ANEUPLOIDY DETECTION BY METABOLOMIC PROFILING

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A major issue in the human reproductive field is the selection of appropriate embryos, in terms of chromosomal constitution and viability potential, for transfer into the maternal uterus. To date, the established method to select the best cleavage embryo or blastocyst has been morphological assessment. However, this selection method is highly subjective and has modest predictive, limiting its potential. Therefore, selection of pre-implantation embryos that result in absence of chromosomal abnormality, highest pregnancy outcome and increased newborn discharge rate is crucial for the reproductive field. The incidence of chromosomal abnormalities in human embryos is extremely high, and a morphologically "good" embryo does not exclude chromosomal abnormalities. In fact, 70% of the morphologically "normal" embryos are aneuploid and 30% of grade I blastocysts have been demonstrated to be chromosomally abnormal. Currently, the metabolomic field has developed a quantitative/qualitative analysis of metabolites produced/secreted by an organism, tissue or even a one single cell aiming to obtain comprehensive metabolite profiles. Low molecular weight metabolites represent the final products of the cellular metabolism and therefore reveal the response of the biological systems to a variety of genetic, nutritional and enviromental conditions. Now, non-invasive quantitative techniques to study the embryo metabolism have been developed, and are the main target of current research to determine their value as predictors of embryo viability and pregnancy. In our studies unbiased metabolomic profiling approach based on liquid/gas chromatography/mass spectrometry (LC/MS and GC/MS) and MNR was used for the first time to identify metabolic markers that would differentiate chromosomally normal embryos from abnormal embryos using a non invasive approach by analyzing spent media from these embryos.