

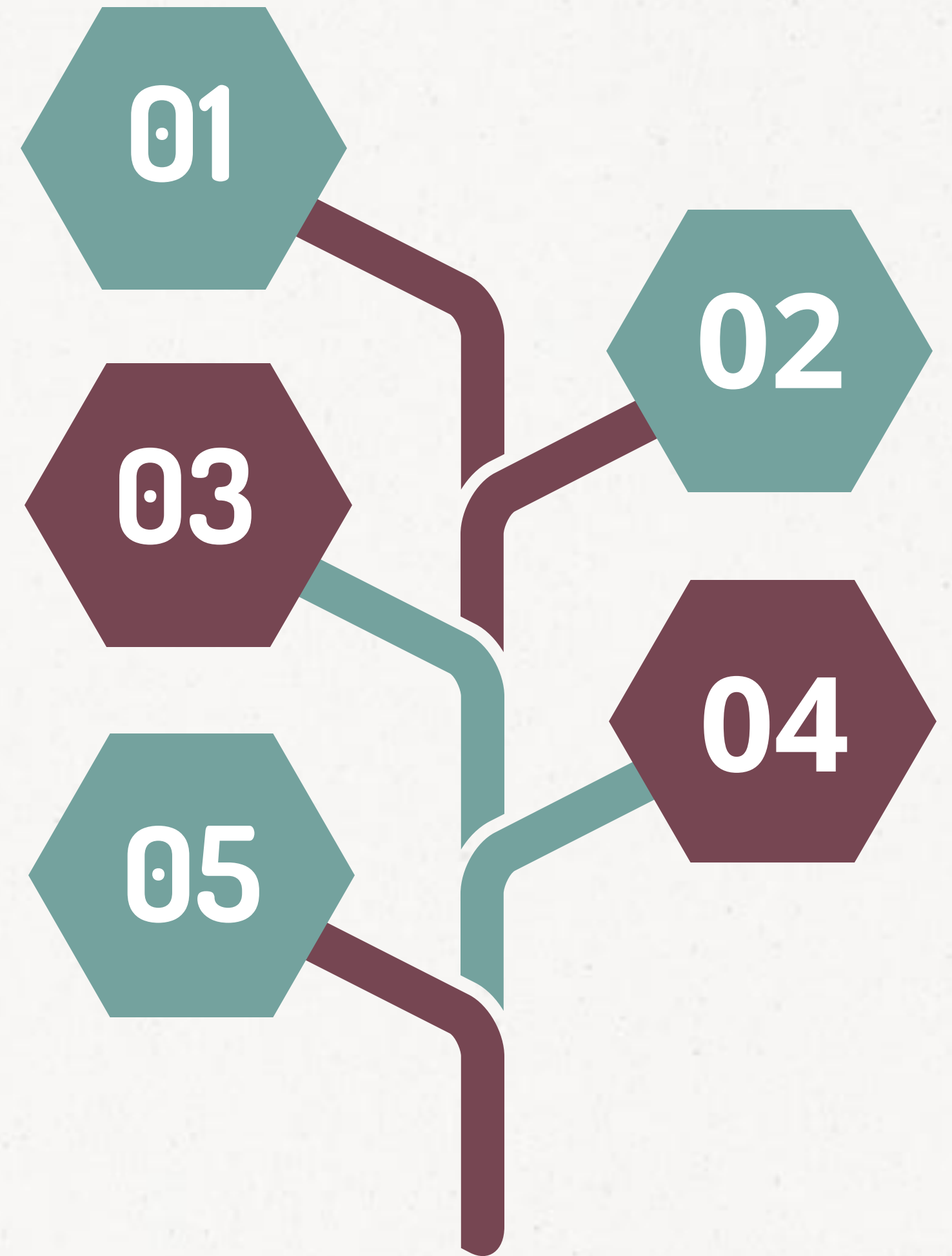


GENETIC MANIPULATION

PRESENTED BY :
KABOUCHE DOUNIA BENCHABANE ASSALA

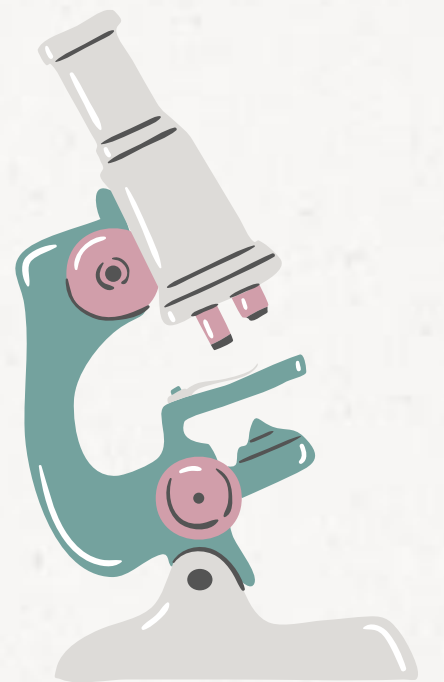
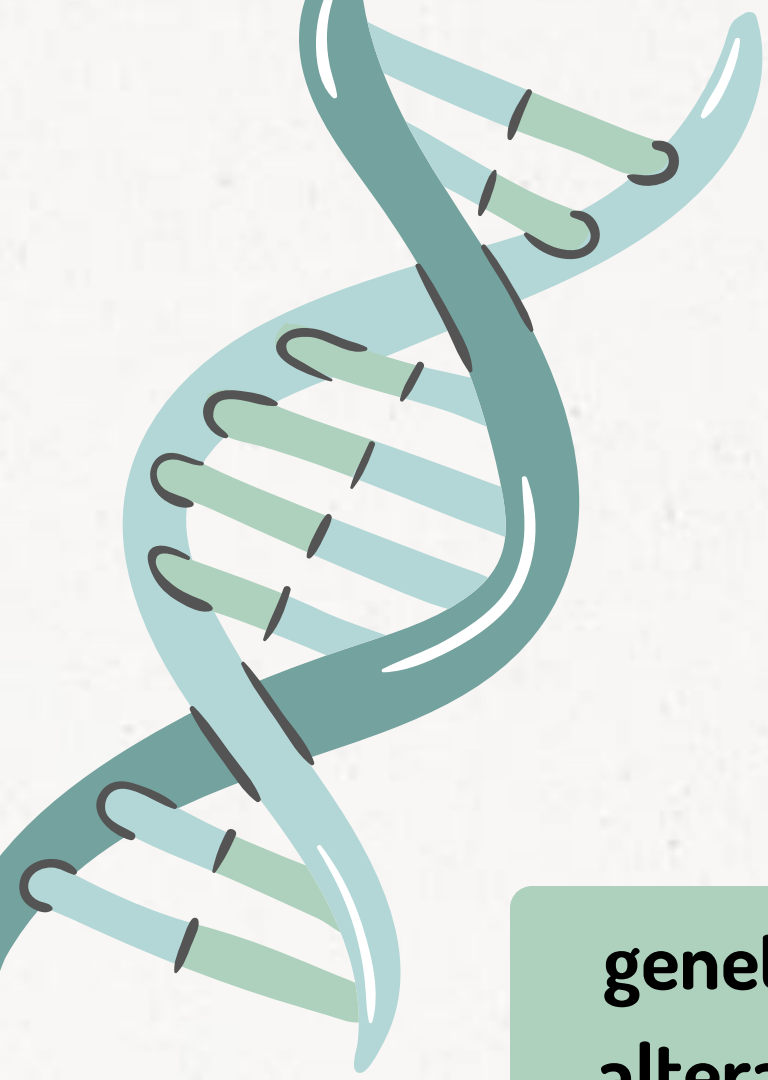
KEY CONCEPTS

- 01 INTRODUCTION TO GENETIC MANIPULATION
- 02 HISTORY
- 03 TYPES APPLICATIONS AND TECHNIQUES
- 04 ETHICAL CONSIDERATIONS
- 05 CONCLUSION



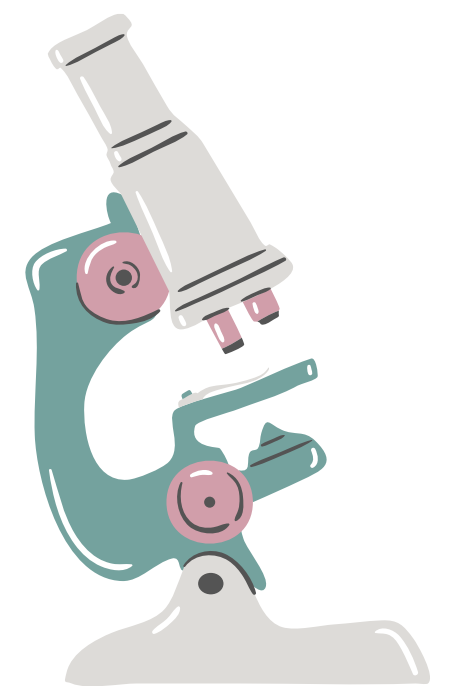
INTRODUCTION

genetic manipulation; the process where the DNA of an organism is altered , this alteration can involve adding, deleting or modifying specific DNA sequences. The purpose is to introduce new traits, enhance existing ones or transfer genetic material from one organism to another.





genetic manipulation has the potential to bring about significant benefits for human well-being, but also raises questions about our identity, values, and role on the planet. While some people are opposed to gene editing, others believe that the benefits outweigh the risks. However, there are still ethical concerns about it, especially when it comes to editing embryos that would be inherited by future generations

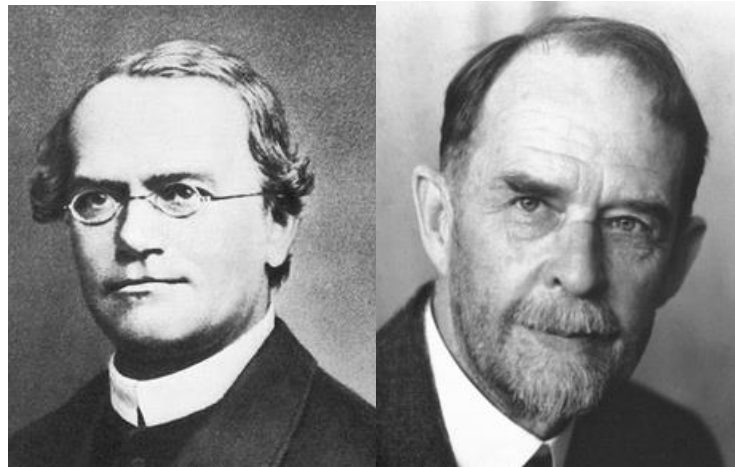


02

**GENETIC MANIPULATION:
HISTORY**



HISTORY:



early 20th century

the concept of genetics inheritance was developed by scientists like George Mendel and Thomas Hunt Morgan, laying the foundation for understanding how genes work

avery, MacLeod, and McCarty identified that DNA carries genetic information

1944



1953

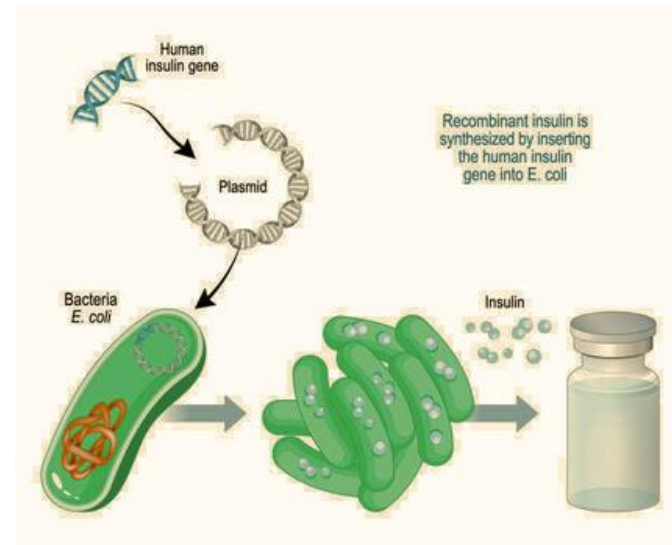
the discovery of DNA structure by James Watson and Francis Crick with the help of Rosalind Franklin's work; providing insights how genetic information is stored and replicated

the discovery of restriction enzymes by the Swiss microbiologist Werner Arber which made recombinant DNA plausible

1968s

1970s

they successfully combined DNA from different organisms. This led to the birth of DNA recombinant technology, the foundation of modern genetic manipulation

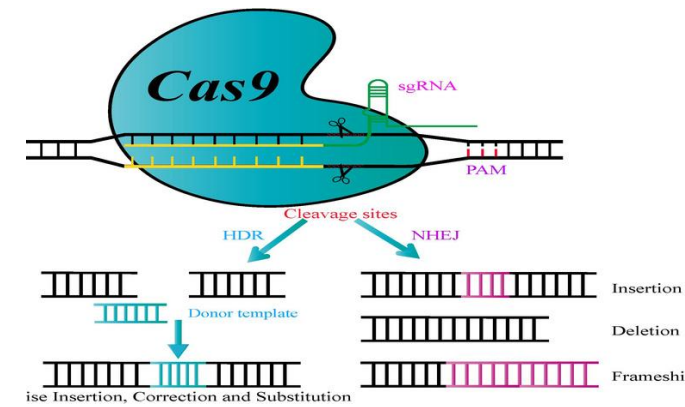


1982

the first genetically engineered product for medical use, human insulin, was approved for commercial production

genetically modified organisms engineered for resistance to pests and herbicides became commercially available

1990s



2010s

the revolutionary gene-editing tool CRISPR-Cas9 emerged, offering precise and efficient gene editing capabilities

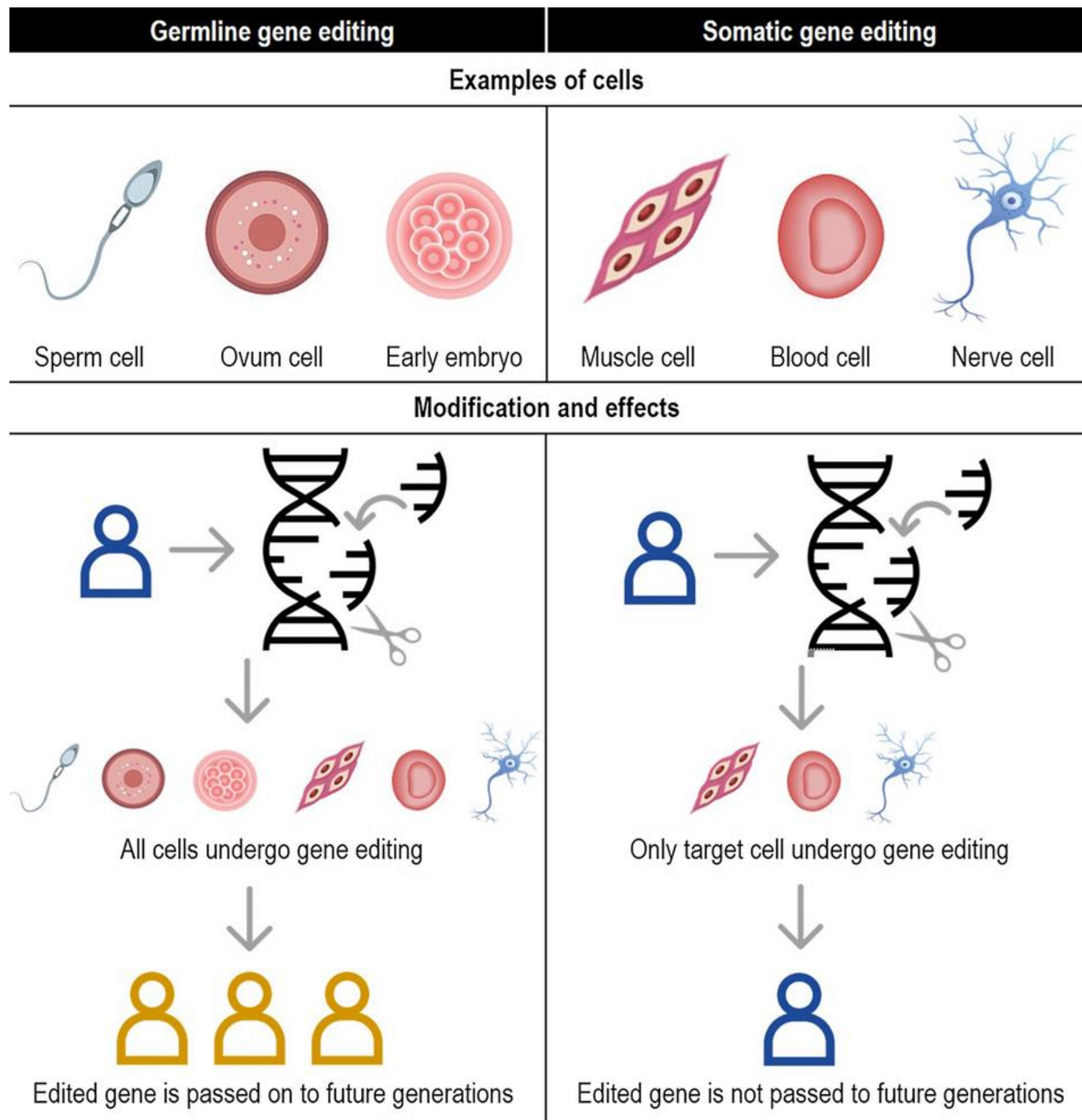
as gene manipulation advanced debates and regulations regarding the ethical use of this technology intensified

modern time

03

**TYPES, APPLICATIONS
AND TECHNIQUES**





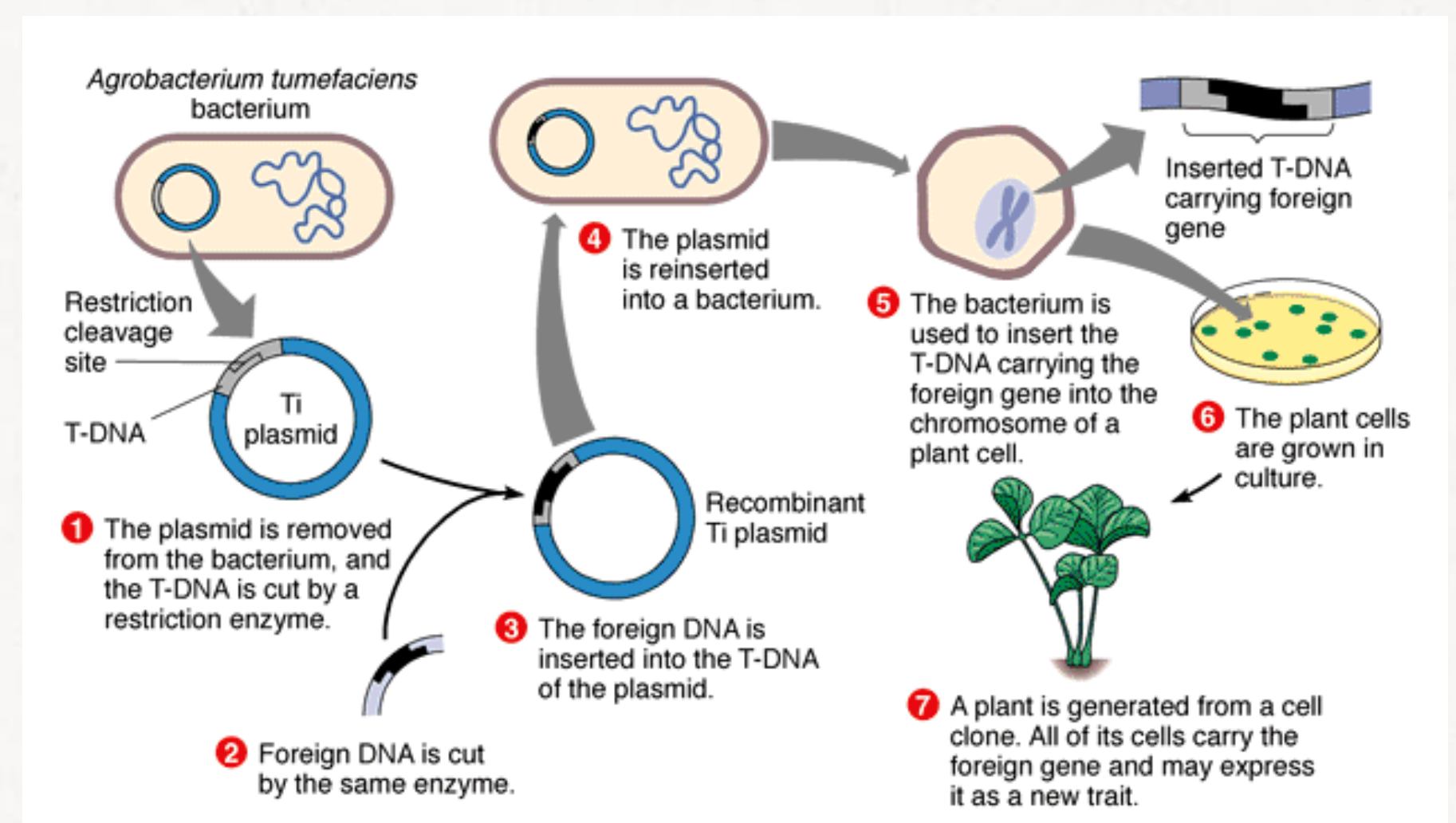
TYPES OF GENE MANIPULATION

- Straightforward delivery of edited gene into reproductive cell
- All cells will have functioning gene
- Ethically controversial
- Inconsistent and variable guidelines and regulation
- Limited research/application permitted
- Manipulation passed to next generation, resulting in good or bad outcomes

- Tricky delivery of edited gene into target cells
- Difficult to achieve gene functioning in the genome
- Therapy is short-lived and has to be repeated
- Regulations available to govern applications
- Research/application permitted as only actual person affected

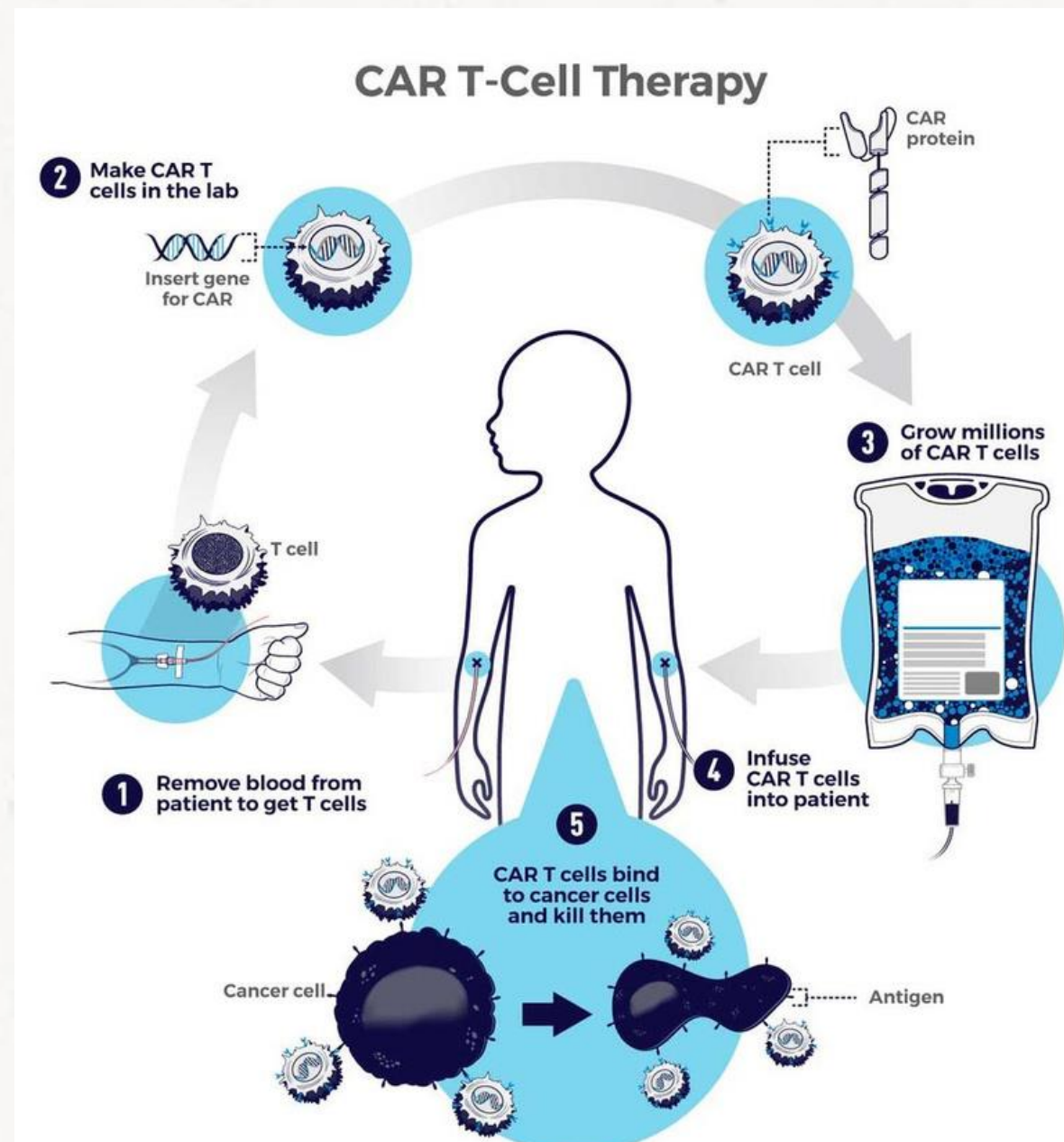
01 AGRICULTURE

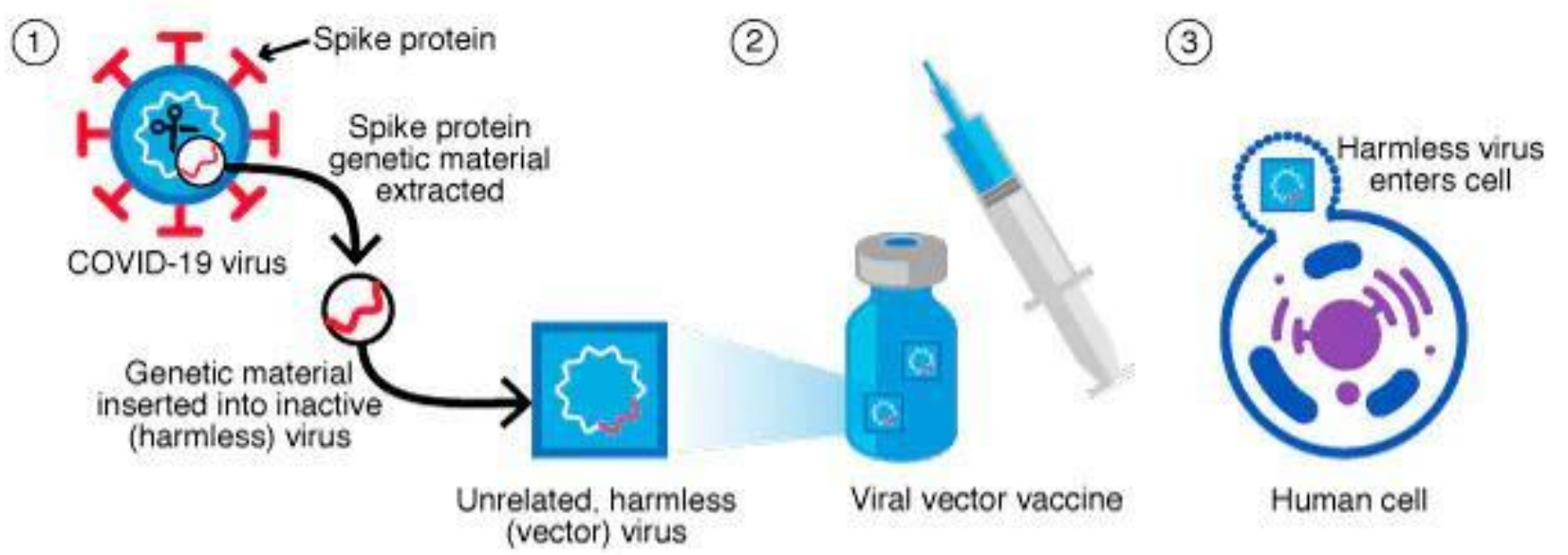
genetic manipulation is used to enhance crop traits such as resistance to pests, diseases, improving nutritional content.



02 MEDECINE

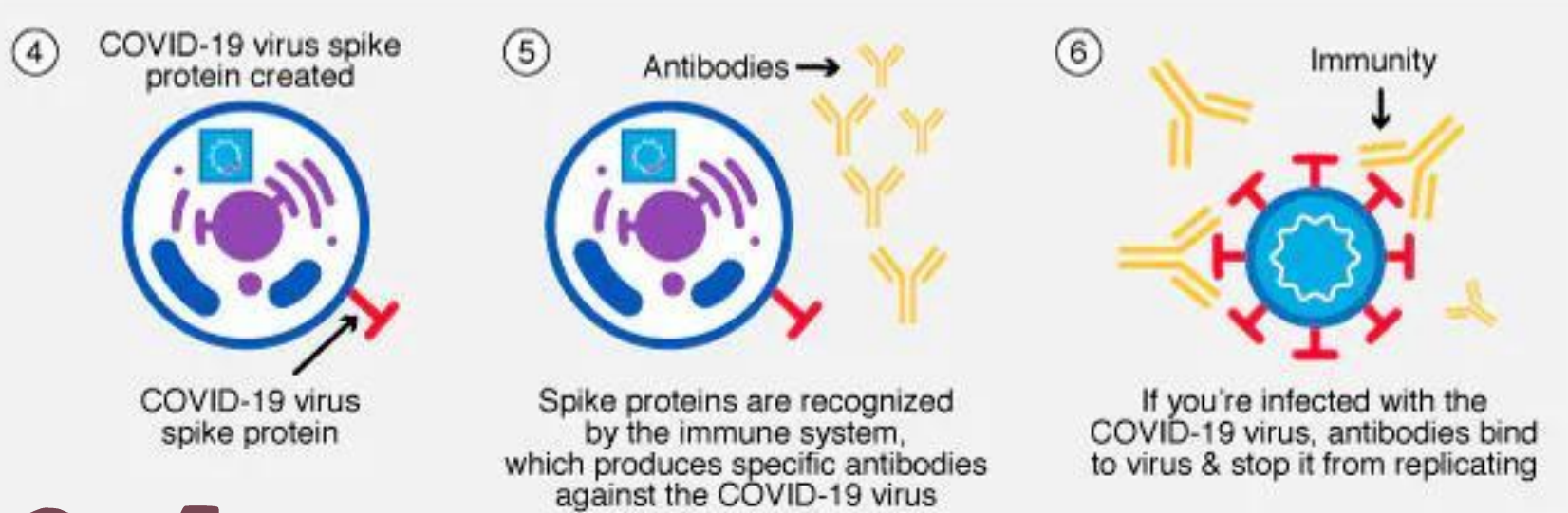
used to treat genetic disorders by introducing genes in human's cells like cancer therapy where patient's own T cells are modified to recognize and attack cancer cells more effectively. CAR-T cells is an example where T cells are engineered to express chimeric antigen receptors specific to cancer cells





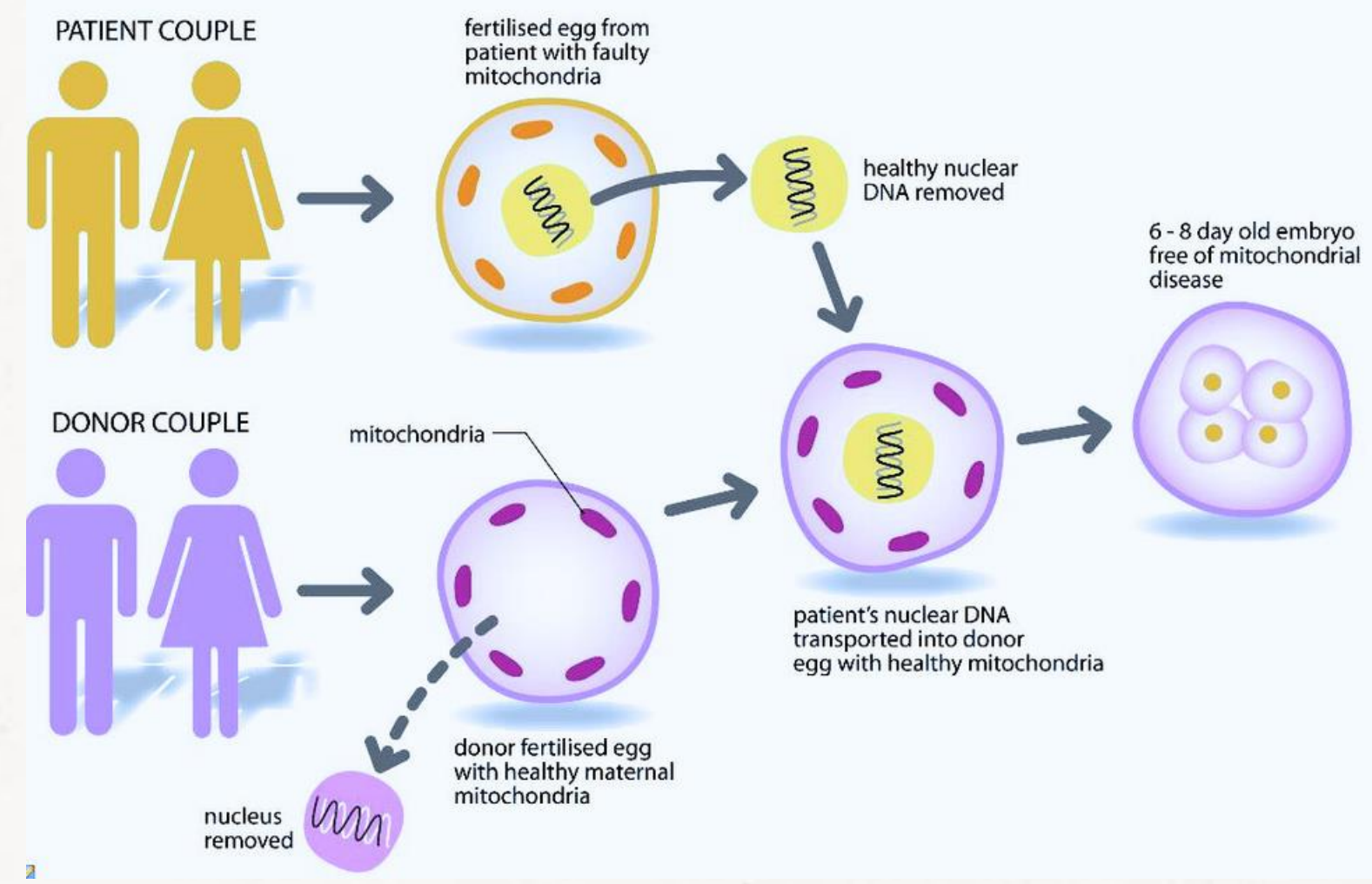
03 VACCINES DEVELOPPEMENT

used in the developpement and production of vaccines. one example, covid vaccine.



04 GERMLINE GENE THERAPY

involves making genetic modifications to the reproductive cells or the embryos that develop from them, unlike somatic gene therapy which target non reproductive cells and affects only the individual treated, it has the ability to introduce heritable changes that would be passed on to future generations



recombinant DNA

involves the insertion of genes from one organism into the DNA of another using restriction enzymes and DNA ligase

gene cloning

the process of making identical copies of a gene, typically by inserting it into a vector like a plasmid and introducing it into a host organism (bacteria for example)

gene editing (CRISPR-CAS9)

a revolutionary method that allows precise modification of specific DNA sequences

TECHNIQUES

gene therapy

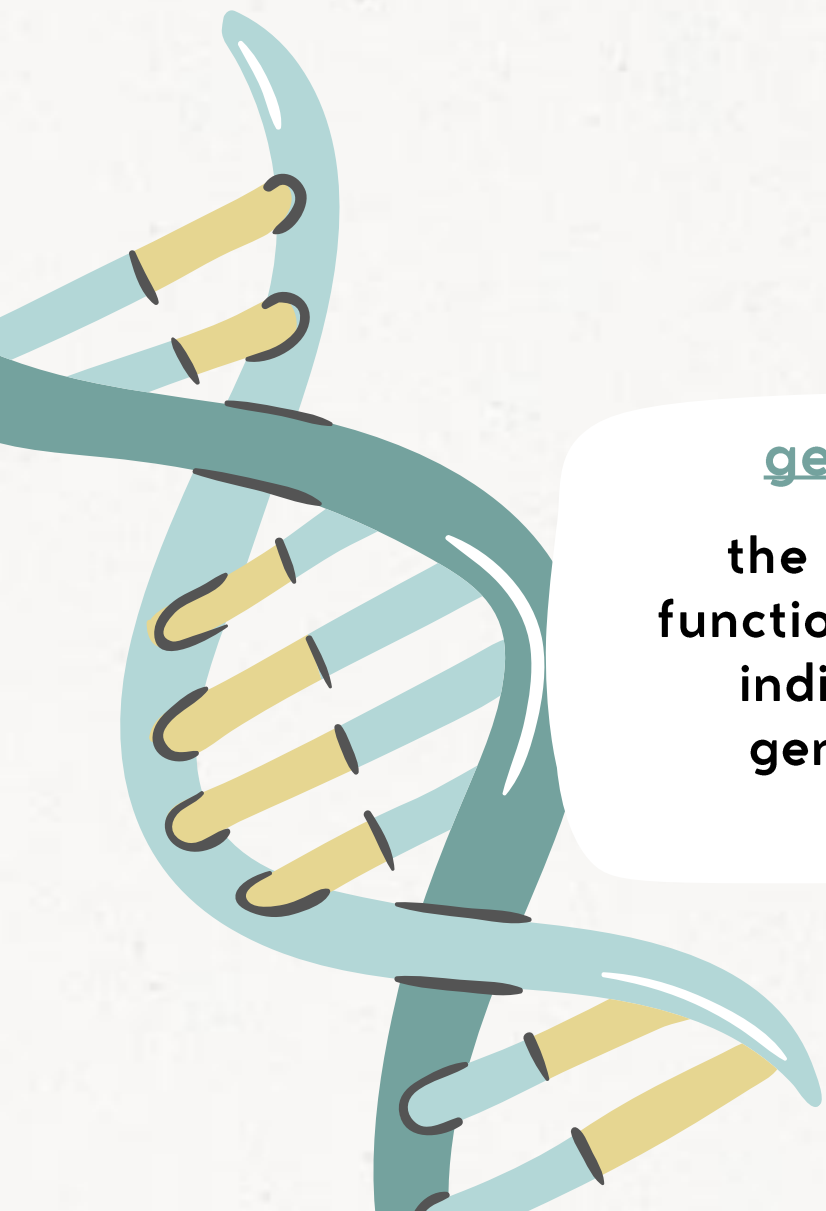
the introduction of functional genes into an individual to treat genetic disorders

GMO technology

modifying the genetic makeup of plants or animals to achieve desired characteristics, like disease resistance and increased crops yield

mutagenesis

inducing mutations in an organism's DNA to study the effects of specific genetic changes



04

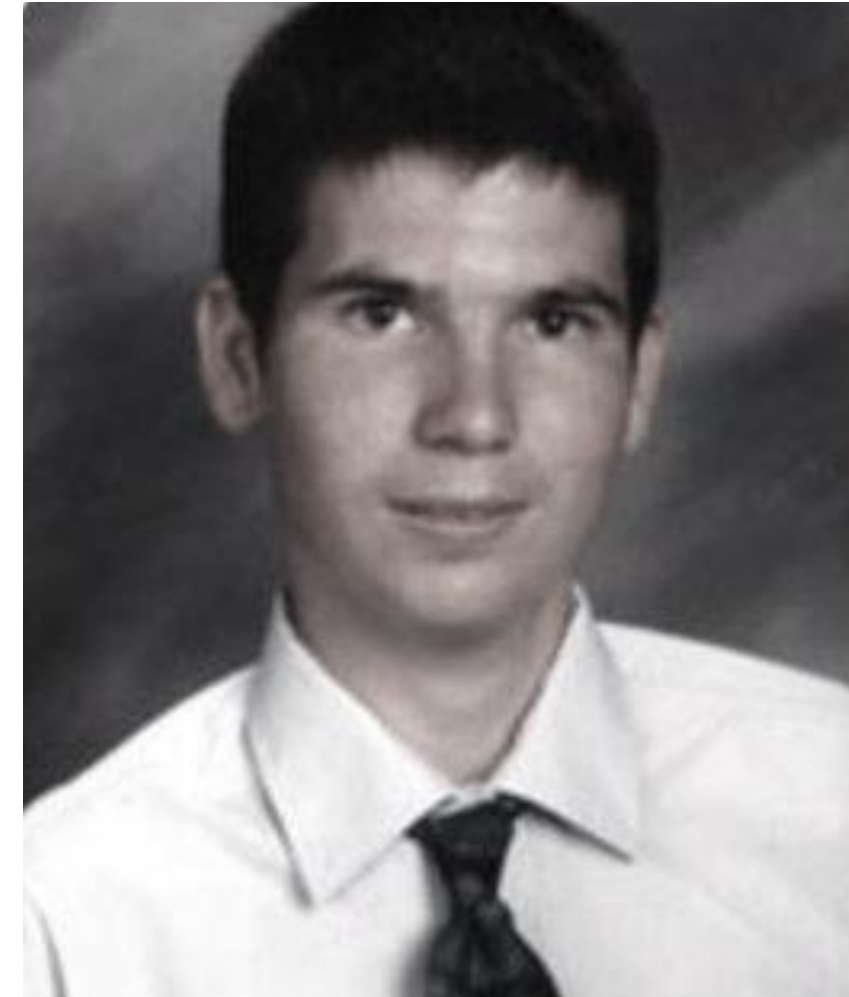
**ETHICAL
CONSIDERATIONS**



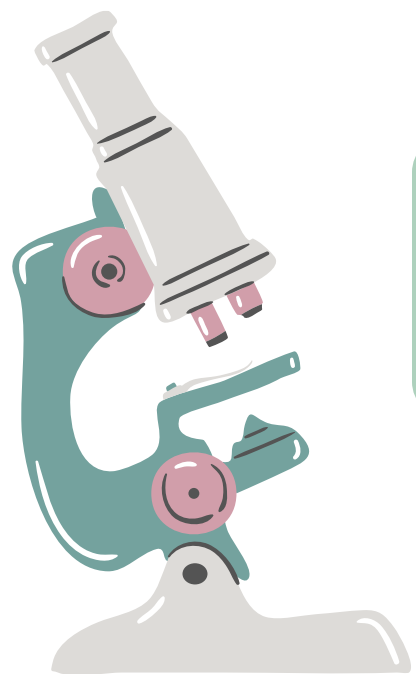
GENE MANIPULATION CASES



according to scientists not all forms of human GM remained off limits. Somatic gene manipulation has been researched since 1990. But in 1999, a young person with a mild genetic disorder, which was managed with diet and medication, enrolled in a gene therapy experiment at a major research university in the United States. He received the maximum dose and had an immune response that caused massive organ failure



jess gelsinger's death from gene therapy clinical trial in 1999 raised many questions concerning the experminets of gene therapy safety



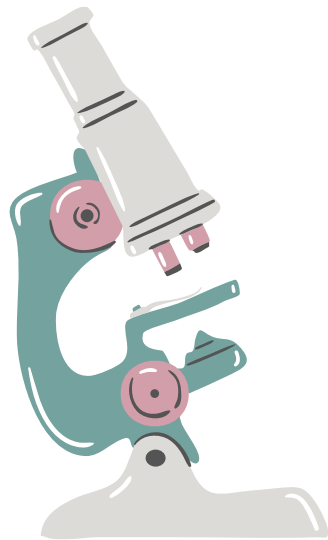
These events were critical warnings about unknowns and risks.

GENE MANIPULATION CASES



In 2019, Chinese geneticist He Jiankui defied his country's laws, and arguably his ethical responsibilities, by genetically modifying twin girls while they were embryos using CRISPR-CAS9. He believed he was protecting them from HIV, but he may have doomed them to early deaths.

He was universally condemned and excommunicated from the scientific community. China apologized on the global stage and ultimately sentenced He to prison



ETHICAL CONSIDERATIONS

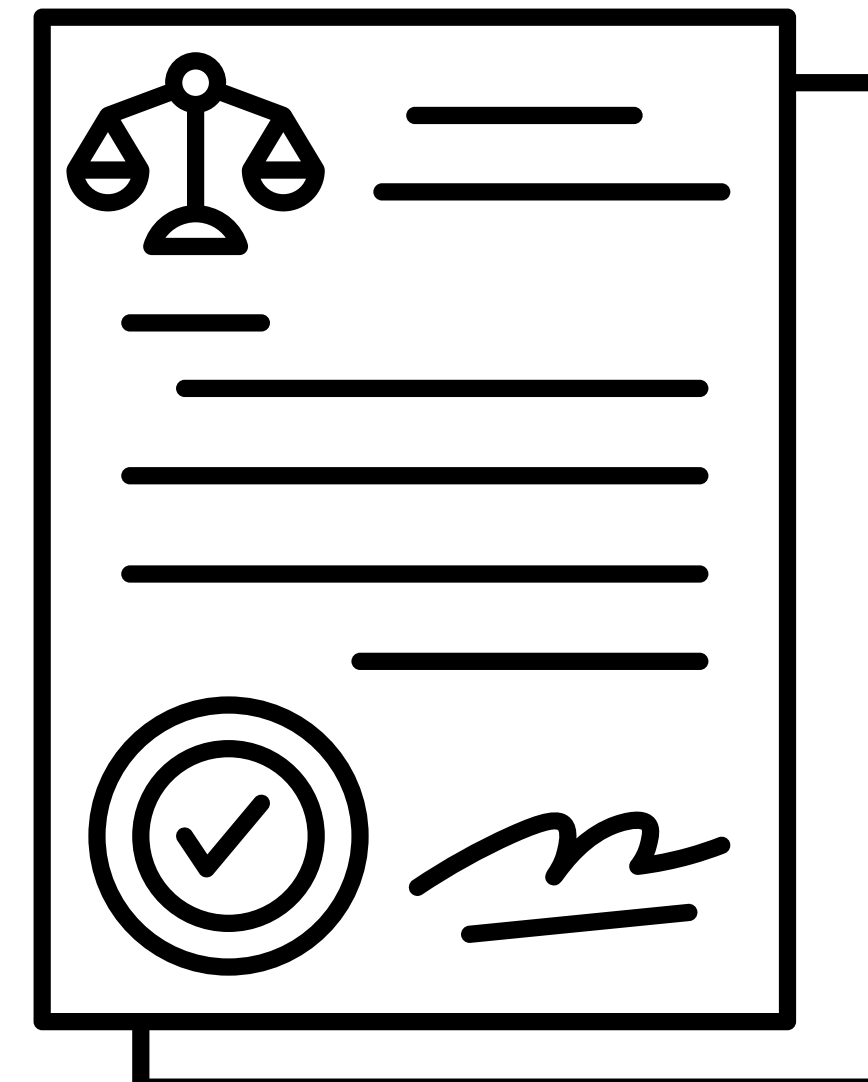
the Council of Europe's 1997 Convention on Human Rights and Biomedicine states in Article 13, regarding "interventions on the human genome,"

that "an intervention seeking to modify the human genome may only be undertaken

for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants. This means, according to paragraph 91 of the

Explanatory Report to this Convention, that "interventions seeking to introduce any modification in the genome of any descendants are prohibited. Consequently, in particular genetic modifications

of spermatozoa or ova for fertilisation are not allowed."

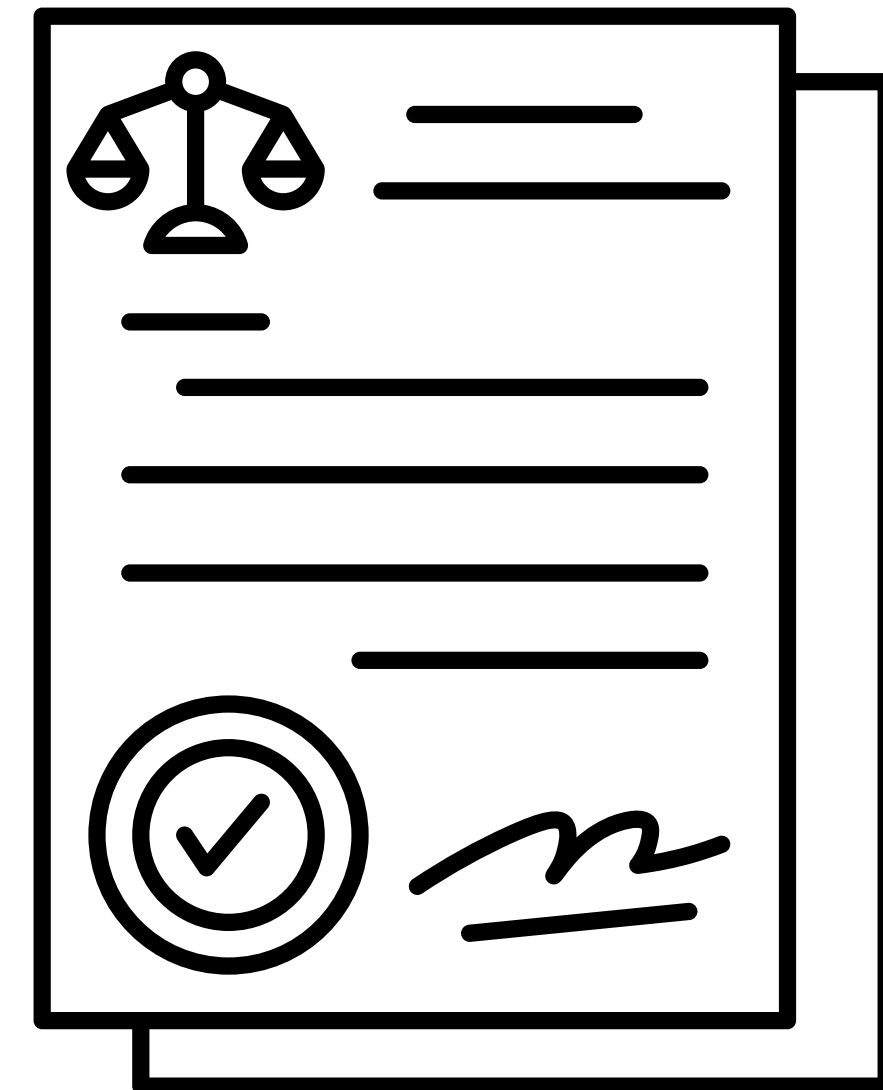


ETHICAL CONSIDERATIONS

in a report published in 2017, the U.S.-based National Academies of Sciences, Engineering, and Medicine actually recommended the use of heritable genome editing in human beings in certain specific circumstances. This happened even though the above international regulations condemned such a possibility

and a 2015 UNESCO International bioethics Committee report had clearly highlighted the eugenic dangers of selective germline procedures. This indicated that if any intentional germline selection was accepted (such as with genome editing), this would "jeopardize the inherent and therefore equal dignity of all human beings and renew eugenics, disguised as the fulfilment of the wish for a better, improved life."

it was in order to address such a danger that (UNESCO) 1997 Universal Declaration on the Human Genome and Human Rights indicates in Article 24 that germline interventions could be considered as a practice that would be "contrary to human dignity." (UNESCO, 1997).



RELIGION PRESPECTIVES ON GENE MANIPULATION

religion	support gene editing	against gene editing
somatic cell therapy		
islam	<p>provide care and relieve suffering through new and better cure strategies for diseases</p> <p>Encourage the tradition of scientific research and medical innovation to develop treatments for diseases and conditions that cause suffering</p>	<p>Believes that life is a test and that suffering is part of this test to endeavour</p>
christianity	<p>Effective against a range of illness, and so many believers would consider it stewardship to support them</p> <p>Appreciate the manipulation as God-given knowledge that continues the healing work of Jesus</p>	<p>pulating an individual's genes goes further than conventional medicine, and deemed as playing God</p>

RELIGION PRESPECTIVES ON GENE MANIPULATION

religion	support gene editing	against gene editing
germline gene editing		
islam	<p>It is establishing treatments that would ensure that future generations do not suffer from hereditary disorders</p> <p>The embryo does not have a soul until later in pregnancy, so manipulation of embryos at early stages of their development to ensure that they do not suffer after the birth</p>	<p>Greater unknown risks The genetic make-up of each individual is part of Allah's plan, and any manipulation regarded as a violation against this plan</p>
christianity	<p>Develop treatments that would ensure that future generations do not suffer from hereditary disorders</p> <p>While Christian faiths differ on the point at which the embryo attains full human status (conception, 14 days, gradually), manipulation of embryos to ensure they do not suffer after birth must be balanced by considerations of risk and respect for human dignity</p>	<p>Greater unknown risks Expensive type of treatment accessible for wealthy and would go against Christian teachings on justice</p>

informed consent

ensuring that individuals have a clear understanding of the potential benefits and risks of genetic manipulation

human dignity

altering the human genetic code for non medical purposes can raise concerns about human dignity

equality and access

concerns about social equity arise when discussing access to gene manipulation technologies. will these be available for to all or only to those who can afford them

unintended consequences

the introduction of functional genes into an individual to treat genetic disorders

some key bioethical issues associated with gene manipulation

environmental impact

GMO can affect ecosystems and biodiversity. bioethics in this context considers the environmental consequences of gene manipulation

germline editing

editing the genes of future generations raises complex questions. the long effect and the ability to consent on behalf of unborn individuals

genetic enhancements

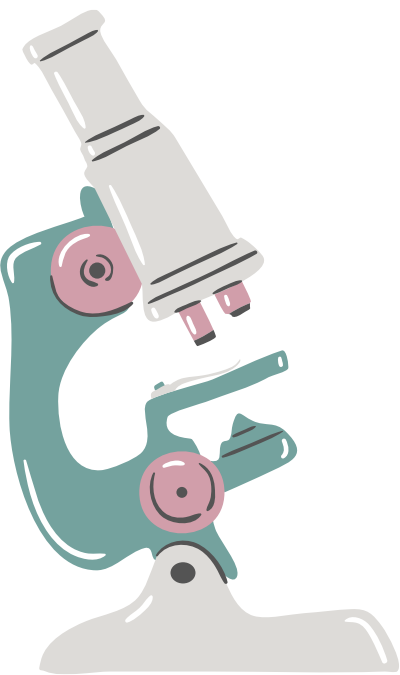
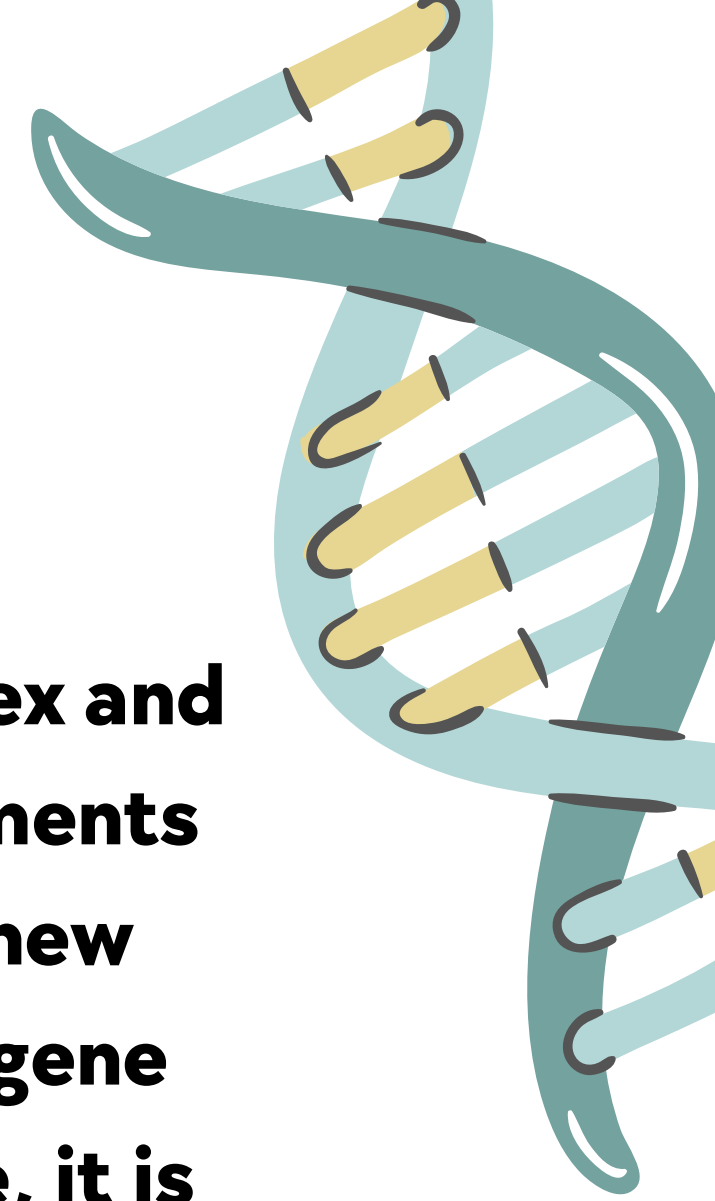
when gene manipulation is used for non medical purposes like improving physical or cognitive traits, ethical dilemmas

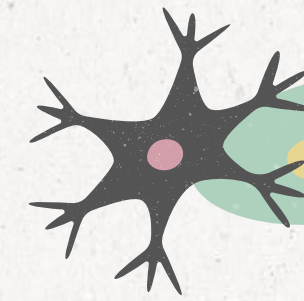
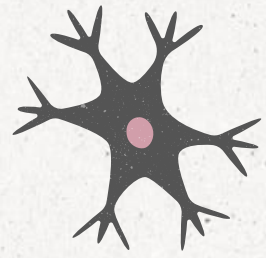
beneficence and non-maleficence

this bioethical principles guide the responsible use of gene manipulation for the benefit of individuals and society

CONCLUSION

in conclusion the implications of genetic manipulation are complex and multifaced. while it holds immense potential for medical advancements and adressing genetic disorders,especially with the came out of new techniques like CRISPR-Cas9 that has revolutionized the field of gene editing it also has the potential to be used irresponsibly. Therefore, it is important to consider the risks and benefits of gene manipulation and careful considerations must be given to issues such as consent equality and intended consequence





THANK YOU FOR YOUR

ATTENTION

