



FROM BIRTH TO DEATH AND BENCH TO CLINIC

THE HASTINGS CENTER BIOETHICS BRIEFING BOOK

for Journalists, Policymakers, and Campaigns

CHAPTER 12

Enhancing Humans

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enhancing humans

by Mark S. Frankel and Cristina J. Kapustij

Framing the Issue

Roger Clemens used to spend summer days basking in the gaze of adoring fans. Now he spends winter mornings under the glare of probing members of Congress. Marion Jones euphorically raised her hands in victory as she crossed the Olympic finish line in gold medal position five times. These same hands were recently placed in handcuffs to serve a six-month prison sentence. These superstars' falls from grace are due to their alleged or admitted use of steroids and human growth hormone, or HGH, to throw harder and run faster. Dinner table conversation around the country is now permeated with debate about athletes' attempts to augment their natural abilities with performance enhancing drugs. (Also see "Sports Enhancement.")

While high school, collegiate, and professional athletes are using artificial means to gain a competitive edge, ordinary Americans grab a cup of morning coffee to give a caffeinated boost to their day, and college campuses are populated with students using prescription drugs to increase their attention span and short-term memory to prepare for exams. Other Americans are enhancing their appearance with plastic surgery. According to the American Society of Plastic Surgeons, approximately \$11.5 billion was spent on 11 million cosmetic procedures in 2006. And large numbers of patients turn to antidepressants to improve their mental and emotional health. The U.S. Centers for Disease Control and Prevention reports that 118 million prescriptions were written for these drugs in 2005.

Humans have always sought to enhance themselves; ancient Olympians ate mushrooms for improved success in their events, and Renaissance women wore corsets to slim their waists. Merriam-Webster defines enhancement as "heightening, increasing, especially to increase or improve in value, quality, desirability, or attractiveness." The President's Council on Bioethics defines human enhancement as going "beyond therapy," with the understanding that therapeutic treatment is meant to return an individual to a healthy or normal state, while enhancement enables a person to exceed this healthy or normal state. The Council readily admits that this description is flawed for several reasons, including the recognition that "normal" is an ambiguous term and the distinction between therapy and enhancement is not crystal clear.

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HIGHLIGHTS

- What counts as enhancement is not clear because what counts as normal is itself ambiguous.
- The President's Council on Bioethics defines human enhancement as going "beyond therapy"—instead of returning an individual to a healthy or normal state, enhancement enables a person to exceed this healthy or normal state.
- The fields of nanotechnology, biotechnology, information technology, and cognitive science—together, "NBIC"—converge to enable enhancement technology.
- Enhancement technologies have the potential to affect the children we have, the way we think, the way we play, how we age, and how long we live.
- Used in reproduction, enhancement technologies can select for traits that can be passed on to our descendants and so shape future generations.
- Life-extending technologies derived from the rejuvenating potential of human stem cells may allow humans to increase life expectancy dramatically, which will have major implications for resource allocation.
- Human enhancement presents policymakers with new challenges regarding access and regulation.

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enhancing humans

Emerging Technologies That Enable Enhancement

Today's enhancement paves the way for future enhancement via emerging technologies. The convergence of four particular fields—nanotechnology, biotechnology, information technology, and cognitive science—is known as NBIC. This combination of science at the cellular level (nanotechnology), biomedicine and genetic engineering (biotechnology), advanced computing and communications (information technology), and the science of the brain (cognitive science) creates a synergistic effect that will produce powerful new enhancement technologies. These have the potential to affect the types of children we have, the way we think, the way we play, how we age, and how long we live.

Better babies? “Designer babies” is the popular term used to describe children whose parents select for certain traits before they are born. Today you can increase the odds of selecting the sex of a child by a method known as sperm sorting. Parents-to-be can also test embryos for certain genetic diseases in an attempt to have the healthiest child possible. Someday, it may be possible to choose children's hair color, eye color, and even intelligence level. Parents desire the best for their children and may believe this selection will enhance their offspring's life.

Yet selecting for these types of traits presents a dilemma. Currently, enhancements chosen by an individual die with him. Choosing traits in order to “improve” the human bloodline will, for some, sound eerily reminiscent of efforts in the twentieth century to rid society of those considered “unfit” by forced sterilization or of Nazi efforts to create a master race, understandably raising concerns about abuse and “playing God.” Caution is called for, especially considering that when we select for traits that can be passed on to our descendants, we will have the power to design future generations. Long before that, however, society will have to consider the implications of shifting responsibility for human traits and behavior from nature versus nurture to nature versus know-how.

Better living? The discovery of stem cells that have the ability to differentiate into multiple cell types has generated hope that one day medicine will be able to repair cells that have been damaged or replace them with new cells. Developed initially for therapeutic uses, the rejuvenating potential of stem cells may someday be the key to developing life-extension technologies. Skin generated to

CASE STUDY: ENHANCEMENT OR NOT?

Golf legend **Tiger Woods** had lost sixteen consecutive tournaments while wearing contact lenses that made his vision 20/15. Following Lasik surgery to permanently alter his vision to 20/15, he won seven of his next ten tournaments. While 20/15 vision exceeds the norm, there are individuals born with 20/15 vision. The question is whether Woods enhanced himself, or simply achieved a state that some people have naturally. This conundrum logically extends itself to all golfers modifying their vision to 20/15, thereby creating a new norm for the entire sport.

help burn victims may someday return a woman's skin to a more youthful appearance. The National Football League has supported research on platelet rich blood plasma for players with anterior cruciate ligament injuries (the ACL is a ligament in the knee often damaged by athletes). This gel decreases healing time and improves joint strength and flexibility. Eventually, older adults may use these advances to improve their ease of movement. Artificial organs are also increasingly becoming a reality. A synthetic eye is already in use for a man who had previously been blind. Picture an enhanced eye that would grant a painter or forensic scientist the ability to see every minute detail.

The future of human enhancement also brings the promise of improved cognition. The ability to learn more faster and to remember it all creates intriguing possibilities. New discoveries over the last 30 years about how memory works have led to a new class of drugs called ampakines. These drugs assist in learning and memory and have fewer side effects than other stimulants. They are currently being used to treat memory loss in the early stages of Alzheimer and Parkinson disease, but the potential exists for individuals without memory impediments to use the drug to enhance their learning capacities. Imagine the American employee transferred overseas to a country where she does not know the language; it may simply be a matter of taking a pill to learn the tongue of her new colleagues and neighbors. The introduction of NBIC technologies also portends neural implants that will both improve cognition and interface with external electronics such as cell phones and computers. These breakthroughs may enable us to use our minds more efficiently and effectively. Some worry that pills and implants cross the line of acceptable enhancements by making individuals

RESOURCES

Web sites

- <http://www.aaas.org/spp/sfrl/projects/HE/Summary.pdf> – The American Association for the Advancement of Science’s Scientific Freedom, Responsibility and Law Program features a workshop summary report, “Good, Better, Best: The Human Quest for Enhancement,” that provides useful background on human enhancement issues.
- www.actionbioscience.org – An education resource of the American Institute of Biological Sciences created to promote bioscience literacy. The biotechnology section includes “Designer Babies: Ethical Implications,” an article by Nicholas Agar that provides in-depth analysis of concerns raised by designer babies.
- www.nickbostrom.com – Nick Bostrom, Director of the Future of Humanity Institute, Oxford University. Includes “Ethical Issues in Human Enhancement” and other selected papers by Professor Bostrom on relevant ethical and policy concerns.
- www.ieet.org – Institute for Ethics and Emerging Technologies. Includes publications, a newsletter, news and RSS feeds, podcasts, forums, and a blog.

Recent news

- Benedict Carey, “Brain Enhancement Is Wrong, Right?” *New York Times*, March 9, 2008.
- Keith Wailoo, “Old Story, Updated: Better Living through

Pills,” *New York Times*, November 13, 2007.

- John Hoberman, “The Doping of Everyday Life,” *Boston Globe*, August 21, 2006.
- Andrew Jacobs, “The Adderall Advantage,” *New York Times*, July 31, 2005.

Further reading

- Gary Lynch, “A Better Mind on Drugs?” February 29, 2008. Podcast available at www2.warwick.ac.uk.
- Nicholas Agar, “Whereto Transhumanism? The Literature Reaches a Critical Mass,” *Hastings Center Report*, May-June 2007.
- Sarah Glazer, *Enhancement*, The Hastings Center, 2006. Primer available at www.thehastingscenter.org/uploadFiles/Publications/enhancement%20primer.pdf.
- Paul Miller and James Wilson, eds., *Better Humans? The Politics of Human Enhancement and Life Extension*, Demos, 2006. Essay collection available at www.demos.co.uk.
- Erik Parens, “Authenticity and Ambivalence: Toward Understanding the Enhancement Debate,” *Hastings Center Report*, May-June 2005.
- The President’s Council on Bioethics, *Beyond Therapy: Biotechnology and the Pursuit of Happiness*, 2003. Report available at www.bioethics.gov.

that are more drugs and machinery than human body and spirit. Others, however, view the new age of cognitive enhancements as similar to students taking preparatory courses for college entrance exams, and just one more way to gain an advantage in an increasingly competitive world.

Better athletes? This competitive environment is what drives athletes to use steroids and HGH to enhance their performance. Soon these athletes may turn to gene doping to improve their abilities. Gene doping is the use of genetic interventions in a nontherapeutic manner. For instance, an individual with muscular dystrophy may have a synthetic gene inserted to produce high amounts of naturally occurring, muscle-building hormones to improve her quality of life. Athletes without a muscle wasting disorder could use the same gene to increase their muscle mass and escape detection precisely because the hormone occurs naturally in their bodies. This issue is worrisome to the World Anti-Doping Agency (WADA) and the International Olympic Committee, among others. WADA has instituted a rigorous research program to develop effective gene doping detection methods and is

designing a protocol to sanction athletes for this violation. But while international sports agencies deal with performance enhancement, aging adults may see this type of muscle enhancement as a means to reverse or slow down the effects of time.


Longer life? The tale of Ponce de Leon’s quest for the fountain of youth is immortalized in history textbooks. Now that quest may be aided by life-extending technologies. While some researchers believe it will be possible to extend human life by seven years or so, others go so far as to project that new enhancement technologies may allow humans to increase life expectancy dramatically—perhaps to the age of 150. One option for life extension is the prospect of rejuvenation with stem cells. Repairing cells at a molecular level may help avoid disease all together, thereby increasing life span. However, larger questions loom if we attempt to extend the human life cycle. For example, what additional pressures will our financial resources have to bear? Already, there is concern that neither Social Security nor Medicare will have sufficient funds to care for the baby boomer generation until the end of their current life expectancies. Concerns

about the scarcity of water and livable land that were voiced when the Earth's population surpassed six billion will only be exacerbated if the population lives significantly longer than anticipated by today's standards.

Enhancement and Public Policy

Advances in human enhancement present policymakers with new challenges. Two of the overarching issues relate to access to new technologies and the appropriate role of government in their oversight. If only the wealthy have access to these new technologies, the potential for creating an underenhanced underclass exists. In the absence of reasonable access to all, the adage about the rich getting richer will extend to becoming more attractive, smarter, and longer living, with the disadvantaged falling farther behind. But if enhancement

technologies are readily available to anyone who desires them, it is difficult to see where enhancement will end. If everyone is enhanced with HGH to become six feet tall, then, inevitably, someone will want to be taller than six feet, and enhancement to a new height will begin.

To understand and define the role of lawmakers in regulating this technology is pivotal. Fear of new technology and a belief that human enhancement is the next eugenics may lead to demands for strict oversight. But stringent rules may stifle research, and prevent significant breakthroughs to enhance the quality of human life. Lax oversight has pitfalls as well. For example, if the process for developing and using regenerated tissues and organs is not properly regulated, the integrity and safety of the biological products created by these enhancement technologies could be compromised and endanger humans exposed to them. 

Human enhancement refers to any attempt to temporarily or permanently overcome the current limitations of the human body through natural or artificial means. The term is sometimes applied to the use of technological means to select or alter human characteristics and capacities, whether or not the alteration results in characteristics and capacities that lie beyond the existing human range. Here, the test is whether the technology is used for non-therapeutic purposes. Some bioethicists restrict the