How tissue interactions regulate human peri-implantation embryo development and the impact of aneuploidy: the HEYDAY study

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We aim to investigate how chromosomal mosaicism affects development of the different embryonic and extra-embryonic tissues of the peri-implantation blastocyst and early post-implantation embryo to understand why some mosaic embryos can continue...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Foetal complications
Study type	Observational invasive

Summary

ID

NL-OMON53979

Source
ToetsingOnline

Brief title
HEYDAY Study

Condition

- Foetal complications
- Sexual function and fertility disorders

Synonym
in vitro fertilisation, miscarriage

Research involving
(Surplus) Embryos

Sponsors and support

Primary sponsor: Erasmus MC, Universitair Medisch Centrum Rotterdam
Source(s) of monetary or material Support: ZonMW

Intervention

Keyword: Aneuploidy, Chromosomal mosaicism, Human peri-implantation embryo development, Morphogenesis

Outcome measures

Primary outcome

Outcome parameters include embryo morphology before and after culture, live staining for developmental markers, molecular karyotyping, RNA or protein expression of markers for lineage establishment and signalling pathway activation.

Secondary outcome

To establish the molecular interactions between trophoblast, hypoblast and epiblast lineages that regulate their developmental progression, we will combine findings from live imaging analysis, immunofluorescence analysis, single cell transcriptomics analysis and single-cell epigenetic profiles to identify timing and activity of pathways involved.

To test these pathways and to explore candidate extraneous signals that can support pre-implantation development, functional assessment will be performed using the main study parameters as read outs.

Study description

Background summary

Despite significant improvements in culture conditions and selection of embryos from in vitro fertilization (IVF) treatment, success rates have only marginally improved, and the rate of pregnancy loss shortly after implantation remains high. We were among the first to report on the high incidence of chromosomal abnormalities in human cleavage stage IVF embryos. The majority of these embryos display chromosomal mosaicism, a mixture of cells with normal and abnormal chromosomal constitutions. Although the incidence of mosaicism declines towards the blastocyst stage, aneuploid cells can persist at this stage where it is associated with a decreased implantation potential. However, some mosaic embryos can overcome the presence of aneuploid cells and result in healthy live births.

Study objective

We aim to investigate how chromosomal mosaicism affects development of the different embryonic and extra-embryonic tissues of the peri-implantation blastocyst and early post-implantation embryo to understand why some mosaic embryos can continue development and others do not.

Study design

This is an observational study using molecular and imaging techniques to investigate surplus human embryos after in vitro fertilization treatment.

Study burden and risks

The study will not interfere with the standard IVF- and embryo transfer procedures and will only use surplus embryos. The study will not negatively affect pregnancy rates, nor will it affect the women*s or children*s health.
The outcome of these studies will increase understanding of the incidence and consequences of chromosomal abnormalities, and contribute knowledge to improve culture and selection of healthy embryos for future IVF patients.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Inclusion criteria

Eligible embryo donors to donate embryos for this study meet the following criteria:
- The availability of surplus (poor quality) fresh or cryopreserved embryos;
- Signed informed consent form to donate surplus embryos for research
- Age >= 18 years

Exclusion criteria

A potential subject who meets any of the following criteria will be excluded from participation in this study:
- Informed consent form only signed by one of the gamete providers or intentional parents
- No surplus embryos
- Surplus embryos with excessive degeneration or fragmentation (>50%)

Study design

Design

Study type: Observational invasive

Masking:	Open (masking not used)
Control:	Uncontrolled

Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	12-01-2023
Enrollment:	1682
Type:	Actual

Ethics review

Approved WMO Date:	07-12-2022
Application type:	First submission
Review commission:	CCMO: Centrale Commissie Mensgebonden Onderzoek (Den Haag)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL82597.000.22