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# P-218 Donor and patient oocyte quality assessed by MAGENTA artificial intelligence correlates to earlier developmental milestones, as well as blastocyst developmental potential, quality and fate

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**Does MAGENTA effectively predict blastocyst development potential of donor and autologous oocytes, and how does it correlate with embryo developmental milestones, quality and fate?**

Utilization of donor oocytes is particularly beneficial for patients with premature ovarian insufficiency, genetic concerns, or those delaying motherhood for personal reasons. Oocyte quality is a critical factor in in-vitro fertilization (IVF) success, influencing embryo development, blastocyst formation, and potentially later-stage IVF outcomes. Assessing oocyte quality is essential, not only for optimizing IVF outcomes, but for ensuring fair and equitable distribution of donor oocytes to recipients. AI-tools such as MAGENTA, developed to predict blastocyst potential of mature oocytes, may help standardize and enhance oocyte quality assessment, providing patients with equal opportunities for success, especially when using donor oocytes.

This **retrospective and prospective** study assessed **1173** fresh, mature oocytes (donor n=1026, 114 cycles, mean age 26.7±3.8; autologous n=147, 25 cycles, mean age 40.1±7.0) retrieved at IAKENTRO fertility clinic between 2022-2024. Images were captured immediately **pre- (n=242)** or **post- ICSI (n=931)** using an inverted microscope's **DC1 camera** or **Esco MIRI Time-lapse**, respectively, and evaluated by MAGENTA. All oocytes underwent standard ICSI procedure and culture for 5-6 days. Sperm parameters were evaluated in the whole dataset.

Images of denuded oocytes were analyzed using MAGENTA, assigning individual scores from 0 to 10, with higher scores correlating with an increased likelihood of blastocyst (BL) development. Oocytes that developed into blastocysts were further categorized by quality according to their Gardner-Grade:

low-quality (LQ) = expansion-grade 1-6, ICM/TE = C/D
medium-quality (MQ) = expansion-grade 1-3, ICM/TE = A/B
high-quality (HQ) = expansion-grade 4-6, ICM/TE = A/B

Differences in MAGENTA scores and proportions were assessed by Welch's t-test and Two Proportion z-tests, respectively.

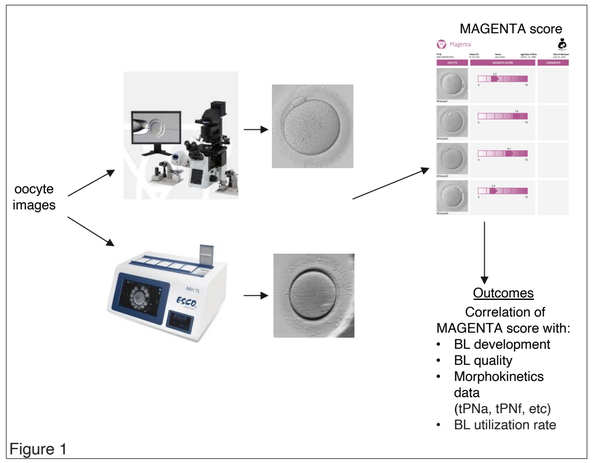

Figure 1

Significantly **higher MAGENTA scores** were observed in **oocytes that developed into blastocysts** (Figure 2) [donors: (n=1026) 5.7±2.3 vs 4.3±2.8, p<0.001; autologous (n=147) 3.9±1.7 vs 3.1±1.8, p<0.01]. Higher MAGENTA scores were also associated with **earlier developmental milestones** (tPNa, tPNf, and t2 through t9), with correlation ranging from r= -0.10- 0.18 (p<0.05) (Figure 3).

A **stepwise increase in blastocyst** development rate was observed **across MAGENTA score groups** (G) (G1: 0-2.5; G2: 2.6-5; G3: 5.1-7.5, G4: 7.6-10), with G1 showing the lowest blastocyst-rate compared to G2, G3 and G4 (Table 1, p<0.001).

**Table 1**

| MAGENTA group | Blastocyst rate |
|---|---|
| **G1 (0-2.5)** | **27%** (n=73/269) |
| **G2 (2.6-5)** | **57,5%** (n=206/358 |
| **G3 (5.1-7.5)** | **66%** (n=206/308) |
| **G4 (7.6-10)** | **63%** (n=151/238) |

Additionally, blastocysts from oocytes with **higher MAGENTA-scores** were **more likely to be utilized** (transferred/frozen) (Table 2, p<0.001).

**Table 2**

| Blastocyst fate | MAGENTA score |
|---|---|
| **Utilized** | donors(n=407) **5.8±2.3**, autologous(n=48) **4.1±1.7** |
| **Discarded** | donors(n=619) **4.5±2.8**; autologous(n=95) **3.1±1.7** |

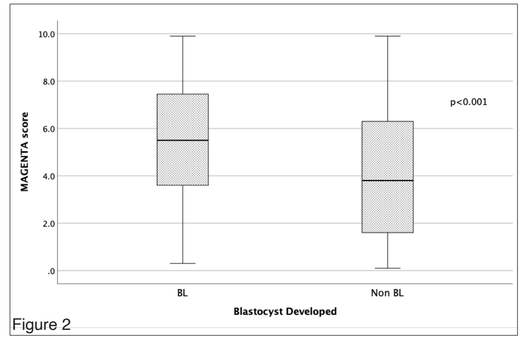

Figure 2

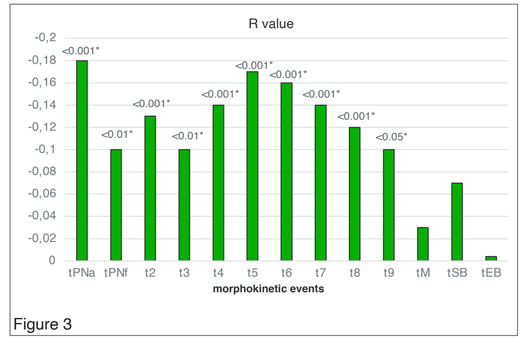

Figure 3

**MAGENTA effectively predicts blastocyst development potential of both donor and autologous oocytes, additionally correlating with earlier embryo developmental milestones, quality, and fate.**

Using AI tools, fertility clinics and egg banks can better identify high-quality oocytes, ensuring a more equitable donor oocyte distribution potentially improving IVF outcomes, especially for patients relying on donor oocytes.