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Embryonic stem cells: a beginning to life, a beginning to research

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Is the ethical dilemma in embryonic stem cell research saving lives or protecting human biased sentiments?

There is often lack of information and quite often misinformation in the public domain about what stem cells are. This is especially true which it comes to discussions around embryonic, foetal, umbilical, and adult stem cells. To be able to understand these cells better let us look at distinct types of stem cells and their brief description.

The most popular and the least controversial stem cells. These are extracted from the patient's own bone marrow and replaced back into the patient's affected area to repair damage. Limitations of using these cells is their availability is low and they are difficult to isolate and purify. Adults stem cells might have their DNA damaged by sunlight and might contain toxins which would limit their usefulness[5].

Umbilical cord cells:

These stem cells are extracted from various parts of the umbilical cord or placenta at birth and can develop into several types of blood cells. However, umbilical cord derived stem cell therapies for adults have been particularly challenging and has not shown major improvement, another limitation is that they can only treat blood related conditions[5].

Foetal stem cells:

Provide stem cells capable of differentiating into all cell types. These are extracted from a foetus after an abortion if the family has given consent. A key limitation is that foetal stem cells can only be extracted from 8–9-week-old foetuses and have limited proliferation capacity[5].

My topic of interest are embryonic stem cells, which are far from the most controversial stem cell type. To be able to carry out research many stem cells are required due to these being unstable and delicate. This is because these cells must be kept under specific conditions to allow their growth in the lab.

What are embryonic stem cells?

After fertilisation, the zygote's first divisions are called cleavage which distribute the cytoplasm equally among the blastomeres (cells formed after cleavage). Compaction leads to the formation of the primitive cyst consisting of eight cells, these eight cells further divide forming sixteen cells; this is called morula, which divides into a sphere of cells (64 cells) called blastocyst. Blastocysts have an inner cell mass where all these embryonic stem cells (ESCs) are found. All these processes take five to six days after fertilisation. In normal embryonic development, after the seventh day they start forming tissue layers that end up

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forming the foetus. ESCs can be extracted from the inner cell mass and cultured in the laboratory where if kept in the desired conditions proliferate indefinitely[3]. ESCs can differentiate into a variety of somatic cells, properties that make these cells exceptional are:

- ES cells can be cultivated in vitro, these continue dividing and increasing the numbers of cells indefinitely.
- These cells can be kept for a prolonged period, and they retain their properties e.g., pluripotency (the ability to develop into any cell type in an adult body)[2].

Pluripotency is promising great advancement of, disease modelling, toxicology, drug discovery and cellular therapy development. In summary, these cells would revolutionise clinical practice as they offer the prospective of personalised medicine.

One point to take into consideration is that these cells are extracted from the inner cell mass of 5-day old embryos which brings about ethical concerns. There are four sources of human embryonic stem cells (hESCs) used in research:

1. Immature aborted foetuses (EG cells)

2. Fertilisation in the lab by donated eggs and sperm

3. ‘’Spare’’ embryos from in vitro fertilisation (IVF) clinics

4. Embryos created through SCNT (somatic cell nuclear transfer)

The use of human embryonic stem cells (hESCs) creates an ethical dilemma for many, with religion quite often influencing people's points of view on matters such as when exactly does life begin. Whilst some people hold the view that abortion is always the woman's choice, for others abortion is only acceptable in exceptional circumstances, for instance if it improves quality of life or health.

Of course, there are those who completely disagree with abortion and so the use of hESCs is never acceptable.

The consensus is that the use of ‘’spare’’ embryos from IVF is ethical. This is because, these embryos are created for reproductive not scientific purposes. Many people believe that the ‘’spare’’ cells could potentially save lives and just wasting them cannot be justified by anybody's beliefs or thoughts. There are two ways in which we can further divide the ethical viewpoints: fatalistic and feministic[4].

Fatalistic:

This discusses the moral status of the embryo. Different religions have their own interpretations whether embryos have a status or not, according to some at time of conception life has started therefore, killing the embryo is taking a life.

Scientists believe that religion confuses “fertilisation” and “conception.” Conception is the natural formation of the zygote that grows in the womb and forms a human being. In the other hand, fertilisation can occur in the lab by growing cells in a petri dish, this has no possibility to form a human being unless implanted into a womb. These cells are genetically human but do not present human characteristics, neither conscious nor self-aware, hence not moral status[4].

Feministic:

The second major problem of embryonic stem cell research is that many eggs are required to keep up with this, many women donors are needed. These volunteers go through an uncomfortable procedure which is painful and carries medical risks.

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Before the procedure can happen, women must get hormonal treatment to stimulate ovulation, counselling sessions to provide them with a clear understanding of potential risks and finally a medical procedure happens. The procedure involves inserting a needle in the vagina to extract eggs from the ovary. This, in a small percentage of donors, causes health problems which lead to kidney failure. This could also lead to exploitation of women in underdeveloped countries[4].

The following newspapers' article proves how something similar has happened in east Europe:

In 2006 unanimous reports were found that young women from Russia, Ukraine and Poland were paid to sell their eggs. These women were left uninformed about the potential risks associated with egg donation. Moreover, they lacked awareness about the specific that were being used and the potential side effects. A woman confessed that she donated her eggs only for financial reasons and kept this decision concealed from her family. Not only this, but she also proceeded to reveal that she knew 20 other women who had done the same. Clearly, these young women were exploited. Serving as a means to procure eggs, which were then made available to Western women who were willing to pay substantial amounts to fulfil their dreams of parenthood. Moreover, selective breeding also occurred while picking the eggs, because the donors were often individuals with gifted genes, tall, healthy, and intelligent[1].

In conclusion, allowing embryonic stem cell research could potentially lead us to experiment different major diseases in more depth. Allowing us to understand human life better as well as bringing change in its quality. However, I want to also make a point about how not allowing embryonic stem cell research is staying-in-the-save-zone. Ask yourself, is extracting eggs from women who are not really being educated about the potential risks of the process itself ethical? You cannot forget the fact that although, here in the UK, the donors do go through a secure procedure, not everyone around the world is equally privileged. Therefore, in my opinion, we are saving lives by not allowing embryonic research because this is a way to prevent many violations of human rights.

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