

Embryo Selection: A New Era
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The Use of Noninvasive Metabolomic Profiling to Assess Gamete and Embryo Viability in IVF

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In-vitro fertilization (IVF) is often criticized for its generally low success rates and high treatment costs. Nevertheless, IVF is generally accepted as effective first-line therapy for the treatment of infertility. The procedure is confounded by a high incidence of multiple gestations that contribute to preterm delivery, small for gestational age babies and increased neonatal mortality, all of which lead to increased healthcare costs. A major limitation in IVF is the inability to predict embryo reproductive potential or viability prior to transfer. The "Holy Grail" of IVF is embryo selection; more specifically, how to determine which embryos in a cohort group are viable, competent embryos that will implant and produce a pregnancy versus those that will not. This challenge has led to the "IVF paradox": how to maintain or increase pregnancy rates in IVF while reducing the incidence of multiple pregnancies.

Morphological examinations remains the primary tool for selecting embryos although it is well recognized as a sub-optimal method. More recent methods have been investigated to assess embryo viability including genomic, proteomic and transcriptomic approaches. However, these measurements cannot be made directly without invasive biopsy of the embryo. Alternate strategies are still needed and, therefore, the quest for rapid, non-invasive techniques remains a priority in IVF. This presentation will focus on the development of biospectroscopy based metabolomics as a novel, non-invasive technology having the capability to resolve the "IVF paradox". Clinical validation of this new technique will be presented and compared to standard morphological examination.