

# Title: NON-INVASIVE METABOLIC PROFILING OF DAY 5 EMBRYO CULTURE MEDIA ADDS TO THE DISCRIMINATORY POWER OF BLASTOCYST CULTURE FOR SINGLE EMBRYO TRANSFER

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**Objective:** We have recently reported that non-invasive metabolomic profiling of embryo culture media using near infrared (NIR) spectroscopy correlates with the reproductive potential of embryos in IVF (Seli et al., 2007). This technology assesses modifications of the chemical composition of the embryo's surrounding medium using spectroscopy and generates a value termed the "ViaTest-E™ score". In the current study, we hypothesized that the use of a ViaTest-E score could further assist in determining the most viable embryo in addition to extended culture to blastocyst.

**Design:** NIR analysis of Day 5 embryo culture media samples and correlation with pregnancy outcome.

**Materials and Methods:** Single embryo Day 5 transfers (n=137) were performed at the Fertilitetscentrum, Gothenburg, Sweden and Shady Grove Fertility RSC, Rockville, Maryland, USA. Day 5 embryos were assessed for SET based on morphology. After SET a media sample from the transferred embryo and a blank were collected and cryostored. Media NIR analysis and a genetic algorithm were used to identify spectral regions, for eg. -SH, C=C, -CH, -OH, and -NH groups, that discriminated most between transferred embryos that did and did not result in pregnancy (fetal cardiac activity detected at 12 weeks of gestation). Relative ViaTest-E scores were calculated by quantification of these spectral regions, adjusting for parallel blank media controls.

**Results:** The overall pregnancy rate from the two clinical sites using SET was 69/137 (50.4%). When the transferred embryo's ViaTest-E scores were assessed, we found a large variability in metabolic profiles (range: -0.5 to 1.5). A significant (Pearsons: P<0.001) positive correlation was observed with increasing ViaTest-E score quintiles and their associated implantation rates (Table 1).

ViaTest-E scores of Day 5 embryos and implantation rates			
ViaTest-E score	Pregnant	Not Pregnant	Implantation Rate (%)
<0.2522	7	19	26.9
0.2522-0.4451	6	21	22.2
0.4451-0.5415	13	14	48.1
0.5415-0.7004	21	6	77.8
>0.7004	22	8	73.3

**Conclusions:** The ViaTest-E score helps discriminate between day 5 embryos, confirming that the embryo's metabolism varies widely regardless of morphology. The added armory of metabolomic profiling by NIR spectroscopy, coupled with bioinformatics, to current morphological assessment protocols seems to allow a greater discrimination for selection of embryos for transfer, and has considerable promise to improve IVF outcomes.

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