

# *Designer Babies*

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## *Preface*

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We chose the topic "Designer Babies", because it is often discussed in the media and because they are now discussing legalization of In-vitro-fertilization in Switzerland. The first thing that comes to mind by the name "Designer Babies" is "is humanity able to design their own offspring?" If so humanity would soon be able to have control over how the new generation would look like or how they are supposed to function. However, this was not the case to our relief. There is also something very beneficial behind the methods of "Designer Babies". There are ways of preventing incurable disease and disorders from new born children. This made it very interesting.

How does this method function and is there a chance of risk?

Why is it applied?

Is it a danger or a benefit to humanity?

## *Introduction*

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It is a technology which aims to stop the transmission of diseases. Those diseases are caused by failures in the DNA of mitochondria. They are only inherited from mother to child and can cause loss of muscle coordination, visual/hearing problems, mental retardation and other problems. Most common problems of brain, heart and muscles are introduced by those defects. To stop those problems, scientists create an embryo with the nuclear DNA from both of the parent and the mitochondrial DNA from a donor without mitochondrial defects. This is also known as three-parent reproduction.

Before the US used a similar but simpler version of this technology but they had to stop because of safety reasons. The FDA (Food and Drug Administration) ruled that it should be tried on animals because it is a type of gene therapy. After the studies have determined that it is safe enough for human being, they allowed them to apply this technology on human body. This was about ten years before, since 2005 the animal studies have been undertaken and the FDA got asked for approval to conduct the clinical trials. And now it is not only a topic for the United States it became famous in different countries such as the UK. There they allowed them that clinical trials could take place as long as they scan and check the health of the children.

Although there is still cosmetic changes for babies possible. So people can do some changes for their children but it's not possible to create a "perfect" baby. "But the core concern raised by the term—that we are moving toward a new eugenics in which children are valued and ranked based on their genes and prospective parents feel pressure to use genetic technology to create the 'best' babies—is real and present, not only in the technology discussed by the FDA last week, but also in the current expansion of prenatal testing to include an ever-wider array of genetic traits." - Josephine Johnston (research scholar)

## Description of engineering techniques

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There are three methods to diagnose if an embryo has a disorder:

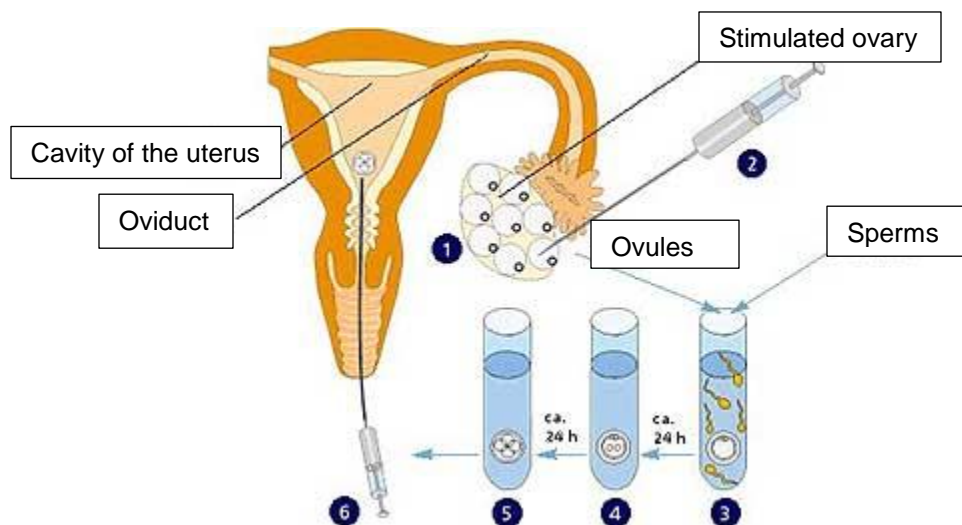
- **NIPD (Non-invasive Prenatal Diagnosis)/Screening method**  
A small sample of blood from the maternal bloodstream is used for testing
- **CVS (Chorionic Villus Sampling)**  
A small sample of the amniotic fluid is removed from the uterus for testing
- **Amniocentesis**  
A small sample of the wispy projections that are part of the developing placenta (chorionic villi) are removed from the placenta for testing

These three methods are a step towards the expression “Designer Babies”.

They are used to determine whether your baby is at risk of Down syndrome, extra sequences of chromosome 13 (trisomy 13), extra sequences of chromosome 18 (trisomy 18) or a sex chromosome abnormality, such as Turner syndrome. The testing can also be used to determine a baby's sex and rhesus (Rh) blood type.

If the embryo then is diagnosed with a disorder its parents may choose an abortion. With these methods parents aren't able to design their baby but they are able to refuse a baby if they don't like how it looks like.

There is only one method yet for parent to decide between a selection of different embryos. This method is called **In-vitro-Fertilisation**. A Few ovules from the mother are fertilized with the sperms of the father outside of the mother's body. All the new formed embryos are then diagnosed for disorders and the healthy embryos are placed into the womb of the mother to start growing.



1. The IVF can of course be performed in the spontaneous cycle. But hormonal stimulation is useful. In nature the unstimulated cycle normally ripens only one egg. This also means

a relatively low chance of embryo transfer and pregnancy. Through the stimulation the chances increase. Multiple follicles are encouraged to grow with the aim also to win more than one ovum. The stimulation is done by the means of daily hormone injections.

2. The growing follicles during stimulation treatment are controlled on ultrasound. In parallel, the estradiol hormone is measured. In this way, the best time for obtaining mature, fertilized egg cells is determined.
3. When a follicle size of 16-20 mm and corresponding hormone values is reached, the ovulation is retained by a HCG injection. 34 to 36 hours later, the eggs are removed from the follicle
4. The follicles are regulated by ultrasound and extracted by suction of a thin needle.
5. A sperm sample from the partner is needed and the motile sperm cells are concentrated by special extraction methods.
6. The sperm and eggs are combined into a tube. The day after the successful fertilization is tested by the pronuclei. The fertilization is successful to 60% of the ovules. Two to three days later the embryos are placed back into the womb.

## **Interview**

Dr. Rolf Zeller is teacher at the University of Basel in the Biomedicine department.



### **In which sector did you specialize yourself?**

I am working in the biomedicine sector, but I have specialised myself on embryonic development, in my case the embryonic development of mice to find out which factors lead to specific diseases. For the cure of these diseases are some of my friends responsible.

### **Did you often deal with the topic „Designer Babies“?**

Of course you hear a lot about this topic, mainly because it is often talked about in the media and because in Switzerland it is now discussed if pre-implantation genetic diagnosis should be legalized. This does not include the selecting of sex, eye-colour, hair-colour etc..

### **What kind of circumstances leads couples to use this method?**

Couples who have inheritable genetic diseases often want such a treat. They are afraid to pass on the mutated genes or diseases to their baby, because it could lead to major sicknesses and disorders under which their child and they would suffer. For example an open spinal cord. Many children die within the first few months because of such deformities or diseases. The method is also used by couples who can't have babies because of their infertility.

### **Have you dealt with similar cases before?**

Not me directly but a colleague of mine. Peter Miney who is very familiar with this topic and who is occupied with this topic gets calls every day from couples who don't want to pass on genetic diseases to their child. But every now and then there are also people who want to determine the gender.

### **What are the Advantages/Disadvantages?**

One advantage is obviously preventing genetic diseases and disorders. One disadvantage is that some parents might want to change characteristics like the child's sex or even make cosmetic changes. Fortunately this is not yet possible because there are too many genes

involved in the formation of cosmetic changes such as eye-colour. It would also be a danger that it will become normal.

### **With the contemporary knowledge about „Designer Babies“, which characteristics of a baby could we change?**

As I said earlier, currently you can just prevent parents from having children with diseases and disorders. In addition science is also able to determine the gender, but it is not yet legal in many countries.

### **Would you be able to influence talents or the IQ of a child?**

A few years ago there was a rumour that they have found the IQ gene in a fly, but this was not the case, later it was proven wrong. A talent doesn't only have to do with genes it is also a matter of practising. It is just the same with the physique or the IQ. Scientists have found out that the environment is very influential on the IQ, as well. Making modifications to our genes to get a higher IQ is impossible because of the large quantity of neurons in our brain, which are connected with each other.

### **What are the future goals?**

The main goal would be to prevent parents from passing on genetic diseases to their children. In this way we could get rid of genetic diseases or mutations. I think that we should not search for new ways to determine other characteristics because it is probably not possible and because it is just bizarre. Everyone should be happy with a healthy baby.

### **Could this method evolve to a trend?**

I do not think so because it would not be legalised in Switzerland anyway. There are not many couples who want to determine characteristics of their baby, as well.

### **Under which circumstances would you recommend this process?**

I would recommend this method to couples who have genetic diseases who could harm their child by passing on those genes. For other reasons I think it would be unnecessary.

### **What is your opinion to this topic?**

I think, „Designer Babies“ are a joke in the meaning of determining characteristics of a baby. But it's a very good method for treating genetic diseases in a family. In my opinion there is no sense in wanting to change the look of your own baby. Science has always its borders. We should not make people hope for things like that, because then they would be insisting on doing it.

## *Discussion*

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With the application of in-vitro-fertilization many parents were prevented from a disordered or sick child but were still able to have a healthy one, as well as it is one of the methods to solve the problem of infertility. The IVF method was initially for those women whose Fallopian tubes were removed. However, at present, IVF is the most effective treatment for all types of infertility, including endometriosis, polycystic ovary syndrome or other diseases. But the rate of IVF pregnancies is not very high (25-30%). This is because of Implantation failure. IVF failures may be caused by a variety of factors: diminished ovarian reserve, maternal and paternal age, excessive body weight, quantity and quality of transferred embryos and number of transfers.

If the in-vitro-fertilization is used to prevent disorders and to allow infertile partners to have children is a good deed but if parents want to choose the sex of their child it should not be permitted. Because the sex of a child is no disorder and is should not be a burden for parents. Unfortunately it is permitted in some regions of the USA.

There have also been cases where parents have a child which suffers under diseases such as leukemia and need a donor with a perfect match. The parents then decide to create a child with a perfect match through in-vitro-fertilization. This case is very critical because the child is created to save another but it will not be treated like a human being because it was created to be a cure for somebody else. This must be very difficult to understand for a child and must suffer under the fact that it was just created to save another child with its own organs. It will have to give up its own health in order to save its sibling.

Another more critical aspect of in-vitro-fertilization is that people think further in designing their child they will want to determine every part of it, so it will be a perfect child and specialists are already researching to achieve that goal. Nevertheless, this could be seen as a crime against nature. Every child should be allowed to live just how nature has made it. There should be no excuse for that. Humanity would be destroying morality because it is more interested in ability.

In 2011 Europe and India have Machines employing metabolomics culture through the Massachusetts-based firm Molecular Biometrics. This metabolomics machine is expected to increase IVF success rates, decrease costs, and reduce dangers related with numerous pregnancies and early deliveries. These components offer a better understanding of an embryo, allowing pregnancy to succeed. The goal in future is to have one healthy baby per pregnancy.

## Summary

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“Designer Babies” is a dream to some people but is still not fulfilled, fortunately! The aim of “Designer Babies” is to prevent from having babies with inherited disease and disorders as well as enabling infertile women to receive their long wished for child. It is a dream come true to a lot of parents. But there are also very critical cases in which In-vitro-fertilization is used like choosing the sex of a child or creating a child which is genetically identical (perfect match) to a child which is suffering from a disease and is in need of a donator. But Morality and Nature are hurt by the expression “Designer Babies”. Every Baby should have the right to live even if it is disordered or suffers under an incurable disease. On the other hand it is inequitable. It might not be fair for parents to live with the burden of a disordered child or a child dying of a disease. Neither is it fair for a child to suffer all its life. But is it then fair just not letting that child live, not even letting it be born? “Designer Babies” is a difficult subject to discuss. In future the next aim of researchers is to become a better understanding of embryos and assure one healthy baby per pregnancy. And pre-implantation genetic diagnosis soon might be legalized in Switzerland. “Designer Babies” is a subject not yet concluded. It is now at its beginning.



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