Fact sheet for Research Participants/Patients

What are pluripotent stem cells?

Pluripotent stem cells (PSC) are cells that have the special ability to develop into any cell type, e.g. muscle cells, kidney cells, nerve cells, etc. This ability is called pluripotency.

Why are pluripotent stem cells attractive research objects?

These cells are attractive for human biology research and cell therapy, because a wide variety of cell types can be produced and studied in the laboratory. We can produce more cell material indefinitely, in other words, a small cell donation allows researchers to produce enough cells from it in the laboratory to conduct years of study. This opens up new areas of research: in the petri dish, for example, neurons, muscle cells or kidney cells could grow outside of the body and form complex structures to study diseases, for therapies or to identify new drugs. Beyond this, these cells can form small organs, so-called organoids, which resemble major aspects of complex tissues. These miniature organ models can be used to develop and test new drugs. Moreover, these models start to replace animal experiments. First of all, new drugs can be tested on human instead of animal cells. Secondly, the data derived from these experiments to personalize drug development and find new therapies for diseases that are nowadays incurable.

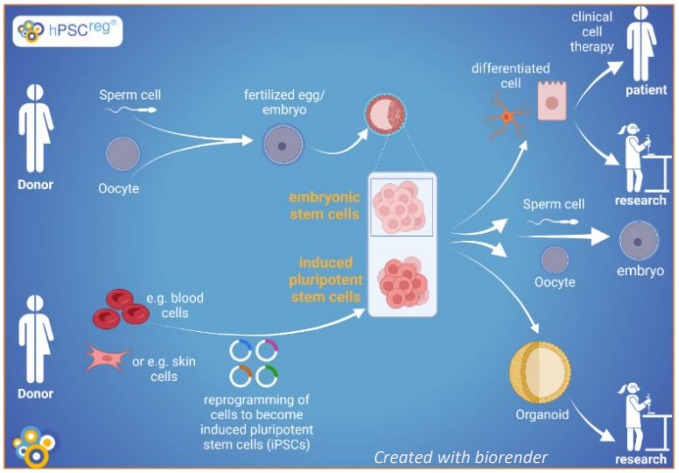
Which cell structures can be produced from pluripotent stem cells in the laboratory?

Due to their pluripotency, researchers can grow different body cells or miniature organs in the laboratory from stem cells. In the future, researchers will develop the possibility to grow more complex organs made out of stem cells in the laboratory and allow them to fully function when transplanted back into the human body. As such, in the future, an artificial heart or kidney grown out of stem cells may eventually help patients who suffer from organ failure.

Are pluripotent stem cells already being used in clinical therapy?

Cells derived from pluripotent stem cells can also be transplanted as a therapeutic agent in the clinic to regenerate damaged tissue. It is hoped that damaged or destroyed tissue can be healed in this way. For now, PSC are used already successfully to treat different degenerative eye diseases in clinical studies. More clinical trials are ongoing to cure for example Parkinson disease using neurons derived from stem cells.

Where are embryonic stem cells used for research derived from?



Research uses very early embryos in the so called blastocysts stage (5-6 days after fertilization) to produce embryonic stem cells (ESC) from them. The embryo itself is destroyed during this process. Human blastocysts that are surplus during artificial fertilisation and have to be discarded are usually used for research.

ESC have the special ability to transform into any cell type. Kidney cells, liver cells, nerve cells, muscle cells etc. can therefore be derived from such stem cells. Today it is also possible to produce such stem cells from somatic body cells with the help of genetic reprogramming: These so called induced pluripotent

stem cells (iPSCs) can be produced from a variety of body cells e.g. blood, urinary or skin cells.

Why are cell donations so important for research?

Scientific progress in the field of human biology and medicine, on which the current high level of knowledge and technology in healthcare are based on, depends on the donation of human biological material. These cell donations form the source for all human biological research and are indispensable and valuable for scientists. Without human donor material, research intended to understand and prevent the development of diseases or reduce e.g. animal experiments can not be developed further.

Which cells can be donated?

Blood cells, skin cells, hair follicle cells or urinary cells are mostry used for the generation of iPSCs.

What role does the Consent Form play during the donation process?

Since the donation of cells should be a voluntary, autonomous act of the cell donor, prior to cell donation, donors must be informed about the process of donation, the future handling of the cells and the further use of the donated cells. Consent to cell donation must be given voluntarily. To ensure this, the donor signs a consent form informing him/her about all these aspects and has the right to ask all questions of interest to a qualified person.

Why is there no large payment for the cell donation, but at most a small expense allowance?

The possibility of making a financial profit from cell donations could have the detrimental effect that poorer groups in society in particular are pressurised to donate. This pressure to donate in order to earn money would limit the voluntary nature of donation. (Small payments are excempt to cover e.g. travelling costs and other donor's expenses)

What personal data can be collected when cells are donated?

The specific donor data collected at the same time as the cell donation varies from case to case: the amount of data can include clinical, socio-demographic, biographical, life style, etc. data. In any case, however, each donated cell contains the donor's individual genome, the DNA, which represents the donor's personal (genetic) data.

How are my personal data/my privacy protected after donation of cells?

Personal data is protected either by anonymising or pseudonymising the donor's identity: Anonymisation means that the donor's identity can no longer be re-identified. Pseudonymisation means that the donor's identity is protected with a password-key access, which would allow the donor to be kept informed about the samples' fate and possible medical findings.

Once the identity of the donor has been protected by anonymisation, it is no longer possible to establish a link between the cell material and the corresponding donor. This means that if it is no longer possible to identify which donor donated which cells, the donor can no longer withdraw and revoke the use of their cells for previously consented purposes. However, the donor should be informed of this fact at the time of cell donation.

The authorisation to sequence the genome of the donated cells and access to this sequence is regulated in the consent form.

Can I withdraw the use of my cells after cell donation?

In most current consent processes at the time of cell donation, the donor's consent to the scientific use of their cells is obtained once and is then valid. As long as the donated cells are still available at the institution that carried out the cell donation, the donor can usually withdraw his/her consent for his/her cells to be made available for research. However, once the cells have been modified, further developed and transferred to other research institutes, it is often no longer possible to withdraw consent. The conditions of withdrawal are outlined in the consent form.

Donors can be involved more closely in the use of their cells by the newly emerging concept of "dynamic consent": With increasing digitalisation, new, more dynamic forms of declarations of consent are emerging, so-called dynamic consent approaches: Here, the donor is put in a position to decide repeatedly whether and for what purpose material donated by him/her may be used. By contacting the donor again, the researcher can enquire whether the donor consents to new research projects/objectives or wishes to object to them.

What happens if consents get lost or are not available?

If the consent documents are lost or are not available to the researchers who wish to use the stem cells, the donor him/herself can often no longer be contacted (e.g. due to the anonymisation of his identity). For this reason, advice is often sought from an independent ethics committee which consists of interdisciplinary experts. This committee then decides in place of the donor.

Can donated and derived cells be used for any future research?

In many consent forms, so-called "broad consents", the donor agrees that his/her cells can be used in any future research, even unforeseen.

However, there are also consents in which the donor specifies limits to the use of their cells: for example, if they are only to be used in specific, disease-related research or if certain derived products of the cells are to be prevented (e.g. the production of germ cells or the genetic modification of the genetic material).

In which cases can the donor be represented by others in the consent process?

For the production of embryonic stem cell lines, surplus embryos created during artificial fertilisation that have to be discarded are usually used. In this case, parental consent is required if the embryo is to be used and destroyed for research purposes.

Particular care should be taken with regard to cell donation from children/minors: children are also capable of donating cells for research and should also be given an information and consent process appropriate to their understanding, but the consent of the custodian (parents) is also required here. In the case of persons with limited cognitive abilities, the legal guardian may consent.

What happens to cells for which no consent forms are available?

Sometimes stem cells or cellular material are used in research for which no informed consent is available: either the generator that produced or distributes the cells does not want to give the consent, or the consent has been lost over time, or the cell donation took place in a country or at a time when it was not necessary, that a consent document had to be prepared and signed by the donor. In these cases, the ethical provenance of the stem cells is incomplete and undetectable. As an alternative, ethics committee approvals can be obtained: here, an independent ethics committee decides whether the cells in question may be used for research.

What is hPSCreg®?

The hPSCreg Registry (www.hpscreg.eu) is a global database that collects and makes available biological and ethical data on human pluripotent stem cell lines.

hPSCreg offers stem cell researchers the opportunity to register their developed stem cell lines into the database in order to make them visible to the scientific community and share the information worldwide. During registration, each cell line is assigned a unique identifier that makes it unique and discoverable worldwide (https://hpscreg.eu/about/naming-tool). hPSCreg also includes a database of stem cell-related projects (https://hpscreg.eu/browse/projects) and a database of clinical trials that use hPSC-derived cells for therapy (https://hpscreg.eu/browse/trials).

How can hPSCreg support me as donor?

hPSCreg protects the personal rights of the donor and does not disclose any personal data of the donor. All data stored in hPSCreg is anonymized. hPSCreg also collects the consent forms concerning the ethical background of the cells, but only as blank documents, without the donor's signatures, and only in the part of the database that is not publicly accessible. With the help of the information from these consent documents, hPSCreg can identify the terms of use for the cell lines that originate from the donor's will and make them available to researchers worldwide. This ensures that the will of the donor remains known and can be respected.

hPSCreg issues certificates to those cell lines with a clear ethical provenance, thus supporting the adherence to ethical values for donors and researchers.

Where can I find further information?

https://hpscreg.eu/about/documents-and-governance

https://www.eurogct.org/theme/factsheets