making steady progress in what is an extremely complex field. The traits gained from genome editing could be used to enhance and improve the human race, as well as providing some quality of life improvements, but with the moral implications potentially affecting some of the qualities assigned to humanity, the cost may be too great.

References

[1] D. Vergano, "Humans Evolved Weak Muscles to Feed Brain's Growth, Study Suggests," National Geographic, 2014.

[2] A. Munshi, "DNA Sequencing - Methods and Applications," InTech, Rijeka, 2012.

[3] New England BioLabs Inc., "Genome Editing: Tools for CRISPR/Cas Applications," New England BioLabs Inc., Ipswich, 2019.

[4] D. R. Yutova, "The Regulation of Genome Editing and Human Reproduction Under International Law, EU Law and Comparative Law," Nuffield Council on Bioethics, London, 2017.

[5] National Human Genome Research Institute, "DNA Sequencing Fact Sheet," National Human Genome Research Institute, 30 March 2020. [Online]. Available:

https://www.genome.gov/about-genomics/fact-sheets/DNA-Sequencing-Fact-Sheet. [Accessed 30 March 2020].

[6] Biotechnology Industry Organization, "Current Uses of Synthetic Biology for Renewable Chemicals, Pharmaceuticals and Biofuels," Biotechnology Industry Organization, Washington, DC, 2013.

[7] Genscript Biotech, "Application of Synthetic Biology in Food Industry and Agriculture," Genscript Biotech, 2019.

[8] D. Carroll, "Genome Editing: Past, Present, and Future," *Yale Journal of Biology and Medicine,* vol. 90, pp. 653-659, 2017.

[9] T. Gaj, S. J. Sirk, S.-l. Shui and J. Liu, "Genome-Editing Technologies: Principles and Applications," *Cold Spring Harbor Perspectives in Biology,* vol. 8, no. 12, 2016.

[10] A. Krumins, "The mutants are here - and you might be one of them," Ziff Davis, LLC, 2015.

[11] U.S. National Library of Medicine, "SCN9A gene," U.S. National Library of Medicine, 17 March 2020. [Online]. Available: https://ghr.nlm.nih.gov/gene/SCN9A#. [Accessed 31 March 2020].

[12] Synthego, "Real-Life X-Men: How CRISPR Could Give You Superpowers in the Future," Synthego, 2018.

[13] A. A. Lisenkova, A. Grigorenko, T. Tyajelova, T. Andreeva, F. Gusev, A. Manakhov, A. Goltsov, S. Piraino, M. Miglietta and E. Rogaev, "Complete mitochondrial genome and evolutionary analysis of Turritopsis dohrnii, the "immortal" jellyfish with a reversible life-cycle," *Molecular Phylogenetics and Evolution,* vol. 107, pp. 232-238, 2016.

[14] Fact Animal, "Axolotl Facts," Fact Animal, 31 March 2020. [Online]. Available: https://factanimal.com/axolotl/. [Accessed 31 March 2020].

[15] M. Lenardo, B. Lo and C. L. Lucas, "Genomics of immune diseases and new therapies," U.S. National Library of Medicine, Bethesda, 2015.

[16] T. C. McConnell, "The Argument from Psychological Egoism to Ethical Egoism," *Australasian Journal of Philosophy,* vol. 56, no. 1, pp. 41-47, 1978.