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Validation of Magenta software for AI-Based evaluation of oocyte quality to predict blastulation rate

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Study Question

Can the AI-based Magenta software, which assigns predictive scores to oocyte morphology, correlate with blastocyst formation in assisted reproduction treatments?

Summary Answer

The study results indicate a weak yet positive correlation between AI-generated oocyte morphology scores and blastocyst formation, suggesting Magenta may aid oocyte selection in IVF.

What is Already Known About the Magenta Study

Artificial intelligence (AI) is emerging as a valuable tool for embryo selection. The Magenta algorithm, trained on neural networks, analyzes oocyte morphology to predict blastocyst formation. These scores complement traditional selection criteria, such as oocyte count and female age, reducing subjectivity and increasing precision. Studies suggest AI can identify oocytes with higher blastocyst potential, but effectiveness depends on integration with other laboratory techniques. Further validation is needed before routine clinical use.

Study Design, Size, Duration

A retrospective cohort study including 83 patients who consented to participate. A total of 738 oocytes were collected between February 2023 and August 2024. Cases with male factor infertility (oligozoospermia, testicular/epididymal sperm) were excluded. Oocytes were cultured in a time-lapse incubator and evaluated using Magenta software.

Materials and Methods

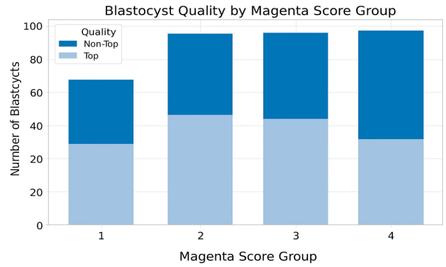
Post-ICSI images of 738 oocytes were captured using Embryoscope plus® and analyzed in Magenta software, which assigned predictive scores categorizing them into four groups: Group 1 (0-2.5), Group 2 (2.6-5.0), Group 3 (5.1-7.5), and Group 4 (7.6-10.0)(table1). Spearman's correlation test was applied to compare scores with blastocyst formation rates, assessing AI efficacy.

Magenta Group	Score Range	Number of Oocytes
1	0,0 – 2,5	246
2	2,6 – 5,0	185
3	5,1 – 7,5	156
4	7,6 – 10,0	151

Table 1: Predictive scores categorizing them into four groups: Group 1 (0-2.5), Group 2 (2.6-5.0), Group 3 (5.1-7.5), and Group 4 (7.6-10.0).

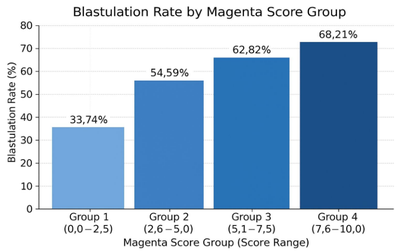
Main Results and Role of Chance

Results indicated a positive correlation between Magenta scores and blastocyst formation (Spearman's Rho = 0.270; $p < 0.001$), suggesting that the software's predictive scores align with observed blastocyst formation. Higher Magenta scores were associated with an increased proportion of morphologically top-quality blastocysts (Graph 1).



Graph 1: Proportion of morphologically top-quality blastocysts.

Performance across groups reinforced this trend, with increasing blastulation rates according to classification: 33.74% in Group 1, 54.59% in Group 2, 62.82% in Group 3, and 68.21% in Group 4 (Graph 2).



Graph 2: Blastulation rates according to classification: 33.74% in Group 1, 54.59% in Group 2, 62.82% in Group 3, and 68.21% in Group 4 .

Although statistically significant ($p < 0.001$), the correlation strength is weak, indicating that other factors not captured by the predictive score may influence the outcome. The robust statistical analysis minimized the role of chance in the results. However, Magenta technology should be considered an additional tool rather than a replacement for traditional IVF laboratory evaluations. These findings confirm Magenta's potential as a support tool for embryologists, allowing for a more objective approach to oocyte evaluation. Nevertheless, its clinical use requires further studies to enhance predictive capacity and ensure validation in different populations.

Study Limitations and Cautions

The weak correlation suggests that Magenta scores alone cannot replace traditional evaluations. Other variables, such as culture conditions and genetic factors, were not analyzed but may impact results.

Further studies should validate Magenta across different patient populations to ensure reliability and clinical applicability.

Wider Implications

AI-assisted oocyte assessment can improve IVF decision-making by enhancing predictive accuracy and reducing subjectivity. Patients may benefit from more personalized treatments based on oocyte quality. Future research should refine the Magenta algorithm and ensure clinical validation to optimize embryo selection strategies in assisted reproduction.

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The authors declare no conflict of interest.

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