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Review of Recent Developments in AI Applications in IVF Laboratories

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Abstract: *Over the past ten years, progress has been concentrated on the integration of deep learning algorithms and artificial intelligence into medical care, especially in the areas of in vitro fertilization and assisted reproductive technologies. The area of IVF is heavily dependent on visual judgments, which can be vulnerable to subjectivity and inaccuracy and depend on the amount of training and skill of the observing embryologist. This is because embryo morphology is the cornerstone of clinical decision making for IVF. AI algorithms can be used in the IVF lab to provide fast, unbiased, and accurate evaluations of microscope pictures and clinical data. This paper aims to explore the numerous advancements in various elements of the IVF process by discussing the ever-expanding uses of AI algorithms within the IVF embryology laboratory. We will go over how AI will enhance a number of processes and procedures, including cell tracking, embryo witnessing, micromanipulation, ploidy prediction, fertilization evaluation, embryo assessment, oocyte quality assessment, sperm selection, and quality management. All things considered, AI has much promise for enhancing not just clinical results but also laboratory efficiency—a crucial area of study given the rising number of IVF clinics across the country.*

Keywords: Artificial intelligence, machine learning, predictive modeling, IVF, embryology, time-lapse imaging, assisted reproduction, ART