

# Connecting the Dots and Drawing a Line

## Dilemmas in 21st Century Reproduction

Rapidly advancing human biotechnologies can offer new options for family formation, medical treatments, and other potential benefits. But safety, effectiveness, and equitable access must be ensured. Some uses are controversial, such as embryo screening for sex selection. Others in the pipeline are widely considered unacceptable because of health and safety risks – especially to women and resulting children – and concerns related to social justice and human rights. What is the landscape of these technologies, the links between them, and the lines we should not cross?

### Intended Parents

People who want to have a child. Assisted reproduction provides new opportunities for people who are experiencing infertility, or who are LGBTQ and/or single.



### Adoption

### In Vitro Fertilization (IVF)

Creates embryos outside the body.

Using own egg & sperm

OR  
Using donor egg & sperm

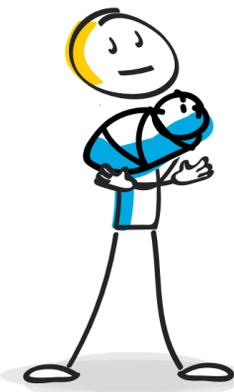


**Egg freezing** for postponed pregnancy via IVF, for self or donation.

### Scientific Research

**Eggs for embryo cloning**, used to create embryonic stem cell lines.

**Human gene editing** to develop gene therapies for patients by modifying DNA in their own cells and tissues (other than eggs or sperm)



### Gestational Surrogacy

Gestational mother carries pregnancy created via IVF and embryo transfer; using sperm/eggs of intended parents/donors makes her genetically unrelated to the resulting child.

### Genetic Testing

**Pre-implantation genetic diagnosis (PGD)** tests IVF embryos, permitting selection and “de-selection.” Developed to prevent transmission of serious inherited diseases; also now used for less serious conditions and to select desired traits (notably sex selection).

**Prenatal testing of fetuses** including amniocentesis and genetic testing of fetal cells found in pregnant women’s blood.



### Reproductive human cloning

To create a child genetically identical to an existing or deceased person.



**Producing eggs and sperm** from ordinary (e.g., skin) cells to create unlimited numbers of embryos, which could then be tested, selected or deselected via PGD; or modified using gene editing.

### Reproductive gene editing (human germline modification)

Modifying DNA in eggs, sperm, and/or embryos to create genetically modified children. Changes (intended and unintended) would be inherited by all future generations. Though proposed by some to prevent transmission of serious genetic diseases, this can already be done via PGD – without the extreme safety and social risks.



### Designer Babies? A New Eugenics?

Human biotechnologies are social and political matters, not just scientific ones. Who has access and who does not, who can hire and who must provide, who will gain and who will not? Who decides what is “safe enough,” or whether to proceed when significant social harms loom? How might particular uses of these technologies reinforce existing racial inequalities or shape the way we value or stigmatize people with disabilities? Procedures that would engineer the traits of future children and generations are currently prohibited in dozens of countries. How do we respond to those promoting their use? Grappling with these questions is crucial: the decisions made now will affect all of humanity.

