

647: The use of Artificial Intelligence (AI) in interpreting the validity of mitoscore

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Objective

Other than providing vital information about the euploid status of an embryo, NGS also provides key information about the nuclear and mitochondrial genome ratio, commonly referred to as Mitoscore.

Although there is no consensus regarding the predictability of Mitoscore for the range of implantation efficacy and is variable across the globe, our objective was to evaluate Artificial Intelligence (AI) and R based prediction for an acceptable range of mitoscore.

Design

Retrospective cohort study.

Materials and Methods

Written consent of couples undergoing PGT was obtained. Embryos were biopsied and taken up for NGS. Trophectoderm biopsy leading to 3-6 cell source was subjected to whole genome amplification followed by library preparation followed by NGS for 1000 embryos. Chromosomal aneuploidy data and ratio of nuclear to mitochondrial genome were subjected to R based machine learning and deep learning. Observed data and predicted data were compared using biostatistics for evaluating positive prediction efficacy of mitoscore and its correlation with clinical outcome. The data of 1000 embryos were subjected to deep learning and machine learning algorithms like random forest, support vector machine, general linear model and linear discriminant analysis. Open source software package like h2o R package was employed to perform R analysis and Box-Behnken design (BBD) using response surface methodology (RSM).

Results

NGS data revealed 100% chromosomal aneuploidy, in embryos with mitoscore above 40 and 92.86% embryos were abnormal when mitoscore was observed to be less than 25. R2 analysis also predicted with confidence interval of 0.9843 that mitoscores above 40 and less than 25 were predictive of aneuploidy in any one/multiple chromosomes. Clinical outcome was positively correlated with embryos having mitoscore between 25 to 40, which was positively predicted by machine DOE and R2 analysis with 0.9769 confidence.

Conclusions

Thus from the experimental data, R package prediction through deep learning and machine learning, it can be concluded that Mitoscore can be reliably employed as a selective biomarker for implantation efficacy of euploid embryos.

Support

None

Disclosure

None