

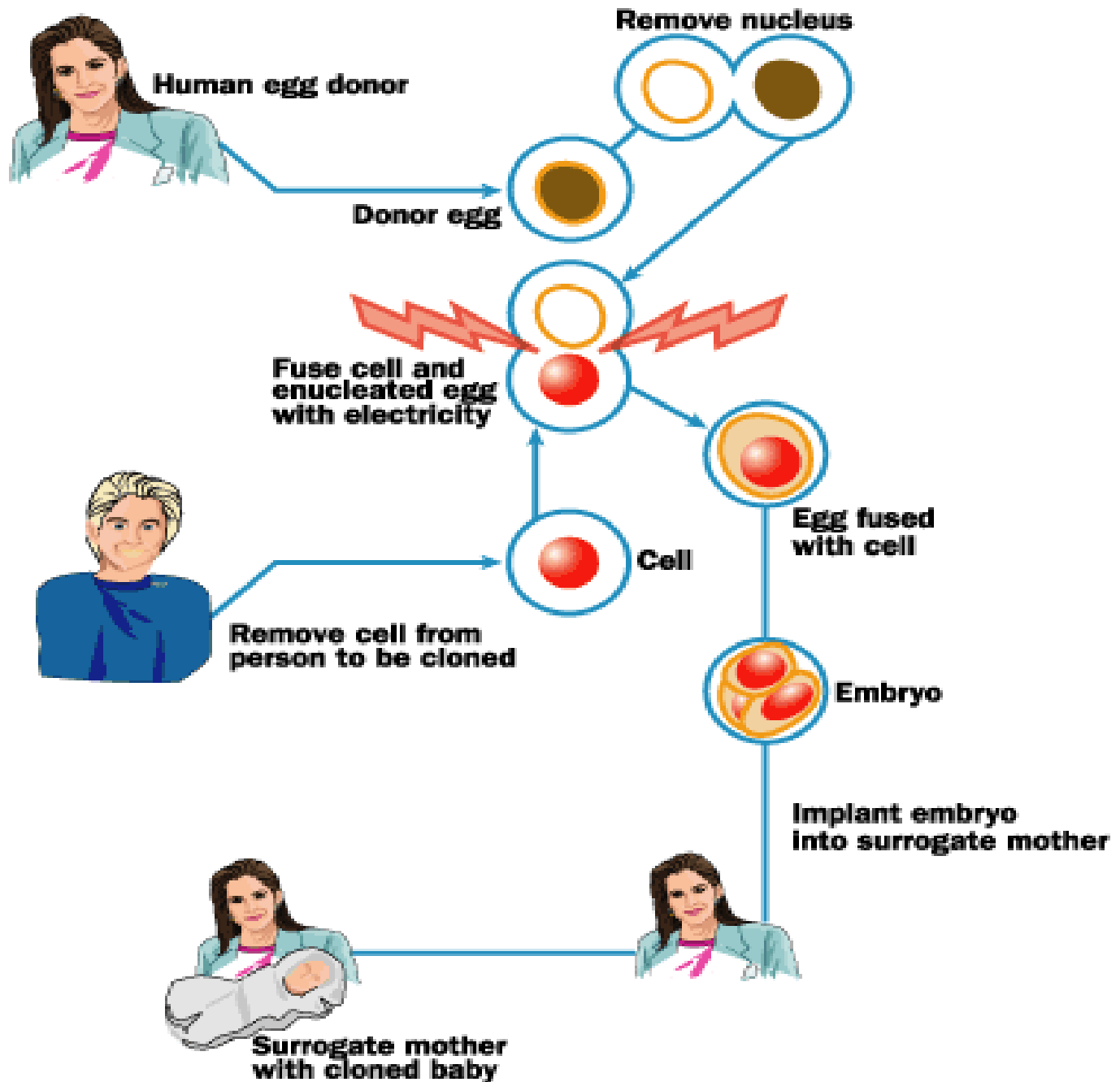
HUMAN CLONING AND ITS ETHICAL ISSUES



Early Successes - Human Cloning

- 2001 - First cloned human embryos (only to six cell stage) created by Advanced Cell Technology (USA)
- 2004* - Claim of first human cloned blastocyst created and a cell line established (Korea) - later proved to be fraudulent

Principle of Human cloning

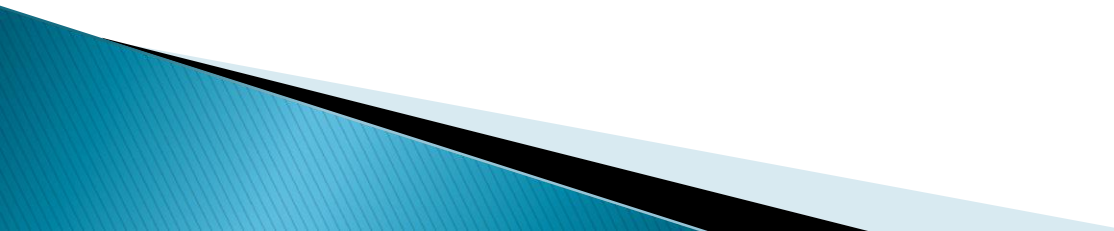


TYPES OF CLONING

❖ RECOMBINANT DNA TECHNOLOGY DNA/
MOLECULAR/ GENE CLONING

❖ REPRODUCTIVE CLONING
ADULT DNA CLONING

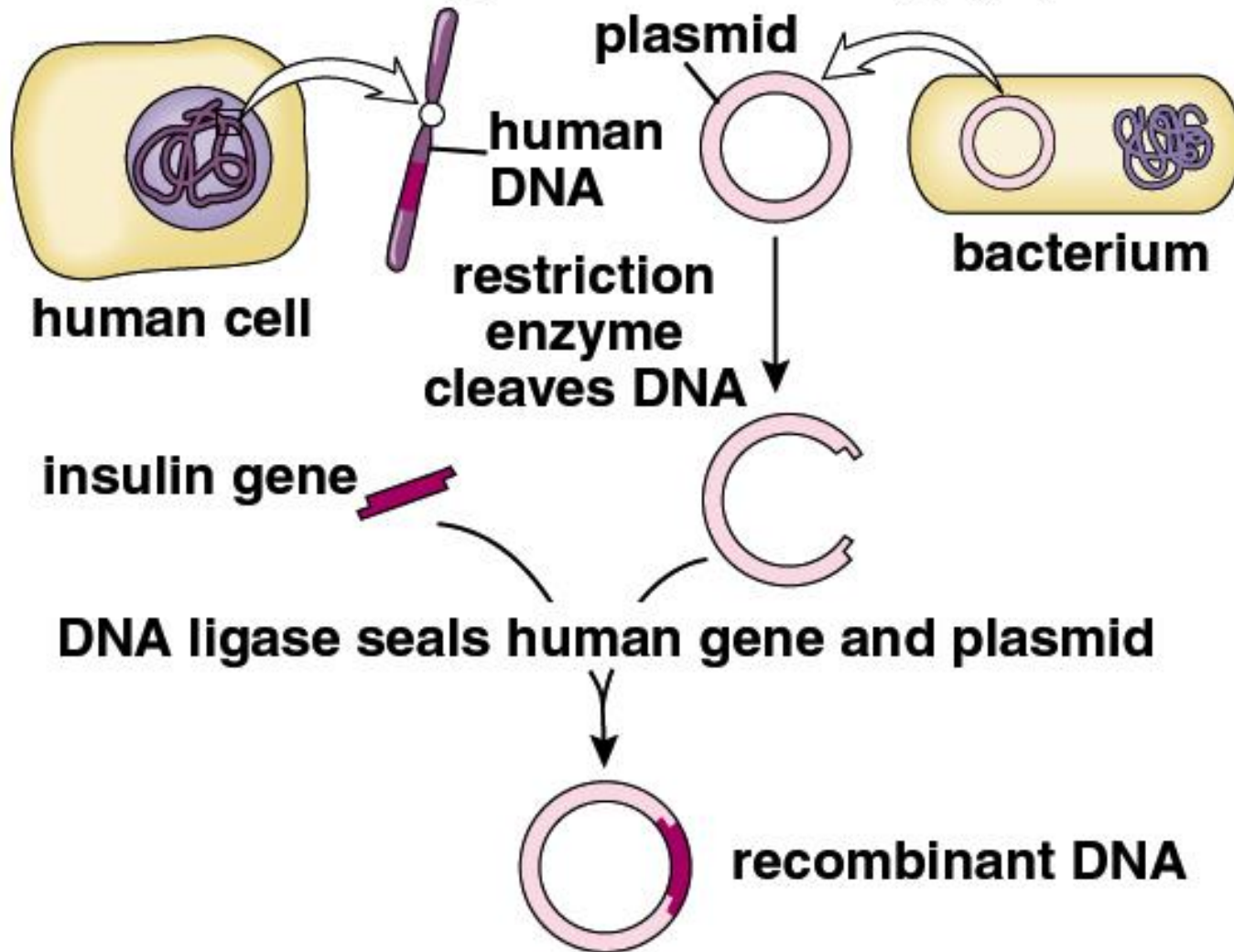
❖ THERAPEUTIC CLONING
EMBRYO/ BIOMEDICAL CLONING



Recombinant DNA Technology

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Human gene cloning (1)



RECOMBINANT DNA TECHNOLOGY OR DNA CLONING

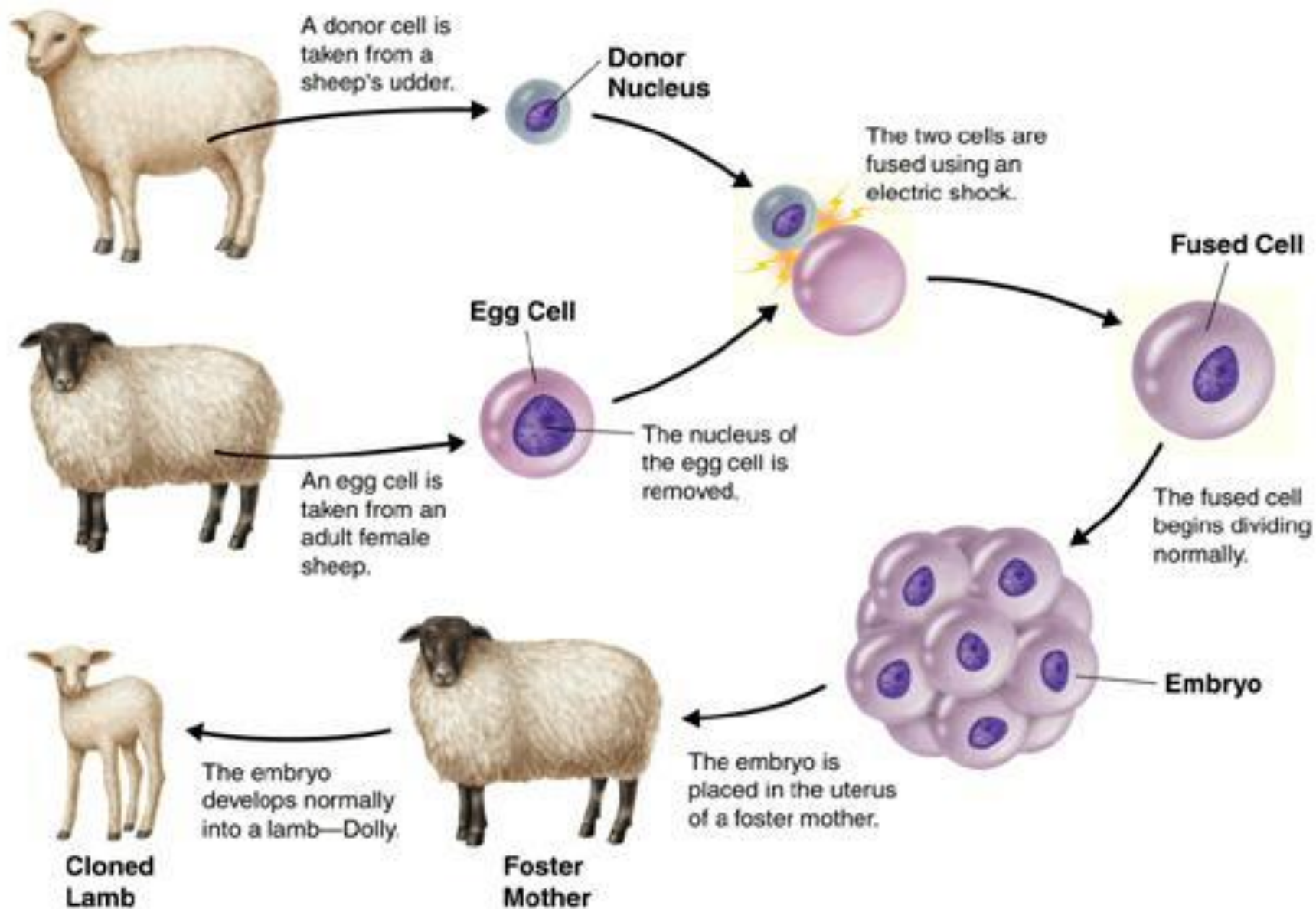
The term “recombinant DNA technology” “DNA cloning” “molecular cloning” or “gene cloning” all refer to the same process the transfer of a DNA fragment of interest from one organism to a self replicating genetic element such as a bacterial plasmid. The DNA of interest can then be propagated in a foreign host cell. This technology has been around since the 1970’s and it has become a common practice in molecular biology labs today.



Reproductive cloning uses the cloning procedure to produce a clonal embryo which is implanted in a woman's womb with intent to create a fully formed living child--a clone. Reproductive cloning is a technology used to generate an animal that has the same nuclear DNA as another currently or previously existing animal.



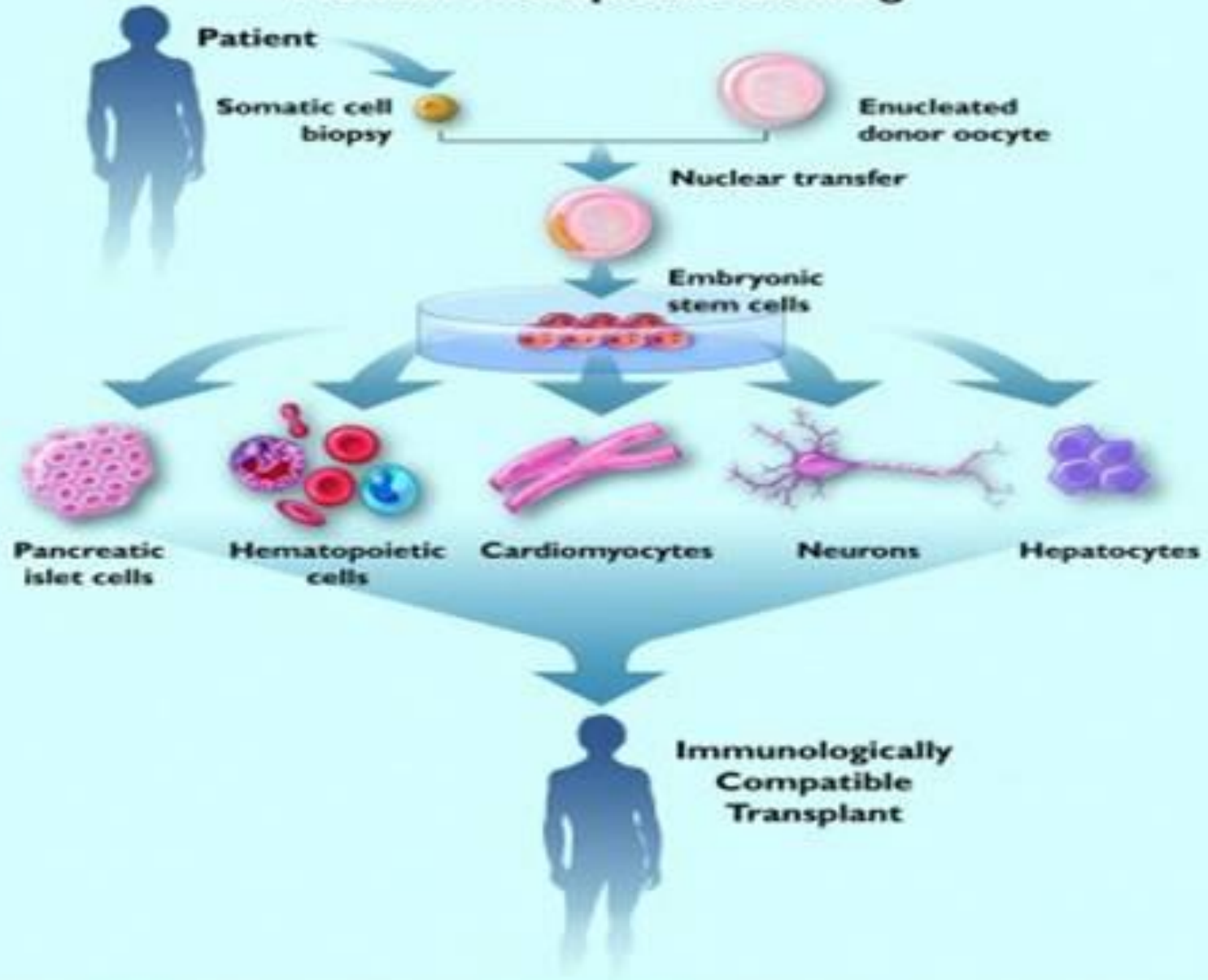
Dolly was created by reproductive cloning technology. In a process called “somatic cell nuclear transfer” (SCNT) scientists transfer genetic material from the nucleus of a donor adult cell to an egg whose nucleus, thus its genetic material, has been removed. The reconstructed egg containing the DNA from a donor cell must be treated with chemicals or electric current in order to stimulate cell division. Once the cloned embryo reaches suitable stage it is transferred to the uterus of a female host where it continues to develop until birth.



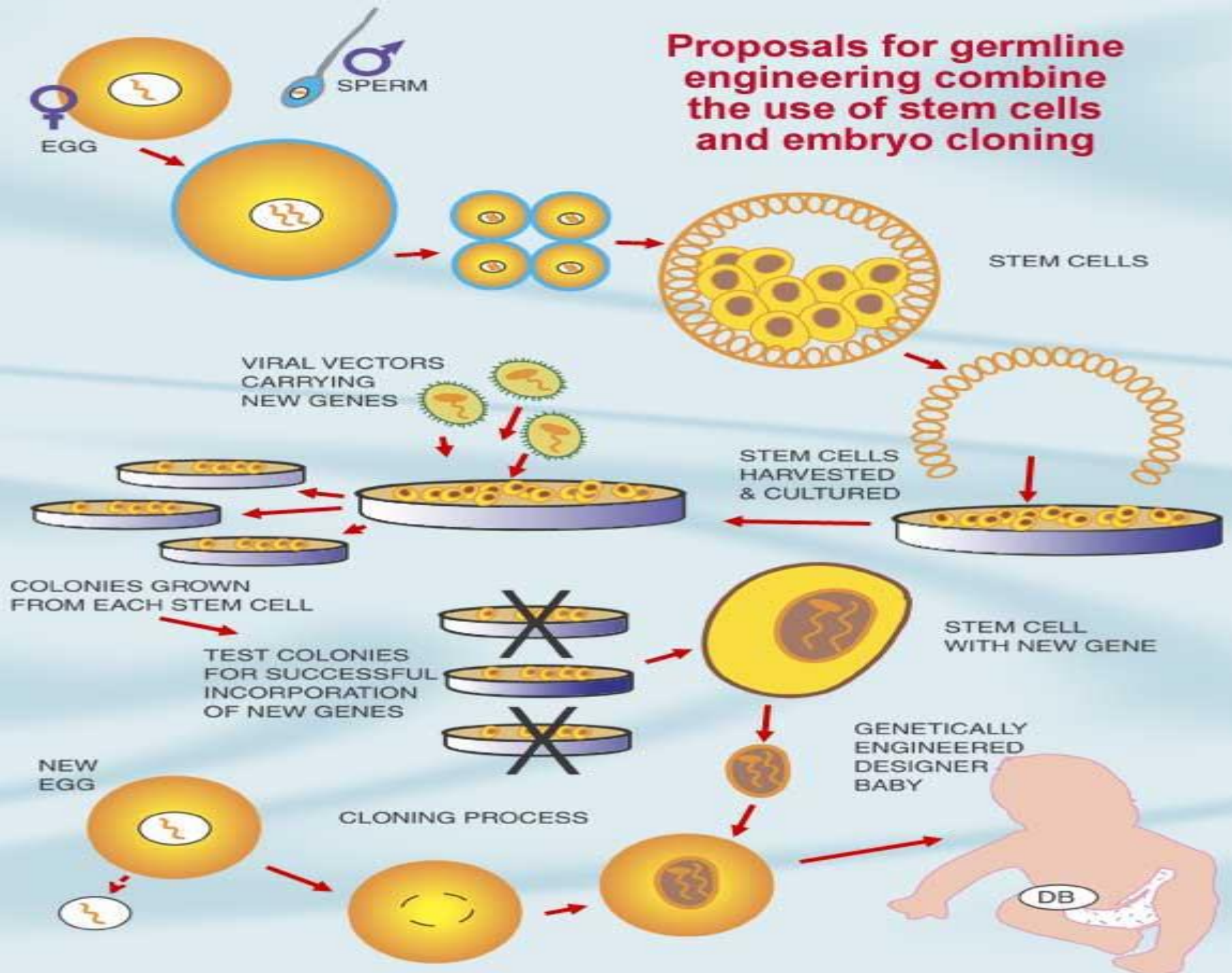
Therapeutic cloning uses the cloning procedure to produce a clonal embryo, but instead of being implanted in a womb and brought to term it is used to generate stem cells. Therapeutic cloning also called “embryo cloning” is the production of human embryos for use in research. The goal of this process is not to create cloned human beings, but rather to harvest stem cells that can be used to study human development and to treat disease.

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- Stem cells are important to biomedical researchers because they can be used to generate virtually any type of specialized cell in the human body.
 - Stem cells are extracted from the egg after it has divided for 5 days.
 - The egg at this stage of development is called a blastocyst. The extraction process destroys the embryo, Which raises a variety of ethical concerns.
 - Many researchers hope that one day stem cells can be used to serve as replacement cells to treat heart disease, Alzheimer's cancer and other disease.

Human Therapeutic Cloning

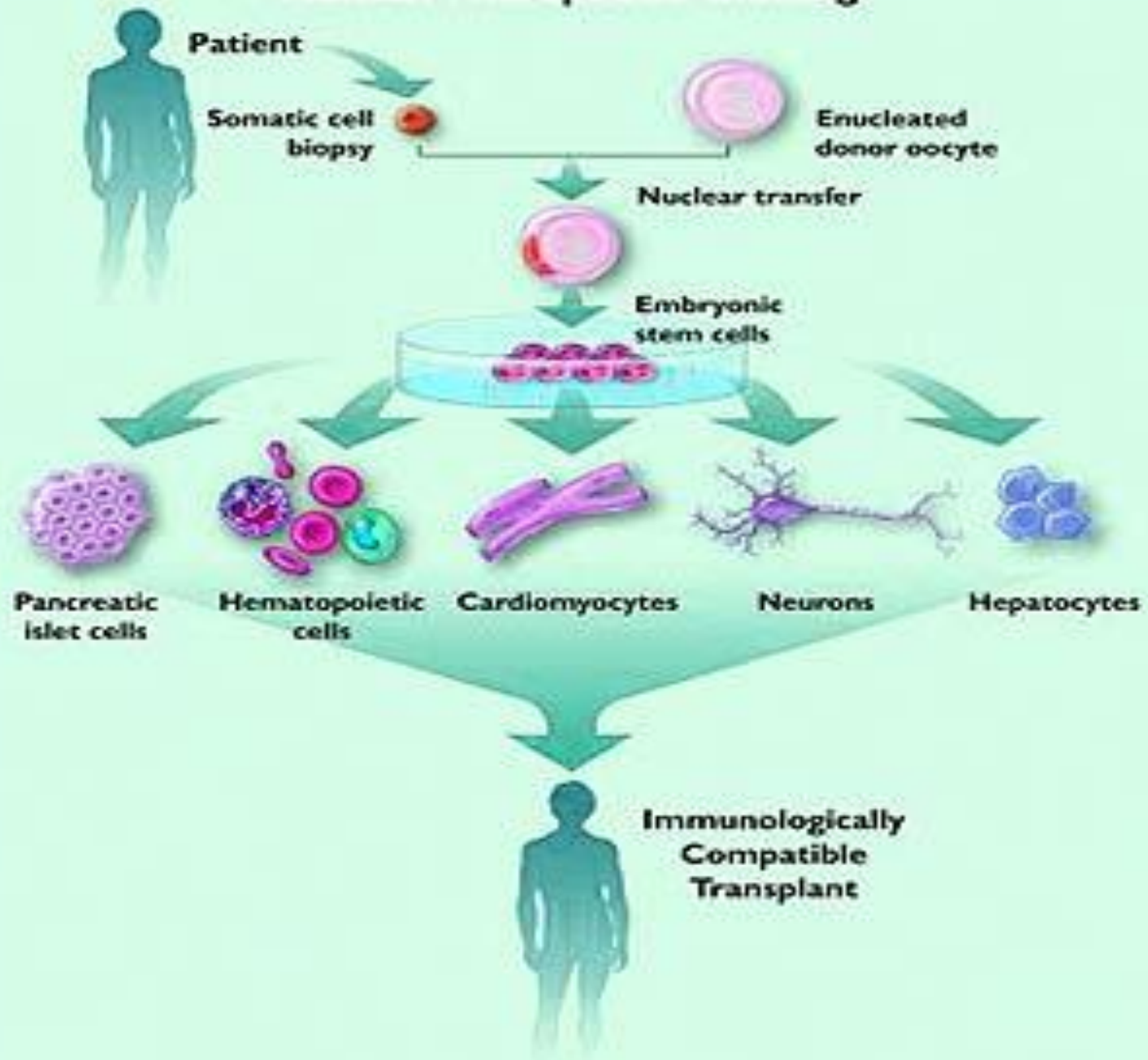


Proposals for germline engineering combine the use of stem cells and embryo cloning



Applications

Human Therapeutic Cloning



Patient with disease

Disease free cells recovered from patient

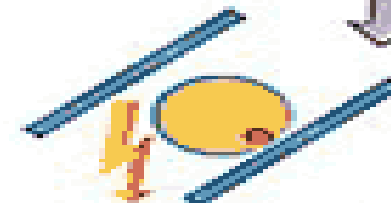


Transfer of cell to egg



Therapeutic cloning

Egg and cell fused by electric current



Embryo cultured for 7 days



Embryonic stem cells recovered

Embryonic stem cells grown in culture



Specific cell types derived from embryonic stem cells

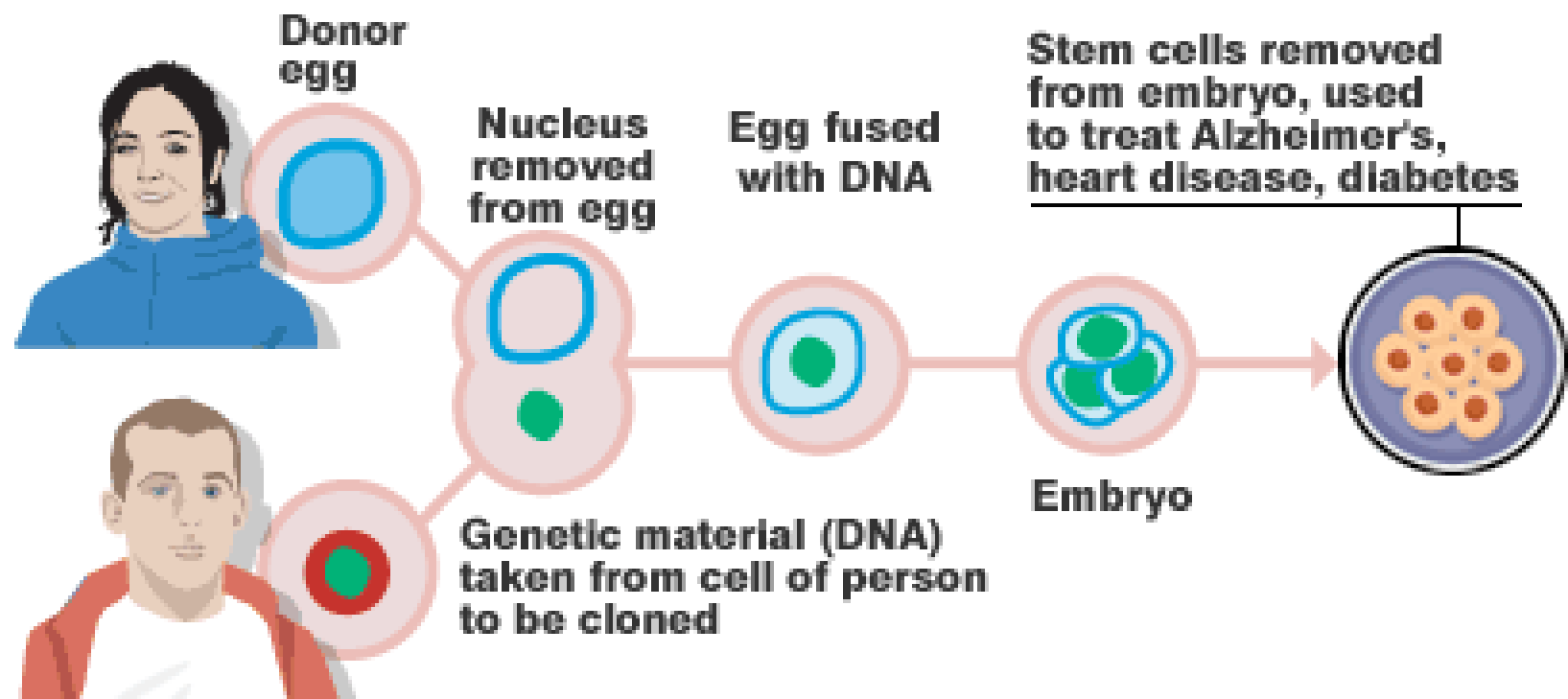


Specific cell types required for therapy re-introduced into patient



Adult Therapeutic

HUMAN CLONING



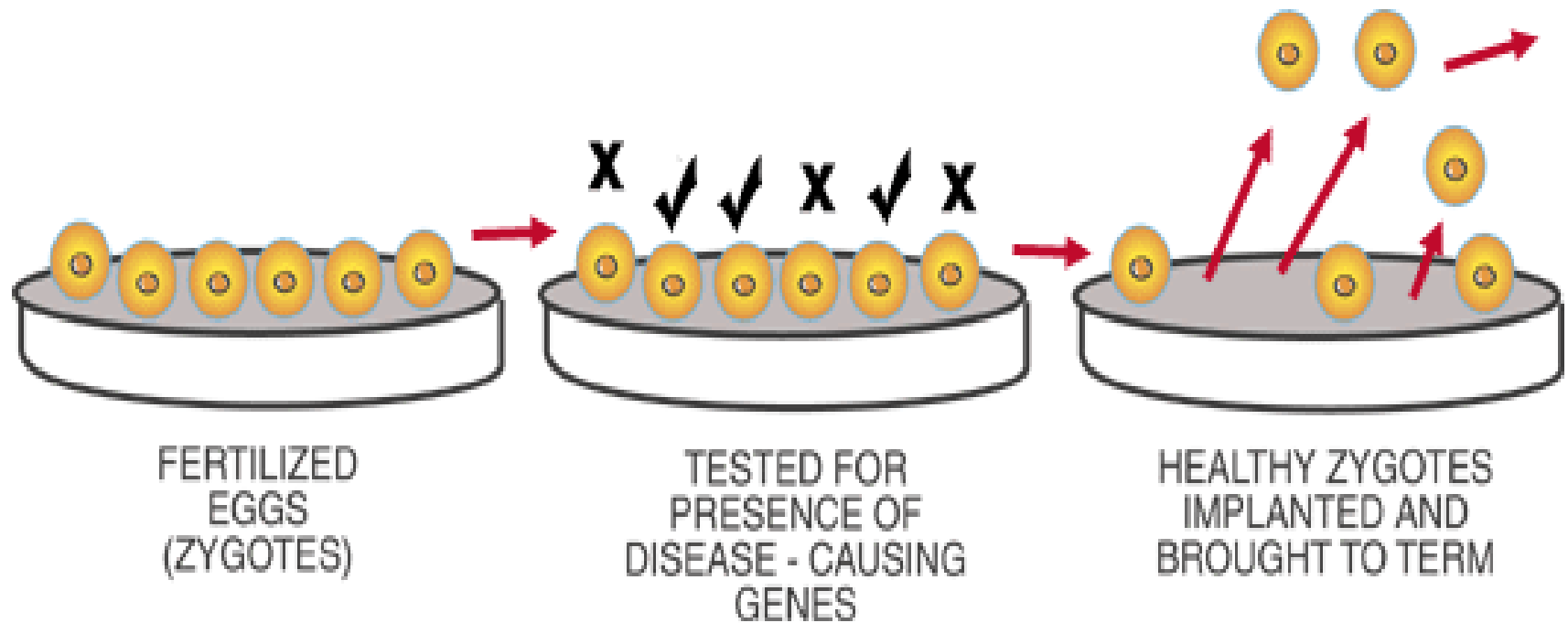
A photograph of several newborn infants in clear plastic incubators, illuminated by a blue light. The text 'ETHICAL ISSUES' is overlaid in white capital letters on a dark horizontal band across the middle of the image.

ETHICAL ISSUES

What are the risks of cloning?

- Reproductive cloning is expensive and highly inefficient
 - Cloned animals tend to have more compromised immune function and higher rates of infection, tumor growth, and other disorders
 - Genomes of cloned mice are compromised, 4% of genes function abnormally
 - The abnormalities do not arise from mutations in the genes but from changes in the normal activation or expression of certain genes.
 - A process called "imprinting" chemically marks the DNA from the mother and father so that only one copy of a gene (either the maternal or paternal gene) is turned on. Defects in the genetic imprint of DNA from a single donor cell may lead to some of the developmental abnormalities of cloned embryos
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Pre-Implantation Genetic Diagnosis and Selection (PDS)



Why Cloning Humans is Ethically Unacceptable



Controlling Someone Else's Genetic Makeup

Child can reject any aspect of its upbringing, but it could never reject the genes that were chosen for it. Such control by one human over another is incompatible with the ethical notion of human freedom, in the sense of that each individual's genetic identity should be inherently unpredictable and unplanned.



Infertility - an Exception to Instrumentality

- An exception to this objection would be the idea of producing a child from an infertile couple by cloning one of them.
- But this raises other problems. Instead of being the unique genetic product of both parents, the child is a copy of one of them.
- It would not be the biological child of both parents in the normal sense.

Psychological Effects - Identity and Relationship

Would the clone feel that he or she was just a copy of someone else who's already existed and not really themselves?

Am I really someone else but put into a different womb?

What will be my relationship to the one I was cloned from?

No one can predict with any degree of assurance what the response would be.

Physical Risk

- ❖ To repeat the same thing on humans would be giving both the mother and the potential foetus an unacceptably high risk of damage.
- ❖ How many abnormal babies would have to be produced to get one right?
- ❖ Roslin researchers have said that there is no experiment that could be done to prove the safety of human cloning without causing serious risk to humans in the process.



Social Risk

Human cloning would bring grave risks of abuses to human dignity and exploitation by unscrupulous people.

Christian Arguments and Response

We may not do evil so that good will result (Romans 3:8)

Humans are created in the image of God before birth
The human soul begins before birth



Morality of Human Reproductive Cloning

Be fruitful and multiply” – assumed to be natural, but
IVF and cloning not mentioned in the Bible

Problems with cloned animals – most suffer premature
aging and other genetic problems.

Might be avoidable with better techniques?



- ❖ Gergory stock is a scientist and out spoken critic against restrictions on cloning research.
- ❖ The social implications of an artificial human production scheme were famously explored in Aldous Huxely's novel Brave New World
- ❖ According to the US food and drug Administration, food coming from cloned animals are safe to eat. In addition the FDA stated that cloned food does not require special labeling differences from the conventionally bred animals.
- ❖ The ethical issues with reproductive cloning include genetic damage to the clone, health risks to the mother, very low success rate meaning loss of large numbers of embryos and fetuses, psychological harm to the clone, complex altered familial relationships, and commodification of human life.



The image features three babies positioned at the top, each wearing a white, pointed hat with a yellow band and a long, white, curly streamer. They are holding up large, white, petal-shaped pieces of fabric or paper. These petals are arranged to form a large, stylized flower shape in the center of the image. The background is a solid, light brown or tan color. The word "Thanks" is written in a dark red, serif font across the middle of the flower.

Thanks