NYU Grossman School of Medicine

DIVISION OF MEDICAL ETHICS
HIGH SCHOOL BIOETHICS PROJECT

LESSON 17:

Sex Selection, Genetic Analysis, and Designer Babies

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Overview

Assisted reproductive technologies afford prospective parents the ability to select their child's sex and to determine whether their prospective child will inherit a particular disease or be born with a disability. Although current technology allows only for the selection of embryos that have such traits, parents may soon be able to engineer their child's genome so that he or she has certain desirable traits, like better immunity to disease or higher intelligence. There are many ethical discussions surrounding where to draw the line when it comes to selecting for traits and, in the near future, engineering the genome itself. Should parents be allowed to select the sex of their child? What about selecting against hereditary disease? What implications would genome engineering have on society? This module will review ethical debates about the use of biomedical technologies to "design" babies, giving students the tools that they need to have an informed discussion, respectfully deliberate with their peers, and form their own opinions on the matter.

Learning Outcomes

After completing this lesson plan, students will be able to:

1. Learn basic scientific facts about reproductive technologies available to prospective parents and about technologies. currently being developed
2. Understand and assess the main arguments for and against selecting embryos on the basis of particular traits, including sex and disability
3. Understand the ethical and philosophical implications of genome editing
4. Develop and be able to defend a position on the issue of genome editing

Terms to Review Before Starting

1. **DNA**
2. **Gene**
3. **Genome**
4. **Genotype**
5. **Phenotype**
6. **Chromosome**
7. **Embryo**
8. **Sex cells**
9. **Trait**

Introduction to Topic

This activity is designed for students to start thinking about genetic selection and engineering. Ask students: **Is it okay for parents to select their child's traits? Which traits should parents be allowed to select?**

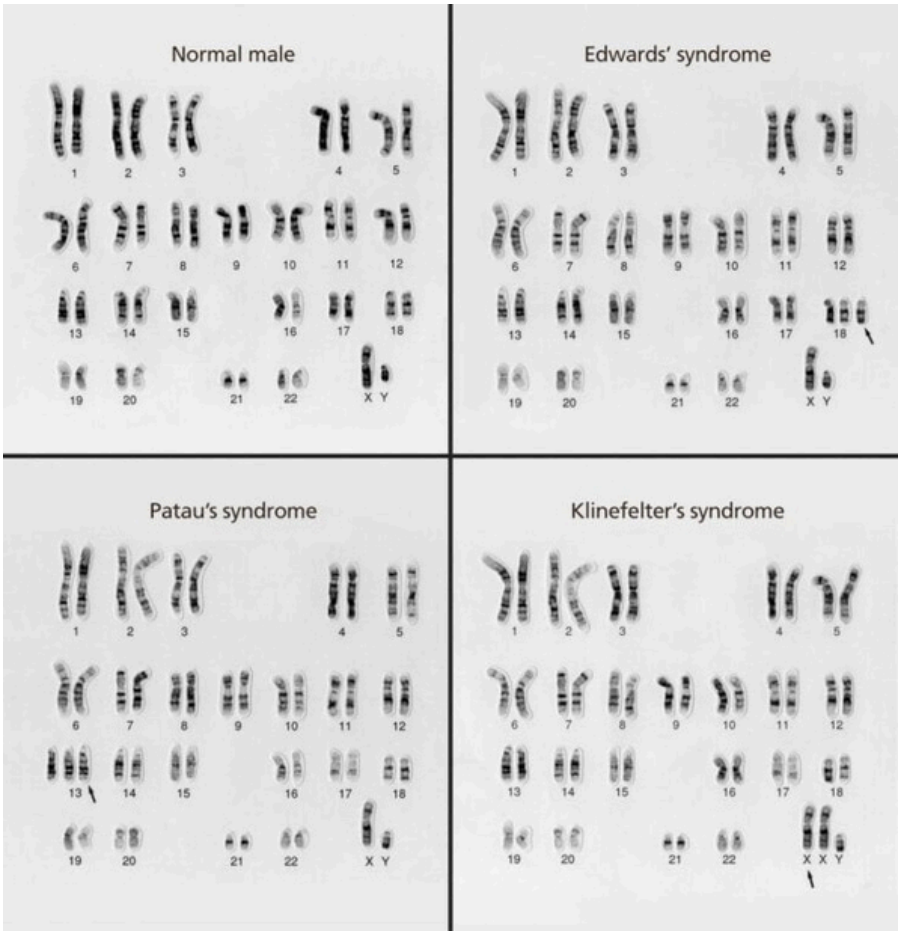
Not all options are able to be selected for using today's technology, but they may be available in the future.

Characteristic	Yes	No
Eye color		
Hair color		
Sex		
Height		
IQ/Intelligence		
Sexual Orientation		
Down syndrome		
Cancer predisposition		
Alzheimer's disease		
Nearsightedness		

Definition of New Terms

In vitro fertilization (IVF):
IVF is a method of assisted reproduction in which an egg and sperm, retrieved from the biological mother and father, are fertilized in a laboratory dish. (In vitro literally means “in glass.”) Fertilization is the union of a sperm and an egg cell, resulting in the creation of an embryo. The embryo is then created through in vitro fertilization and, depending on successful cell division, is transferred and implanted into a woman’s uterus a few days later. The biological mother carries her child, or a surrogate mother may do so. Usually multiple embryos are created, and sometimes more than one embryo is implanted, which may result in twins, triplets, or more.

Preimplantation genetic screening (PGS):
PGS is the screening test that checks the chromosomes of cells from embryos created during IVF, before they are transferred to the uterus. PGS screens only for the number of chromosomes and is used to identify chromosomal abnormalities such as Trisomy 21. It is also possible to identify the future baby’s sex, as the sex of a child is determined by the shape of the sex chromosomes (XX for girl or XY for boy) using PGS. In this module, we discuss the ethics of PGS in terms of sex-selection.



Credit: Wessex Reg. Genetics Center

Preimplantation genetic diagnosis (PGD):
PGD is a test in which a cell is extracted from an IVF embryo and then tested for specific genetic mutations associated with disease or disability before it is transferred to the uterus. PGD usually takes place when a parent is a carrier of a certain genetic condition and wants to implant an embryo that has not inherited the condition. Very occasionally, parents use PGD to select embryos with a mutation associated with disability. In this module, we discuss PGD in terms of selection against or for genetic mutations associated with disease or disability. It is important to note that PGD is only able to investigate and identify existing genes; it does not alter DNA.

Eugenics:
Eugenics is defined as the science of improving a human population by means of structured breeding to increase the occurrence of desirable heritable characteristics. Breeding is controlled, as opposed to uncontrolled, when those with desired traits are encouraged to reproduce with others who have the same desired traits, while those with undesirable traits are discouraged from reproducing, and, in some cases, are sterilized. Eugenics was the root ideology that caused many historical atrocities, including the Nazi persecution of Jews and the disabled, who were routinely killed or sterilized. Breeding may also be controlled by selection of some embryos rather than others or by using genome editing.

Genome editing:
Genome editing is the use of technology to alter the genome. Alteration can be done via adding, replacing, removing, and splicing DNA bases.

Designer baby:
A child whose genome was engineered or edited to express a particular phenotype or eliminate a certain mutation associated with disease or disability.

Germline engineering:
The use of genome editing techniques to alter sperm, eggs, or embryos so that the genetic changes become permanently encoded in the sex cells of the resulting offspring and are able to be inherited by future offspring.

Partner Activity

Compare and contrast genome editing/engineering methods: CRISPR, TALEN, and ZFNs.

Genome editing can be achieved with different methods or tools. Three of the most reliable tools are: CRISPR, TALEN, and Zinc Finger Nucleases. These three tools can be used to create the same result, namely, an embryo with (or without) a particular genotype. Have students research these three technologies and compare them.

Selecting vs. Designing

To a certain extent, humans have always had some degree of agency over the traits of their offspring by choosing mates with desired phenotypes, like eye color or intelligence, and hope that their child will inherit those traits. However, as we know, this does not ensure that one's future child will have those desired traits.

When parents use IVF to have a child, they have the opportunity to use PGS or PGD. This provides a level of control over the traits of one's child that is not possible when a child is conceived through intercourse. Since multiple embryos are typically created during one round of IVF, parents are able to choose which among the multiple embryos to implant for pregnancy. For example, at this stage, parents might choose the sex of the child, or might use PGD to determine if any embryos have a genetic disorder such as Huntington's disease or sickle-cell disease. In theory, parents could also select embryos on the basis of eye color, hair color, or any other genetic trait. Although it is legal in the United States, much debate surrounds sex-selection and overall trait selection. PGS and PGD allow parents to choose which embryos to implant on the basis of certain traits, but currently there is a moratorium on human genome editing in the U.S.

Scientists might, in the near future, use genome editing to delete undesirable genotypes (such as the gene for sickle-cell disease) or introduce genotypes that will give rise to desired traits (such as increased intelligence, height, or perfect pitch). Genome editing brings into focus the potential of germline engineering of designer babies, meaning that parents can design their offspring with certain traits that will then be heritable to their children's children. Genome engineering goes beyond PGS or PGD because it gives parents the ability to introduce new traits in the embryos created using IVF, rather than merely selecting among embryos.

Using PGS, PGD, or genome editing to select or design one's offspring will likely result in the destruction of some embryos. For example, if a parent creates five embryos during IVF, but selects to implant only two of the embryos on the basis of sex (two boys, let's say), the other three embryos may be destroyed, frozen, or donated to science. This module will not explore ethical issues surrounding the moral status of embryos or the use of embryos in research.

Ethical Debate

Sex Selection

Sex selection refers to choosing offspring on the basis of sex. Some parents prefer to have a girl or boy for various reasons. Parents can select their offspring using PGS or PGD when they use IVF for pregnancy. They may also determine the sex of fetuses in utero, and some choose to abort on the basis of sex.

Question: Should sex selection at the pre-implantation phase be allowed?

Pro: Avoid sex-selection abortions, infanticide, and child abandonment

- Recent research predicts that the lives of almost 5 million baby girls in India will be lost from 2020 to 2030 due to the prevalent use of sex-selective abortions. Academics at King Abdullah University of Science and Technology in Saudi Arabia estimate the average annual number of "missing female births" will be 469,000 from 2017 to 2025 and 519,00 from 2026 to 2040, resulting in around 6.8 million lives lost.
    - Abortions that are done correctly, and in a proper facility, are very safe. However, they can be expensive, and many women, especially in developing countries or in U.S. states that strictly regulate abortion, do not have access to such facilities. Therefore, women often resort to at-home abortions, which can be extremely dangerous.
- Infanticide is the unlawful killing of infants, and female infanticide is the unlawful killing of female infants based solely on their sex.
    - Infanticide is a result of cultural bias and sex stereotypes, and is especially prevalent in India and China. Females are considered as inferior in almost all aspects of life, while men are valued for their ability to contribute to the family's socioeconomic stability, making economic considerations one of the main reasons for female infanticide.
- While sex selection IVF will not stop female infanticide, it will provide families with an alternative to female infanticide, as they can ensure that they will have a boy.
- If sex selection were to be done at the pre-implantation stage, the number of abortions due to sex selection, and the number of deaths due to infanticide or child abandonment, might be greatly reduced.

Pro: Family Balancing

- Family balancing is when a couple undergoes sex selection for the purpose of balancing the representation of boys and girls in a family.
    - For example, if a family already has 3 girls, parents may opt to undergo IVF and use sex-selection so that they can fulfill their desire to have a boy.
- Family balancing is defended on the basis that it is beneficial to a family and can bring a family much happiness without directly causing harm to anyone or disenfranchising another group.

Pro: Prevention of sex-linked disorders

- This argument says that parents should be able to select for a certain sex if there is history of sex-linked disorders in their family history. For example, retinitis pigmentosa affects only males, as it is carried on the Y chromosome. Sex selection via PGS is much simpler and cheaper than using PGD to comb through the DNA to diagnose a certain disorder. Therefore, sex selection allows certain prospective parents to select against disease using PGS at a cheaper cost than if they were to use PGD, making it a more viable option for parents who want to prevent passing on a sex-linked disorder, but who cannot afford PGD.

Pro: Parental Autonomy

- Ultimately, sex selection is supported by the conception of parental autonomy.
- According to the law, parents have the right to bring up their children according to their own beliefs and ideas, allowing parents to make the majority of decisions concerning their children.
- Parents should be allowed to make choices that reflect their values. While this could lead to decisions influenced by sexist beliefs or norms, it is still the choice of the parents and within their right to choose what kind of child to bring into the world.

Con: Promotion of sex selection legitimizes policies that have led to sex-selection abortions, infanticide, and child abandonment

- If sex selection at the pre-implantation stage is condoned by the government and becomes normalized, then there will be fewer ethical qualms with sex selection overall. Many women and men in countries all over the world have fought for a very long time against sex-selection; legitimizing it poses a risk that sex-selection will be seen as ethically permissible, even at later stages of pregnancy or after birth. People who develop this argument tend to think that the government should ban sex-selection at the pre-implantation stage, to set a precedent that choosing male lives over female lives (or vice versa) is not ethically acceptable, at any stage of pregnancy or family life.

Con: A Slippery Slope

- A “slippery slope” argument is a term used for arguments that propose we should ban one practice because it might lead to another, worse, practice. In this context, some are worried that if we allow selecting embryos on the basis of sex, it might lead to the general acceptance of allowing embryo selection on the basis of other traits. Since that’s ethically problematic, it is argued that we should ban sex-selection, too.

Con: Justice concerns

- Sex selection via IVF is very expensive, and many families are unable to afford not only IVF, but also PGS and embryo freezing that often comes along with it. Thus, this ability will be available only to wealthier people.
- Opportunities and choices for families continue to expand for the elite but remain closed to those who cannot afford to take advantage of those opportunities.

Con: Changes the relationship between parents and children

- Parents are expected to love their child no matter what. When parents begin selecting desirable traits, including their child's sex, it turns their child into a commodity rather than a subject of unconditional love. Those who advance this argument are typically concerned that selecting embryos on the basis of sex opens the door inevitably to the selection of embryos on the basis of other traits. This is seen as an undesirable and immoral practice, and it would lead to irreparable harm to the relationship between parents and their children.

Think Critically: Why might parents want to select the sex of their child? What sorts of cultural beliefs influence whether people want a girl or a boy?

Disability

Selecting for or against a disability is done through either PGS or PGD depending on the type of disease or disability. For example, Trisomy 21 can be detected via PGS, since it is the number of chromosomes that causes the syndrome, while other diseases that are due to mutations of particular genes are detected via PGD. Prospective parents can choose not to implant embryos that have such mutations to avoid having a child with a disease or disability. On the other hand, parents may also choose to implant embryos with particular mutations if they desire to have a child with a particular disability or difference, such as deafness or dwarfism.

Question: Should prospective parents be allowed to select for or against a disability using PGS or PGD?

Pro: Selecting against disability avoids hardship for families

- Impact on the family
  - Raising a child with a disability can be a huge economic strain that many families would not be able to sustain for every single year of the child's life. Costs include treatment, full time care, and sometimes the need for specialized housing and environments. Selecting against disability is a relatively easy way to avoid these costs, and avoid the hardship brought on by disability.
- Disruption to Family Life
  - Having a disabled or sick sibling can be very challenging to able-bodied siblings. Some parents who choose to use PGD to select against disability cite concern for

already existing children. Since disabled or sick children require more care than healthy and able-bodied children, some parents worry that their healthy or able-bodied children would feel neglected.

Pro: Parents ought to give their children the best chance at having a life worth living

- Some argue that parents ought to give their children the best chance at life. Some even argue that parents have a duty to ensure that their offspring have lives free of extreme adversity and suffering. If that's the case, it could be considered immoral to deliberately conceive a child with a disease or disability that would otherwise inhibit a "life worth living." Ethicist Laura M. Purdy even says that parents have an ethical duty to use PGD to avoid bringing into the world a child with a disease or disability.
- A "life worth living" is challenging to define, but those who advance this argument typically say that a life worth living has the following elements:
  - A life free of pain caused by medical disease
  - Autonomy to live a normal life
  - Freedom from crippling anxiety regarding the onset of a disease (e.g., years building up to the onset of Huntington's disease)

Pro: Helpful to families living with disability to have a child with the same disability (such as deafness or dwarfism)

- Parents sometimes use PGD to select for genes to make sure that their child has the same disability or disease that they do.
- According to a survey performed in 2006, 3% of 190 IVF clinics in America said that they had provided care for parents using PGD to select for embryos with a certain disability.
- Many with the disability do not view the "disability" to be crippling, and in fact regard their disability as a strength. Therefore, it is argued that they should be able to select for the trait in their children as it is regarded positively. People in this camp vehemently deny that having a disease or disability makes their life not worth living.

Con: Expressivist Argument

- When parents choose not to implant an embryo that has a disability, essentially discarding it, they implicitly degrade and devalue the lives of persons who are disabled saying, "Your life is not worth living." It expresses the judgment that those who are disabled are less worthy of existence than those without a disability. This contradicts the moral principle that all life is valuable and dignified.
- The option to do this promotes a social message that those who are disabled are not considered full people, as their lives are being treated as meaningless and as a disease. Thus, allowing genetic selection on the basis of disability is discriminatory toward those who have disabilities, as it would be seen as okay to discard, and not give a chance to, embryos that present disability.

Con: Problems surrounding disability are caused by society, not by the disability itself

- Some argue that impairments due to disability or disease are created by society. A better word for “disability” is “difference.” For example, people in wheelchairs move differently. If our infrastructure were created to better accommodate wheelchairs, persons in wheelchairs would not be “disabled” in the sense that they are unable to get around. We can fix “disability” by making our environments and our societies more accommodating of differences among people in how they get around, how they perceive things, how they learn, and how they work. We don’t need to eliminate disability genetically, we need to eliminate disability by changing our environment. With the right technology, those who are disabled can live to their maximum capacity.
- Those who advance this argument conclude that selecting against disability using PGD is the wrong way to go about solving the “problem” of disability.

Con: Reduced resources for the disabled community

- If parents continue to use PGD to choose embryos that do not have any disabilities, the disabled community will slowly shrink, leading to fewer resources and representation for existing communities. This will lead to reduced incentive for governments to provide financial support to those with disabilities.

Think Critically: What makes your life worth living? Make a list of what about your life makes it worth living. Some arguments in this debate make the assumption that only certain kinds of lives are worth living. What sorts of things must human lives have if they are to be worth living at all? Can individuals with disabilities or diseases have lives worth living?

Genome Editing

Genome editing is a technique that is currently being studied but has not yet been put in clinical practice. As research on genome editing advances, the possibility of editing the human genome has caused much debate about whether or not it should be allowed, and to what extent should scientists and doctors be able to manipulate the DNA of a human embryo.

Question: Should doctors be allowed to perform genome editing?

Pro: Parental autonomy

- Just as it is the choice of prospective parents to use assisted reproductive technology, the choice to genetically engineer babies should also be given to parents, as it would fall under the same category of assisted reproductive technology. Those who are against genome editing would not have to undergo the procedure for their own children, but parents should have the freedom to do so if they want.

Pro: Ability to eradicate some genetic diseases and inherited conditions

- By using genome modification, we will eventually be able to eradicate some genetic diseases and disabilities. By eliminating certain traits or mutations of the genome at the embryo stage, a person will never be able to pass down such diseases.
- If genome editing were used on a very large scale to erase genomic mutations that cause disability and disease, it would eventually eliminate those diseases across the entire human population and reduce human suffering caused by it.

Pro: We already greatly influence and mold our children; genome editing is no different

- Children are already structurally "engineered" by their parents. Parents choose where their kids go to school, what religion they practice, what they eat, and what sports or instruments they will play. While these methods of molding children's lives are not done so "scientifically" and are not permanent in the same way choosing genetics is, they still have a significant impact on the child's life. Some supporters of genome editing argue that parents have always been "designing" their babies in this way; genome editing represents a new tool to design babies, but is morally equivalent to these other ways of "designing" children.

Pro: Equality of Opportunity

- Some argue that genome editing could be used to reduce inequality. For example, inequality exists in intelligence; those who excel in school tend to be healthier and have higher-paying jobs than those who do not. Perhaps we could use genome editing to enhance the intelligence of those who otherwise might not achieve academic success.

Pro: Human rights approach

- Similar to the argument above, this approach argues that children have a human right to a life worth living. When we say that someone has a right to a particular thing, that implies it would be morally wrong to deprive the person of it. So, if parents are provided with technology to increase the likelihood that their children will have a life worth living, they have a duty to use it. This argument lends strength to the idea that parents have a moral obligation to use medical technologies and other means to make sure that their children are healthy, happy, and able to lead worthwhile lives.

Pro: Parents ought to provide for their children a life worth living

- This argument for selecting against disability also figures prominently in the debate over genome editing. Genome editing could be used to edit genomic mutations associated with disease or disability. Some argue that parents are obliged to give their children the best chance in life and create a life that is enjoyable for their own child. Therefore, it could be considered immoral not to give one's child the most comfortable and enjoyable life possible. If genome editing is available, and a parent

declines to use it to improve their child's chances of having a life worth living, some argue that the parent would be acting immorally.

Con: Propagation of inequality

- While some argue that genome editing could be used to reduce inequality, others (in fact, many more) worry that genome editing will instead lead to an increase in inequality. Based on the prices of assisted reproduction today, it can only be expected that editing genomes would be very expensive, and, therefore, only available to families who are very well-off financially. The effects of this could widen an already significant and growing gap between health, life expectancy, earning potential, and academic success between the different socioeconomic classes.

Con: Lack of individuality

- Beauty ideals vary from person to person, yet the ideal wavers around a common line within a culture. Apart from beauty, the majority of parents would design their children to be highly intelligent, athletic, creative, etc. As the world in which designer babies lived grows, there would be a decrease in individuality, as children would be designed to resemble a certain ideal, as well as have all of the same character traits.

Con: The child is unable to consent to the life-altering procedure

- Consent involves saying yes to a procedure, action, or activity that will affect you. Doctors are ethically and legally required to ask their patients for their consent to all procedures, actions, or activities. This ensures that the procedure, action, or activity respects the patient's autonomy by being in line with the patient's values and desires.
- As the genome editing would occur on the embryo, well before a child is able to consent to genome editing, the human that the embryo will develop into cannot consent to the procedure. Since he or she cannot consent, some argue that it is unethical to subject him or her to this procedure.

Con: Child's right to an open future

- If a parent chooses a child's characteristics or abilities, that child's life has been chosen by someone else and they no longer have autonomy in choosing their interests or their capabilities. For example, if a parent wants to have a child with an amazing voice, that child will be forced into a certain life path. Further, if parents "design" their child, there is more pressure on the child to perform at a high level and to meet the expectations of their parents.

Con: Sanctity of nature

- It is ethically wrong to alter human DNA, no matter the purpose of doing so. It is wrong to play the hand of "God," and such decisions are beyond the limits of human control. By permitting a small group of humans to be able to perform such a

procedure, too much power is being placed in their hands, and they would have too much control over evolution via germline intervention.

Think Critically: Watch or think back on movies that involve genome editing or mutations, such as Gattaca or X-men. How much of this is realistic? Do you think our world will eventually resemble these movies?

Case Studies

1: Savior Siblings: Charlie Whitaker

Adapted from The Daily Mail

From the moment Charlie Whitaker, age 5 at the time, began his chemotherapy treatment for Diamond Blackfan anemia, he was in terrible pain. DBA is a disease that prevents a person from making red blood cells, and only six out of 13 children survive. He complained of excruciating pain in his eyes and stomach, and soon started vomiting as a reaction to his treatment. He had to receive two to three blood transfusions a week, which were incredibly painful. Charlie's parents were distraught and willing to do whatever it took to relieve their son's pain and suffering. Doctors told them that their only hope was a stem cell transplant, and neither parent, or their other child, Emily, was a match. Their only option left was to either find a match elsewhere, which could take years, time that Charlie did not have, or have another child. The Whitakers chose to have another child. But they needed to ensure that the new child would be a match for Charlie so that stem cells from the new baby's umbilical cord could be used for Charlie's stem cell transplant.

The Whitakers used PGD, in combination with IVF, to select an embryo that matched Charlie's blood type. Their son, Jamie, was born nine months later.

Jamie is labeled a "savior sibling," as one of the main purposes for his birth was to save his brother. Charlie received a stem cell transplant, using stem cells obtained from Jamie's umbilical cord, when he was 12, and was finally relieved from this pain.

Mrs. Whitaker said: "We have been open with both the boys. Jamie knows why he was born but knows we would have loved him whether he was a savior sibling or not. He is a bit of a miracle and he did a great thing. The boys will always have a bond because of it." The whole family is very grateful for Jamie, and all of the Whitakers are now healthy and happy. Jamie is said to be happy to have helped his brother and is proud to have saved him; however, he has also said that "I know I was born to do that instead of being just born for me." Thus, he can be incredibly proud for being able to save his brother's life, but he has grown up with a mindset that he was born in order to accomplish something specific, not just to be himself.

Discussion Questions:

- How would you feel if you were a “savior sibling”?
- Do you think that it is ethically sound to have a child mainly for the purpose of being a “savior sibling”?
- Do you think being a “savior sibling” would be empowering or make the child feel unwanted and used?
- Do you think that PGS or PGD should be used when parents want to have a savior sibling? Or would that further the idea that the child is being designed for a particular use instead of for himself?

2: Choosing Deafness

Sally and Ben Parker are a newly married deaf couple who are finally ready to have a child. After much thinking, Sally and Ben make an appointment at an IVF clinic, because they have decided that they want to select for a deaf baby using PGD. Before being able to go through with PGD, every couple must meet with a genetic counselor to go over the process and to make sure that the parents are truly comfortable with and aware of their actions.

During the meeting, the counselor begins to challenge the Parkers to make sure that they fully understand the consequences of using PGD, especially when selecting for a disability. The Parkers argue that deafness is not a disability, and it is only deemed a disability due to societal constructs and misunderstanding on the part of those who are not deaf; the disadvantages that come with deafness is a product of society, not of the disability itself. Further, they believe that they will be better parents to a deaf child, as they would form a stronger bond and be able to share their life experiences. Their outlook on life and experiences would be irrelevant to someone who does not have to face the same adversities. They brought up the fact that 3% of IVF-PGD clinics in the U.S. have reported having provided PGD to couples who seek to use PGD in this manner. Therefore, they are allowed, and even entitled, to use PGD this way.

The counselor, however, does not agree, and brings up the role of a parent. A parent is supposed to give his or her child the best chance in life and the most advantages possible; it would go against the role of a parent to put his or her child at a disadvantage. She also points out that an unborn child has no choice in the decision, and it is unfair to select for a debilitating trait for someone without their consent. At the end of the day, it is not the parents’ life but the life of the child, and the child should not be subject to the preferences of the parents, especially when it would negatively impact the child’s life. The Parkers and the counselor are unable to come to an agreement, but because it is legal for the Parkers to use PGD to select for deafness, they go ahead with the procedure.

Discussion Questions:

- Do you think that the parents should have authority in this situation to select for deafness?
- Is it morally permissible to deliberately cause a child to be deaf, which can limit the child's opportunities in life?
- Given that the unborn child cannot give consent to PGD, do you think that it should still be allowed in cases such as these?
- At what point can a line be drawn in selecting for defects or diseases? For example, would your opinion change if the Parkers were anemic, and wanted their child to be anemic too? Would it be okay to select for that, or even a more serious disease?
- Should there be laws restricting the use of IVF and PGD to selecting only healthy embryos?
- If two parents are carriers for one disease, is it morally wrong not to use PGD when having a child, as without PGD, the child would have a high probability of inheriting the disease?

Conclusion

Teachers should invite students to return to the chart and pairing questions outlined in the beginning of this module. An optional reflection may be written, so that students can compare their thoughts on the issues before and after the lesson.

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