A single-cell survey of the human first-trimester placenta and decidua

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LEARNING OBJECTIVES

- Summarize the scientific basis and methods for single-cell transcriptome analysis.
- Describe the diversity and complexity of cell types in the human placenta and decidua.
- Examine the complexity of interactions within and between the human placenta and decidua.

DISCLOSURES

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Sample processing and analysis workflow

- Placental villi (first trimester) - decidual
- Dissociation and preparation of single cell suspension
- Generating single-cell sequencing libraries
- Library preparation and sequencing
- Mapping to genome and creating single-cell profiles
- Clustering analysis based on differential gene expression

DropSeq Microfluidic System
DropSeq Microfluidic System

Macosko, E.Z., et al., Cell 2015

DropSeq Single Cell Analysis

Macosko, E.Z., et al., Cell 2015

Oil droplets

bail
Single-cell expression atlas of first-trimester villi.

Hemant Suryawanshi et al. Sci Adv 2018;4:eaau4788
Single-cell expression atlas of first-trimester villi.

Hemant Suryawanshi et al. Sci Adv 2018;4:eaau4788

Serine peptidase in early PET

Imprinted signaling molecular-fetal growth
Single-cell expression atlas of first-trimester villi.

Hemant Suryawanshi et al. Sci Adv 2018;4:eaau4788

Single-cell expression atlas of first-trimester decidua samples

Hemant Suryawanshi et al. Sci Adv 2018;4:eaau4788

Pseudotemporal ordering of stromal cells of the decidua

Hemant Suryawanshi et al. Sci Adv 2018;4:eaau4788
Sex-specific gene expression

Ligand-receptor interaction analysis

Conclusions

The human placenta is a complex organ diverse and unique cell subtypes.

There is a high level of cell-to-cell communication within and between the decidua and placenta.

These interactions appear to help regulate immune tolerance of pregnancy and regulation of trophoblast growth.
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