

# Evaluation of The Impact of Severe Endometriosis on Embryo Morphokinetics

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# Endometriosis & IVF

Endometrial stroma and glands outside of endometrium

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**Frequency:** 1/3 of women undergoing IVF treatment<sup>1</sup>

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**Number of oocytes:** Number of total and mature (MII) oocytes collected from OPU



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**Quality of Oocyte/Embryo:** Controversial results<sup>2,3,4</sup>



# What Is Time-Lapse Monitoring (TLM) ?

*TLM*; is a system of camera imaging and incubation where embryos are monitored until they are transferred to the endometrium in the IVF laboratory.

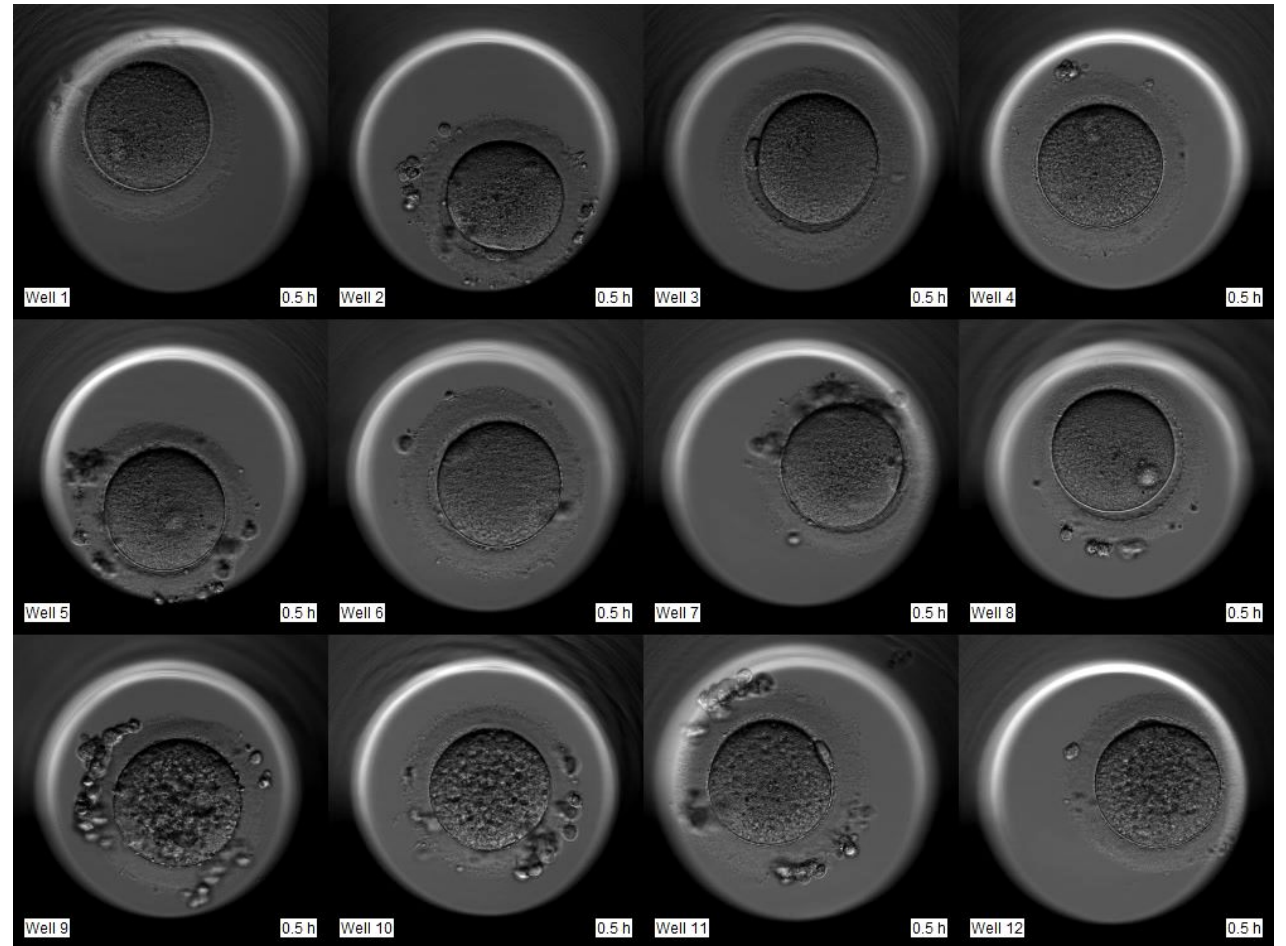


EmbryoScope®



# What Is Time-Lapse Monitoring (TLM) ?

Good Quality Embryo



Medium Quality Embryo

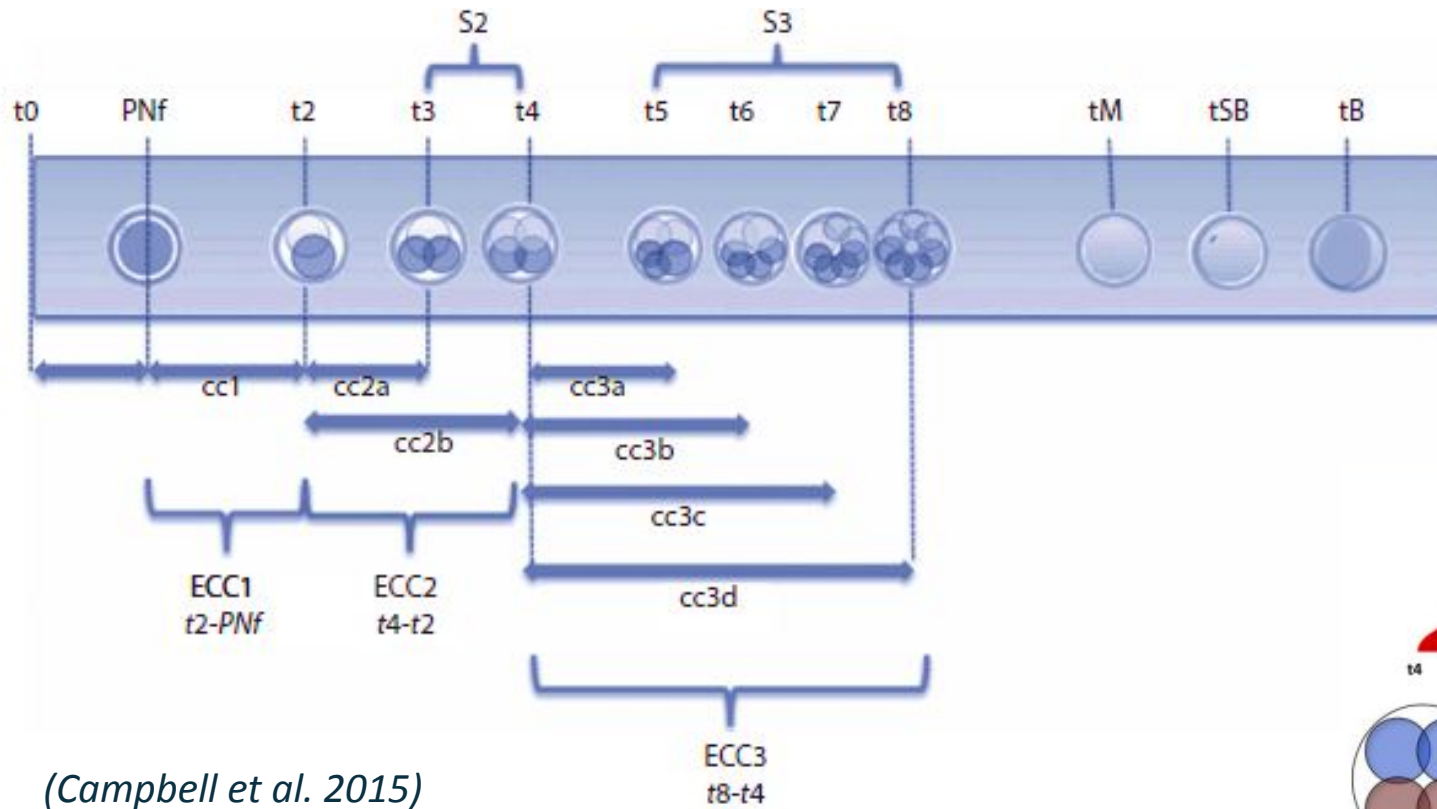


Bad Quality Embryo



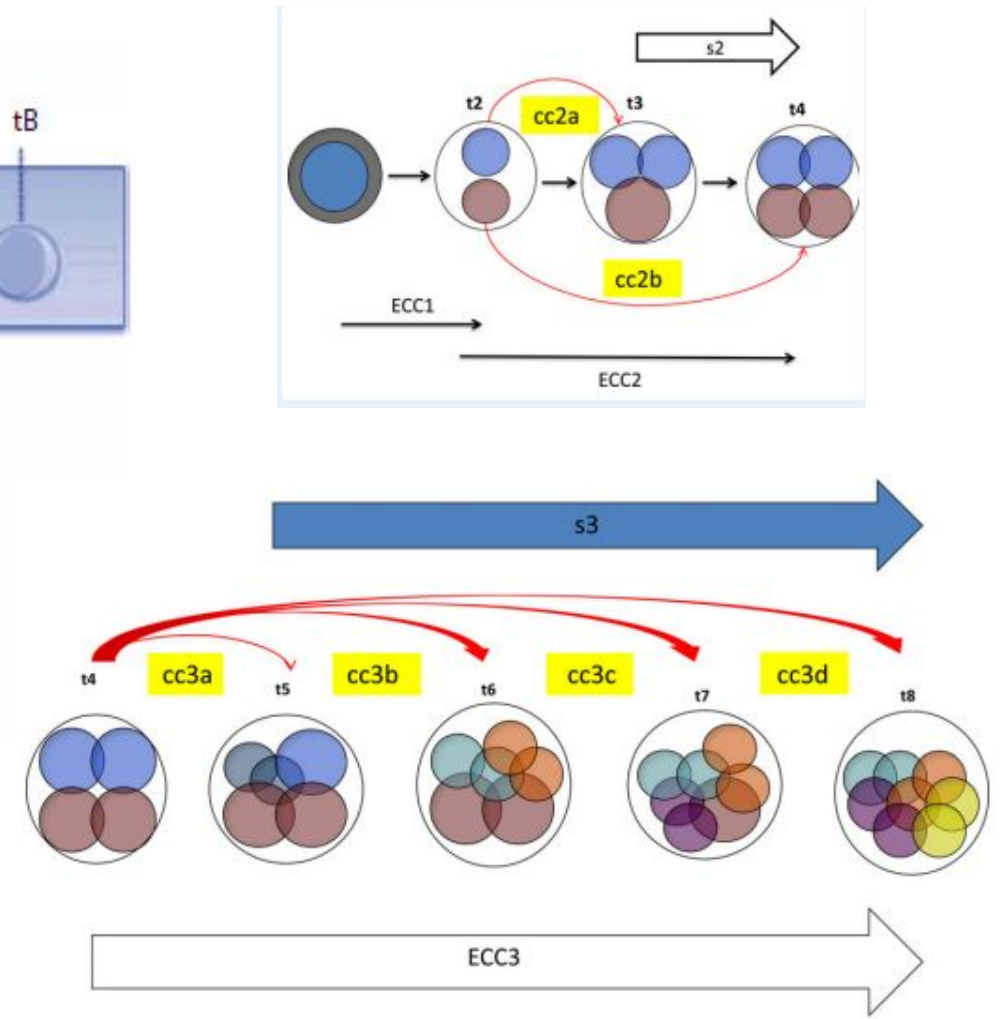
*\*After microinjection (IMSI), embryos placed into the system are photographed from 5 different levels every 10 minutes, creating videos of all developmental stages.*

# Morphokinetic Assessment of Embryos



(Campbell et al. 2015)

ECC: Embryonic Cell Cycle  
 S2/S3: synchronization of cell divisions



(Ciray et al. 2014)

# Background

Morphokinetic parameters  more detailed info about embryo development

Only a few studies and controversial results about endometriosis and morphokinetics<sup>5,6,7,8</sup>

Women BMI / sperm characteristics  have impact on morphokinetics<sup>9,10</sup>

# What Was Our Aim?

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To evaluate the impact of severe endometriosis (SE) on morphokinetic parameters of embryos compared to a control group (tubal factor).



# Material & Method

**Retrospective study**  
( October 2011 –  
July 2023)  
Memorial Şişli IVF  
Center

**A total of 241  
patients**  
134 SE & 107  
control

**A total of 1280  
embryos**  
SE (n=729)  
Control (n=551)

**Inclusion Criteria**

- Maternal age < 38
- **Maternal BMI < 30**
- Sperm only selected with **IMSI**
- Embryos incubated at TLM only
- **Tubal factor only** □ as controls
- Endometriosis **stage 3 and 4** □ according to 1996 ASRM Criteria

**Exclusion Criteria**

- **Severe male factor** (< 5 million/mL)
- Sperm collected via surgery (TESE)
- Surgically removed endometriosis
- Known genetic abnormalities
- Any other endometrial, tubal or endocrine pathology



*-Ethics committee approval on sept. 2023*  
*-Morphokinetic assessment*  
*-Statistical analyses (SPSS 28.0)*  
*\*Student's t-test, Chi-square*  
*\*Power analyses □ 410 embryos per group*  
*for 80% test power and 95% confidence*



# Sperm Selection with IMSI



- ➔ Morphologically selected with IMSI
- ➔ Efforts were made to eliminate potential effects of sperm on morphokinetics

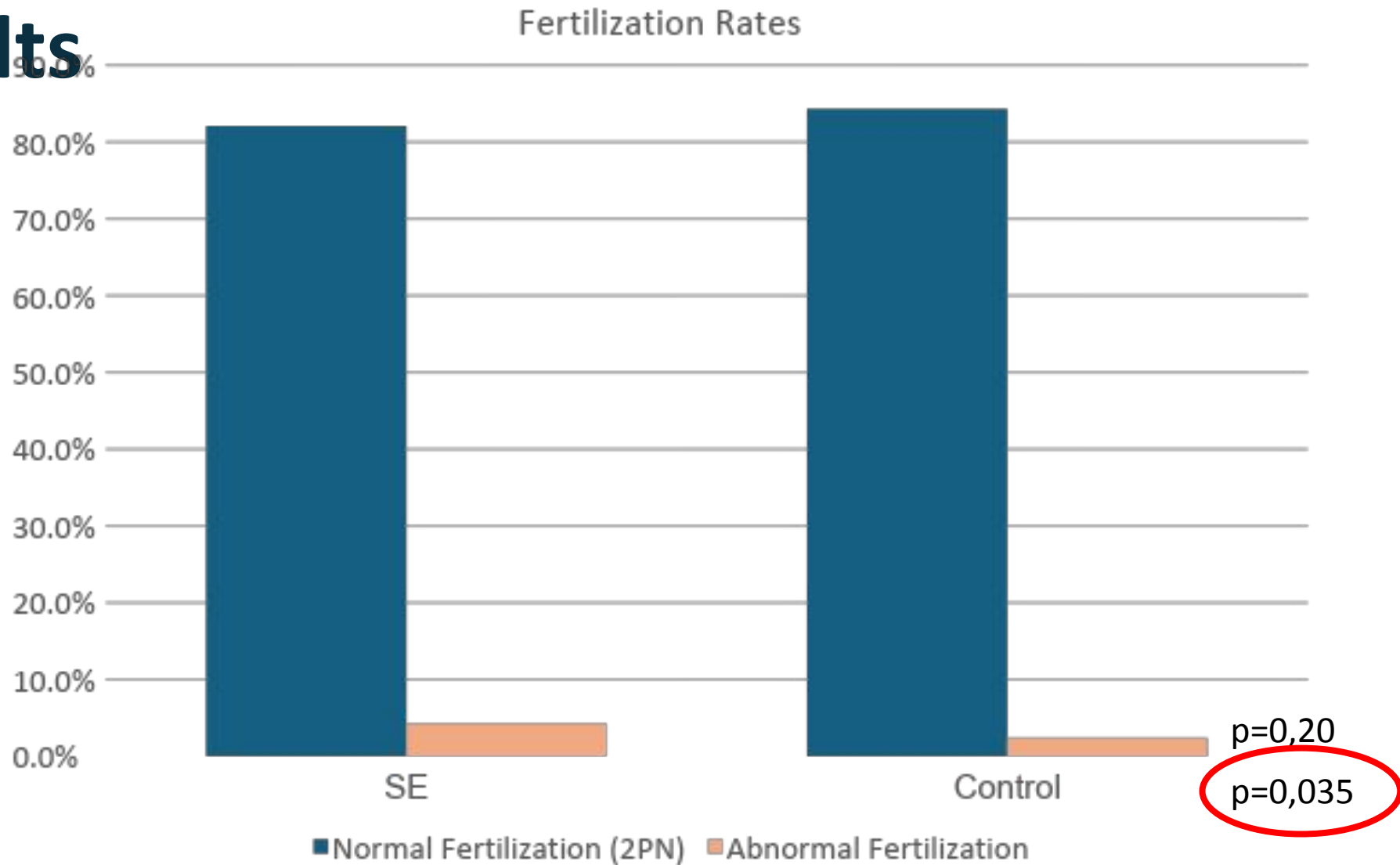
# Results

Demographic and clinical characteristics of patients

	<b>SE (n=134)</b>	<b>Control (n=107)</b>	<b>p-value</b>
<b>Women Age (year)</b>	32,49±3,34	32,70±3,28	0,629
<b>Women BMI (kg/m<sup>2</sup>)</b>	22,96±2,82	23,56±2,84	0,100
<b>AMH (ng/ml)</b>	2,62±1,92	1,89±1,45	0,636
<b>Basal FSH Level (mIU/ml)</b>	8,83±3,45	9,24±4,31	0,592
<b>OPU Total Oocyte (n)</b>	8,81±5,64	9,30±5,90	0,515
<b>OPU MII Oocyte (n)</b>	7,49±4,77	7,80±5,22	0,622

*Inter-group comparisons were conducted using the Student's t-test. Values are presented as mean ± standard deviation.  
FSH: Follicle Stimulating Hormone, AMH: Anti-Müllerian Hormone, MII: metaphase II, n: number*

# Results



*Inter-group comparisons were conducted using the Chi-square test.*

*2PN: 2 pronucleus*

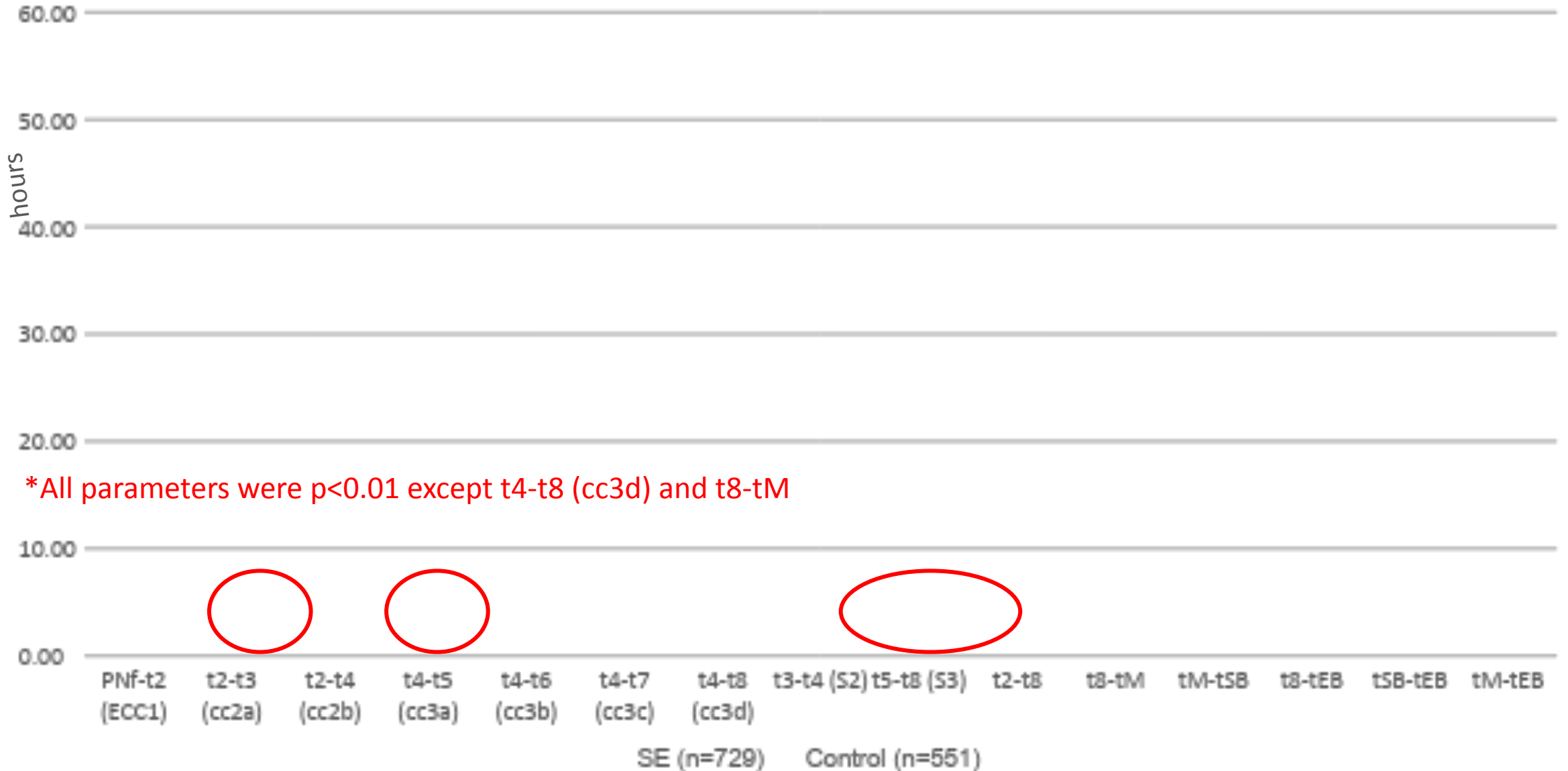
# Results

Morphokinetic Parameters	Groups		p-value
	SE (n=729)	Control (n=551)	
<b>PNa</b>	8,64±3,76	7,74±2,64	<b>&lt;0.001</b>
<b>PNf</b>	24,95±5,13	24,04±5,70	<b>0,007</b>
<b>t2</b>	33,76±7,42	30,02±6,34	<b>&lt;0.001</b>
<b>t3</b>	39,34±7,17	37,69±6,85	<b>&lt;0.001</b>
<b>t4</b>	46,52±9,78	41,68±8,30	<b>&lt;0.001</b>
<b>t5</b>	52,58±9,28	50,04±8,81	<b>&lt;0.001</b>
<b>t6</b>	55,96±9,51	53,79±9,08	<b>&lt;0.001</b>
<b>t7</b>	59,02±10,03	56,80±9,90	<b>&lt;0.001</b>
<b>t8</b>	66,51±11,38	61,04±11,02	<b>&lt;0.001</b>
<b>t9</b>	77,48±12,41	70,48±10,60	<b>&lt;0.001</b>
<b>tSC</b>	88,52±10,09	86,43±11,78	0,053
<b>tM</b>	95,76±9,74	89,10±11,84	<b>&lt;0.001</b>
<b>tSB</b>	103,59±8,49	99,27±9,09	<b>&lt;0.001</b>
<b>tB</b>	109,43±7,50	105,41±7,49	<b>&lt;0.001</b>
<b>tEB</b>	111,20±7,26	110,81±6,16	0,552

Inter-group comparisons were conducted using the Student's t-test. Values are presented as mean ± standard deviation. Morphokinetic parameters are calculated as hours following ICSI. PNa: pronucleus appearance, PNf: pronucleus fading, t2....t9:time to 2....9 cell, tSC:start of compaction, tM:morula, tSB: start of blastulation, tB:blastocyst, tEB: expanded blastocyst

# Results

## Cell Cycle Intervals



Inter-group comparisons were conducted using the Student's t-test. Values are presented as mean values. Morphokinetic parameters are calculated as hours following ICSI. ECC: embryonic cell cycle, S2/S3: synchronization of cell divisions

# Discussion

Journal of Assisted Reproduction and Genetics (2022) 39:619–628  
<https://doi.org/10.1007/s10815-022-02406-2>

Update, Vol.28, No.5, pp. 656–686, 2022  
in on May 25, 2022 <https://doi.org/10.1093/humupd/dmac022>

ASSISTED REPRODUCTION TECHNOLOGIES

## The impact of endometriosis on embryo morphokinetics: embryos from endometriosis patients exhibit delayed cell cycle milestones and decreased blastulation rates

Natalia C. Llarena<sup>1</sup> · Christine E. Hur<sup>1</sup> · Meng Yao<sup>2</sup> · Kaia Schwartz<sup>3</sup> · Tommaso Falcone<sup>1,4</sup> · Nina Desai<sup>1</sup>

## Morphological and morphokinetic associations with aneuploidy: a systematic review and meta-analysis

Thomas Bamford<sup>1,\*</sup>, Amy Barrie<sup>2</sup>, Sue Montgomery<sup>1</sup>, Rima Dhillon-Smith<sup>3</sup>, Alison Campbell<sup>4</sup>, Christina Easter<sup>3</sup>, and Arri Coomarasamy<sup>3</sup>

Human Reproduction, Vol.26, No.10 pp. 2658–2671, 2011

Advanced Access publication on August 9, 2011 doi:10.1093/humrep/der256

RESEARCH ARTICLE

## Endometriosis accelerates synchronization of early embryo cell divisions but does not change morphokinetic dynamics in endometriosis patients

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human  
reproduction

ORIGINAL ARTICLE *Embryology*

## The use of morphokinetics as a predictor of embryo implantation†

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Submitted on March 25, 2011; resubmitted on June 27, 2011; accepted on July 4, 2011

# Discussion & Conclusion



increase abnormal fertilization  
alter embryo morphokinetics

delayed cell division pattern  
(S2 & S3) were observed



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*Thank you for listening*