

# A novel human implantation model to decipher embryo-endometrium interaction

Nina Maenhoudt<sup>1</sup>, Amber de Moor<sup>1</sup>, Heidar Heidari Khoei<sup>2</sup>, Nicolas Rivron<sup>2</sup>, Hugo Vankelecom<sup>1</sup>

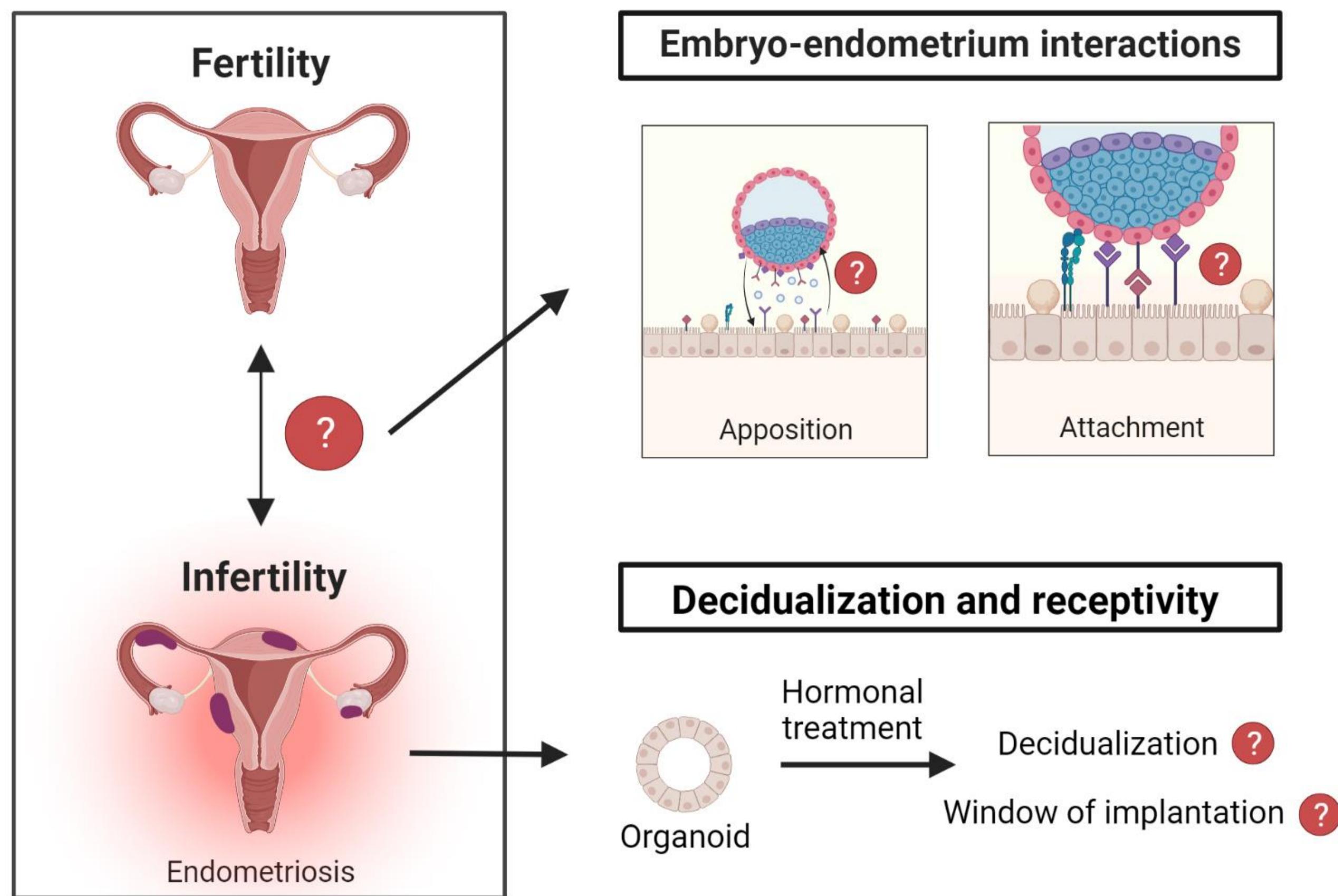


nina.maenhoudt@kuleuven.be

<sup>1</sup> Unit of Stem Cell Research, Cluster of Stem Cell and Developmental Biology, Department of Development and Regeneration, KU Leuven, Leuven, Belgium.

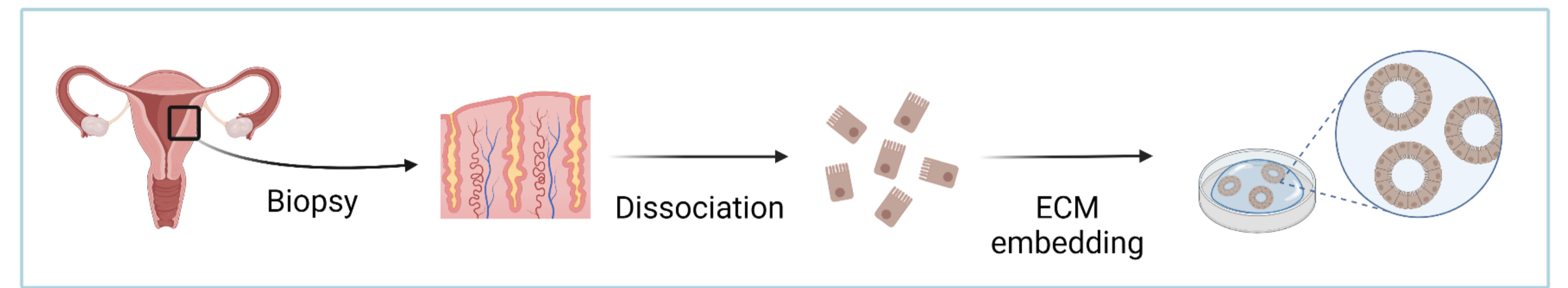
<sup>2</sup> Institute of Molecular Biotechnology of the Austrian Academy of Sciences (IMBA), Vienna BioCenter (VBC), Vienna, Austria

## INTRODUCTION

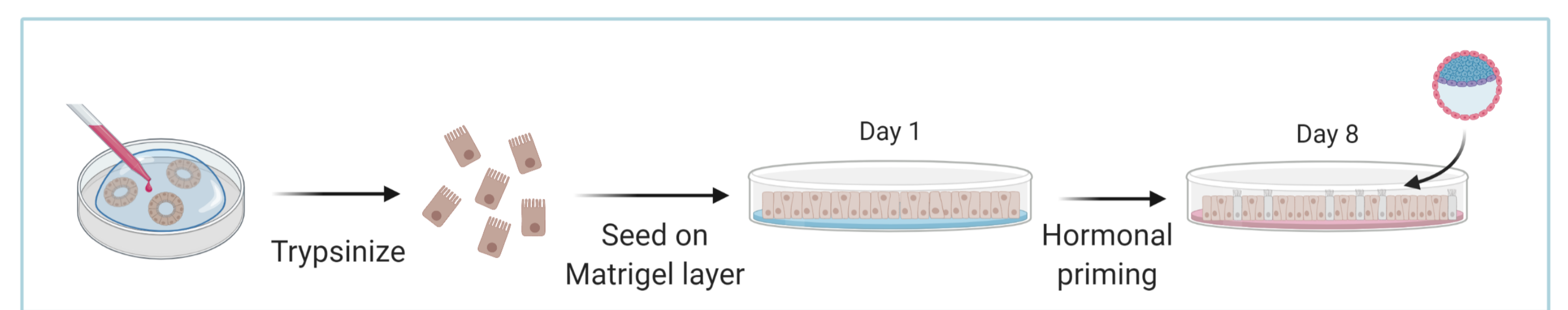


## METHODS

### Organoid technology



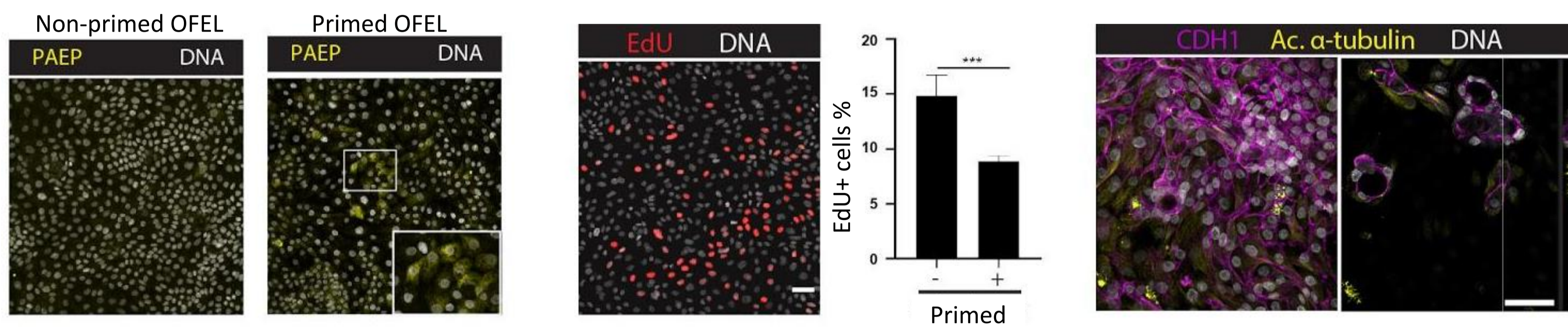
### In vitro implantation model (OFEL – open-faced endometrial layer)



## RESULTS

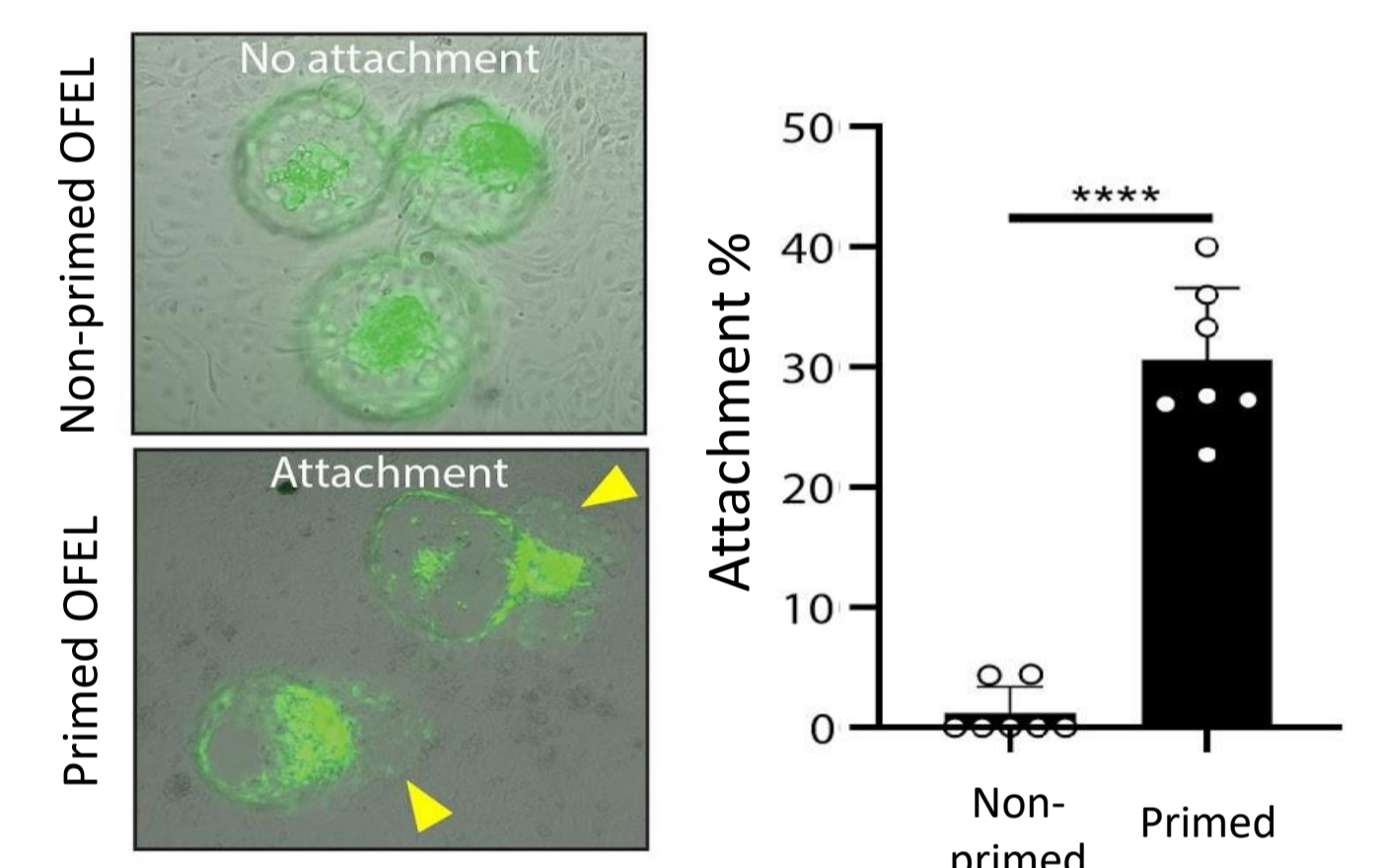
**Blastoid**  
(Kagawa et al. Nature 2022)

### Characterization of the OFEL



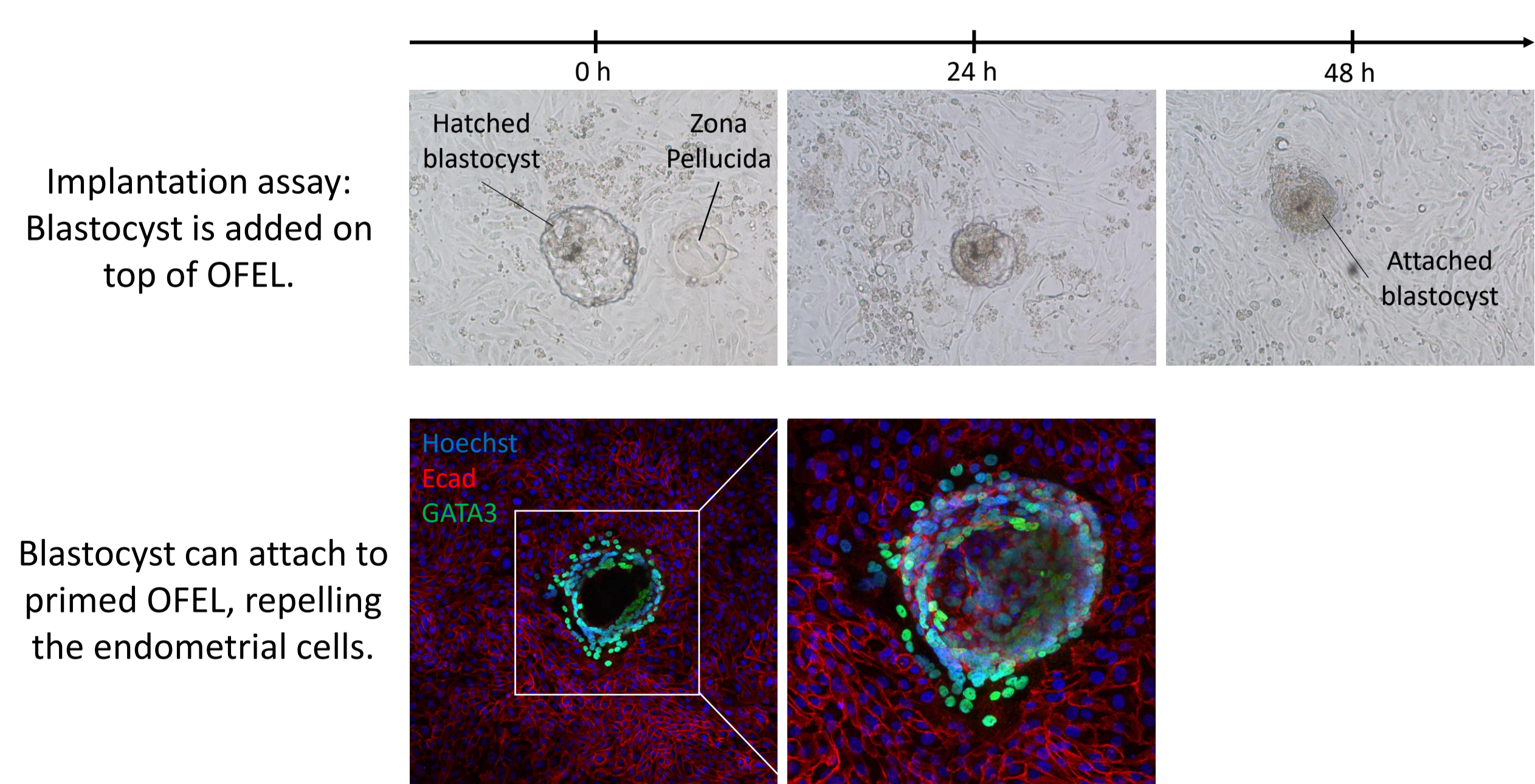
Upon hormonal priming of the OFEL, differentiation markers are expressed (PAEP), proliferation is reduced (transition of proliferative phase to secretory phase), and ciliated cells emerge.

### Implantation assay



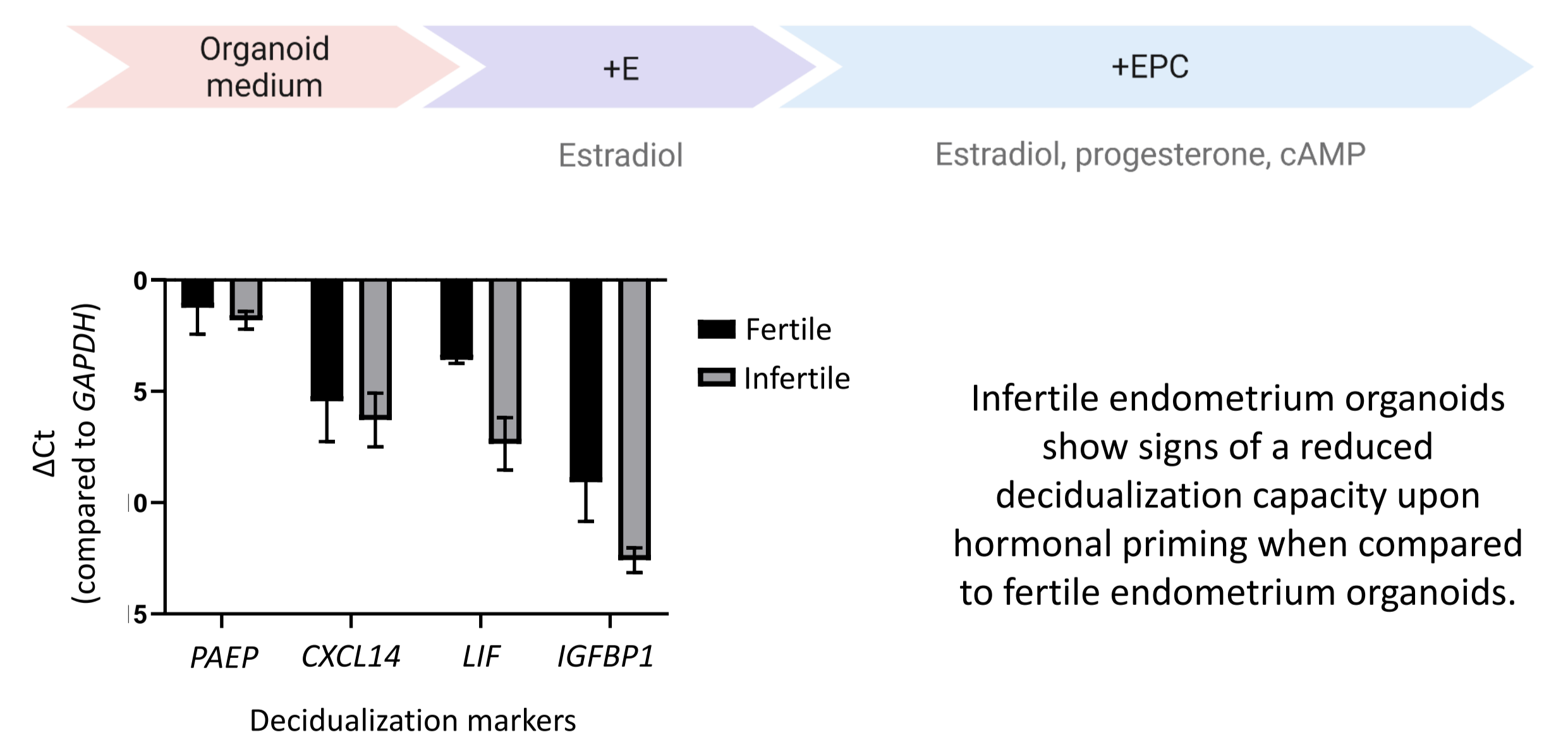
Attachment of blastoids could only be observed on primed OFELs. Attached blastoids showed polar outgrowths, repelling endometrial cells.

**Blastocyst**



Implantation assay: Blastocyst is added on top of OFEL.  
Blastocyst can attach to primed OFEL, repelling the endometrial cells.

**Receptivity**



Infertile endometrium organoids show signs of a reduced decidualization capacity upon hormonal priming when compared to fertile endometrium organoids.

## CONCLUSION

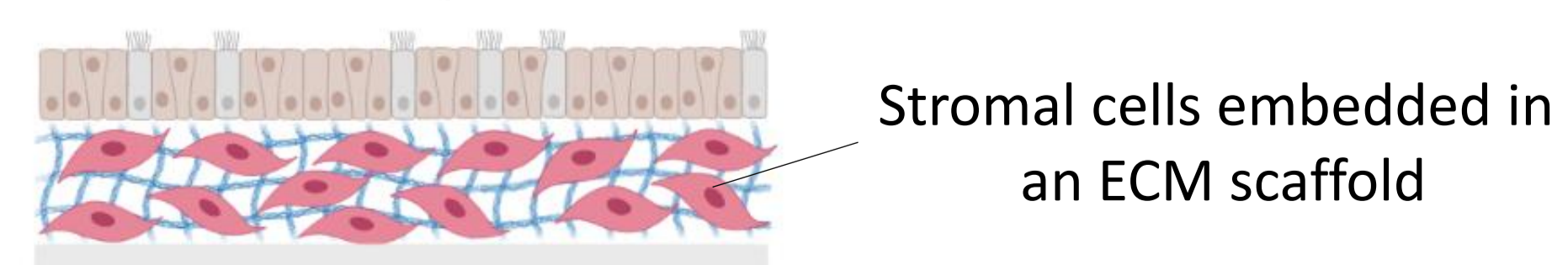
**Blastoid**  
Subpopulations of the OFEL were positive for decidualization markers when primed with hormones. Blastoids could only attach to primed OFELs.

**Blastocyst**  
Human blastocysts can attach to primed OFELs.

**Infertility**  
Infertile endometrium organoids show signs of a reduced decidualization response.

## FUTURE PERSPECTIVES

- Enhance tissue mimicry of OFEL.



- Repeat implantation assay using OFELs from infertile endometrium organoids.