**Supplementary S1: Morphologic and Morphokinetic grading Criteria and scoring system**

**Supplementary S1A:Morphologic grading Criteria for embryos from all Arms (1 to 3) of the study:**

Time Points of assessment: (as per Desai 2014 as seen in Goodman 2016)

- 16 – 18 HPI
- 42 HPI (d2)
- 66 HPI (d3)
- +- 90 HPI
- 114 HPI
- +- 138 HPI

**Overall Evaluated morphologic parameters:**

- oocyte Polar body presence?
- 2PN post-fertilization?
- cell number (Optimal?)
- Cell size & symmetry
- percent fragmentation.
- Multinucleation
- +- Blastocyst check – Optimal parameters:
  - Stage of development: Early blastocyst, Blastocyst, Expanded, Hatched/Hatching
  - Inner Cell Mass (ICM) grade: A,B, C
  - Trophectoderm (TE) grade: A, B, C

**Breakdown of assessment:**

| | | | | |
|---|---|---|---|---|
| **Pre-fertilization** | PB presence? | | | |
| **16 - 18 HPI** | 2 PN? | | | |
| **42 HPI (d2)** | # Cells? | % Fragmentation? | Multinucleation? | Appropriate cell size / symmetry? |
| **66 HPI (d3)** | # Cells? | % Fragmentation? | Multinucleation? | Appropriate cell size / symmetry? |
| **+- 90 HPI (morula)** | Stage? | Inner Cell mass (ICM) grade? | Trophectoderm (TE) grade? | |
| **114 HPI (exp blast)** | Stage? | Inner Cell mass (ICM) grade? | Trophectoderm (TE) grade? | |
| **+- 138 HPI (hatched blast)** | Stage? | Inner Cell mass (ICM) grade? | Trophectoderm (TE) grade? | |

**Optimal Parameters:**

- Day 0 check: oocyte parameters:
  - Examination of polar body presence
- Day 1 / fertilization check:
  - 2 Pronuclei present
- Day 2 check:
  - Four cells

    - Minimal fragmentation (<10%)
    - No multinucleation
    - Symmetry at 4 cells
- Day 3 check:
    - Eight cells
    - Minimal fragmentation (<10%)
    - Symmetry at 8 cells
- Blastocyst check:
    - Stage of development: Early blastocyst, Blastocyst, Expanded, Hatched/Hatching
    - Inner Cell Mass (ICM) grade:
        - A (Good): Prominent, easily discernible, with many cells that are compacted and tightly adhered together
        - B (Fair): Easily discernible, with many cells that are loosely grouped together
        - C (Poor): Difficult to discern, with few cells
    - Trophectoderm (TE):
        - A (Good): Many cells forming a cohesive epithelium
        - B (Fair): Few cells forming a loose epithelium
        - C (Poor): Very few cells

- **Embryos graded on day 3 or day 5 (predetermined) and transferred according to preferential morphological grading (if in Arm 1 or 3)**

**Supplementary S1B: Morphokinetic grading Criteria and scoring system**

**Morphokinetic Criteria recorded for ALL embryos in TLI (Arm 2&3):**

**(t0 = time of insemination)**

- **tPNf**: time to pronuclear fading
- **t2**: time to 2 cells
- **t3**: time to 3 cells
- **t4**: time to 4 cells
- **t5**: time to 5 cells
- **t8**: time to 8 cells
- **t9**: time to 9 cells
- **tMor**: time to morula
- **tSB**: time to start of blastulation
- **tBL**: time to blastocyst
- **tEBL**: time to expanded blastocyst
- **cc2**: duration of the 2nd cell cycle (t3-t2)
- **cc3**: duration of the 3rd cell cycle (t5-t3)
- **t4int**: interval between 4 and 5 cells (t5-t4)
- **t5-t2**: interval between 2 cells and 5 cells
- **s1**: t2-tPNf
- **s2**: t4-t3
- **s3**: t8-t5

**Other qualitative Data:**

- **Multinucleation (MU):**
  - more than one nuclei in a cell observed in 2–4-cell-stage embryos
  - recorded based on the number of cells affected and the number of nuclei per cell
- **Reverse Cleavage (RCLV):**
  - reabsorption of a blastomere after previous visual confirmation.
- **Direct uneven cleavage (DUC):**
  - evidence of one blastomere directly splitting to three
- **Irregular Division (ID)**
  - 1→3 Direct or rapid (>5h) cleavage from 1 to 3 cells, referred to as irregular division pattern
  - 2→5 Direct or rapid (>5h) cleavage from 1 to 3 cells, referred to as irregular division pattern

**Morphokinetic Criteria,additional grading for Embryos from Arm 2 (and Arm 3 retrospectively):**

*HPI = Hours post-insemination*

- POSITIVE points:
  - t5 = 45.8–57.0h HPI (+1)
  - s2 = 0-0.1h (+1)
  - s3 = 1.4-7h (+1)
  - tSB < 100 HPI (+1)
- NEGATIVE points:
  - cc2 <5h (-1)
  - Multinucleation (-0.5)
  - Irregular division (-0.5)

- SCORE=_____

**Embryo initially screened by morphology**

**THEN embryos with the highest morphokinetic score (MAX of 4 and MIN of -2.0) selected for transfer.**