Read the following overviews of Stem Cell research and Designer Babies and the opposing viewpoint articles by Rahul Thadani and Hemmy Cho. As you read, develop 5 level 2/3 questions to be used during our Socratic Seminar.

**Stem Cells**

Opposing Viewpoints Online Collection, 2015

Stem cells are cells found in animals and humans that have several distinctive properties. They have the ability to divide and reproduce themselves for long periods of time. They are unspecialized, meaning they do not perform a specific function like muscle cells or nerve cells. But they are also pluripotent, meaning they have the ability to divide and make specialized cells—such as muscle, nerve, or skin cells—and even have the potential to make entire body parts.

Stem cells have been the focus of much hope (some would argue hype) concerning their potential for restoring damaged tissue in people or treating or curing certain diseases, such as Parkinson’s disease. However, they have been controversial as well, in part because creating stem cells for research involves destroying human embryos. Whether or not stem cells will ever live up to their medical promise, and whether stem cell studies are morally justifiable, are the two basic controversies surrounding this relatively new area of biomedical research.

**Embryonic Stem Cells and Adult Stem Cells**

There are two basic types of stem cells: embryonic stem cells and adult stem cells. Most of the ethical controversy around human stem cell research concerns embryonic stem cells.

Embryonic stem cells are those produced very early in human development. A few days after a human egg is fertilized by sperm and begins to divide, it becomes a blastocyst—a hollow ball with a cluster of stem cells inside. In the normal course of human development the blastocyst implants itself in the uterus, and its cells continue to divide and produce specialized cells and eventually all the tissues and organs of a human being. In 1998, however, scientists announced that they had successfully removed the mass of stem cells from a blastocyst and were able to grow a line of human embryonic stem cells in the laboratory. Embryonic stem cells have the potential to develop into any kind of cell found in the human body; much current research focuses on how to precisely control or induce such differentiation.

Adult stem cells are stem cells found in various locations in the adult human body, including the skin, fat tissue, bone marrow, and muscles. They seem to have the function of being held in reserve to be used as necessary to repair and renew damaged tissue by replenishing the body’s supply of cells. They are not as potentially versatile as embryonic stem cells; they generally produce specialized cells in their tissue of origin. In addition, biologists have found them extremely rare and difficult to isolate within the human body and much more difficult than embryonic stem cells to cultivate in the laboratory.

**The Medical Promise of Embryonic Stem Cells**

Since their isolation in the laboratory in 1998, human embryonic stem cells have been touted as having potentially dramatic and lifesaving properties. If such cells can be specifically directed to produce various specialized cells, scientists argue that patients can be treated with transplanted cells. A person paralyzed by a traumatic spinal cord injury could possibly walk again with the introduction of new nerve cells generated from human embryonic stem cells, for example. A person with diabetes could possibly avoid insulin injections if scientists could create insulin-producing pancreatic cells. Other conditions that might be treated this way include Parkinson’s disease, muscular dystrophy, heart disease, and vision and hearing loss.

Another possible medical boon of stem cell research is the ability to create cell lines that can be used to test experimental drugs or cancer treatments. Stem cell research also has the promise of giving scientists new information about how cells divide, reproduce, and differentiate. This in turn may lead to information on how to treat or prevent cancer or birth defects—problems that originate with abnormal cell division and differentiation.

Many of the medical promises of stem cells have yet to reach practical application. According to a publication of the National Institutes of Health, “The promise of stem cell therapies is an exciting one, but significant technical hurdles remain that will only be overcome through years of intensive research.”
Ethical Arguments on Embryonic Stem Cell Research

However, stem cell research has been controversial, with some people arguing that such research is unethical. The derivation of human embryonic stem cells necessarily involves the destruction of the blastocyst or embryo (some recent experiments have held out the promise of removing stem cells without killing the embryo but leaves unresolved the ultimate fate of the embryo used). These embryos are almost always leftover embryos from assisted reproduction facilities that perform in vitro fertilization but for some reason were never implanted in the mother’s womb. But some people strongly believe that human life begins at fertilization, and that even small embryos are genetically unique individuals who should be treated with the same moral status as human beings. The Roman Catholic Church is one of several religious institutions that has spoken out against embryonic stem cell research, arguing that the valid and noble ends of improving health and medicine do not justify the means of killing embryos. “We must not sacrifice one class of human beings to benefit another,” argues Richard Doeflinger, an official with the National Conference of Catholic Bishops. However, in 2011, the Catholic Church announced its support for adult stem cell research. Explaining why adult stem cell research was considered acceptable, Cardinal Renato Martino said, “This research protects life.”

But another view is that the interests of embryos should be weighed against the potential benefits of stem cell research to humans. Some argue that the embryos destroyed in stem cell extraction have no nervous systems and thus have no consciousness or awareness. Writer David Holcberg asserts that such embryos should not be treated as having the same moral status as children or adults and that banning stem cell research by such reasoning ends up “sacrificing real human beings for microscopic clumps of cells.”

US Stem Cell Policy

The US government banned federal funding of certain types of stem cell research under a policy announced by President George W. Bush in August 2001. Adult stem cell research was supported under the guidelines, but no federal research funds were to be used on any embryonic stem cell research that necessitated the destruction of a blastocyst or embryo. Research on embryonic stem cell lines already created prior to August 2001 was permitted. Bush’s decision was criticized by some who argue that it placed the United States behind other countries in biomedical research. In 2006 and again in 2007 Congress passed legislation that lifted Bush’s ban, but Bush vetoed both measures. Bush did not criminalize such stem cell research, however, and some states such as California established embryonic stem cell research funding programs to make up for the lack of federal support in this area. In March 2009, less than two months after taking office, President Barack Obama lifted the ban by executive order.

Embryonic Stem Cells and the Human Cloning Debate

Stem cells have also figured in the ethical debates over whether human cloning should be allowed or banned. Reproductive cloning is the process of creating an animal that has the same genetic makeup as an existing animal. The announcement that a sheep had been successfully cloned in 1996 raised the possibility that science might someday create a way for a person to clone him or herself—to have a child that was also his/her genetic identical twin. There is widespread (but not universal) agreement that this form of human cloning raises serious ethical questions, and several countries have passed laws against it. However, efforts in the United States to ban human cloning have foundered because of concerns over how such laws might affect stem cell research.

The first steps toward making a human clone are identical to the steps in creating a line of embryonic stem cells for a patient (genetically identical cells would possibly reduce the risk of immune rejection), so creating laws that would ban human cloning but not restrict stem cell research is complicated. The primary technique used is called nuclear transplantation, in which the nucleus of a cell (containing its DNA) is transplanted into a human egg cell that had its nucleus removed; the egg begins to divide and replicate as if it were a fertilized embryo. At that point, it can (theoretically) be implanted in a woman’s uterus and develop into a baby, or the stem cells can be harvested and the embryo destroyed.

Some individuals and groups, such as the American Association for the Advancement of Science (AAAS), make a distinction between “reproductive” cloning and “research” or “therapeutic” cloning. The AAAS has endorsed a legal ban on “efforts to implant a human cloned embryo for the purpose of reproduction,” noting that there are serious health risks associated with the procedure. However, it opposes such a ban on using nuclear transplantation to create embryos for the purpose of cultivating stem cells, arguing that such stem cell research has “enormous potential health benefits.” But many
opponents of human cloning reject this distinction between reproductive and therapeutic cloning and call for a comprehensive ban on all forms of human cloning. “The distinction in types of cloning is without a moral difference” argues Alfred Cioffi, a Roman Catholic priest and a staff member at the National Catholic Bioethics Center. “Therapeutic cloning is extremely immoral just because the human embryo created in the lab is then sectioned into pieces in order to obtain stem cells.” Disagreements over whether to ban therapeutic cloning have, as of 2010, prevented Congress from passing reproductive cloning legislation. Despite this, as of 2012, several states—California, Connecticut, Maryland, Massachusetts, New Jersey, and Rhode Island—had passed laws prohibiting reproductive cloning. In addition, several other states—Arkansas, Indiana, Iowa, Michigan, North Dakota, and South Dakota—had established legislation that prohibits both reproductive and therapeutic cloning.

Conclusion

As the debate over the ethical nature of stem cell research wages on, new developments are being made every day. In 2010 a biotech company in the United States began the first embryonic stem cell trial in patients with paralysis, but the trial was called off in 2011 due to financial issues. Also in 2011, two patients enrolled in another trial at the Jules Stein Eye Institute at the University of California, Los Angeles received retinal cells created from embryonic stem cells to treat progressive blindness. Reports published in 2012 indicated that the treatment was helping the patients regain some of their vision, but many scientists held off on declaring the trial a success. A man in the United Kingdom became the first person in that country to receive a similar treatment using retinal cells in 2012. While these initial trials have yet to provide conclusive evidence regarding the effectiveness of stem cells in treating some of the most serious diseases and conditions, scientists remain hopeful that continued research will lead to important medical advances in the near future.

Source Citation


Designer Babies
Opposing Viewpoints Online Collection, 2015

In his groundbreaking 1932 novel Brave New World, writer Aldous Huxley envisioned a future in which advances in fertility technology would eliminate natural reproduction in mankind. Instead, he imagined, embryos would be modified to predetermine intellect, physical prowess, and beauty. As a consequence, in his novel society becomes stratified into a rigid caste system. Now, less than a century later, developments in the science of genetics may be opening the door for science fiction to become reality. Within a few short years, some scientists claim, reproductive science could give birth to the age of “designer babies.”

The term was coined to denote children whose genetic characteristics have been artificially selected or modified to ensure specific intellectual and cosmetic characteristics. Although both medical and legal obstacles remain in place, it is possible that soon parents could walk into a clinic and select not only their baby’s gender, but also their height, hair, and eye color. As genetic science progresses, some expect that other characteristics, such as athletic or cognitive ability, will be enhanceable on demand.

The scenario of an artificially created race of genetically enhanced super-humans has brought forth comparisons between the designer baby of the future and the eugenics of Hitler’s Third Reich.

Yet there are those, like transhumanist James Hughes, who see the genetic modification of humans as not only a natural progression of our species, but a right “in the same category as abortion.” For Hughes, “if you think women have the right to control their bodies, then they should be able to make this choice.”

Despite the controversy, the actual science of designer babies is rooted in technology that is widely supported by the reproductive medical community and public. Pre-implantation genetic diagnosis, or PGD, is a fairly common procedure that allows doctors to screen embryos for the presence of genetic defects before they are implanted into a woman’s uterus. Used in tandem with IVF or in vitro fertilization, PGD allows parents who are fearful of passing on devastating genetic diseases to their children some peace of mind. A couple with a family history of a genetic condition like Tay-Sach’s disease or a
chromosomal anomaly like Down syndrome, for example, can ensure that only healthy embryos are selected for implantation.

With such great potential for preventing life-threatening disease, it is not surprising that a majority of Americans support the use of PGD. However, when screening is opened up to include traits unrelated to health, 72% disapprove of the procedure, according to a June 2006 paper published by Kathy L. Hudson of the Genetics and Public Policy Center. Many, therefore, want the government to draw and enforce a line between acceptable and unacceptable uses for PGD. Reproductive science is moving faster than potential regulation, however, and the list of genetic characteristics under consideration is lengthening.

Sharon Duchesneau and her partner Candy McCullough have both been deaf since birth and view the condition as a positive and defining characteristic of their family rather than a disability. When the two decided to become mothers, Duchesneau and McCullough approached several sperm banks, requesting a donor who was also congenitally deaf. After being turned away by several clinics, the couple connected with a friend who had a long family history of deafness who agreed to donate his sperm.

Gauvin, who was carried by Duchesneau, was born nearly deaf, with limited hearing in one ear. When the story reached the media, many were outraged, believing that Duchesneau and McCullough had intentionally handicapped their son. Despite the very public backlash, the couple insisted, as Duchesneau wrote on her website, that “with an enhanced sense of smell, touch, and sight, Gauvin is not disabled, he is blessed.”

As genetic and reproductive science march steadily forward, private fertility clinics are also pushing the boundaries. In 2009, the Fertility Institutes in Los Angeles offered to let parents select their children’s hair and eye color. Given that the fertility industry brings in $4 billion a year, it is easy to see why the Institutes’ Jeff Steinberg would be eager for his clinic to be the pioneer of human genetic modification in America.

The reaction of the public, however, was swift and decidedly negative. The day after proclaiming the Fertility Institutes’ doors open to parents seeking their very own designer baby, the clinic changed its policy. In a statement released to the media, the clinic declared that “Though well intended, we remain sensitive to public perception and feel that any benefit the diagnostic studies may offer are far outweighed by the apparent negative societal impacts involved.”

Source Citation

The Public Should Oppose Designer Baby Technology
By: Rahul Thadani

Rahul Thadani has written extensively for Buzzle.com, covering topics ranging from sports to cutting-edge scientific discoveries, and from food to home tattoo removal.

While the public may have little insight into new developments on the frontier of designer babies, the issue is intensely debated within the scientific community. As possibilities within genetic modification science expand, a world in which children can be selected for appearance, intelligence, and health seems just around the corner. The impact on society is hard to predict, but several ethical questions immediately arise. The hefty cost of the procedure means that few families will have access to the procedures, creating a wide divide between the poor and the genetically altered wealthy. Genetic diversity will also be greatly reduced, leaving the human race susceptible to certain diseases. There may be additional unintended consequences for the modified children themselves. While the basic intentions of the science behind designer babies are good, the potential for ethical entanglements is great. Humanity would be better off not pursuing such technologies.

Alpha children wear gray. They work much harder than we do, because they’re so frightfully clever. I’m awfully glad I’m a Beta, because I don’t work so hard. And then we are much better than the Gammas and
Deltas. Gammas are stupid. They all wear green, and Delta children wear khaki. Oh no, I don’t want to play with Delta children. And Epsilons are still worse. They’re too stupid to be able to read or write. Besides they wear black, which is a beastly color. I’m so glad I’m a Beta.

When Aldous Huxley coined this quote in 1932 in his novel *Brave New World*, he had no idea how intense the designer babies debate could become less than a century after. His book was a satirical look into a Utopian society, where people were segregated on the basis of genetic modifications that they were subjected to as embryos. The end result was a seriously disillusioned world where these modifications brought on a revival of the dark ages.

The designer babies debate today is something that the public eye has been shielded from, and for good measure. Companies like Google and Amazon have banned advertisements of gene modifications in many countries, since this is an issue that really splits opinion. It is in the confines of scientific labs and multinational companies’ conference halls that this debate is slowly rising and threatening to boil over.

The designer babies debate is ... about how we are learning to sidestep nature, and how this could crumble society as we know it today.

**Defining Designer Babies**

Before we get into designer babies ethical issues, it is crucial to understand what this truly means. Picture a world where parents of a yet unborn child can modify his/her genes, and thus determine his/her physical appearance, cleverness and resistance to disease. It sounds like stuff that science fiction movies are made of, but we are fast approaching a day when this method will be guaranteed to work. What happens to the world after that, remains to be seen.

According to the *Oxford English Dictionary*, a designer baby is “A baby whose genetic makeup has been artificially selected by genetic engineering combined with IVF (In Vitro Fertilization) to ensure the presence or absence of particular genes or characteristics.” The process involves fertilizing the egg by the sperm in a test tube outside the mother’s womb, and altering the genes. Admittedly, the purpose is noble (to eradicate genetic disorders and diseases), but where will the human race really draw the line? Who is to stop affluent families (for this is an expensive procedure) from using these methods to change their child’s eye color, or to make him a professional football player, or to make her slender and gorgeous? The designer babies debate is more about how we are learning to sidestep nature, and how this could crumble society as we know it today.

The process of selecting the traits and characteristics of children is also known as Pre-implementation Genetic Diagnosis (PGD), and here the embryo is checked for genetic deficiencies before it is returned to the mothers’ womb. Suitable alterations can be made along the way, and the repercussions that this will have is open for debate.

The human race must stop trying to play God by messing with genetics and embryo alterations, and this is exactly what the designer babies debates are all about.

**An Ugly Outlook**

The designer babies ethical considerations come into play because of the effects this procedure will have. Families that can afford these alterations will be few, and this will only increase the disparity between the various social classes. This will ultimately result in a segregation between the superior 'modified' humans, and the pure but inferior ones. Sooner or later, this situation will turn ugly. Moreover, the diversity of the gene pool and human genetics will be affected, and this may even lead to a major percentage of the human race being wiped out completely by some major disease. All this is without even taking into consideration the effect this procedure will have on the child.

People involved in designer babies debates sometimes forget to think about the effects these alterations will have on the children. After all, if you are tweaking one gene here, then another gene somewhere else must be shifting to balance the event. This could ultimately lead to a situation where each child is programmed to do certain tasks, and is unable to do anything else, much in the way Mr. Huxley envisaged. Moreover, the freedom of the child to choose a profession of his choice in the future will also be severely diminished. The ethical repercussions of this are not very pleasant....

The human race must stop trying to play God by messing with genetics and embryo alterations, and this is exactly what the designer babies debates are all about. Though it is too late to eradicate these procedures entirely, we can still do
our best to control the situation. The purpose may be noble (to eradicate genetic diseases), but in the wrong hands this knowledge could be devastating. And human beings do have a tendency to allow such knowledge to ultimately fall into the wrong hands.

Source Citation

Enhancing Humans Through Science Is Beneficial
By: Hemmy Cho

Hemmy Cho is Global Programme Manager at Google. Previously, she worked as a multiplatform trainer and product manager at the BBC, specializing in TV, radio, web, gaming, and social media.

Out of the development of gene science has emerged a new relationship between humans and evolution. Rather than relying on natural selection, parents can now select certain traits for future children. While these advancements have stirred up controversy, designer babies are not the first or only example of humans enhancing their natural states through science. Technology is now moving beyond aids like artificial limbs, which are a substitute for a lost ability, and into giving people "superhuman" powers. Whether genetic selection or technological innovation, these movements in artificial human enhancement bring forward many ethical and societal questions, but all people should be able to benefit from important and worthwhile advancements in human technology.

I recently spent a day with married friends and their beautiful one-year-old girl, Lily. Lily smiled, giggled and ooh-ed at everything and everyone around her. She was simply delighted to be there, in that non-descript café-bar on the South Bank on a grey London afternoon. When she cracked one of those gorgeous sunny smiles at you, it wasn't for any other reason but because she was there, now and she was very pleased about it, and you couldn't help but feel pleased yourself.

Lily is the perfect baby. Cute, pretty, smiley, well-behaved, fun, smart. If people could choose to design their babies, they would make her like Lily. Currently, our knowledge of genetics is not enough to select much more than gender or eliminate certain diseases, but advances in genetics in the future will probably make it possible for parents to 'design' their babies while they are still embryos, i.e. select the gender, hair colour, personality, IQ, and eliminate any diseases and 'negative' traits such as anti-social tendencies. Would it be a problem for you if Lily, in all her perfection, had been genetically modified?

Beyond Evolution

[Ethologist] Richard Dawkins has suggested that through evolution, certain traits get more and more specialized, but not necessarily better. This is because natural selection relies on random mutations of genes that enhance certain traits and thus help that individual to reproduce and pass on his or her genes. Over millennia, those traits that are most helpful to the propagation of the species will become more widespread. But now, advances in genetics mean we don't have to rely on evolution. We can choose the genes that we wish to pass onto our immediate future generations and bypass the genetic lottery.

Understandably, many debates rage around the ethics of 'designer babies.' Does the foetus have the right to not be genetically modified, or do parents own the right to change its genetic code to have the kind of child they want? Would the 'advantages' the parents endow upon the foetus in fact stop the child from experiencing character-building trials and make the child feel superior to its non-genetically modified peers? What if the child could be genetically engineered to be modest and kind as well as superior in intelligence, appearance and ability?

Many people feel uncomfortable with 'playing God' or being able to change someone else's destiny. But don't parents shape the child mentally, emotionally and physically after birth anyway through upbringing and the environment.
they provide for the child? Also throughout history, humans have been selecting the traits that they want in their children by selecting their mates. Why not give the child a head start with a little help from available science?

One could argue that everything we do to develop ourselves is 'enhancement' of our natural state, whether it's learning an instrument, foreign language, or social skills. On the physical side, parents paying for orthodontics and even breast enhancements for their children are accepted by society, so why not enhance the more fundamental and arguably more important aspects of our children like intelligence or memory before birth? ...

[Th]roughout history, humans have been selecting the traits that they want in their children by selecting their mates. Why not give the child a head start with a little help from available science?

Technology Already Enhances People

[M]any ordinary people out there have "superpowers" already thanks to mechanical or technological enhancements. They are real-life cyborgs, defined as a being with both biological and artificial (e.g. electronic, mechanical or robotic) parts. And what's more, with our growing reliance on technology, we all seem to be well on our way to becoming cyborgs. What kind of ethical dilemmas might this bring to our society?

Daniel Kish, a man who's been sightless since a year old, is still able to mountain bike and camp out in the wilderness alone. He uses echolocation, the technique that bats use to see in the dark, which involves him clicking his tongue and interpreting the sound of the returning echo to figure out his surroundings. Most people rely on sight to navigate but Daniel has learned to use echolocation to do most things that sighted people can do, and in certain instances, can "see" his surroundings much better than them. His dream is to help all sight-impaired people see the world as clearly as he does. He is developing canes for the blind that would create the same range of sonar waves that bats send out, and hearing enhancements that would enable those blind people to hear a wider range of sound waves that are returned so they could navigate accurately just like a bat does.

[D]on't people have the right to change their bodies whichever way they see fit ... ?

Enhancements like these are going one step further than, say, artificial limbs in that instead of acting as a poor substitute for an ability a person has lost, they actually give "superhuman" powers that are not part of ordinary human biological make-up and allow the person to do things other humans cannot do....

There are people who already advocate the development and use of technology to improve the human condition by eliminating aging and enhancing human intellectual, physical and psychological capabilities. This international intellectual and cultural movement is called Transhumanism (often abbreviated to H+ or h+). They predict that human beings may eventually be able to transform themselves into beings with such greatly expanded abilities as to merit the label "posthuman"....

Many of the ["designer baby"] arguments could apply to transhumanism. Many people feel uncomfortable with "playing God", and philosophically and culturally, many people place a moral value on being "natural." But don't people have the right to change their bodies whichever way they see fit, as long as it's not harmful to themselves or others?

Source Citation