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P-127

Mature oocyte central granularity emerges as a strong predictor of blastulation using a non-Invasive AI image analysis tool: A prospective analysis

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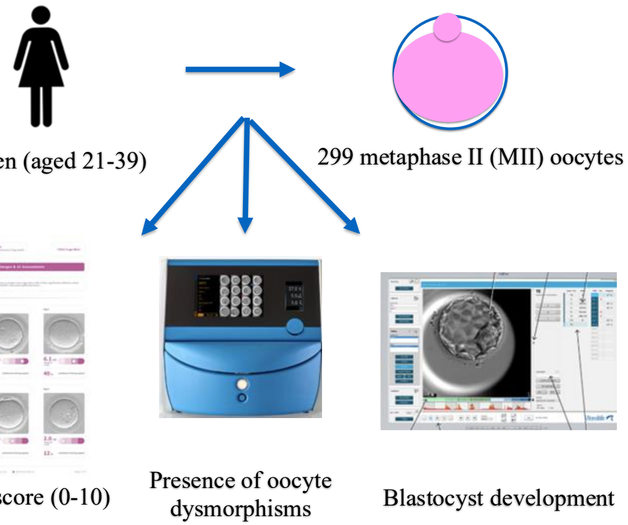
Study question

What is the relationship between oocyte morphological features, blastocyst formation and commercially available AI-based image analysis scores?

Materials and methods

Prospective study (March-December 2024) examining the relationship between Magenta scores, their cytoplasmic and extracytoplasmic features and blastocyst development.



Results

- Blastulation rate per MII oocyte was 67.6% (175/299).
- Lower (0-5) Magenta scores were associated with decreased blastocyst formation rates (54.1%) compared to higher (5.1-10) scores (75.8%, $p<0.001$).
- Central granularity showed a significant association with Magenta scores, with centrally granulated oocytes more likely to have lower Magenta scores (53.5% vs. 33.3%).
- Binary logistic regression analysis stratified by Magenta score groups resulted in different predictors.

In the high Magenta score group (5.1-10), the absence of polar body fragmentation (OR=2.78, p=0.041) and large vacuoles (OR=26.88, p=0.016) significantly increased the odds of blastocyst formation

In the low Magenta score group (0-5), the absence of small inclusions, increased the odds of blastocyst formation (OR=4.93, p=0.015).

Conclusion

- The findings offer valuable insight into correlations between oocyte features, blastocyst development and non-invasive AI tools for oocyte image analysis.
- Varying patterns of significance between statistical approaches suggest that the importance of individual morphological features in predicting blastocyst formation depends on overall oocyte quality.
- Continued data accumulation and the development of more advanced analytical methods will enhance understanding of the predictive power of oocyte features.

All authors declare no COI