הכינוס השנתי ה-66 של
האגודה הישראלית לחקר הפוריות (אי"ה)
7 במאי 2024, מלון דיוויד אינטרקונטיננטל, תל אביב
האגודה הישראלית לחקר הפוריות (אי"ה)
THE ISRAEL FERTILITY ASSOCIATION (IFA)
الجمعية الإسرائيلية لأبحاث الخصوبة

AN ARTIFICIAL INTELLIGENCE BASED APPROACH FOR SELECTING THE OPTIMAL DAY FOR TRIGGERING IN ANTAGONIST PROTOCOL CYCLES

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Abstract

Can a machine-learning model suggest an optimal trigger-day (or days), analyzing three consecutive days, to maximize the number of total and mature (MII) oocytes retrieved, during an antagonist protocol cycle?

A retrospective cohort study including 9,622 antagonist cycles between 2018-2022. The dataset was divided into training, validation and test sets. An XGBoost machine-learning algorithm, based on the cycles' data, suggested optimal trigger-days for maximizing the number of MII retrieved by considering the MII prediction, prediction errors and outlier detection results. The evaluation of the algorithm was conducted using a test dataset including three quality groups: "Freeze-all-oocytes", "Fertilize-all" and "ICSI-only" cycles. The model suggested one, two, or three days as trigger options, depending on the difference in potential outcomes. The suggested days were compared to the actual trigger-day chosen by the physician and were labeled "concordant" or "discordant" as per agreement.

Result

In the "Freeze-All" test-set, the concordant group showed an average increase of 4.8 oocytes and 3.4 MII oocytes. In the "ICSI-only" test-set there was an average increase of 3.8 MII oocytes and 1.1 embryos, and in the "Fertilize-all" test set an average increase of 3.6 oocytes and 0.9 embryos was observed ($p<0.001$ for all parameters in all groups). Results were consistent among all age groups.

Conclusion

Utilizing a machine-learning model for determining the optimal trigger-day or days, may improve antagonist protocol cycle outcomes across all age groups, in freeze-all or fresh transfer cycles. These models may optimize the physicians' decisions, balance workloads and create more standardized, yet patient specific protocols.

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