

Artificial Intelligence in embryo selection: integrating genetic profile with morphology.

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Abstract

Selecting the best single embryo for transfer is the essential goal of all IVF embryologists. Traditionally, embryo selection has relied on non-invasive visual morphological assessment at specific developmental stages under the microscope, a process that remains subjective and heavily dependent on embryologist expertise. To improve embryo selection, advanced methods like time-lapse (TL) imaging and artificial intelligence (AI) are increasingly applied in clinical practice. Since its introduction by Professor John McCarthy in 1956, AI has shown great potential in enhancing embryo evaluation.[1] This study investigates the role of AI in embryo selection by integrating detailed morphological data from the blastocyst stage with genetic profiling information. AI analyzes these combined datasets to provide an objective and precise assessment of embryo quality, aiming to improve both accuracy and consistency in selection. Enhancing embryo selection in this manner is expected to increase implantation success rates. Additionally, a comparative analysis between embryologists and AI systems is performed, considering their respective expertise and practical usability in clinical settings. This assessment addresses not only the precision of embryo selection but also the integration of morphological and genetic data. Findings suggest that integrating genetic profiling with morphological assessment through artificial intelligence significantly enhances the accuracy and consistency of embryo selection.

References

[1] Fernandez EI, Ferreira AS, Cecílio MHM, Chéles DS, de Souza RCM, Nogueira MFG, Rocha JC. Artificial intelligence in the IVF laboratory: overview through the application of different types of algorithms for the classification of reproductive data. J Assist Reprod Genet. 2020 Oct;37(10):2359-2376.

Figure

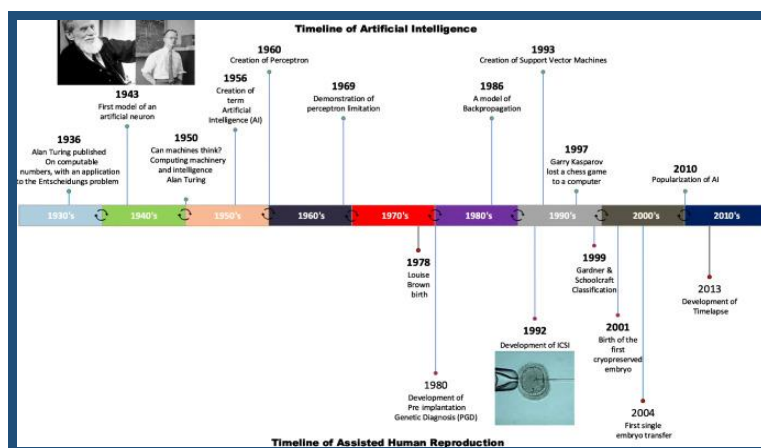


Figure 1 Timeline of Artificial Intelligence (from Ref [1])